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# Prevalence of Disability among Hispanic Immigrant Populations: New Evidence from the American Community Survey

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## Abstract

Using nationally representative data from the 2010-2014 American Community Survey, this paper provides updated disability rates for working and retirement age Hispanics in the United States. Crude and age standardized rates, disaggregated by gender, national origin group and nativity, are calculated for six measures of disability. The older foreign-born Mexican population is also disaggregated by year and age at arrival. Once age structure is controlled for older foreign-born Mexican males have higher rates of disability than non-Hispanic White males, and older foreign-born Mexican females have higher rates than both US-born Mexicans and non-Hispanic White females – findings that are at odds with immigrant health advantage theories. Further, there is limited impact of either selection on age at migration or era of migration among retirement age foreign-born Mexicans. These updated estimates are critical for researchers and policymakers and shed light on a growing population at risk for an immigrant health disadvantage.

## Keywords

Immigrant health advantage, disability, aging, American community survey

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## Introduction

Two major demographic processes are well under way in the United States and are changing the face of America. First, the aging and retirement process of the US-born baby-boom population, those born between 1946 and mid-1964, has significant implications for the US labor market, the economy, health care system, and social security program. In addition, the US is undergoing rapid diversification. As a result of the Immigration and Nationality Act of 1965 (Hart-Celler Act), which eliminated the national origins quota system, the vast majority of immigrants to the US in the last 50 years have not been of European descent; rather, they have been of Asian, Latin American and Caribbean descent (Lee and Bean 2004). The integration of these non-European immigrants and their children has led to an increase in the share of ethnic and racial minority populations in the US.

At the intersection of these two processes is the aging of post-1965 immigrants themselves (Markides et al. 2007; Markides and Gerst 2011; Torres-Gil 2007; Torres-Gil and Treas 2009; Treas and Marcum 2011). While the age distribution of the immigrant population is younger than that of the native-born population (Brown and Bean 2005), this population is also facing an increase in the proportion of older members with unique circumstances and needs (Angel and Whitfield 2007; Arias 2010; Borjas 2009; Treas and Carreon 2010). Treas and Carreon (2010) predict that minorities (including but not limited to foreign-born minorities) will account for a large proportion of the growth in the population of Americans 65 and older. By 2050 those of Hispanic origin are expected to make up 20 per cent of the US population 65 and over, an increase from 7 per cent in 2010 (Vincent and Velkoff 2010). In fact, those 65 and older are the fastest growing segment of the Hispanic population in the US (Angel and Whitfield 2007). Current American Community Survey (ACS) 1-year estimates (2015) show that of the over 43 million foreign-born persons in the US, 14.8 per cent are 65 or older. That is, almost 6.5 million foreign-born persons in the United States are 65 or older.

Potentially because of the assumption that immigrants tend to be young, research on the older immigrant population is scarce (National Academies of Sciences, Engineering and Medicine 2015). The fields of gerontology and geriatrics have generally neglected immigrants, and the literature on immigration has focused on children and working age immigrants and mostly ignored older immigrants (Torres-Gil and Treas 2009; Treas and Marcum 2011). The exception to this is the body of research that provides conclusive and robust evidence that the mortality advantage among immigrants extends into older ages (Angel et al. 2010; Elo et al. 2004; Hayward, Hummer, Chiu, González-González, et al. 2014; Hummer et al. 2000; Markides and Eschbach 2011; Turra and Goldman 2007). However, it is still unclear how these immigrants

are living out the last stage of their lives (Gubernskaya, Bean, and Hook 2013; Torres-Gil and Treas 2009; Treas and Marcum 2011). Preliminary literature on this subject has found evidence that at older ages foreign-- Hispanics have equivalent or higher disability rates as compared to non-Hispanic Whites (Crimmins, Hayward, and Seeman 2004; Hayward, Hummer, Chiu, González-González, et al. 2014; Hummer, Benjamins, and Rogers 2004; Mehta, Sudharsanan, and Elo 2013; Melvin et al. 2014), a finding that stands in opposition to longstanding empirical evidence of an immigrant and Hispanic health advantage over non-Hispanic Whites in the US (Abraido-Lanza et al. 1999; Arias 2010; California Center for Health Statistics 1984; Eschbach, Kuo, and Goodwin 2006; Franzini, Ribble, and Keddie 2001; Markides and Coreil 1986; Markides and Eschbach 2005, 2011; Palloni and Morenoff 2001; Sullivan et al. 1984).

Because the study of older immigrant health is still nascent in its development, the descriptive epidemiology task of identifying where health differences between population subgroups occur is of utmost importance in order to enable public health and policy institutions to focus their attention on the unique needs of specific populations and develop relevant policy and service responses (Siordia 2014a, 2014b, 2015c). The identification of between group differences also contributes information critical to generating hypotheses of determinants of disability, which will further the analytic study of the older immigrant population, improve our ability to be prepared for the social and economic implications of this aging population, and reduce health disparities among certain subgroups. To that end, the main goal of this paper is to contribute updated estimates of disability prevalence among retirement age foreign-born Hispanics living in the US, disaggregated by nativity, national origin group and gender, and to compare these rates by subgroups across life course stages (i.e. comparing retirement age Hispanic immigrants to working age Hispanic immigrants, and comparing retirement age Hispanic immigrants to retirement age US-born non-Hispanic Whites, non-Hispanic Blacks, and Hispanics).

In order to do this, this paper analyzes updated data from the largest, nationally representative data set available for estimating disability in the US population (Siordia 2015e) and calculates crude disability rates on six measures of disability for working age as compared to retirement age subgroups divided by gender, nativity, national origin and race. In addition, to facilitate accurate between group comparisons it estimates age standardized prevalence rates for each subgroup on each disability, untangling the effect of age structure differences from disability prevalence. Finally, by disaggregating the Mexican-born older population, the largest immigrant group in the US, into key age at migration and year of migration groups, it begins to parse out the selection mechanisms at play leading to disability outcomes of this national origin group at older ages.

**Literature review**

Longstanding empirical evidence points to an immigrant and Hispanic health advantage over non-Hispanic Whites in the US (Abraido-Lanza et al. 1999; Arias 2010; California Center for Health Statistics 1984; Eschbach et al. 2006; Franzini et al. 2001; Markides and Coreil 1986; Markides and Eschbach 2005, 2011; Palloni and Morenoff 2001; Sullivan et al. 1984). When measured in terms of mortality rates, this mortality advantage extends into older ages for foreign-born Hispanics (Angel et al. 2010; Elo et al. 2004; Hayward, Hummer, Chiu, González-González, et al. 2014; Hummer et al. 2000; Markides and Eschbach 2011; Turra and Goldman 2007). However, a developing body of literature on older immigrant disability has provided evidence that foreign-born Hispanics have equivalent or higher disability rates as compared to non-Hispanic Whites (Crimmins et al. 2004; Hayward, Hummer, Chiu, González-González, et al. 2014; Hummer et al. 2004; Mehta et al. 2013; Melvin et al. 2014). Further, some studies have found that foreign-born Hispanics have lost their immigrant advantage over people of the same national origin group born in American (Eschbach et al. 2007; Melvin et al. 2014).

While often separating foreign-born and American-born groups, some studies combine all Hispanic national origin groups together (Crimmins et al. 2004; Hayward, Hummer, Chiu, González-González, et al. 2014) or focus on Mexicans and either exclude or group all other non-Mexican Hispanics together (Eschbach et al. 2007; Hummer et al. 2004). This can be misleading because health differentials among the Hispanic population in the US can differ significantly by country of origin (Zsembik and Fennell 2005). Three analyses do separate older Hispanics by national origin in order to estimate disability rates, predict odds of disability or estimate proportions of disability respectively (Markides et al. 2007; Mehta et al. 2013; Melvin et al. 2014). Among these, Mehta et al (2013) compares the odds of disability between Hispanic groups by national origin and nativity. They find that after controlling for sociodemographic variables foreign-born Mexicans and foreign-born non-Mexican Hispanics have lower odds of disability as compared to US-born Mexicans, and that no statistically significant differences between older Puerto Ricans or other US-born Hispanics exist as compared to US-born Mexicans. Markides et al (2007) find that older Puerto Ricans in the US have the highest disability rates, followed by older Mexicans and Dominicans in the US. Nativity does not seem to have an impact on these rates, with foreign-born and American-born Mexicans having similar disability rates. Melvin et al (2014) find that older Puerto Ricans, along with foreign-born Mexicans and foreign-born other Hispanics have higher proportions of disability than non-Hispanic Whites, while Cubans maintain a disability advantage into older ages. They conclude that mechanisms of selection on socioeconomic status operate to produce these results.

While the conclusions of Melvin et al (2014) are primarily conjectural, a number of studies seek to understand the mechanisms at play leading to increased Hispanic and immigrant disability rates at older ages. To that end they use logistic regression models to predict disability, controlling for a combination of variables related to acculturation (nativity, time in the US, language ability) and sociodemographics (age, sex, region, education, income). In this way, Hummer et al (2004) find that higher odds of disability among older Mexicans and other Hispanics, as compared to non-Hispanic Whites, are largely explained by education and income. Similarly, Crimmins et al (2004) find that socioeconomic controls, in particular education, explain higher prevalence of cognitive disabilities among these populations but not in the case of physical disability. Comparing US-born and immigrant Mexicans, Eschbach et al (2007) conclude that neither language skills nor years of schooling explain the loss of the immigrant health advantage at advanced ages.

Uncovering the social mechanisms leading to these outcomes, as the reviewed studies seek to do, is of particular importance. In addition, with a large and growing older Hispanic population in the US it is urgent to have updated estimates on the prevalence of disability in this population so that institutions of public health and associated policy can focus on the unique needs of specific subgroups and develop relevant policy and service responses. These updated rates will also serve to focus the attention of researchers developing and testing hypotheses of determinants of immigrant disability disparities. To that end, this paper contributes up-to-date disability prevalence estimates on a variety of disability measures, disaggregated by gender, nativity and country of origin for Hispanic groups in the US. Further, in order to accurately compare disability prevalence across groups, age structure differences between subpopulations must be analyzed and taken into account (Brault 2012). This is especially important here because of a relatively young age structure of immigrants predicted by model migration schedules (Raymer and Rogers 2007; Rogers 1990; Rogers, Raquillet, and Castro 1978) as compared to an aging baby-boom population. Thus, by calculating disability rates for both the working age and retirement age populations and by estimating age standardized rates this analysis allows us to make accurate comparisons independent of age structure differences across age groups. Finally, by looking at differences in Mexican-born disability rates by age at migration and period of migration, this paper starts to address some of the explanations for disability differentials and furthers our understanding of the complexities of the emerging immigrant disability disadvantage.

**Data and methods**

This study uses nationally representative data from the 2010-2014 American Community Survey (ACS) 5-year public-use microdata sample (PUMS), which randomly sampled 5 per cent of the American population between 2010 and 2014 (Ruggles et al. 2015). The ACS, and before it the Census long form, is frequently used as a source of data for studies of disability in the American context (Elo, Mehta, and Huang 2011; Gubernskaya et al. 2013; Markides et al. 2007; Siordia 2014a, 2014b, 2015a, 2015b, 2015d, 2015e, 2016; Siordia and Leyser-Whalen 2014; Siordia and Ramos 2015; Stern 2004). In fact, the ACS is considered the leading source, or the "gold standard" (Siordia 2014a:262), of data for estimating prevalence of disability in the US (Siordia 2014a, 2015c, 2015d). Further, because of its large sample size and the fact that it is nationally representative this dataset is particularly advantageous for research on specific subgroups because it enables the investigator to break the sample into specific groups with large enough sample sizes for analysis. For this reason, ACS 5-year data or similar variables from Census data has previously been used to investigate immigrant health (Elo et al. 2011; Gubernskaya et al. 2013; Markides et al. 2007; Siordia 2015e; Siordia and Le 2013). In addition, ACS microdata enables an analysis of age specific data, which is critical to a high-quality analysis using the demographic methods employed in this paper. Finally, while the ACS questionnaire asks about citizenship status, it does not inquire as to whether the foreign born are documented or undocumented and thus includes undocumented immigrants, a population that is otherwise difficult to survey. It is important to note that the undocumented population is likely still underrepresented in the ACS because of sampling challenges specific to this population (Judson and Swanson 2011; Woodrow-Lafield 2012) and faces unique barriers to accessing health care, leading to distinct outcomes (Portes, Fernández-Kelly, and Light 2012).

The original 2010-2014 5-year data includes a random sample of 15,552,144 (unweighted) people ranging in age from 0 to 96 years old. The current analysis limits the age range from 18 to 90. At the lower boundary the analytic sample was restricted to the adult population. At the upper boundary the analytic sample was restricted to the age 90 because some subgroups had limited sample sizes above this age. It was finally restricted to a number of specific groups (as will be explicated) based on nativity, race and ethnicity. The final analytic sample was comprised of 10,341,429 (unweighted) people between 18 and 90 years old.

The ACS survey asks a series of six questions about specific types of disabilities, or difficulties,[1] as termed by the ACS. These include: hearing disabilities, vision disabilities, cognitive disabilities,[2] ambulatory difficulties,[3] self-care difficulties,[4] and independent living difficulties.[5] Previous research using the ACS and similar questions from the 2000 Census have found that the ACS self-care measure and the independent living measure respectively mirror some of the items from Activities of Daily Living (ADL) and Independent Activities of Daily Living (IADL), which are considered to be more standard measures used to determine disability status (Elo et al. 2011; Markides et al. 2007). Further, the measures of hearing, vision, cognitive, ambulatory and self-care disability were found to be reliable, while the independent living measure was found to be less so, which is a limitation of this specific measure (Stern 2004). In addition to the individual disabilities this analysis also includes a measure of any disability. For this measure a person is considered disabled (coded 1) if they indicated they had at least one of the six disabilities. Throughout the paper the measure of having at least one disability is referred to as *overall disability* and used to calculate overall disability rates. Further, hearing and vision disabilities were combined into one measure of sensory disability which indicates that the respondent answered in the affirmative to at least one of these two individual measures. Finally, it must be noted that usually one member of a household answers the ACS questionnaire on behalf of all members of the household, so some of the responses in this dataset were provided by proxy.[6] Despite this, ACS and Census data 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, 2015b, 2015c, 2015e, 2016; Siordia and Ramos 2015).

In order to facilitate a comparative analysis individual level microdata was aggregated by age, in one year age intervals using normalized[7] sample weights provided by the ACS, for native-born and foreign-born groups. Since aggregated counts are derived from survey estimates using sample weights these counts are estimations with confidence intervals around the count.[8] For each group aggregation was performed separately for males and females. Table 1 displays the groups included in this analysis, which include: US-born non-Hispanic Whites (henceforth, Whites) and US-born non-Hispanic Blacks (henceforth, Blacks),

[1] This paper uses the word disability instead of difficulty as is common in studies using these variables from ACS data.
[2] Difficulties concentrating, remembering or making decisions
[3] Difficulties walking or climbing stairs
[4] Difficulties dressing or bathing
[5] Difficulties doing errands such as visiting a doctor or shopping
[6] Limitations of proxy-reporting as well as other limitations of this data will be addressed in the discussion section of the paper.
[7] ACS provided PERWT sample weights were normalized to preserve the original N so that standard errors in bivariate analysis reflect actual sample sizes
[8] The limitations of using survey data to produce count estimates are clarified in the discussion section of the paper.

US-born and foreign-born Mexicans, US-born (on the mainland) and foreign-born (on the island) Puerto Ricans, US-born and foreign-born Cubans, and US-born and foreign-born Hispanics from other countries of origin (henceforth, other Hispanics). Inclusion in these groups was based on answers to a number of survey questions about birth place, race and ethnic origin. The ACS asks where each member of the household was born. Those who were born outside the 50 states were considered foreign born. Puerto Ricans were included among the foreign born because immigrant health patterns hold for those who migrate from Puerto Rico to the mainland US (Landale, Oropesa, and Gorman 2000). 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 including Mexican, Puerto Rican, Cuban and other Hispanic. Among the Hispanic groups there are those who are native born and foreign born and their respective disability rates were aggregated separately by age. Native-born Whites and Blacks are included in this analysis as reference groups. Whites are those who answered White to the race question, non-Hispanic to the Hispanic question and were born in the US. Similarly, Blacks are those who answered Black or African American to the race question, non-Hispanic to the Hispanic question, and were born in the US.

After aggregating each disability by age for each group, age specific disability rates were estimated. Using these single year disability rates, crude disability prevalence rates (disability probabilities) for males and females of each group were calculated for both the working age population (18-64) and for the older adult population (65-90).[9] This facilitates a comparison of group specific crude disability rates for the working age versus the older adult population and provides an initial accounting for potential age structure differences. The formula $CDR = \sum_{i=1}^{\beta} D_i \cdot C_i$ was used where CDR = Crude Disability Rate, i = 1 year age intervals from 18 to 64 and 65 to 90, $D_i$ = age-specific disability rates $C_i$ = age distribution of the population. Standard errors for empirical crude prevalence was calculated using the formula $SE(p) = \sqrt{\frac{p(1-p)}{n}}$ where *n* equals the total sample and *p*, the probability of disability, equals the number of disability cases (*d*) divided by *n.* This assumes that disability cases follow a binomial distribution. Both *n*, the total sample, and *p*, the probability of disability used to calculate crude rates (and age standardized rates via the method outlined below), are themselves derived from survey estimates and thus are approximations with confidence intervals around them. As will be addressed in the discussion section, these estimations themselves may be subject to non-random factors (Siordia 2014a, 2015d, 2015d; Siordia and Le 2013).

[9] This paper uses the age 65 as the cut point to be included in the analysis of older adult disability rates due to the fact that many government programs serving the older adult population use this as the age minimum and thus makes the estimation of disability rates for this population readily applicable in policy arenas.

Because the age structure of the foreign born is known to be younger than that of the native born, in order to facilitate between group comparisons these crude disability rates were standardized by using the age structure of the analytic sample. This was done using $ASCDR = \sum_{i=1}^{\beta} D_i \cdot C_i^{US}$ where ASCDR = Age Standardized Crude Disability Rate, i = 1 year age interval from 18 to 64 and 65 to 90, $D_i$ = age-specific disability rates for the specific group analyzed and $C_i^{US}$= the age structure for the entire analytic sample. "Pseudo" standard errors were calculated for the age standardized rates using $SE(p) = \sqrt{\frac{p(1-p)}{n}}$ where $p$ is the age standardized probability of disability and $n$ is the sample size from the unstandardized rates. It is important to note here that age standardized rates are artificially estimated rates that depend on the standard population chosen and are meant to facilitate between group comparisons but not to be considered true estimated rates. For this reason, a previous analysis, not shown here, used an alternative standard age structure[10] to test sensitivity to changes in standard population. No notable differences in results were observed.

Finally, using a similar methodology as Siordia and Ramos (2015) to test the statistical significance of between group differences, individual two-group t-tests were conducted of both crude and age standardized disability prevalence rates between US-born Whites (the reference group) as compared to each other subgroup respectively. The formula $z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}}$ was used to calculate z scores to determine statistical significance, where $\hat{p}_1$ is the proportion of disability for the reference group (non-Hispanic Whites), $\hat{p}_2$ is the proportion of disability for the respective comparison group, $\hat{p}$ is the pooled proportion of disability, $n_1$ is the sample size for the reference group and $n_2$ is the sample size for the respective comparison group. Again, when conducting t-tests for age standardized disability prevalence, sample sizes (n) from the unstandardized rates are used. Additionally, using the same methodology individual two-group t-tests were conducted to test the statistical significance of disability prevalence differences between US-born Hispanic groups (reference) and the foreign born from the same country of origin respectively.

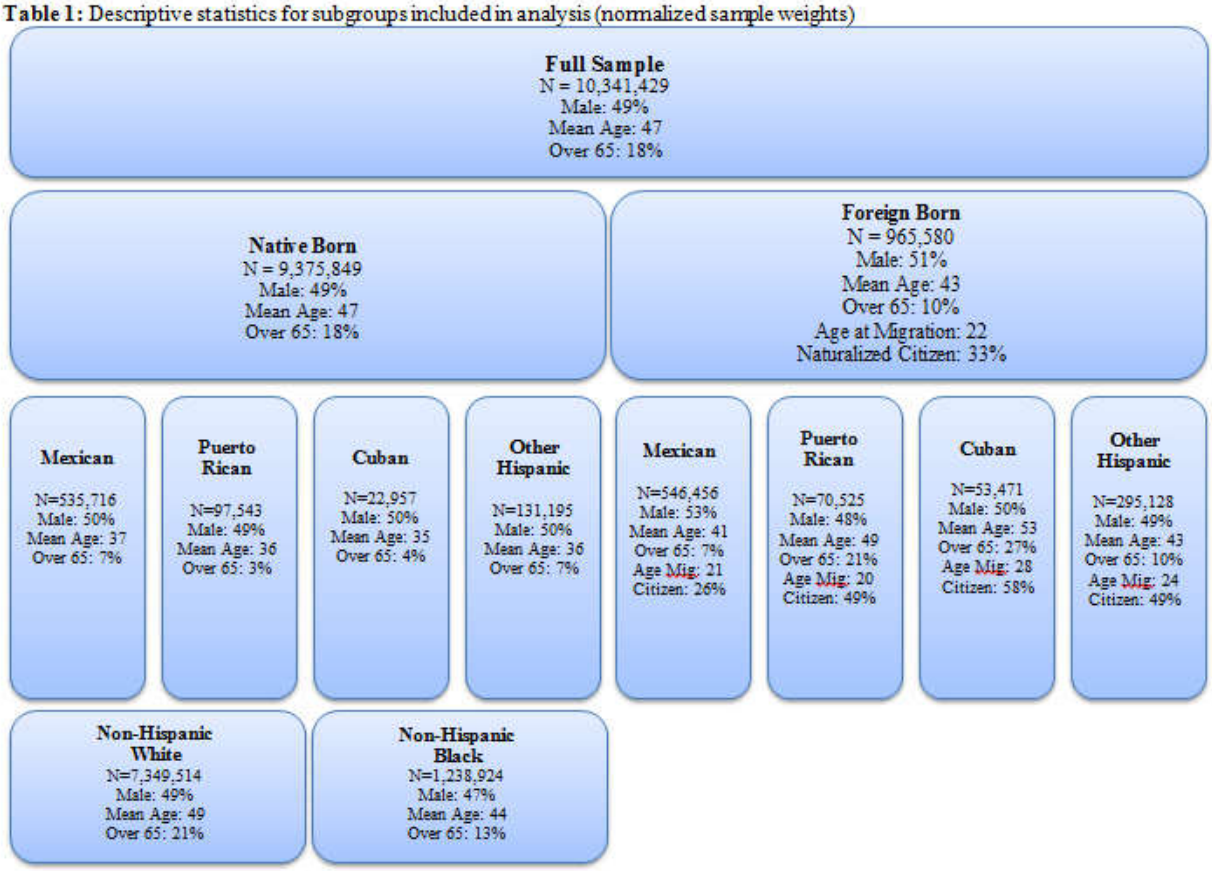
[10] All 18-90 year olds in the ACS 2010-2014 5-year dataset, including subgroups not analyzed in this paper.

## Main results

*Descriptive statistics*

As outlined in Table 1, the final analytic sample is comprised of 10,341,429 native-born Whites and Blacks, and native and foreign-born Hispanics separated into national origin groups between the ages of 18 and

**Table 1:** Descriptive statistics for subgroups included in analysis (normalized sample weights)




90. As estimated using normalized sample weights, the mean age of the analytic sample is 47 with a standard deviation of 18 and 18 per cent of the sample is over the age of 65. The sample is 49 per cent male and 91 per cent is native born. Among the foreign-born groups, Cubans on average are the oldest with a mean age of 53 (s.d. = 17), the largest portion over 65 at 27 per cent and have the highest rate of naturalization at 58 per cent. On the other end of the spectrum, foreign-born Mexicans are the youngest with an average age of 41 (s.d. = 14), have the smallest portion over 65 at 7 per cent and only 26 per cent are naturalized citizens. All the native-born Hispanic subgroups are on average younger than their foreign-born co-ethnics and a small percentage are over the age of 65. This is a product of the history of immigration by these natural origin groups to the US and model migration schedules predicting migration at young ages. For comparison, native-born Whites are among the oldest in terms of average age with a mean of 49 (s.d. = 18) and 21 per

cent are over the age of 65, whereas the mean age of the Black subgroup is 44 (s.d. = 17) and only 13 per cent are over the age of 65. These empirical differences in age structure by nativity, national origin and race reinforce the need to calculate age standardized disability probabilities in order make valid cross group comparisons. The figures for the entire analytic sample, as well as each subgroup, are included in Table 1.

*Working age Disability Rates*

Crude and age standardized disability rates were calculated for the working age (18-64) population of each subgroup. As is evident from Table 2, the overall crude disability prevalence rate for working age native-born White males is 11.4 per cent. Among the native-born groups, Black males have the highest crude overall disability rate at 15.5 per cent. Based on these crude rates, working age males in all of the foreign-born Hispanic national origin groups, with the exception of foreign-born Puerto Ricans, have a statistically significant disability advantage over native-born Whites. Foreign-born Mexicans and other Hispanics also have statistically significant lower disability rates as compared to US-born Mexicans and other Hispanics.

**Table 2.** Disability Prevalence Rates for Males ages 18 to 64 by nativity, race/ethnicity and national origin (95% margin of error in parentheses)

| Race/Ethnicity | Any Disability | | Ambulatory | | Cognitive | | Independent | | Self Care | | Sensory | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Crude | Standardized | Crude | Standardized | Crude | Standardized | Crude | Standardized | Crude | Standardized | Crude | Standardized |
| *US Born* | | | | | | | | | | | | |
| NB non-Hispanic White | 0.1137 | 0.1100 | 0.0511 | 0.0482 | 0.0484 | 0.0480 | 0.0362 | 0.0352 | 0.0191 | 0.0183 | 0.0447 | 0.0426 |
| | (.0004) | (.0004) | (.0003) | (.0002) | (.0002) | (.0002) | (.0002) | (.0002) | (.0002) | (.0002) | (.0002) | (.0002) |
| NB non-Hispanic Black | 0.1548 *** | 0.1646 *** | 0.0775 *** | 0.0861 *** | 0.0762 *** | 0.0782 *** | 0.0577 *** | 0.0612 *** | 0.0298 *** | 0.0323 ** | 0.0461 ** | 0.0498 *** |
| | (.0010) | (.0010) | (.0007) | (.0008) | (.0007) | (.0007) | (.0006) | (.0007) | (.0005) | (.0005) | (.0006) | (.0006) |
| NB Mexican | 0.1008 *** | 0.1335 *** | 0.0426 *** | 0.0668 *** | 0.0484 | 0.0566 *** | 0.0335 *** | 0.0437 *** | 0.0184 | 0.0260 * | 0.0399 *** | 0.0565 *** |
| | (.0012) | (.0013) | (.0008) | (.0010) | (.0008) | (.0009) | (.0007) | (.0008) | (.0005) | (.0006) | (.0008) | (.0009) |
| NB Puerto Rican | 0.1289 *** | 0.1545 *** | 0.0533 | 0.0770 *** | 0.0720 *** | 0.0758 *** | 0.0447 *** | 0.0537 *** | 0.0228 *** | 0.0303 *** | 0.0389 *** | 0.0491 *** |
| | (.0030) | (.0033) | (.0020) | (.0024) | (.0023) | (.0024) | (.0019) | (.0020) | (.0014) | (.0016) | (.0018) | (.0020) |
| NB Cuban | 0.0797 *** | 0.1049 | 0.0278 *** | 0.0484 | 0.0436 | 0.0501 | 0.0301 * | 0.0413 * | 0.0152 * | 0.0223 *** | 0.0280 *** | 0.0379 |
| | (.0050) | (.0057) | (.0030) | (.0040) | (.0038) | (.0040) | (.0032) | (.0037) | (.0023) | (.0027) | (.0031) | (.0035) |
| NB Other Hispanic | 0.1007 *** | 0.1362 *** | 0.0390 *** | 0.0660 *** | 0.0545 *** | 0.0649 *** | 0.0362 | 0.0473 *** | 0.0173 * | 0.0252 *** | 0.0383 *** | 0.0571 *** |
| | (.0024) | (.0027) | (.0015) | (.0020) | (.0018) | (.0020) | (.0015) | (.0017) | (.0010) | (.0012) | (.0015) | (.0018) |
| *Foreign Born* | | | | | | | | | | | | |
| FB Mexican | 0.0552 *** | 0.0700 *** | 0.0253 *** | 0.0346 *** | 0.0157 *** | 0.0195 *** | 0.0140 *** | 0.0181 *** | 0.0093 *** | 0.0126 *** | 0.0271 *** | 0.0345 *** |
| | (.0009) +++ | (.0010) "+++ | (.0006) "++ | (.0007) "++ | (.0005) +++ | (.0005) +++ | (.0004) +++ | (.0005) +++ | (.0004) +++ | (.0004) +++ | (.0006) +++ | (.0007) +++ |
| FB Puerto Rican | 0.1749 *** | 0.1701 *** | 0.0913 *** | 0.0868 *** | 0.0872 *** | 0.0867 *** | 0.0594 *** | 0.0579 *** | 0.0359 *** | 0.0347 *** | 0.0602 *** | 0.0579 *** |
| | (.0045) +++ | (.0045) "++ | (.0034) "++ | (.0033) ++ | (.0033) +++ | (.0033) +++ | (.0028) +++ | (.0028) | (.0022) +++ | (.0022) + | (.0028) +++ | (.0028) +++ |
| FB Cuban | 0.0835 *** | 0.0739 *** | 0.0376 *** | 0.0320 *** | 0.0394 *** | 0.0354 *** | 0.0288 *** | 0.0258 *** | 0.0162 * | 0.0140 *** | 0.0307 *** | 0.0270 *** |
| | (.0038) | (.0036) "+++ | (.0026) ++ | (.0024) +++ | (.0027) | (.0026) +++ | (.0023) | (.0022) +++ | (.0017) | (.0016) +++ | (.0024) | (.0022) +++ |
| FB Other Hispanic | 0.0538 *** | 0.0627 *** | 0.0236 *** | 0.0290 *** | 0.0184 *** | 0.0207 *** | 0.0136 *** | 0.0161 *** | 0.0087 *** | 0.0107 *** | 0.0238 *** | 0.0276 *** |
| | (.0012) +++ | (.0013) +++ | (.0008) +++ | (.0009) +++ | (.0007) +++ | (.0008) +++ | (.0006) +++ | (.0007) +++ | (.0005) +++ | (.0006) +++ | (.0008) +++ | (.0009) +++ |

Significance levels reported from individual two-group t-tests (two tailed)

*Reference = NHW *p<.05, **p<.01, ***p<.001

+Reference = NB of same country of origin +p<.05, ++p<.01, +++p<.001

Once age structure is controlled for the picture changes. Based on age standardized rates, working age US-born Cubans no longer have a statistically significant advantage over Whites and foreign-born Cubans now have lower overall disability rates than American-born Cubans. Further, while foreign-born Puerto Ricans still have higher overall disability rates than Puerto Ricans born in the continental US the difference shrinks to about 1.5 percentage points, although this difference is still statistically significant. This highlights the importance of age structure differences. Once age structure is controlled for, the immigrant advantage among Cubans is evident.

Looking at rates of specific disabilities this general pattern persists for working age males. Foreign-born working age Mexican males consistently have lower age standardized disability rates across all measures of disability as compared to both American-born Mexicans and native-born Whites. The same is true for other Hispanics. Again, for Cubans, age standardization makes an important impact on the comparison of rates of specific disability. For example, crude rates show that American-born Cubans have 1 percentage point lower ambulatory disability rates than foreign-born Cubans, a difference that is statistically significant. Once age is standardized, however, foreign-born Cubans have a 1.64 percentage point advantage in ambulatory disability over US-born Cubans. Across the specific measures of disability foreign-born Puerto Ricans have higher age standardized rates of disability than both US-born Puerto Ricans and Whites, and even exceeding the rates of native-born Blacks.

Table 3 (next page) summarizes working age female disability rates. Comparing males to females, among the US-born groups working age Mexicans and other Hispanics have statistically significant lower rates of crude and age standardized overall disability than their US-born males from the same subgroup.[11] However, among foreign-born Mexicans and other Hispanics the opposite is true: women have statistically significant higher age standardized overall disability rates than their foreign-born males from the same subgroup. Differences in overall age standardized disability rates for Puerto Rican and Cuban females as compared to males from the same subgroup are not statistically significant. The higher estimated prevalence of disability for working age foreign-born Mexican and other Hispanic females as compared to foreign-born males of the same national origins group provides evidence supporting the hypothesis that positive selection on health is operating less for immigrant women than for men in some groups (Markides et al. 2007).

[11] Individual two group t-tests were performed to determine statistical significance of differences between male disability rates (reference group) and female rates of the same subgroup. Because male-female differences are not the focus of this paper, detailed results of these tests are not reported here, but they are available.

Female-female comparisons of subgroups show similar trends as male-male comparisons. The crude disability prevalence rate for US-born Whites is 10.5 per cent. With the exception of Puerto Ricans (both those born in the continental US and those in Puerto Rico) all Hispanic subgroups have statistically significant lower crude disability prevalence rates than native-born Whites, supporting the Hispanic health paradox literature. Foreign-born Mexican and other Hispanic females also show evidence of an immigrant advantage in terms of crude rates with statistically significant lower rates as compared to the US-born from the same national origin group. Again, the Cuban groups provide a clear demonstration of the importance of age structure differences; there is no statistically significant difference between US-born Cubans and Whites in terms of overall disability prevalence rates once age is standardized.

**Table 3.** Disability Prevalence Rates for Females ages 18 to 64 by nativity, race/ethnicity and national origin (95% margin of error in parentheses)

| Race/Ethnicity | Any Disability | | Ambulatory | | Cognitive | | Independent | | Self Care | | Sensory | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Crude | Standardized | Crude | Standardized | Crude | Standardized | Crude | Standardized | Crude | Standardized | Crude | Standardized |
| *US Born* | | | | | | | | | | | | |
| NB non-Hispanic White | 0.1046 | 0.0996 | 0.0583 | 0.0538 | 0.0441 | 0.0433 | 0.0401 | 0.0383 | 0.0196 | 0.0185 | 0.0303 | 0.0288 |
| | (.0004) | (.0003) | (.0003) | (.0003) | (.0002) | (.0002) | (.0002) | (.0002) | (.0002) | (.0002) | (.0002) | (.0002) |
| NB non-Hispanic Black | 0.1452 *** | 0.1516 *** | 0.0916 *** | 0.0974 *** | 0.0576 *** | 0.0590 *** | 0.0565 *** | 0.0592 *** | 0.0321 *** | 0.0339 *** | 0.0403 *** | 0.0419 *** |
| | (.0009) | (.0009) | (.0008) | (.0008) | (.0006) | (.0006) | (.0006) | (.0006) | (.0005) | (.0005) | (.0005) | (.0005) |
| NB Mexican | 0.0863 *** | 0.1162 *** | 0.0446 *** | 0.0696 *** | 0.0370 *** | 0.0451 ** | 0.0326 *** | 0.0444 *** | 0.0175 *** | 0.0249 *** | 0.0294 | 0.0390 *** |
| | (.0011) | (.0013) | (.0008) | (.0010) | (.0007) | (.0008) | (.0007) | (.0008) | (.0005) | (.0006) | (.0007) | (.0008) |
| NB Puerto Rican | 0.1236 *** | 0.1544 *** | 0.0611 | 0.0888 *** | 0.0598 *** | 0.0664 *** | 0.0469 *** | 0.0599 *** | 0.0226 ** | 0.0306 *** | 0.0360 *** | 0.0449 *** |
| | (.0029) | (.0032) | (.0021) | (.0025) | (.0021) | (.0022) | (.0019) | (.0021) | (.0013) | (.0015) | (.0017) | (.0018) |
| NB Cuban | 0.0723 *** | 0.1013 | 0.0327 *** | 0.0554 | 0.0380 * | 0.0481 | 0.0293 *** | 0.0440 * | 0.0160 * | 0.0235 * | 0.0212 *** | 0.0270 |
| | (.0048) | (.0056) | (.0033) | (.0043) | (.0036) | (.0040) | (.0032) | (.0038) | (.0023) | (.0028) | (.0027) | (.0030) |
| NB Other Hispanic | 0.0932 *** | 0.1273 *** | 0.0459 *** | 0.0749 *** | 0.0438 | 0.0547 *** | 0.0357 *** | 0.0505 *** | 0.0179 * | 0.0269 *** | 0.0316 | 0.0429 *** |
| | (.0023) | (.0027) | (.0017) | (.0021) | (.0016) | (.0018) | (.0015) | (.0017) | (.0011) | (.0013) | (.0014) | (.0016) |
| *Foreign Born* | | | | | | | | | | | | |
| FB Mexican | 0.0656 *** | 0.0803 *** | 0.0328 *** | 0.0434 *** | 0.0186 *** | 0.0222 *** | 0.0184 *** | 0.0235 *** | 0.0111 *** | 0.0143 *** | 0.0288 ** | 0.0342 *** |
| | (.0010) +++ | (.0011) +++ | (.0007) +++ | (.0008) +++ | (.0005) +++ | (.0006) +++ | (.0005) +++ | (.0006) +++ | (.0004) +++ | (.0005) +++ | (.0007) | (.0007) +++ |
| FB Puerto Rican | 0.1825 *** | 0.1698 *** | 0.1102 *** | 0.0988 *** | 0.0822 *** | 0.0783 *** | 0.0703 *** | 0.0647 *** | 0.0375 *** | 0.0340 *** | 0.0564 *** | 0.0529 *** |
| | (.0045) +++ | (.0044) +++ | (.0036) +++ | (.0035) +++ | (.0032) +++ | (.0031) +++ | (.0030) +++ | (.0029) + | (.0022) +++ | (.0021) | (.0027) +++ | (.0026) +++ |
| FB Cuban | 0.0887 *** | 0.0752 *** | 0.0436 *** | 0.0357 *** | 0.0417 | 0.0356 *** | 0.0353 * | 0.0297 *** | 0.0182 | 0.0155 * | 0.0270 * | 0.0236 ** |
| | (.0041) +++ | (.0038) +++ | (.0029) +++ | (.0027) +++ | (.0029) | (.0027) +++ | (.0026) + | (.0024) +++ | (.0019) | (.0018) +++ | (.0023) + | (.0022) |
| FB Other Hispanic | 0.0655 *** | 0.0705 *** | 0.0351 *** | 0.0383 *** | 0.0216 *** | 0.0233 *** | 0.0203 *** | 0.0223 *** | 0.0118 *** | 0.0128 *** | 0.0239 *** | 0.0255 *** |
| | (.0013) +++ | (.0014) +++ | (.0010) +++ | (.0010) +++ | (.0008) +++ | (.0008) +++ | (.0008) +++ | (.0008) +++ | (.0006) +++ | (.0006) +++ | (.0008) +++ | (.0008) +++ |

Significance levels reported from individual two-group t-tests (two tailed)

*Reference = NHW *p<.05, **p<.01, ***p<.001

+Reference = NB of same country of origin +p<.05, ++p<.01, +++p<.001

Further, what in crude rates is a statistically significant overall disability disadvantage for foreign-born Cubans as compared to US-born Cubans, once age is standardized foreign-born Cubans actually have statistically significant lower rates of disability prevalence. Here too other specific disability rates show an enduring ethno-racial hierarchy of disability with the foreign born (with the exception of Puerto Ricans)

having the lowest disability rates, providing empirical evidence of the immigrant health advantage among working age populations.

*Retirement age disability rates*

Once our analytic lens is focused on the older population (65-90) evidence of an immigrant health advantage diminishes. Table 4 summarizes disability rates for older male subgroups and Figure 1 shows standardized

**Table 4.** Disability Prevalence Rates for Males ages 65 to 90 by nativity, race/ethnicity and national origin (95% margin of error in parentheses)

| Race/Ethnicity | Any Disability | | Ambulatory | | Cognitive | | Independent | | Self Care | | Sensory | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Crude | Standardized | Crude | Standardized | Crude | Standardized | Crude | Standardized | Crude | Standardized | Crude | Standardized |
| *US Born* | | | | | | | | | | | | |
| NB non-Hispanic White | 0.3516 | 0.3599 | 0.1888 | 0.1946 | 0.0802 | 0.0833 | 0.1112 | 0.1165 | 0.0704 | 0.0735 | 0.2205 | 0.2262 |
| | (.0011) | (.0011) | (.0009) | (.0009) | (.0006) | (.0007) | (.0007) | (.0008) | (.0006) | (.0006) | (.0010) | (.0010) |
| NB non-Hispanic Black | 0.4018 *** | 0.4226 *** | 0.2796 *** | 0.2951 *** | 0.1338 *** | 0.1447 *** | 0.1835 *** | 0.2013 *** | 0.1186 *** | 0.1302 *** | 0.1753 *** | 0.1880 *** |
| | (.0038) | (.0038) | (.0035) | (.0035) | (.0026) | (.0027) | (.0030) | (.0031) | (.0025) | (.0026) | (.0030) | (.0030) |
| NB Mexican | 0.4381 *** | 0.4527 *** | 0.2600 *** | 0.2720 *** | 0.1247 *** | 0.1320 *** | 0.1625 *** | 0.1747 *** | 0.1009 *** | 0.1081 *** | 0.2739 *** | 0.2846 *** |
| | (.0073) | (.0074) | (.0065) | (.0066) | (.0049) | (.0050) | (.0055) | (.0056) | (.0045) | (.0046) | (.0066) | (.0067) |
| NB Puerto Rican | 0.3672 | 0.3883 * | 0.2519 *** | 0.2673 *** | 0.1195 *** | 0.1326 *** | 0.1512 ** | 0.1694 *** | 0.0964 * | 0.1037 ** | 0.1721 *** | 0.1848 ** |
| | (.0273) | (.0276) | (.0246) | (.0251) | (.0184) | (.0192) | (.0203) | (.0213) | (.0167) | (.0173) | (.0214) | (.0220) |
| NB Cuban | 0.3811 | 0.3765 | 0.2328 | 0.2325 | 0.1041 | 0.0980 | 0.1654 * | 0.1699 * | 0.0909 | 0.0963 | 0.1851 | 0.1889 |
| | (.0506) | (.0505) | (.0440) | (.0440) | (.0318) | (.0310) | (.0387) | (.0391) | (.0300) | (.0307) | (.0405) | (.0408) |
| NB Other Hispanic | 0.4216 *** | 0.4296 *** | 0.2443 *** | 0.2514 *** | 0.1174 *** | 0.1200 *** | 0.1443 *** | 0.1520 *** | 0.0936 *** | 0.0988 *** | 0.2653 *** | 0.2715 *** |
| | (.0150) | (.0150) | (.0130) | (.0131) | (.0098) | (.0099) | (.0107) | (.0109) | (.0088) | (.0090) | (.0134) | (.0135) |
| *Foreign Born* | | | | | | | | | | | | |
| FB Mexican | 0.3797 *** | 0.4138 *** | 0.2302 *** | 0.2567 *** | 0.1127 *** | 0.1291 *** | 0.1539 *** | 0.1813 *** | 0.0946 *** | 0.1125 *** | 0.2187 | 0.2420 *** |
| | (.0071) +++ | (.0072) +++ | (.0061) +++ | (.0064) ++ | (.0046) ++ | (.0049) | (.0053) | (.0056) | (.0043) | (.0046) | (.0060) +++ | (.0062) +++ |
| FB Puerto Rican | 0.3936 *** | 0.4173 *** | 0.2516 *** | 0.2692 *** | 0.1439 *** | 0.1551 *** | 0.1734 *** | 0.1946 *** | 0.1134 *** | 0.1253 *** | 0.1906 *** | 0.2029 *** |
| | (.0120) + | (.0121) + | (.0106) | (.0109) | (.0086) | (.0089) | (.0093) | (.0097) | (.0078) | (.0081) | (.0096) | (.0099) |
| FB Cuban | 0.3450 | 0.3318 *** | 0.2185 *** | 0.2095 * | 0.1290 *** | 0.1229 *** | 0.1575 *** | 0.1493 *** | 0.1011 *** | 0.0949 *** | 0.1637 *** | 0.1557 *** |
| | (.0117) | (.0116) | (.0102) | (.0101) | (.0083) | (.0081) | (.0090) | (.0088) | (.0075) | (.0072) | (.0091) | (.0090) |
| FB Other Hispanic | 0.2857 *** | 0.3186 *** | 0.1667 *** | 0.1902 | 0.0922 *** | 0.1080 *** | 0.1169 | 0.1401 *** | 0.0716 | 0.0855 *** | 0.1478 *** | 0.1665 *** |
| | (.0084) +++ | (.0087) +++ | (.0069) +++ | (.0073) +++ | (.0054) +++ | (.0058) +++ | (.0060) +++ | (.0064) | (.0048) ++ | (.0052) | (.0066) +++ | (.0069) +++ |

Significance levels reported from individual two-group t-tests (two tailed)

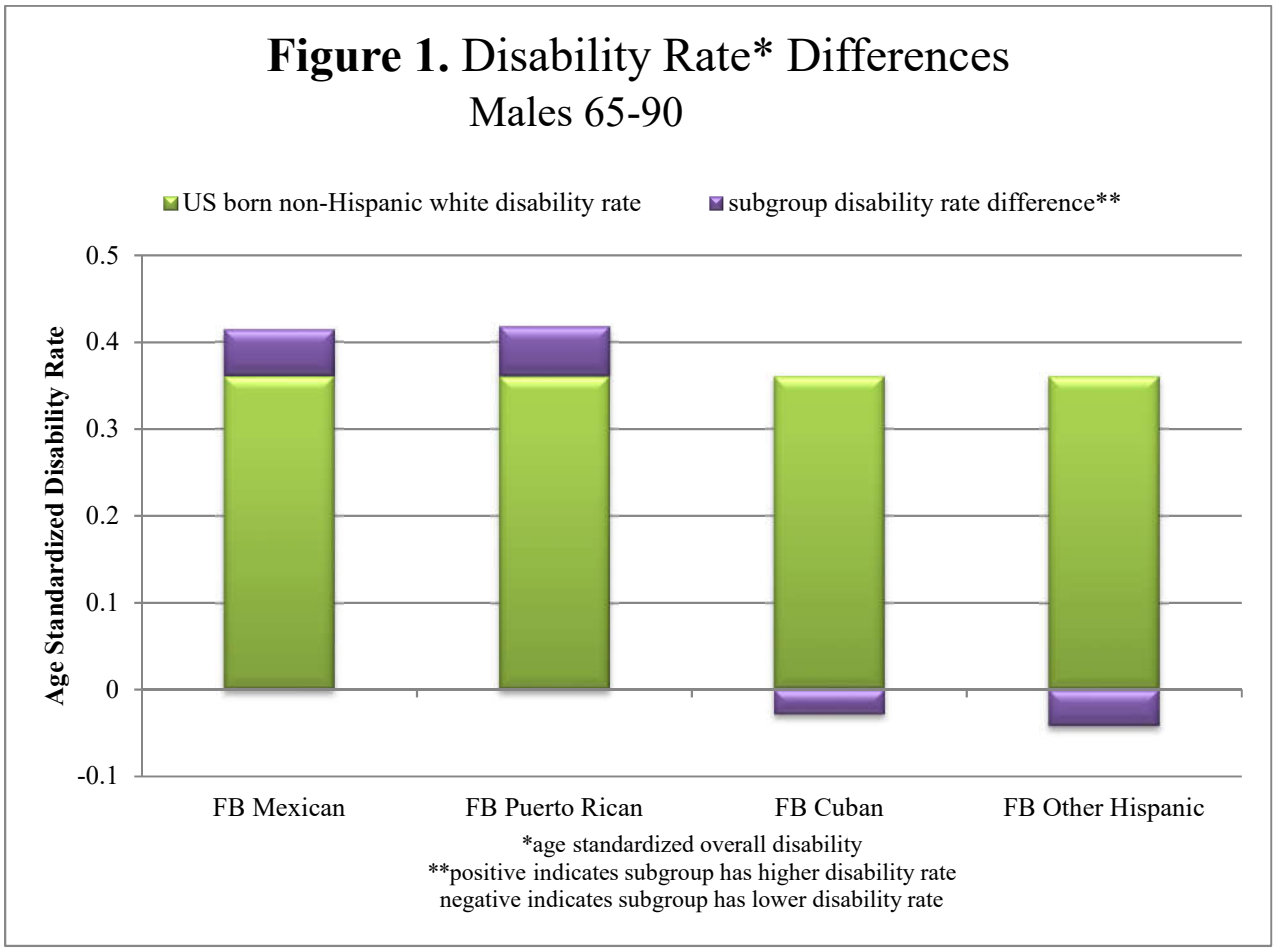
*Reference = NHW *p<.05, **p<.01, ***p<.001

+Reference = NB of same country of origin +p<.05, ++p<.01, +++p<.001

age disability differentials of the foreign-born groups as compared to native-born Whites. Age standardization effectively increases overall disability rates for all subgroups with the exception of both foreign and American-born Cubans. Whereas for the working age population foreign-born Cubans had statistically significant lower crude disability prevalence rates than Whites, for the older age group this is only true once age is standardized. Older mainland-born Puerto Ricans only have a statistically significant disability disadvantage once age structure is taken into consideration, while older Puerto Ricans who were

born in Puerto Rico continue to have statistically significant higher rates of disability as compared to Whites and Us mainland-born Puerto Ricans – again an outlier to the immigrant health advantage literature.

Evidence of the Hispanic paradox and immigrant health advantage is most clearly challenged by the older Mexican groups. While a disability disadvantage for working-age US-born Mexican males as compared to Whites is evident only after age is standardized, for older US-born Mexicans crude rates on all measures of disability are higher than for White males, and the disadvantage grows once age is standardized. Further, foreign-born Mexican males, while still having lower overall disability rates than US-born Mexicans, no longer have the disability advantage that working age foreign-born Mexican males hold over native born White males. Whereas the age standardized rate of overall disability among *older* foreign-born Mexicans is 5.4 percentage points *higher* than for native-born Whites, the age standardized overall disability rate of *working age* foreign-born Mexicans was 4 percentage points *lower* than working age native-born Whites.



What was a disability advantage for working age foreign-born Mexican males becomes a disability disadvantage for older foreign-born Mexicans. Looking at the specific disability rates, the disadvantage among older foreign-born Mexican males seems to be driven by high differentials in ambulatory and independent living difficulties.

As is evident from Table 5 and Figure 2 (next page) the disability disadvantage is even stronger among older females. Comparing males to females, in this case all older foreign-born female subgroups have statistically significant higher rates of disability than males from the same subgroup. Further, all of the

**Table 5.** Disability Prevalence Rates for Females ages 65 to 90 by nativity, race/ethnicity and national origin (95% margin of error in parentheses)

| Race/Ethnicity | Any Disability | | Ambulatory | | Cognitive | | Independent | | Self Care | | Sensory | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Crude | Standardized | Crude | Standardized | Crude | Standardized | Crude | Standardized | Crude | Standardized | Crude | Standardized |
| *US Born* | | | | | | | | | | | | |
| NB non-Hispanic White | 0.3509 | 0.3376 | 0.2499 | 0.2402 | 0.0948 | 0.0893 | 0.1718 | 0.1611 | 0.0963 | 0.0903 | 0.1497 | 0.1419 |
| | (.0010) | (.0010) | (.0009) | (.0009) | (.0006) | (.0006) | (.0008) | (.0008) | (.0006) | (.0006) | (.0008) | (.0007) |
| NB non-Hispanic Black | 0.4604 *** | 0.4641 *** | 0.3643 *** | 0.3672 *** | 0.1456 *** | 0.1479 *** | 0.2507 *** | 0.2545 *** | 0.1507 *** | 0.1533 *** | 0.1547 ** | 0.1567 *** |
| | (.0032) | (.0032) | (.0031) | (.0031) | (.0023) | (.0023) | (.0028) | (.0028) | (.0023) | (.0023) | (.0023) | (.0023) |
| NB Mexican | 0.4367 *** | 0.4365 *** | 0.3246 *** | 0.3244 *** | 0.1353 *** | 0.1360 *** | 0.2319 *** | 0.2318 *** | 0.1346 *** | 0.1349 *** | 0.1938 *** | 0.1942 *** |
| | (.0066) | (.0066) | (.0062) | (.0062) | (.0045) | (.0046) | (.0056) | (.0056) | (.0045) | (.0045) | (.0052) | (.0053) |
| NB Puerto Rican | 0.4188 *** | 0.4338 *** | 0.3234 *** | 0.3320 *** | 0.1447 *** | 0.1566 *** | 0.2387 *** | 0.2519 *** | 0.1386 *** | 0.1464 *** | 0.1573 | 0.1635 |
| | (.0257) | (.0259) | (.0244) | (.0246) | (.0184) | (.0190) | (.0222) | (.0226) | (.0180) | (.0184) | (.0190) | (.0193) |
| NB Cuban | 0.3486 | 0.3406 | 0.2528 | 0.2493 | 0.1372 * | 0.1241 | 0.1849 | 0.1738 | 0.1031 | 0.0921 | 0.1442 | 0.1318 |
| | (.0437) | (.0435) | (.0399) | (.0397) | (.0316) | (.0302) | (.0356) | (.0348) | (.0279) | (.0265) | (.0322) | (.0310) |
| NB Other Hispanic | 0.4134 *** | 0.4141 *** | 0.2903 *** | 0.2914 *** | 0.1211 *** | 0.1222 *** | 0.1939 *** | 0.1956 *** | 0.1091 * | 0.1103 *** | 0.1910 *** | 0.1911 *** |
| | (.0130) | (.0130) | (.0120) | (.0120) | (.0086) | (.0086) | (.0104) | (.0105) | (.0082) | (.0083) | (.0104) | (.0104) |
| *Foreign Born* | | | | | | | | | | | | |
| FB Mexican | 0.4322 *** | 0.4576 *** | 0.3161 *** | 0.3380 *** | 0.1380 *** | 0.1515 *** | 0.2518 *** | 0.2772 *** | 0.1467 *** | 0.1648 *** | 0.1826 *** | 0.1971 *** |
| | (.0065) | (.0065) +++ | (.0061) | (.0062) ++ | (.0045) | (.0047) +++ | (.0057) +++ | (.0059) +++ | (.0046) ++ | (.0049) +++ | (.0051) + | (.0052) |
| FB Puerto Rican | 0.4748 +++ | 0.4867 *** | 0.3585 *** | 0.3691 *** | 0.1821 *** | 0.1914 *** | 0.2786 *** | 0.2918 *** | 0.1559 *** | 0.1639 *** | 0.1778 *** | 0.1842 *** |
| | (.0106) | (.0106) +++ | (.0102) ++ | (.0102) ++ | (.0082) ++ | (.0083) + | (.0095) ++ | (.0096) ++ | (.0077) | (.0079) | (.0081) | (.0082) |
| FB Cuban | 0.4041 *** | 0.3737 *** | 0.2882 *** | 0.2631 *** | 0.1651 *** | 0.1504 *** | 0.2407 *** | 0.2129 *** | 0.1390 *** | 0.1206 *** | 0.1376 * | 0.1240 *** |
| | (.0106) ++ | (.0104) | (.0097) | (.0095) | (.0080) | (.0077) | (.0092) + | (.0088) | (.0074) | (.0070) | (.0074) | (.0071) |
| FB Other Hispanic | 0.3682 *** | 0.3832 *** | 0.2651 *** | 0.2769 *** | 0.1199 *** | 0.1277 *** | 0.2024 *** | 0.2166 *** | 0.1085 *** | 0.1170 *** | 0.1414 * | 0.1487 * |
| | (.0071) +++ | (.0071) +++ | (.0065) +++ | (.0066) | (.0048) | (.0049) | (.0059) | (.0060) ++ | (.0046) | (.0047) | (.0051) +++ | (.0052) +++ |

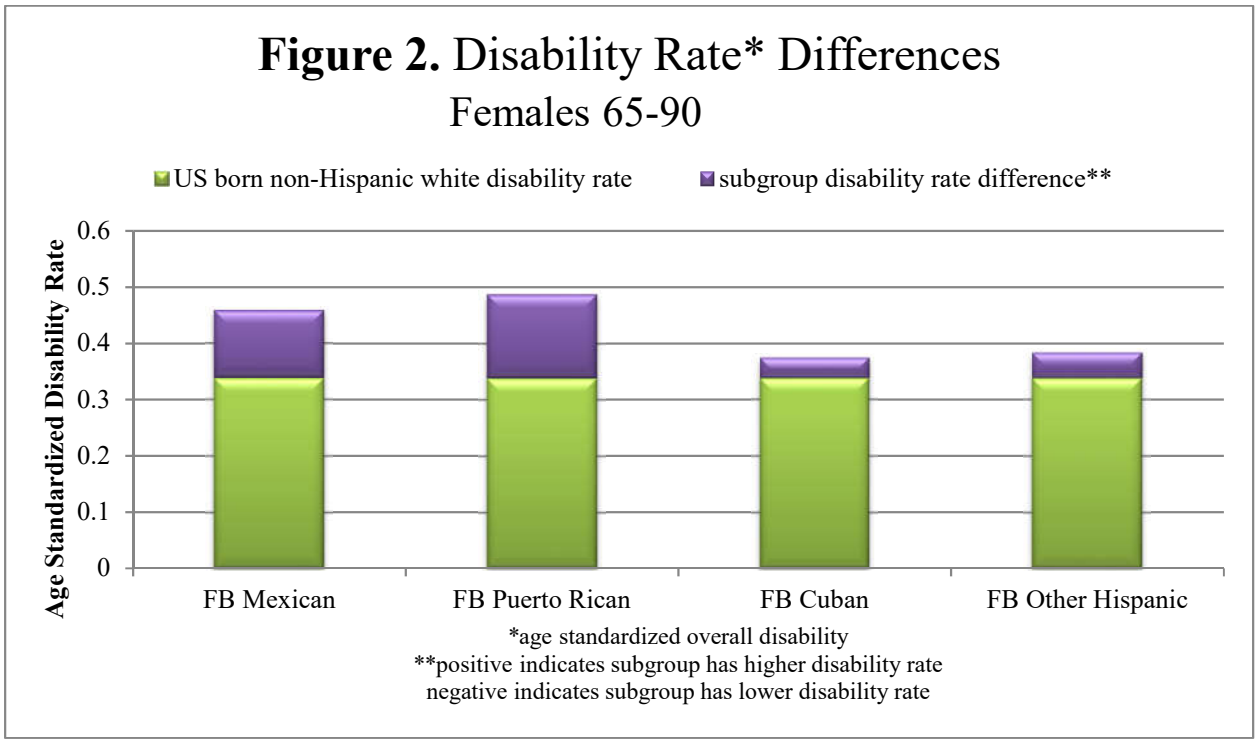
Significance levels reported from individual two-group t-tests (two tailed)

*Reference = NHW *p<.05, **p<.01, ***p<.001

+Reference = NB of same country of origin +p<.05, ++p<.01, +++p<.001

foreign-born groups have higher age standardized overall disability rates than older White females. In fact, with the exception of the other Hispanic group, all the older foreign-born female national origin groups also lose their advantage over those born in the US of the same national origin group. Older foreign-born Puerto Rican women have the highest overall age standardized disability rates, 2.2 percentage points higher than native-born Blacks. This high rate seems to be driven by high rates of ambulatory, cognitive and independent living difficulties among this group, rates that are between 10 and 13 percentage points higher

than for native-born Whites. Older foreign-born Mexican women also have elevated overall disability rates on par with native-born Blacks. Here, once age is standardized, the immigrant disadvantage for foreign-born Mexicans as compared to US-born Mexicans disappears with older foreign-born Mexican women having statistically significant higher rates of overall disability, as well as on all specific disability measures except sensory. Like older foreign-born Mexican males, the high rate of overall disability among older foreign-born Mexican females seems to be driven by particularly high rates of ambulatory and independent living difficulties as compared to native-born Whites.




*Explaining the Mexican disability disadvantage: age and period of migration*

To further parse out potential reasons for this emerging disadvantage for the older foreign-born Mexican population, Table 6 divides the older foreign-born Mexican population by those who immigrated before the age of 55 and those who immigrated at 55 or older. This serves to address the hypothesis that those who immigrant at older ages are potentially negatively selected on health (Gubernskya et al 2013). Based on crude rates, those foreign-born Mexican males immigrating at 55 or older have statistically significant higher rates of overall disability than those migrating at younger ages, which is driven by higher rates of independent living difficulties. However, as shown by the age standardized rates, this is due to the fact these immigrants have an older age structure. Once age structure is controlled for it is evident that those males

who immigrated after the age of 55 actually have a 2.3 percentage point lower overall disability rate than those who migrated at younger ages, a difference that is not statistically significant.

Thus, the prior thesis that those who immigrate at older ages are negatively selected on health is not supported by this analysis of the ACS data. Table 6 also shows that while female foreign-born Mexicans who migrated after the age of 55 have statistically significant higher rates of overall disability, once age structure is controlled for overall disability rates for those Mexican-born females who immigrated before they were 55 are not different at a statistically significant level as compared to those immigrating at older ages. Like in the case of their male counterparts, this fails to provide evidence that older immigrants are negatively selected on disability.

For older foreign-born Mexican males, Table 6 also divides the population by those who immigrated under the Bracero program (1942-1964) and those who immigrated afterward. The Bracero program, an agreement between the US and the Mexican government, brought Mexican workers, primarily men, into

**Table 6**. Disability Prevalence Rates for Foreign Born Mexicans 65-90 by type of disability, gender, age at migration and period of migration (95% margin of error in parentheses)

| Race/Ethnicity | Any Disability | | Ambulatory | | Cognitive | | Independent | | Self Care | | Sensory | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Crude | Standardized | Crude | Standardized | Crude | Standardized | Crude | Standardized | Crude | Standardize | Crude | Standardized |
| **Males** | | | | | | | | | | | | |
| *Age at Migration* [a] | | | | | | | | | | | | |
| Immigrated before age 55 | 0.3735 | 0.4167 | 0.2263 | 0.2583 | 0.1111 | 0.1311 | 0.1474 | 0.1791 | 0.0931 | 0.1152 | 0.2144 | 0.2448 |
| | (.0086) | (.0085) | (.0077) | (.0076) | (.0059) | (.0058) | (.0066) | (.0066) | (.0055) | (.0055) | (.0076) | (.0074) |
| Immigrated at 55+ | 0.4172 ** | 0.3937 | 0.2537 | 0.2408 | 0.1225 | 0.1150 | 0.1949 ** | 0.1846 | 0.1039 | 0.0970 | 0.2428 | 0.2274 |
| | (.0114) | (.0135) | (.0093) | (.0118) | (.0067) | (.0088) | (.0083) | (.0107) | (.0062) | (.0082) | (.0092) | (.0116) |
| *Period of Migration* [b] | | | | | | | | | | | | |
| 1965-2012 | 0.4153 | 0.4195 | 0.2162 | 0.2607 | 0.1035 | 0.1303 | 0.1431 | 0.1872 | 0.0880 | 0.1196 | 0.2056 | 0.2434 |
| | (.0083) | (.0085) | (.0071) | (.0076) | (.0053) | (.0058) | (.0061) | (.0067) | (.0049) | (.0056) | (.0070) | (.0074) |
| 1942-1964 | 0.4153 *** | 0.4126 | 0.2589 ** | 0.2587 | 0.1298 | 0.1302 | 0.1750 ** | 0.1750 | 0.1065 | 0.1063 | 0.2435 * | 0.2411 |
| | (.0137) | (.0136) | (.0121) | (.0121) | (.0093) | (.0093) | (.0105) | (.0105) | (.0085) | (.0085) | (.0119) | (.0119) |
| **Females** | | | | | | | | | | | | |
| *Age at Migration* [c] | | | | | | | | | | | | |
| Immigrated before 55 | 0.4203 | 0.4578 | 0.3082 | 0.3389 | 0.1337 | 0.1540 | 0.2371 | 0.2730 | 0.1407 | 0.1654 | 0.1715 | 0.1930 |
| | (.0072) | (.0073) | (.0068) | (.0069) | (.0050) | (.0053) | (.0062) | (.0065) | (.0051) | (.0055) | (.0055) | (.0058) |
| Immigrated at 55+ | 0.4793 *** | 0.4520 | 0.3481 ** | 0.3286 | 0.1549 | 0.1435 | 0.3101 *** | 0.2856 | 0.1717 * | 0.1585 | 0.2270 *** | 0.2125 |
| | (.0147) | (.0147) | (.0141) | (.0139) | (.0107) | (.0103) | (.0136) | (.0133) | (.0111) | (.0108) | (.0124) | (.0121) |

Significance levels reported from individual two-group t-tests (two tailed)

[a]Reference = Before age 55, [b]Reference = 1965-2012, [c]Reference = Before age 55

*p<.05, **p<.01, ***p<.001

the US on a temporary basis to fill jobs originally vacated by those Americans called to serve in World War II. They worked primarily in agriculture but also building railroads and in other manual labor jobs – jobs that potentially would lead to more significant physical impairments and disability in the long term

(Hayward, Hummer, Chiu, Gonzalez-Gonzalez, et al. 2014; Massey, Durand, and Malone 2002). However, again here, once age structure differences are controlled for there are no statistically significant differences in disability rates between those who immigrated under the Bracero program and those who immigrated afterward.

**Discussion and conclusion**

This analysis makes a number of critical contributions. First of all, in providing updated estimates of older Hispanic immigrant disability prevalence, the results of this analysis confirm findings that the immigrant disability advantage does not persist into older ages for most Hispanic subgroups (Crimmins et al. 2004; Eschbach et al. 2007; Hayward, Hummer, Chiu, Gonzalez-Gonzalez, et al. 2014; Hummer et al. 2004; Markides et al. 2007; Melvin et al. 2014). By estimating prevalence rates by gender, nativity and national origin group this analysis shows that the story is not consistent across national origin and gender groups.

After disaggregating Hispanic subgroups, both American and foreign-born Puerto Ricans have among the highest estimated disability prevalence rates, while Cubans – both native and foreign born – have among the lowest (Hajat, Lucas, and Kington 2000; Markides et al. 2007; Zsembik and Fennell 2005). Others have previously attributed this to socioeconomic selectivity of these immigrant groups where the original waves of Cuban immigrants were among the upper class and Puerto Ricans among the lower class (Portes and Rumbaut 2014). Cuban and other Hispanic males are the only foreign-born groups that retain their disability advantage as compared to native-born Whites at older ages.

All of the female foreign-born groups (with the exception of other Hispanics) not only have higher disability rates in comparison to native-born White females at older ages and US-born females from the same national origin group. Moreover, older foreign-born females, across national origin groups have higher disability rates than older foreign-born males from the same country. This is also the case for working age populations. Together these gender differentials provide evidence that positive selection on health is operating less for immigrant women than for men (Markides et al. 2007). It is important to consider that research on aging independent of the immigrant and Hispanic health literature finds worse health outcomes for females than males. Thus, the findings discussed in the present research may have a more gender based rather than immigrant selection explanation (González-Rivera 2013; Smeeding and Sandstrom 2005).

The updated estimates of age standardized disability rates for Mexicans paint a particularly interesting story. While both male and female working age foreign-born Mexicans have among the lowest overall disability

rates, they have among the highest rates at older ages. Because this paper uses cross-sectional data, cohort specific factors cannot be ruled out as driving these differences. That is, it is possible that the current working age Mexicans (analyzed here) will retain their disability advantage as they age. However, because of the large size of the Mexican population in the US, these high rates of disability among the current retirement age Mexican immigrant population point to a substantial group of people with culturally specific needs.

It is imperative to parse out the mechanisms, whether cohort, selection or otherwise, that lead to these high rates of disability in the large population of Mexican immigrants. This paper starts to do this, disaggregating by age at and year of migration, finding limited impacts of either selection in either case. Instead, it seems that high ambulatory and independent living difficulty rates are driving the high rates of overall disability for both older male and female foreign-born Mexicans. Due to the fact that physical disabilities are primarily driving these high rates, the argument that employment in sectors involving manual labor and hazardous work conditions and high rates of work-related injury is a viable explanation for elevated disability rates among this population (Dong and Platner 2004; Hayward, Hummer, Chiu, Gonzalez-Gonzalez, et al. 2014; Kochhar 2005; Smith et al. 2005; Toussaint-Comeau 2006). Future research must continue to parse explanations for these findings.

In addition to providing updated estimates, this study points to the importance of taking into consideration age structure differences when comparing between group disability prevalence rates, especially when immigrants are the focus of inquiry. Here age standardization was found to increase overall estimated disability prevalence rates for all Hispanic subgroups at older ages (with the exception of both foreign and American-born Cubans). Because age structure differs between subgroups and because age plays a central role in health and disability this offers a point of caution for users of crude prevalence rates when comparing across groups (Brault 2012). For example, US government bodies report estimates of disability prevalence rates comparing race/ethnicity and nativity but do not always report age standardized estimates (Centers for Disease Control and Prevention 2013; US Department of Labor 2016; US Social Security Administration 2007). As noted by the Centers for Disease Control and Prevention, estimating "the demographic profiles of persons with different disability types, and health disparities associated with disabilities will better enable researchers and program planners to make more focused, data-driven decisions and modify existing interventions to more effectively improve the health of persons with disabilities" (Centers for Disease Control and Prevention 2013:782). However, estimates are not enough. To fully understand the demographic profiles associated with disability rates, age structure differences must be taken into account. The estimates provided here allow policymakers and service providers to consider both crude and age

standardized rates, thus taking into consideration age structure effects in the process of prioritizing policy agendas and designing services that target specific populations.

A few broad policy suggestions can be offered as a result of these findings of disability disadvantage among older Hispanics in the US. From a life course perspective, earlier life experience contributes to health outcomes in later life (Dannefer 2003; Verbrugge and Jette 1994). Thus, policy to reduce these disparities should not only focus on older Hispanics but also on reducing risk factors across the life span of this population. As such, while health insurance coverage among the older US-born Hispanic population and certain categories of immigrants[12] is quite high due to Medicare, working age Hispanics lack health insurance at higher rates (26.1%) than Whites (8.8%) and Blacks (13.5%) (US Department of Health & Human Services 2016). Within the Hispanic population, health insurance coverage is lower for the foreign-born population than for the US-born population, with non-citizens (including the undocumented) having the lowest rates of health insurance coverage (Carrasquillo, Carrasquillo, and Shea 2000; Derose et al. 2009; Ku and Matani 2001; Singh, Rodriguez-Lainz, and Kogan 2013). The primary form of health insurance in the US is employer-sponsored health insurance. In many cases, however, the jobs occupied by Hispanic immigrants, even those that are employed full time, do not include benefits like employer-sponsored health insurance (Derose et al. 2009). In addition, increases in the number of immigrants employed in informal or temporary positions, which by design offer no benefits (Alba and Foner 2015), further exacerbate the low health insurance coverage of immigrants.

This means that policy measures aimed specifically at expanding access to affordable health insurance for Hispanics, especially focused on those ineligible for Affordable Care Act (ACA) coverage due to immigration status, could have long term implications for reducing risk of disability later in life. This is especially true considering that those ineligible for ACA due to immigration status are also those most likely to be employed in riskier jobs because they have fewer job opportunities (Mehta et al. 2002; Orrenius and Zavodny 2009). In fact, expanding health insurance coverage for the disproportionate number of uninsured Hispanics in the US was an aim of the ACA (National Academies of Sciences, Engineering and Medicine 2015; US Department of Health & Human Services 2015) and while it has reduced uninsured rates among the Hispanic population by about 9 per cent (between 2013 and 2015) health insurance

[12] Legal permanent residents (LPRs) are eligible for public health insurance (Medicaid and Medicare) 5 years after gaining LPR status, whereas visa holders and undocumented immigrants are not eligible for this coverage (Oropesa, Landale, and Hillemeier 2015).

coverage disparities remain, especially for foreign-born Hispanics (Ubri and Artiga 2016). With the future of ACA uncertain, it is possible that even these gains may be reversed.

The findings of this paper also point to comparatively high levels of physical disabilities (ambulatory and independent living) among foreign-born Mexicans in the US. Here a conjectural argument that these specific disability prevalence rates are associated with high rates of Mexican immigrant employment in sectors involving manual labor and hazardous work conditions and high rates of work-related injury is supported by other evidence on this relationship (Dong and Platner 2004; Hayward, Hummer, Chiu, Gonzalez-Gonzalez, et al. 2014; Kochhar 2005; Smith et al. 2005; Toussaint-Comeau 2006). Policy efforts to increase health and safety regulations, enforce labor laws, and reduce the prevalence of informal labor economies in agriculture, construction and manufacturing where Mexican immigrants are concentrated (Zong and Batalova 2016) may reduce the risk of work-related physical stress and injury leading, through the disablement process, to disability later in life (Verbrugge and Jette 1994).

A number of limitations characterize this study. As primarily descriptive in nature, this paper offers limited analysis of the factors mediating and impacting these outcomes, besides broad theoretical hypotheses. For example, while taking into consideration nativity, race/ethnicity and sex, this study does not look at the prevalence of disability by socioeconomic status, which has been found to be the most important source of risk for disability (Siordia 2015c, 2016). While exploring the intersection of race/ethnicity and sex, without adding the intersection of class (as well as other relevant covariates), the study is limited to identifying disability disparities without making definitive explanatory conclusions. As noted previously, this is compounded by the fact that using cross-sectional data, as is done here, means examining immigrants at one point of time with no ability to study change over time, or cohort specific patterns. Further, this study only begins to address the health selection issues relevant to immigrant health and does not have the methodological ability to test the "salmon bias" hypothesis, which holds that those immigrants who experience illness return to their country of origin, resulting in artificially low rates of mortality among those who are left (Palloni and Arias, 2004).

In addition, there are a number of limitations related to data and measurement. First of all, while the Census Bureau reports high response rates of between 89.9 and 97.6 per cent for the ACS 2010-2014 housing unit based surveys (US Census Bureau 2015), there is evidence of underreporting of the Hispanic population in US Census data, and it is impossible to account for bias in estimates due to survey nonresponse (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, 2015d; Siordia and Le 2013; Siordia and Young 2013). This limitation leads some to consider between group comparisons of disability rates using ACS data as qualitative (Siordia 2014b). Finally, it is limited by qualifications that self-reporting and proxy-reporting of disability are subjective measures, which may not accurately reflect an individual's actual physical ability (Siordia 2014c; Siordia and Lewis 2015). Researchers have postulated that Hispanics may be so health pessimistic that self-reported health measures may be unreliable (Angel and Guarnaccia 1989; Hummer et al. 2004; Markides et al. 2007; Shetterly et al. 1996; Viruell-Fuentes et al. 2011). However, despite these findings self-reported measures are considered valid (Chandola and Jenkinson 2000) and are a valuable source of data for measuring disability because they are frequently used in observational studies and are accessible and replicable (Siordia 2015c). Further, ACS data is considered "the gold standard for producing reliable measures of disability in the general US population" (Siordia 2014a:262).

Taking into consideration these limitations, this paper makes a number of key contributions to the growing body of literature pointing to an immigrant health *disadvantage* at older ages. First, the estimates of both working age and retirement age disability rates disaggregated by nativity and Hispanic subgroup provide updated, critical data that allow for a better understanding of the approximate size of the population facing disability challenges. This is particularly salient in light of findings that a mortality advantage persists into old age (Angel et al. 2010; Elo et al. 2004; Hayward, Hummer, Chiu, González-González, et al. 2014; Hummer et al. 2000; Markides and Eschbach 2011; Turra and Goldman 2007), pointing to a population that will live more disabled years – what some have pointed to as a new type of paradox (Markides 2015). Further, it points to the considerable impact of age structure differences between subgroups and calls on those seeking to make between group comparisons to take these factors into account. Overall, it provides a renewed call for scholarly attention to this phenomenon, especially in light of its enormous economic, social and political implications.

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