The Pennsylvania State University

The Graduate School

Department of Sociology and Criminology

DISABILITY AMONG HISPANIC SUBGROUPS: THE EFFECT OF DURATION OF RESIDENCE ON PHYSICAL DISABILITY AMONG HISPANIC IMMIGRANTS

A Thesis in

Sociology and Demography

by

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Submitted in Partial Fulfillment

of the Requirements

for the Degree of

Master of Arts

August 2014

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ABSTRACT

The number of elderly Hispanics, most of whom are immigrants, is growing faster than any other minority group. Even though Hispanics are expected to live longer than non-Hispanic whites, they spend more years living with a disability. Elderly Hispanics are a socially vulnerable group that faces particular financial needs as they tend to have low educational attainment, high levels of poverty, and are more likely to lack health insurance. Understanding the socioeconomic factors associated with physical disability among Hispanics is critical in order to inform public policy to address the needs of this population. I use pooled data from the American Community Survey (ACS) 2008-2012 to examine differences in self-reported physical disability among Hispanic immigrants. First, I determine whether the burden of physical disability is evenly distributed among Hispanic immigrant subgroups, after accounting for demographic and socioeconomic factors. Secondly, I examine whether the relationship between duration of residence in the country and physical disability varies by Hispanic immigrant subgroup. Finally, I explore whether any association between duration of residence and physical limitations can be explained by demographic and socioeconomic differences among Hispanics. Multivariate logistic regressions indicated that there are significant differences among Hispanic immigrant subgroups with Cubans, Central Americans, Mexicans, and Dominicans being more disadvantaged than South Americans. The results indicate that there are little or no significant differences in physical disability among recent arrivals. However, among immigrants with longer residence in the country, Mexicans have higher odds of reporting physical disability than any other immigrant group. While socioeconomic factors, educational attainment, income-to-poverty ratio, occupation, race, and English ability differences reduce the association between length of residence and physical disability, these factors did not explain the observed associations. This study demonstrated that there are important differences among Hispanic immigrant subgroups in physical disability and in their health trajectories.

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INTRODUCTION

Hispanics live longer, but they spend more years living with a disability. Commonly referred as the "Hispanic Paradox," research has consistently shown that Hispanics, immigrants in particular, are expected to live longer than non-Hispanic whites despite their low-socioeconomic status (Markides 1983; Hummer et al. 2000; Palloni and Arias 2004; Turra and Elo 2008; Arias et al. 2010; Hayward et al. 2014). Unfortunately, this mortality advantage does not appear to extend to other health outcomes such as disability. Research has found that older Hispanics aged 65 and older are more likely to report a disability than non-Hispanic whites (Crimmins, Hayward, and Seeman 2004; Markides et al. 2007). Research has also found that even though foreign-born Hispanics are expected to live longer than non-Hispanic whites, they are expected to spend more years living with a disability (Hayward et al. 2014). Even more alarming, poor health and disability also appear to be associated with longer durations of U.S. residence (Cho and Hummer 2001; Huang et al. 2011; Hill, Angel, and Balistreri 2012), thus suggesting that any health advantages initially enjoyed by Hispanics are temporary.

The significance of these findings cannot be understated. Currently, Hispanics have a younger age structure than non-Hispanic whites, but the number of elderly Hispanics is projected to increase. The U.S. Census has estimated that the Hispanic population age 65 and older is expected to grow by more than six-fold, from 2.9 million in 2010 to 17.5 million in 2050, when they will represent 20% of the population in this age group (Vincent and Velkoff 2010). Furthermore, Latinos, in general, tend to have lower educational attainment, higher poverty rates, lower occupational socioeconomic index and lower rates of health insurance coverage than non-Hispanics whites (Saenz 2010). Thus, the growing number of elderly Hispanics, their high rates of poverty and their higher prevalence of disability are likely to place significant burdens on the U.S. health care system and caregivers (Angel 2003; Vega and Gonzalez 2012).

However, this may be an overly simplistic assessment of Hispanics' health and health care burdens because the Hispanic population is becoming more diverse (Lopez, Gonzalez-Barrera, Cuddington 2013). While research has documented that foreign-born Hispanics bear the greatest burden of disability of all racial/ethnic groups, very little is known about diversity in health and disability outcomes among Hispanic subgroups. The main reason is that researchers have struggled with data limitations, including inadequate numbers of Hispanics in health surveys, and the lack of measures that allow researchers to distinguish among the different Hispanic subgroups. Until very recently, scholars had difficulties defining and correctly identifying respondents of Hispanic origin in national surveys and death certificates

(Markides 1983; Arias et al. 2010). It has been documented, for instance, that the 2000 U.S. Census did a poor job in identifying Hispanics. According to Logan's estimates, the census undercounted Mexicans by 2.4 million, Central Americans by 1.2 million, South Americans by 800 thousand and Dominicans by more than one-third of a million (2002). Nevertheless, improvements to the American Community Survey (ACS) in 2008 have opened up new possibilities for researchers to examine Hispanic subgroups. In this study, I take advantage of these improvements to explore subgroup variations in the prevalence and dynamics of physical disability among Hispanics.

My study contributes to the literature on Hispanic health in three major ways. First, I explore whether the prevalence of physical limitations varies significantly across different Hispanic subgroups. Secondly, I investigate whether duration of residence in the U.S. is associated with reporting physical disability. Third, based on theoretical and empirical research linking disability to exposure to life in the United States (Cho and Hummer 2001; Cho et al. 2004; Huang et al. 2011; Elo, Mehta and Huang 2011), I examine whether the relationship between physical disability and duration of U.S. residence varies significantly across different Hispanic subgroups. Because Hispanic subgroups have different modes of entry and different experiences once they come to the United States, I expect this association to vary systematically across these groups. I draw upon the cross-national framework on immigrant health (Acevedo-Garcia et al. 2012) to develop hypotheses about differences across Hispanic subgroups. The cross-national framework is helpful because it integrates structural and cultural explanations in the study of immigrant health. It proposes that factors in the sending and receiving societies, the context of reception and the process of adaptation can influence immigrants' health while also acknowledging the role of individual-level characteristics such as acculturation. Overall, my research reveals important diversity among Hispanics with respect to the prevalence and dynamics of physical disability.

BACKGROUND: CROSS-NATIONAL FRAMEWORK FOR RESEARCH ON IMMIGRANT HEALTH

I investigate differences between foreign-born Hispanics who self-identified as South American, Cuban, Central American, Dominican or Mexican. I excluded Puerto Ricans because my focus is on Hispanic subgroups that face legal and/or physical barriers to entry the country, and as U.S. citizens Puerto Ricans can enter and leave U.S. mainland as they want (Duany 2002). Because of the inherent complexities of analyzing so many different groups, it is important to adopt a theoretical lens to interpret the similarities and differences across the groups. Although most literature on immigrant health is guided by acculturation theory, some argue that researchers should extend beyond acculturation-based understandings of health by incorporating structural factors that also could

influence health (Viruell-Fuentes, Miranda, and Abdulrahim 2012). Therefore, I used the cross-national framework for research on immigrant health proposed by Acevedo-Garcia and her colleagues (2012).

The cross-national framework identifies both structural and cultural perspectives as important for understanding immigrant health, both at the time of migration and after arrival in the destination country (Acevedo-Garcia et al.2012). More specifically, immigrants' health at the time of migration is viewed as a function of country of origin factors that have triggered events that set migration in motion and influence the demographic and social composition of migration flows. Social determinants of health in the sending and receiving context such as education, poverty and race can further impact immigrants' health both at the time of migration and after arrival. Immigrants' health after arrival is thought to be influenced by government policies, which can marginalize or alternatively welcome immigrants, and by immigrants' level of acculturation, which influences the extent to which they immerse themselves into the adoptive country's cultural practices, with the risks and benefits this entails.

In the following section, I expand on several of the factors that are proposed by the cross-national framework to influence immigrant health, specifically discussing how they relate to the Hispanic subgroups studied in this paper. I then outline my research expectations regarding the relationship between Hispanic subgroup and physical disability.

Triggering Events, U.S. Immigrant Policy, and Immigrant Health at the Time of Migration

According to the cross-national framework, triggering events and U.S. immigrant policy affect who migrates and the challenges they encounter throughout the migration process, which in turn, influence the health of immigrants upon arrival to the U.S. As briefly explained in this section, the events that have triggered flows of migration from Mexico, Central America, South America, and the Caribbean differ substantially.

Mexicans are the largest immigrant group from Latin America whose history of migration dates back to the signing of the Treaty of Guadalupe Hidalgo through which the United States annexed formerly Mexican territory. The Bracero Program (1942-1967), which strengthened the social and economic ties created with the signing of the Treaty, enabled temporal and circular migration. The sudden elimination of the Bracero program together with the imposition of a 20,000-country visa cap in 1976, however, had the predictable outcome of large increases in undocumented migration (Massey and Pren 2012). Mexican migration has also been sustained by family reunification provisions amended in the 1965 Immigration Act (Massey and Pren 2012).

The exodus from Cuba began with the establishment of a socialist regime in 1959. The new regime expropriated land, business, and companies owned by the upper and middle-classes, many of whom sought exile in the U.S. The U.S. opened its doors to Cuban exiles through the 1966 Cuban Adjustment Act (CAA), which continues to allow Cuban immigrants to apply for permanent residency after residing in the country for only one year (Wasem 2009). Despite restrictions to travel outside the country, Cubans have come to the U.S. by boat or by a third country. However, after the Rafter Crisis of 1994,when 33,000 Cubans were interdicted by the U.S. Coast Guard and encamped in Guantanamo, the U.S. and Cuba signed an agreement known as the "wet-foot, dry-foot" policy. Under this policy, only those Cubans who reach American soil are granted admission through the CAA; otherwise they are returned to Cuba (Cervantes-Rodriguez 2010; Henken 2005). While the first wave of Cuban immigrants was mainly composed by political exiles, following waves can be considered economic migrants (Portes and Bach 1985).

The exodus of Central Americans started when civil wars in El Salvador and Guatemala, the two largest source countries, killed and displaced thousands of people and debilitated the already weak economies of these countries during the 1980s. These events triggered the influx of Central American immigrants; some were fleeing persecution but others migrated due to the complicated socioeconomic repercussions of the war (Mahler 1995; Lundquist and Massey 2005; Alvarado and Massey 2010). Unlike Cubans, Central Americans were not welcome in the United States. Congress granted Salvadoran asylum seekers Temporary Legal Status (TPS) in 1990, but it wasn't until 1997, after several years of activism and a class action lawsuit filed in 1985, when the government granted Central American immigrants a chance to stay legally in the country (Menjivar 2000;2006; Coutin 2011). More recent migration from the region has been encouraged by the socioeconomic repercussions of the war and the inability of governments to address unemployment, underemployment and violence (PNUD 2008; Stoltz Chinchilla and Hamilton 2007). Finally, existing social networks have sustained the flow of migrants and it has been exacerbated by natural disasters that have left millions homeless (Massey and Garcia Espana 1987; Hagan 1994; Stoltz Chinchilla and Hamilton 2007).

Migration from the Dominican Republic and South America may have been triggered by political events but it has been sustained by economic factors. In 1961, Trujillo, a dictator who ruled the Dominican Republic for more than 30 years, was assassinated. Turmoil and political instability ensued. The U.S. ambassador, John Bartlow Martin, offered his assistance to the Dominican government through granting visas to radical Dominicans (Hernandez 2002). Some authors have argued that this event was

critical to facilitate the Dominican exodus (Grasmuck and Pessar 1991; Hernandez 2002:49). Even though political events might have facilitated initial waves of Dominican immigration to the United States, scholars maintain that economic forces, such as massive foreign debt, soaring oil prices, and unemployment have sustained migration flows since the 1970s (Hernandez 2002; Kasinitz et al. 2008, , Levitt 2007).

South American migration may have started as a response to political violence, but economic factors push migration flows to the United States. Guarnizo and Espitia (2007) suggested that *La Violencia,* a period of civil unrest in Colombia in the 1950s, may be associated with the first waves of migration from this country to the United States. Other authors have also cited drug trafficking and violence related to guerillas as the drivers of migration from Colombia during the 1980s (Collier et al. 2001; Guarnizo and Espitia 2007; Pumar 2011). However, quantitative and qualitative research has shown that economic factors such as oil price collapse, high levels of inflation, slow economic growth, and structural economic adjustment have been the main driving forces of migration from South America to the United States (Mahler 1995; Ramirez Gallegos and Ramirez 2005; Massey and Capoferro 2006).

Even though the specifics of the events setting migration in motion differ for each country or region, there is a common pattern that emerges. With the exception of the first waves, immigrants from Latin America can be characterized as economic migrants as opposed to refugees who leave due to political reasons. Economic migrants are often not the most destitute but low risk-averse individuals seeking to fulfill ambitions usually difficult to attain in their country of origin. They tend to migrate during the working ages when they are more likely to be in good health (Portes and Rumbaut 1996). Secondly, the circumstances of migration are different for each Hispanic immigrant subgroup, but they all faced challenges to leave the country and to get into the Unites States.

As outlined by the cross-national framework, triggering events and immigration policy influences the health of immigrants at the time of migration and upon arrival in the receiving country. This is largely because of health selectivity processes. Migrant selectivity theory, which has been central to the study of migration processes, posits that migrants have a set of characteristics that set them apart from their non-migrant compatriots. Simply put, not everyone migrates; even in top immigrant-sending countries not all individuals migrate or plan to migrate (Lee 1966). For example, individuals in the lowest quintile of the income distribution seldom migrate because they lack the resources to pay even the most basic costs of migration. Those who are relatively deprived, as opposed to those who live in absolute poverty, are the ones who are more likely to migrate (Stark and Bloom 1985). Thus, it is not

unemployment but the lack of job opportunities that fulfill migrants' aspirations that prompts migrants to embark in a journey to pursuit their ambitions abroad (Portes and Rumbaut 1996). Research on immigrants from Latin America, for instance, has shown that migrants are younger and have higher levels of education than their non-migrant peers (Feliciano 2005; Lindstrom and Lopez Ramirez 2010; Fernandez-Huerta Moraga 2011). Positive selection also appears to extend to health. Studies that have evaluated health selectivity across different places and immigrant groups have found evidence suggesting that migrants represent a healthier segment of the population of origin countries (Marmot, Adelstein, and Bulusu 1984; Sharma, Michalowski and Verma 1990; Landale, Oropesa and Gorman 2000; Ullmann, Goldman, and Massey 2011).

Data constraints prevent me from assessing health selectivity across the Hispanic subgroups studied in this paper, but I draw from immigrant selectivity theory to hypothesize whether I expect to find differences in health upon arrival. Jasso and colleagues' model of initial health selectivity postulates that greater geographic and cultural distances as well as higher costs of migration imply greater selectivity (2004). In addition to greater geographic distance, Lee (1966) proposed the difficulty of obstacles between the sending and receiving country also determines the degree of positive selection.

In addition to the immigration policy barriers faced either in their country of origin or in the United States, all Hispanic immigrant subgroups studied in this analysis have to overcome cultural, geographic and intervening obstacles to enter the United States. The U.S. is culturally different from Latin America, where people speak Spanish, tend to be Catholic and have a different culinary tradition. In terms of geographic distance, South Americans are the group who has to travel the longest distance, which suggests that only those individuals who can undertake the logistics and the monetary and psychological costs of relocating would migrate (Feliciano 2005). Central Americans are closer to the United States than South Americans, but they may face the most dangerous trip. Most Central Americans enter the country illegally, which means that they have to cross through Guatemala and Mexico. It has been documented that crossing Mexico is more dangerous than crossing the U.S.-Mexico border as migrants have to travel on top of trains; they are exposed to kidnappings, torture, robbery and sexual assault by drug trafficking gangs and the Mexican police (Castillo 2000; Johnson 2008; Martinez 2010; Bustamante 2011; Casillas 2011). Migration from Mexico is more diverse as a significant portion migrates legally, but the health selection has been previously documented (Ullman et al. 2011). While Cubans are offered a path to citizenship no other group enjoys, they face barriers, as it is difficult to obtain a passport to leave the island. Moreover, they have to either risk their lives by improvising a boat

to leave the country or they have to travel to a third country. Like Cubans, Dominicans also have to cross the Atlantic Ocean and it has been previously documented that Dominicans who migrate tend to have more skills, higher literacy, lower levels of unemployment, and are more likely to come from cities than non-migrants (Portes and Rumbaut 1996). Overall, although Hispanics from different origins encounter different migration circumstances, all encounter significant risks and challenges. As a consequence, I expect that there will be few or no differences in health upon arrival across the Hispanic immigrant subgroups studied.

Receiving Country Context and Health Trajectories After Migration

The previous section discussed the reasons for which I expect no differences in health upon arrival. However, as reflected in the cross-national framework, immigrant groups may follow different paths upon arrival due to differences in a variety of factors related to the social determinants of health and the U.S. context of reception. Broadly speaking, the framework proposes that government policies can determine immigrants' modes of incorporation, and how immigrants incorporate into their new host society may influence their health. Government policies can encourage migration for certain groups, facilitate their resettlement process and grant them access to the rights of its citizens (Portes and Rumbaut 1996). For instance, Cuban migration has not only been encouraged through the Cuban Adjustment Act but the government has assisted Cubans' incorporation through bilingual education programs, job training services, a college loan program, and exceptions that grant them access to government cash programs and expedite their path to citizenship. These privileges have been denied to most immigrant groups (Portes and Bach 1985; Henken 2005; Perez 2007; Wasem 2009, Cervantes-Rodriguez 2010). In contrast, government policies have not recognized the existence and contributions of Central American immigrants. These immigrants have spent years in "liminal legality," which has precluded them from getting access to resources effectively blocking their incorporation (Menjivar 2000,2006; Arias 2003; Coutin 2011). Although my research does not directly examine the impacts of government policies, I do expect that groups that have had more government support like Cubans will be healthier than groups that have had a more difficult settlement process such as Mexicans, Dominicans and Central Americans. Additionally, as outlined below, the context of reception may impact immigrant health through its interactions with other characteristics, like education, income, race, and occupation.

Education. With very few exceptions, studies show that poorer and/or less educated individuals are more likely to have worse health outcomes than wealthier/more educated people. This association has been consistent across place, age and gender (Lynch and Kaplan 2000; Goldman 2001; Adler and Newman 2002). Education is strongly associated with disability. Previous studies have found that low educational attainment is a strong predictor of disability (Pope and Tarlov 1991). Low educational attainment has been thought to be associated with the inability to control personal, social and work circumstances, poor health behaviors, and may be related to the ability to adjust and undertake the necessary changes imposed by a disabling process. Education has been hypothesized to be even more critical for the health trajectories of immigrants (in contrast to health upon arrival) because educated individuals are more equipped to obtain good quality health care and take preventive measures to avoid illness (Jasso et al. 2004).

There are important differences in educational attainment across the Hispanic subgroups. Immigrants from South America and Cuba stand out as more highly educated than other Hispanics (Portes 1976; Marrow 2007; Kasinitz et al. 2008). Dubbed the "Golden Exile", the first immigrant waves from Cuba were middle-class and upper class Cuban fleeing a socialist regime (Portes and Bach 1985). Many of them were professionals and entrepreneurs. The newer waves of Cuban immigrants were less socially advantaged but they still tended to have higher educational attainment than Central Americans, Dominicans and Mexicans (Perez 2007). In contrast to Cubans and South Americans, Central Americans, Dominicans and Mexicans tend to have lower levels of education. A substantial number of these immigrants have less than a 12^{th} grade education (Mahler 1995, Rumbaut 2006, Kasinitz et al. 2008). I hypothesize that South Americans and Cubans will experience less health deterioration than the other subgroups, and that this advantage will be explained in part by their higher educational attainment.

Income and Poverty. Family income has also been associated with poor health. Income and education are usually correlated, but income taps into the material resources that a family has. It is well known that poverty is associated with living in poor neighborhoods that have environmental hazards, inadequate housing, and poor nutrition. Not having disposable income could also be related to experiencing daily stressors, as deprived individuals feel unable to solve even relatively small problems like sending the car to the mechanic (Lynch and Kaplan 2000). It has also been proposed that poverty is associated with disability as it often marginalizes individuals, making them more vulnerable to experience a disability (Lustig and Satruser 2007). Family income is particularly important for immigrants as many immigrants experience downward social mobility during their first years in the United States

(Toussaint-Comeau 2006). Moreover, Hispanic immigrant subgroups differ in their levels of poverty. It has been reported that South Americans and Cubans tend to have higher incomes than other Hispanic immigrants (Perez 2007; Marrow 2007; Logan and Zhang 2009). In contrast, Central Americans, Dominicans and Mexicans tend to be more likely to live in poverty (Rumbaut 2006; Kasinitz et al. 2008; Logan 2009). Due to the theorized relation of poverty with disability, I expect South Americans and Cubans to have a lower prevalence of physical disability and experience less health deterioration than Central Americans, Dominicans and Mexicans; family income is expected to explain part of these differences.

Occupation. One way that immigrants' context of reception influences health is through the jobs they tend to have. Immigrants may not differ in their ambitions and willingness to work, but the conditions of the labor market, their human capital and the circumstances of their migration may steer them into different occupational paths. Newer immigrants usually settle in communities where their own ethnic group already resides (e.g. Cubans in Miami, Dominicans in New York City and Mexicans in Los Angeles). Social networks could negatively influence labor markets as they pressure immigrants to take jobs in ethnic niches, and this reinforces employers' views of immigrants as a minority position in the labor market (Portes and Rumbaut 1996). Perhaps more importantly, immigrants' human social capital constrain their occupational opportunities. Research has found that upon arrival Hispanic immigrants with low and high capital start off at the same low occupational prestige score, but those with higher human capital tend to improve their occupation status as they spend more time in the country (Toussaint-Comeau 2006). Hispanics with low human capital immigrants, however, remain stuck in low prestige backbreaking jobs (Kochhar 2005).

It has been hypothesized that physically demanding jobs are associated with a higher likelihood of disability, independent of education or income. Individuals in these types of occupations may not be able to control the conditions of their work environments and may not be able to avoid physically strenuous postures. Furthermore, individuals who work in these types of occupations are less likely to return to their previous employment due to the nature of the work and the employer's willingness to accommodate workers with disability (Pope and Tarlov 1991). Because Hispanics tend to report lower rates of cancer, cardiovascular diseases and chronic lung conditions (Crimmins et al. 2004), it has been suggested that Hispanics' high rates of disability may be linked to musculoskeletal conditions (Hayward et al. 2014). Given that Hispanics are overrepresented in physically demanding jobs (Kochhar 2005; Toussaint-Comeau 2006), this seems a plausible pathway. However, as previously discussed, not all

Hispanic subgroups follow the same occupational path. South Americans and Cubans are more likely than Mexican, Central Americans and Dominicans to work in white-collar jobs (Kasinitz et al. 2008; Stoltz Chinchilla and Hamilton 2007). Therefore, I expect a greater health decline for the latter three groups and for this disadvantage to be partially explained by the hazards and risks associated with their occupations.

Racial Discrimination. Hispanic subgroups may also experience different degrees of racial discrimination, which may explain differences in health outcomes. Racial discrimination is an important and widely studied determinant of health (Krieger 2000). However, examining the effect of race on health outcomes among Hispanic immigrants has been less popular (Viruell-Fuentes 2012). Studying racial differences among Hispanic is somewhat challenging because in Latin America there is a widespread reluctance to officially recognize racial hierarchies (Wade 2008; Telles 2013). This rejection of racial definitions is evinced in Hispanics' reluctance to pick a racial category in the U.S. census, which has been documented by several scholars (Rodriguez 2000; Landale and Oropesa 2002). For instance, Latinos have preferred the category "Other Race" in the census, not because Hispanics do not understand the question, but because they view race as a "culture, national origin, ethnicity or a combination of this and skin color" (Rodriguez 2000:13). Even after changes were made in the instructions for the race and Hispanic items in the ACS and 2010 Census (see Figures 1 and 2), a high proportion of Hispanics chose to identify their specific Hispanic-origin subgroup as their race. The census reclassified these answers as "Some Other Race" category (Humes, Jones, and Ramirez 2011)

Because of what has been previously discussed and due to the fact that black Hispanics represent a small proportion of Hispanics, some authors have re-conceptualized the process by which Hispanics experience racial discrimination. Viruell-Fuentes coined the term "othering" to describe the process by which Hispanics are stigmatized as different from the majority group, internalize their minority status and embody discrimination (2007). "Othering" draws from the weathering hypothesis, which was originally applied to explain health disparities between non-Hispanic whites and non-Hispanic blacks (Geronimus 1992,1996). Like weathering, "othering" is experienced through the interaction with institutions and individuals, and this contributes to the shaping of the individual's ascribed racial/ethnic status. The social inequalities experienced by racial minorities expose them to psychological, social, and environmental hazards, and as a consequence of coping with daily stressors the health of racial minorities is expected to deteriorate earlier in life and at a faster pace.

There is not a consensus, but some studies show darker/black Hispanics have worse outcomes than lighter skinned Hispanics. Studies have documented that darker/black Hispanics are more likely to live in segregated neighborhoods and have lower socioeconomic status, measured by education, income, and occupational prestige than lighter skin/nonblack Hispanics (Arce 1987; Denton and Massey 1989; Rodriguez 1990). Furthermore, race/darker skin among Hispanics has been associated with a higher prevalence of left ventricular hypertrophy, and higher odds of reporting poor health and high blood pressure than white Hispanics (Sorlie et al. 1988; Borrell 2006, 2008). However, other authors have found only partial or weak association between race/dark skin color and health among Hispanics (Costas et al. 1981; Landale and Oropesa 2005).

Based on the literature reviewed above, I expect Hispanics who self-identified as "black" or "other race" to experience a higher likelihood of reporting physical limitations. Further, I expect race to help explain a portion of the health differences between Hispanic subgroups. Most South Americans and Cubans perceive themselves as white and are less likely to report discrimination than other Hispanic subgroups (Portes and Rumbaut 1996; Rumbaut 2006; Kasinitz et al. 2008). In contrast, Mexicans and Central Americans have a higher proportion of immigrants with indigenous roots who have experienced marginalization both in their country of origin and in the United States (Hagan 1994; Stephen 2007; Stoltz Chinchilla and Hamilton 2007; Holmes 2013). Dominicans are the most likely to be black and the most likely to report discrimination (Rumbaut 2006; Kasinitz et al. 2008). Moreover, Mexicans are also more likely to report discrimination than Cubans (Portes and Rumbaut 1996). Therefore, I expect Central Americans', Dominicans' and Mexican's health to deteriorate faster than South Americans' and Cubans' on account of race.

Acculturation. Upon arrival, immigrants tend to be healthier than natives, but their health is thought to deteriorate with exposure to the U.S. due to abandoning their cultural practices and adopting their host country's health behaviors (Scribner and Dwyer 1989; Hajat et al. 2000; Cho et al. 2004). It has been argued, for example, that immigrants' body mass index (BMI) is initially lower than that of natives, but the gap is significantly reduced after they adopt their host country's health behaviors (Antecol and Bedard 2006; Park et al. 2009). Some studies have shown that Hispanic immigrants have some advantageous health behaviors. For example, when compared to non-Hispanic whites, less acculturated Latinos, in general, are less likely to smoke and drink alcohol than non-Hispanic whites (Abraido Lanza et al. 2005). Another example is research showing that Mexican immigrant women are less likely to smoke, drink alcohol, and use drugs, and have more positive attitudes toward pregnancy

than Mexican American women, which could be protective against poor birth outcomes (Scribner and Dwyer 1989; Zambrana et al. 1997).

According to the acculturation hypothesis, retaining immigrants' cultural practices protects them from experiencing a health decline. Therefore, less acculturated individuals should report lower rates of physical disability than the more acculturated. However, if the disabling process is more influenced by social than individual determinants of health, lack of acculturation could be detrimental as it would further limit immigrants' ability to participate in their communities. It has been documented that South Americans and Cubans are more proficient in English than Central Americans, Dominicans and Mexicans (Mahler 1985; Rumbaut 1996; Marrow 2007; Kasinitz et al. 2008). According to the acculturation hypothesis, the least English proficient groups will be more advantaged in terms of physical disability than South Americans and Cubans.

RESEARCH EXPECTATIONS

My first research question examines whether the prevalence of physical disability varies across Hispanic immigrant subgroups, without regard to duration of residence. Despite their high levels of English proficiency, South Americans are expected to be the healthiest group because they are tend to have more education and family income, are more likely to be white, and less likely to have physically demanding occupations. By contrast, Central Americans Dominicans and Mexicans are expected to be the most disadvantaged groups because of their opposite profile on these factors. Drawing upon the cross-national framework, several key aspects of the framework are tested as plausible mediators of any differences observed, namely, education, poverty, race, occupation and English ability.

Second, my research assesses whether duration of residence is associated with higher odds of disability. The literature on immigrant health (Antecol and Bedard 2006) and research on disability among immigrants (Huang et al. 2011) has found that immigrants who have spent longer time in the United States, net of their age and socioeconomic factors, have worse health outcomes than recently arrived immigrants. Thus, I expect to find a similar pattern in my research. Duration of residence is expected to be positively associated with physical disability.

Third, my paper examines whether the effect of duration of residence varies across Hispanic subgroups. As discussed above, most Latin American immigrants are economic immigrants. They leave their countries due to the lack of economic opportunities during their working-ages when health selectivity is expected to be stronger. Each Hispanic immigrant group studied in this paper experiences a degree of difficulty reaching the United States. Therefore, I expect to see little or no differences among

recently arrived immigrants. However, I expect that they follow different paths after migration. Cubans, for example, are welcome by immigration policies that aid their resettlement, while Central Americans and other immigrant groups do not have any preferential treatment. Immigrants' skills will also prove to be critical for immigrants' incorporation. South Americans and Cubans have usually with higher levels of education, which enables them to better navigate their new country. It also helps them in finding a job and moving up the social ladder. In contrast, Central Americans, Dominicans and Mexicans' low skills make their socioeconomic incorporation difficult. Thus, I expect South Americans' and Cubans' health to deteriorate more slowly than the other three immigrant groups' health. Drawing upon the cross-national framework, I further expect that education, poverty, race, occupation and English ability will explain part or all the immigrant subgroup differences in physical disability, particularly their health differences after several years of U.S. residence.

METHODS

Data Source

To explore these questions, I pooled data from the 2008, 2009, 2010, 2011, and 2012 American Community Surveys (ACS) obtained from the Integrated Public Use Micro Data Series (IPUMS) website. After 2000, the ACS replaced the long form of the census. A sample representative of each U.S. county or county equivalent is selected each month. The ACS questionnaire is then mailed to the selected monthly sample; respondents can fill out the survey electronically or returned it by mail. Those who do not respond are followed-up via telephone for a computer assisted telephone interview (CATI) one month later. One month after the CATI attempt, mail or telephone nonrespondents are contacted in person for a computer assisted personal interview (CAPI). In addition, the ACS collects data from small geographic areas and difficult to enumerate areas from 31 select test sites. The ACS partitions each county or county equivalent into 5 sub-frames. Each county sub-frame is representative of the housing unit addresses in the county. The ACS design requires that no housing unit be in the sample more than once in any 5-year period. The person sample is composed of the persons selected in the occupied housing units.

The sample used in this analysis begins in 2008 because it corresponds to the year the ACS made important changes to the questionnaire. The disability questions in the ACS 2008 were revised to reflect the conceptual framework outlined in the International Classification of Functioning, Disability and Health (ICF). The old and new disability items were tested in the 2006 ACS Content Test Survey; results showed the new items had equal or better response rates and measures of reliability indicated the new

questions performed better item by item and for the overall disability recode (Brault 2009). Moreover, comparisons between prior ACS estimates of disability and ACS 2008 estimates revealed statistical significant differences reflecting conceptual differences, real change in disability status and differences in measurement (Brault 2009).

The second important change made in 2008 is related to the Hispanic item. In 1990 the U.S. Census added examples to the "Yes, Hispanic origin" item (e.g. "Salvadoran", "Dominican", see Figures 1 and 2), but these examples were dropped in the 2000 census in order to make the survey more user friendly (Martin et al. 2007). According to Logan's estimates, however, the 2000 census did poorly in identifying Hispanics (2002). In 2008, the ACS made several changes to address these concerns. New instructions were added preceding the Hispanic origin and race questions and the examples were brought back. The new instruction clarified that Hispanic origin is not a race. These changes resulted in substantial improvements in the reporting of Hispanic origin subgroups and fewer generic Hispanic origin responses such as Hispanic or Latino. However, many Hispanics self-identified their race as "Latino" or wrote down their specific Hispanic origin, which the census reclassified to "Some Other Race" (Martin et al. 2007; Humes et al. 2011).

I restricted the analytic sample to foreign-born Hispanics of South American, Cuban, Central American, Dominican and Mexican-origin age 50 or older (N=213,829). Puerto Ricans were excluded because this study focuses on immigrants who face physical and/or legal barriers to enter the country. As a "nation on the move," Puerto Ricans rely on their American passport to move back and forth between the U.S. mainland and the island (Duany 2002). The age range excluded those younger than 50 because disability is rare in younger populations. The analytical sample was reduced by 2.6% after immigrants who arrived at age 65 or over were excluded. It has been documented that older immigrants have different characteristics than younger immigrants, which impacts their health upon arrival and health trajectories (Jasso et al. 2004, Gubernskaya, Bean and Van Hook 2013). The final analytic sample is composed of 208,171 adults of South American (28,867), Cuban (26,975), Central American (26,243), Dominican (10,697) and Mexican (115,389) origins.

Study Variables

Physical Disability: The ACS measures physical disability by asking respondents aged 5 years and older, "Because of a physical, mental or emotional condition, does this person have serious difficulty walking or climbing stairs?" This question has been previously used to measure physical disability across immigrant groups (Markides et al. 2007; Elo et al. 2011; Huang et. al 2011; Mendes et al. 2011; Gubernskaya et al. 2013). Nagi (1991) conceptualized the disabling process to be influenced by the individual's biological endowment, life style and behavior as well as the social and physical environment. This process can be reversible, but it usually progresses from pathology to impairment, to functional limitation to disability. Physical disability is expected to capture the functional limitation stage.

Hispanic Origin: The main independent variable is Hispanic origin. As shown in Figures 1 and 2, the Hispanic origin item in the ACS provides Mexican, Puerto Rican, and Cuban as boxes to check and examples to write down the specific Hispanic origin subgroup for those not identifying as Mexican, Puerto Rican, or Cuban (e.g. "Salvadoran", "Dominican" etc.). Salvadoran, Guatemalan and Hondurans are the three top-source countries from Central America. Colombia, Ecuador and Peru are the largest source countries from South America.

Duration of Residence: The second main independent variable is duration of residence in the country. This variable was tested as a continuous variable. A test of non-linearity was performed and a categorical specification was a better fit for the data. Length of residence was therefore coded as less than 10 years in the country, between 10 to 19 years and more than 20 years. There were no statistical differences found among those who have spent less than 10 years in the country.

Education: As discussed above, education is an important determinant of health (Lynch and Kaplan 2000) and disability (LaPlante 1988; Verbrugge et al. 1991; Pope and Tarlov 1991). Due to the high proportion of Hispanics with less than a high school degree, educational attainment was coded as less than 9^{th} grade, 9-12 (no diploma), high school, some college and college and above.

Family Income: Independent of education, poverty may lead to disability (Waldrop and Stern 2003; Lustig and Satruser 2007; Brault 2012). I used income-to-poverty ratio (IPR) as this is a household-level indicator that taps into family socioeconomic position instead of individual-level status. Poverty is a continuous variable that was categorized into Poor (0-99% IPR), Low Income (100-299% IPR), Middle Income (300-499% IPR), and High Income (500% IPR).

Race*:* Even though racial identification is not a direct measure of discrimination and unexplained differences in health outcomes between groups can only at best be inferred (Krieger 2000), I included

race as a one of the plausible mechanisms that may explain differences among Hispanic subgroups. Race was coded as “white”, “black”, “some other race” and “American Indian, Asian Two ore more Races.” However, the results of the race question have to be carefully interpreted. As previously discussed, after changes to the race and Hispanic items in the ACS Hispanics tend to simply identify their Hispanic origin as their race, response that the ACS recodes to “some other race” (Humes et al. 2011). Furthermore, the U.S. Census is still examining better ways to query Hispanics about race (Martin et al. 2007; Humes et al. 2011).

Occupation: It has been hypothesized that physically demanding occupations are associated with disability (Pope and Tarlov 1991, Hayward et al. 2014). In order to measure occupational hazard, I used publicly available data from the Department of Labor’s Occupational Information Network (O*NET), which is based on detailed surveys of workers in almost every occupation. Each occupation receives a score in every domain, worker abilities, interest, knowledge, skills, work activities, worker context, and work values. I used the scores for the physical work conditions subcategory of the Work Context Domain in the 2014 update to O*NET (version 18.1) to classify occupations into three categories: “not physically demanding and not exposed to hazards”, “physically demanding” , “exposed to hazards”, and “unemployed/not in the labor force/unknown”. All occupations in the physical work conditions module receive a score in each of the dimensions of the physical work conditions domain, with the highest score (100) given to the occupation that is exposed to hazards, contaminants or a physically demanding environment every day, and the lowest score (0) to the occupation that is never exposed. I chose the 30 occupations with the highest scores to code the occupation variable used in this study. The “physically demanding” category was created by using the following dimensions of the physical work conditions: bending or twisting, crouching or kneeling, climbing ladders, making repetitive motions, walking, and standing. The “exposed to hazards” category was coded using the following dimensions of the work context domain: exposed to hazardous conditions, exposed to weather, exposed to very hot or cold temperatures, exposed to contaminants, and exposed to high places. Occupations with top-30 scores in either category were coded as “physically demanding or exposed to hazards.” The unemployed/not in the labor force/unknown category was created from the occupation variable in the ACS. All other occupations were coded “not as physically demanding and not exposed to hazards”.

English Ability: The ability to speak English is often used to measure acculturation (Viruell Fuentes 2012). English ability is expected to reflect immigrants’ degree of acculturation (Arcia et al. 2001) and may be associated with worse health. English proficiency was determined by using a question that asks:

"How well does this person speak English." Response options were: "Does not speak English", "Yes, but not well", "Well, "Very Well", and "Only English." The options well and very well were collapsed into one category.

Controls*:* I also included marital status, health insurance, U.S. region and year of survey as statistical controls.

Analytical Strategy

Descriptive statistics were produced to summarize the study variables presented in Table 1. Multivariate logistic regression was used to assess the relationship between physical disability and the independent variables of interest. The first set of models, shown in Table 2, determined whether there are differences in physical disability between South Americans and the other groups and estimated the relationship between duration of residence and physical disability. In Table 3 I tested whether the effect of duration of residence on physical disability significantly varies by Hispanic immigrant subgroup. I conducted all the analysis in Stata 13.0. In order to account for the complex sample design of the survey, all statistical analyses were weighted using the person weight, while accounting for strata and cluster. Because several years of ACS data were combined, the weights were normalized.

RESULTS

Descriptive Results

Table 1 presents the weighted statistics for the sample. Reflecting their longer history in the country, more than half of the sample is of Mexican origin. In contrast, only 5% of the sample is of Dominican origin. Cubans and Dominicans have the highest unadjusted prevalence of physical disability, and South Americans and Central Americans have the lowest prevalence. The mean age of Cubans (66) reflects their older age structure compared with the other groups. Except for Mexicans, all groups have a higher proportion of females than males. Hispanic immigrant subgroups appear similar in terms of their length of residence. Roughly three-quarters (77%) of the sample has spent more than 20 years in the country.

Disaggregating Hispanics into subgroups reveals important socioeconomic heterogeneity. South Americans and Cubans stand out as the most successful groups, while Dominicans, Mexicans and to a lesser degree Central Americans are the most disadvantaged groups. While over two-thirds of Mexicans and about half of Central Americans and Dominicans have less than a high school degree, nearly 50% of South Americans and close to 40% of Cubans have completed post-secondary education. South

Americans and Cubans are more likely to live in households whose income exceed 500% of the federal poverty line, while Dominicans are more likely to live below the poverty line than any other group. Aligned with having higher education, the descriptive statistics show South Americans tend to be employed in jobs that are not physically demanding or are exposed to occupational hazards. In contrast, Central Americans tend to have backbreaking jobs and Mexicans are more likely to be exposed to physical and environmental hazards than other groups.

There are important differences in how Hispanic subgroups report their race. Nine out of ten Cubans self- identified as white. Similarly, nearly 73% of South Americans reported their race as white. While Central Americans and Mexicans also tend to choose white as their race, at least one-third of Central Americans and Mexicans preferred "some other race." In contrast with other groups, Dominicans have a higher proportion of blacks and more likely to pick "some other race" than white.

Not surprisingly, only a small proportion of Hispanic immigrants speak only English, but the ability to speak English varies across the Hispanic subgroups. Mexicans and Dominicans are the least likely to speak English. In contrast, 56% of South Americans, 47% of Cubans and 44% of Central Americans speak English well or very well.

There are also differences in other socioeconomic factors. Cubans are the group most likely to have insurance while Mexicans are the least likely. Mexicans are the group with the highest proportion of married respondents while Dominicans are less likely to be married than the other groups.

Regression Results

Group Differences in Physical Disability

Table 2 examines whether the prevalence of physical disability varies systematically across Hispanic subgroups net of other factors. As shown in *Model 1* in Table 2, after accounting for age and gender differences all immigrants' subgroups are more likely to report physical disability than South Americans. Without adjusting for important socioeconomic factors, Dominicans are the most disadvantaged group; they are more than twice as likely to report a physical disability as South Americans.

When duration of residence is introduced in *Model 2* the coefficients for all the groups decreased slightly, which shows that duration of residence explains some of the difference between the groups and South Americans. More importantly, this model shows that after accounting for the effect of age, exposure to the United States is associated with greater logged-odds of reporting a disability. For instance, those who have spent less than 10 years in the country have 36% ((OR=exp(-0.44)-1)*100=36) lower odds of reporting a physical disability than those who have lived 20 or more years in the country.

Models 3 – 6 test whether key aspects of the cross-national framework can explain the differences in the prevalence on physical disability across Hispanic immigrant subgroups. *Model 3* tests whether the differences observed are explained by education and poverty. These two variables are independently associated with physical disability (tested in models not shown). Model 3 shows that those with lower educational attainment and higher rates of poverty are more likely to report a physical disability than those with higher levels of education and more income. The addition of these predictors has a more profound effect on the Hispanic group differentials than any other of the predictors, particularly for Mexicans and Central Americans. The logged-odds for Mexicans are reduced by 45% and 38% Central Americans and 35%. The logged-odds for Cubans and Dominicans are reduced by about one-third.

Model 4 tests whether working on physically breaking or hazardous jobs explains why there is variation in differences in physical disability differences across subgroups. As previous research has suggested, working on physically demanding occupation such as housekeepers and janitors increases the odds of reporting a physical disability by 28% (OR=exp(0.24)=1.28) compared to be employed in occupations that are not physically demanding or are exposed to hazards. In contrast, working on an occupation exposed to environmental hazards is not related to the likelihood of reporting a physical disability. Occupation seems to explain at least part of the differences between the groups and South Americans. Occupation has a stronger effect on reducing the differences for Cubans and Mexicans with respect to South Americans. The logged-odds for Cubans are reduced by about 25% and for Mexicans by about 20%.

Model 5 explores whether racial differences could explain the differences observed. The model shows that there are significant differences between Hispanic immigrant subgroups on the account of race. Black Hispanics are 29% (OR=exp(0.26)=1.29) more likely to report a physical disability than white Hispanics. However, Hispanics who responded “Some other race” are not significantly different from white Hispanics. These results are consistent with the literature. It has been found that darker/black Hispanics are more likely to experience health deterioration that lighter/white Hispanics (Borrell 2005,2006). In contrast, several authors have found that first generation Hispanics were less likely to report discrimination perhaps due to living in ethnic enclave (Viruell Fuentes 2007). Nevertheless, race does very little to explain the differences between the groups. It modestly reduces the logged-odds ratios for Dominicans by 5% and by 4% for Central Americans, but it does not reduce the logged-odds for Cubans, Central Americans and Mexicans.

Model 6 tests whether differences in acculturation, measured by English ability, explain the variation in physical disability across Hispanic subgroups. In contrast with the immigrant acculturation literature, not speaking English is actually detrimental for immigrants' likelihood of reporting a physical disability. Those who seem to be particularly advantaged are immigrants who speak English well or very well; they are 48% (OR=(exp(-0.65)-1)*100=48) less likely to report a physical disability than those immigrants who do not speak English. Moreover, English ability seems to reduce the ethnic differentials, particularly for Dominicans and Mexicans.

Finally, *Model 8* includes the complete set of covariates and controls (marital status, health insurance, U.S. region and year of survey are also included). Results confirm the hypothesis that the prevalence of physical disability varies significantly across Hispanic subgroups. Controlling for the complete set of covariates, all the Hispanic subgroups are more likely to report a physical disability than South Americans. The covariates explain some but not all of the differences in physical disability. Interestingly, without adjusting for socioeconomic and demographic differences, Dominicans are the most disadvantaged. Nevertheless, comparing Model 1 to Model 8 shows that about 70% of the difference between Dominicans and South Americans is explained by the risk factors included in the model. Model 8, however, shows that after controlling for the complete set of risk factors, Mexicans have the highest odds of reporting a disability (OR=exp(0.44)=1.55).

Durational Differences in Physical Disability

The coefficients for duration of residence show that immigrants who have spent less time in the country are less likely to report a physical disability than those who have spent more than 20 years in the country. Controlling for all the risk factors slightly decreases the magnitude of the coefficients but does not eliminate the differences. For instance, looking at the difference between Models 2 and 7 in Table 2, the logged-odds for those who have spent less than 10 years in the country were reduced by 25% but the coefficients are still significant. Similarly, the mediators reduced the logged-odds for those who have lived in the country for more than 10 years but less 19 years in the country by 35%. Consistent with previous research, this paper shows that exposure to the United States is associated with the deterioration of immigrants health even after accounting for aging and other confounders (Huang et al. 2011). Thus, the results suggest that any healthy advantage among Hispanic immigrant is temporary and this health decline is difficult to explain with the measures available in the ACS.

Group Differences in Duration Effects

Table 3 investigates whether the effect of duration of residence on physical disability varies across Hispanic subgroups. I am particularly interested in ethnic differences among those who have lived in the U.S. for several years. To explore this, *Model 1* includes the interaction between Hispanic subgroup and duration of residence controlling for age and sex. Notice that South Americans are the reference group for Hispanic ethnicity and "20 years or more" is the reference group for duration of residence. This means that when the interaction terms between duration and Hispanic ethnicity are included in the model (as they are in Table 3), the main effects for Hispanic ethnicity reflect differences from South Americans *among those who have spent more than 20 years in the country*.

Adjusting for age and sex in Model 1, Cubans, Central Americans, Dominicans and Mexicans who have spent more than 20 years in the country have higher logged-odds of reporting physical disability than South Americans who have spent the same number of years in the country. Without including all the risk factors, among those with longer time in the U.S., Dominicans are worse off than any other group; they are more than twice as likely (OR=exp(0.81)=2.26) to report physical disability as South Americans. It is important to state that when I changed the reference group of duration of residence to "less than 10 years" in the country, only Mexicans were significantly different than South Americans but this is a small difference in magnitude. The results so far confirm my expectations. There are small differences between Hispanic subgroups that have spent less than 10 years in the country. However, as immigrants spend more time in the country, differences increase and become significant.

Model 2 to Model 6 examine whether key aspects of the cross-national framework can explain part or all of the observed differences the variation by Hispanic immigrant subgroup of the effect of duration of residence on physical disability. The associations between education, poverty, race, occupation, and language with disability have already been discussed for Table 2, and the associations in Table 3 do not differ substantively from those in Table 2. I therefore focus here on whether the addition of these factors explains the ethnic differences among those in the country for 20 or more years (i.e., the main effects of Hispanic ethnicity).

Model 2 tests whether the differences observed are explained by education and poverty. The additions of these two factors have a more profound impact on reducing the ethnic differences than any of the other covariates for all the subgroups. Among those in the country for 20 or more years, the logged- odds for Mexicans are reduced by 42% and for Central Americans are reduced by 35%. The logged-odds for Dominicans are reduced by 33% and the logged- odds for Cubans are reduced by 28%.

Model 3 tests whether working on physically breaking or hazardous jobs explains why there is variation in immigrants' health trajectories. Even though the addition of occupation reduces the differences between the subgroups and South Americans, its effect is more modest. The logged-odds are reduced by about 20% for Cubans, Dominicans and Mexicans. In contrast, adding occupation reduces the logged- odds for Central Americans by 8%.

Model 4 examines whether racial differences could explain the differences observed. Race is the weakest of all mediator effects. It does not reduce the ethnic differences for Cubans and Mexicans. Even for the groups with higher proportion of blacks, its effect is modest. For Central Americans, it reduces the logged-odds by 4%, and for Dominicans, it reduces the logged-odds by 5%.

Model 5 tests the cultural buffering hypothesis that more acculturated individuals are more likely to experience health deterioration than those who are linguistically isolated. Inconsistent with this view, speaking English is associated with lower logged-odds of reporting a physical disability. Additionally, accounting for the ability to speak English reduces the ethnic differences for all the groups. It has a stronger effect for Mexicans, reducing the logged- odds by 23%; for Central Americans it reduces the logged-odds by 18%, for Dominicans, by 17%, and Cubans, by 14%.

Model 6 includes all controls. While the inclusion of all controls reduces the differences between the groups, they don't explain the differences entirely. Compared to Model 1, including all the risk factors reduces the ethnic differences in physical disability by 67% for Dominicans, 46% for Cubans, 29% for Mexicans and 22% for Central Americans.

To help interpret the results, Figure 3 graphs the predicted probabilities from Model 6, evaluated at mean levels of all covariates and controls. Within each category of duration of residence, the stars above the bar graphs indicate whether Cubans, Central Americans, Dominicans and Mexicans are each significantly different from South Americans (differences were tested using post-estimation tests in stata). Among those who have spent less than 10 years in the country, Mexicans are the only group that is significantly different from South Americans. However, this is a small difference in magnitude. The prevalence of physical disability among Mexican immigrants who have spent less than 10 years in the country is about 7%, two percent points higher than that of South Americans. As hypothesized, as immigrants spend more time in the country the prevalence of physical disability increases and becomes significant. Among those who have spent more than 10 but less than 20 years in the country, the prevalence of physical disability is significantly higher for Central Americans, Dominicans and Mexicans. Cubans, who were expected to be more advantaged than immigrants from

these three places, are not significantly different form South Americans. Lastly, among immigrants with longer time in the country, all immigrant subgroups are more likely to report a disability than South Americans. The predicted probability of reporting physical disability among Mexicans who have spent more than 20 years in the country increases to about 12%. In contrast, the predicted probability of reporting physical disability among South Americans who have spent more than 20 years in the country is about 8%.

Figure 4 presents the predicted probabilities from Model 6 but rearranges the information by Hispanic group, which is helpful to see the duration effect. As illustrated in the previous graph, exposure to the U.S. has a detrimental effect for all Hispanic immigrants. Figure 4, however, illustrates the effect of duration within each Hispanic immigrant subgroup; the star above the bar indicates that those with longer residence in the U.S. are significantly different from recently arrived immigrants. For instance, the effect of duration seems to be less detrimental for South Americans. The recently arrived South Americans have low probability of reporting physical disability, and it seems that their health deteriorates at slower pace than any other group. Only South Americans who have spent more than 20 years in the country have prevalence of physical disability significantly higher than recent arrived South Americans. Recent Mexicans start at somewhat higher probability of reporting physical disability, but their health deteriorates at slower pace during the first 20 years. However, after twenty years the probability of reporting a physical disability increases to 12%. In contrast, the health of Central Americans seems to deteriorate faster initially. The gap between recent arrivals and immigrants with less than 20 years is bigger than the difference between the latter and immigrants with longer time in the country.

DISCUSSION

Research has consistently shown that foreign-born Hispanics tend to live longer than non-Hispanic whites, a paradoxical finding given Hispanic's low socioeconomic status. Unfortunately, longer life for Hispanics is associated with a long period of disability (Hayward et al.2014). Currently a small proportion of people age 65 and older are Hispanic, but the elderly Hispanic population is expected to growth both numerically and proportionally. This growth, coupled with Hispanics' high poverty rates, low educational attainment, and high number of undocumented immigrants, represents a concern for policy makers, and highlights how important it is for researchers to better understand the disablement process for all Hispanic subgroups as Hispanics are also becoming more diverse.

This research sought to contribute to the literature on Hispanic immigrants' health disparities by examining whether there are statistically significant differences in the odds of reporting physical disability across Hispanic subgroups after accounting for important socioeconomic indicators. Second, it investigated whether Hispanic immigrants' health trajectories in physical disability differ and what factors explain these differences. As expected, the results indicated that after accounting for all the risk factors studied in this analysis there are significant differences between Hispanic immigrant subgroups. Cubans, Central Americans, Dominicans and Mexicans have higher odds of reporting physical disability than South Americans.

With respect to the second research question, Hispanic health trajectories do vary. There existed few significant differences in physical limitations among newly-arrived Hispanic subgroups. However, immigrants' health trajectories begin to diverge as they spend more time in the country. Central Americans, Dominicans and Mexicans become more disadvantaged as they spend more time in the country than do South Americans and (to a lesser degree) Cubans.

What explains these group differences? According to the cross-national framework for research of immigrants' health, factors in both the receiving and sending country could potentially account for group differences in health at the time of migration and after arrival. When considering these ideas, the similarity among the groups near the time of migration might possibly be explained by the fact that all Hispanic immigrant subgroups face obstacles in order to migrate to the United States, which in turn, can lead to greater levels of positive health selectivity among those who are successful in migrating. My analyses were unable to directly test this, so this idea remains speculative. Further research that compares immigrants with non-immigrants in sending countries is necessary to assess the level and direction of health selection.

The results further suggested that many of the key elements of the cross-national perspective are important for understanding physical disability differences between Hispanic subgroups, particularly among those who have lived in the U.S. for several years. Two of the most important mediators were educational attainment and family income. Despite prior work showing flatter socioeconomic health gradients among immigrants than natives (Acevedo-Garcia et al. 2010), I found that immigrants with the lowest educational attainment are more disadvantaged than highly educated immigrants. Similarly, immigrants whose families live below the federal poverty are more prone to experience physical disability. The results show that these two determinants of health are both strong predictors of physical disability among Hispanic immigrants and accounting for them do reduce the difference between the subgroups for all immigrants and among those who had lived in the U.S. for 20 years or more.

The framework also proposes that the context of reception matters for immigrants because it opens or closes doors for socioeconomic mobilization, and the context of reception combined with immigrants' skills can affect whether the immigrant is capable of moving up the occupational ladder. It has also been proposed that physically demanding occupations may be associated with a high likelihood of experiencing disability. My research tested this assertion and found that physical demanding occupations are related to reporting physical disability.

Group differences in acculturation, as indicated by English proficiency, also helped explain group differences overall and among those in the country for 20 or more years. However, this factor did not operate in the expected direction. In contrast to the acculturation perspective, the results here indicate that not speaking English makes immigrants more vulnerable. Additionally, low English proficiency helps explain the disadvantages of some of the subgroups health. . Not speaking English may be make immigrants vulnerable. For example, it has been found that older immigrants with limited English proficiency are less likely to attend a regular physician and are less likely to receive preventive care (Kim et al. 2011). Other studies have also indicated that English ability, particularly for older immigrants, reflects the degree to which immigrants interact with members of the broader society and thereby reflects their ability to function in society (Hazuda and Espinoza 2012).

Finally and unexpectedly, race did not help explain the subgroup differences. Black Hispanics were more likely to report physical disability than white Hispanics. However, race does very little to reduce the subgroup differences. Even among Dominicans with 20 or more years in the country (among whom there is a substantial proportion of blacks), race explained only about 5% of the difference from South Americans.

Overall, improvements in the identification of Hispanics in the ACS allowed me to investigate differences among the Hispanic subgroups in more detail than is possible with other data sources. For instance, the National Health Interview Survey (NHIS) combines Central and South Americans together in one category, but this study demonstrated that there are observable socioeconomic and health outcomes differences between Central Americans South Americans.

However, this study is not without limitations. First, although many of the indicators in the model helped explain group differences, they do not reduce the differences to zero. This may be due to several reasons. Namely, the ACS contains rich socio-economic data, but it lacks a variety of health measures. Thus, important health determinants of health were omitted, which could potentially bias the results. Research has shown that underweight, overweight, diabetes and arthritis are health risk factors associated with disability (Gerst et al. 2012, Ham-Chande and Mejia-Arango 2012, Hazuda and Espinoza 2012). More importantly, at least one study has shown that BMI is associated with a faster transition from disable-free to disabled life in older Americans (Al Snih et al. 2007). Given that immigrants' body mass index (BMI) increases with time in the U.S. (Gordon-Larsen et al. 2003, Antecol and Bedard 2006, Park et al. 2009) and that Hispanics, particularly Mexicans, have a high prevalence of diabetes (Harris et al. 1998, Mokdad et al. 2001, Borrell et al. 2009), it seems important to at least control for BMI and/or diabetes. Secondly, even though the item on physical disability on the ACS has been improved, it focuses in two dimensions only, walking and climbing stairs. Further studies should test other disability outcomes such as Independent Activities of Daily Living (IADL) and Activities of Daily Living (ADL). Another limitation is that I cannot establish the direction of causality between occupation and disability. For example, I cannot determine what proportion of the respondents with a disability is unemployed due to a disability. Finally, I cannot measure to what extend return migration bias the results. That is, do sick immigrants return home, and, if so, whether this varies systematically across Hispanic subgroups?

Despite these limitations, this study provides new information about the diversity of the Hispanic foreign-born population. In particular, this research demonstrates that Hispanics are not monolithic with respect to poor health. It showed that there are significant differences between two groups commonly lumped together in national surveys (South Americans and Central Americans), and it demonstrated that Hispanic immigrants' health trajectories do differ. This research has policy implications, as it shows that education and English ability, for example, are important predictors. As such, effective public health initiatives should address these socioeconomic indicators. For instance, some researchers have suggested funding low-tech solutions like community health workers or

promotores de salud, who could bridge the gap between immigrants and the U.S. health care system (Vega and Gonzalez 2012).

Finally, I will continue to study the topic of disability among immigrants. In future research, I will compare groups using other disability dependent variables such as IADL and ADL. Furthermore, I will look more closely at the gender differences as research has shown that immigrant women are more vulnerable than men (Hayward et al.2014). I also want to look at differences in diabetes across Hispanics subgroups and examine whether diabetes explains the differences in immigrants' trajectories.

APPENDIX A

Table 1. Sample Characteristics of Hispanic Immigrants Aged 50 and over (proportions)

	All groups	South Americans	Cubans	Central Americans	Dominicans	Mexicans
	(N=208,171)	(N=28,867)	(N=26,975)	(N=26,243)	(N=10,697)	(N=115,389)
Physical Disability	0.14	0.09	0.18	0.12	0.17	0.15
Mean Age	61 (9.73)	61 (9.33)	66 (11.17)	60 (8.93)	61 (9.32)	60 (9.31)
Female	0.53	0.56	0.53	0.57	0.59	0.50
Duration of Residence (Ref >=20)						
Less than 10	0.09	0.13	0.09	0.07	0.10	0.07
10-19	0.15	0.20	0.13	0.14	0.18	0.14
20 or more	0.77	0.68	0.77	0.78	0.72	0.79
Education						
Less than 9th	0.44	0.14	0.22	0.38	0.39	0.58
9-12 (No Diploma)	0.12	0.09	0.13	0.12	0.14	0.12
High School	0.20	0.29	0.26	0.23	0.22	0.15
Some College	0.14	0.23	0.18	0.16	0.15	0.10
College or above	0.11	0.24	0.21	0.11	0.11	0.05
Income to Poverty-Ratio						
Poor (<100% IPR)	0.18	0.12	0.20	0.16	0.25	0.20
Low Income (100%-299% IPR)	0.49	0.41	0.42	0.49	0.47	0.53
Middle Income (300%-499% IPR)	0.20	0.25	0.19	0.22	0.18	0.19
High Income (>=500% IPR)	0.12	0.22	0.19	0.13	0.11	0.08
Race						
White	0.67	0.73	0.91	0.55	0.35	0.67
Black	0.02	0.01	0.03	0.04	0.12	0.00
Some other race	0.27	0.21	0.04	0.35	0.46	0.30
American Indian/Asian/Two or more	0.03	0.05	0.02	0.05	0.07	0.03
Occupation						
Not physically demanding/not exposed to hazards	0.25	0.37	0.29	0.25	0.25	0.21
Physically Demanding	0.21	0.22	0.13	0.28	0.24	0.21
Exposed to Hazards	0.17	0.11	0.09	0.16	0.09	0.20
Unemployed/NLF/Unknown	0.37	0.30	0.49	0.30	0.42	0.38
English ability						
No, does not speak	0.23	0.11	0.21	0.18	0.26	0.27
Yes, but not Well	0.31	0.27	0.26	0.32	0.36	0.33
Very Well/Well	0.41	0.56	0.47	0.44	0.34	0.35
Only Eng	0.05	0.06	0.06	0.06	0.04	0.05
Health insurance	0.69	0.74	0.83	0.65	0.80	0.64
Marital Status						
Married	0.62	0.61	0.54	0.55	0.48	0.67
Separated	0.05	0.05	0.03	0.06	0.09	0.05
Divorced	0.13	0.17	0.17	0.14	0.21	0.09
Widowed	0.11	0.10	0.16	0.10	0.11	0.11
Never Married	0.09	0.08	0.09	0.15	0.11	0.08
U.S. Region						
Northeast	0.15	0.38	0.11	0.17	0.80	0.02
Midwest	0.07	0.04	0.02	0.04	0.01	0.09
South	0.38	0.41	0.81	0.36	0.18	0.31
West	0.40	0.16	0.06	0.43	0.01	0.58

Source: American Community Survey 2008-2012

Note: Mean and standard deviation are included for continuous variable (age)

Table 2: Logged-Odds of Physical Disability among Hispanic Immigrants (N=208,171)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Immigrant Group							
Ref=South Americans							
Cuban	0.35 ***	0.34 ***	0.24 ***	0.26 ***	0.35 ***	0.29 ***	0.16 ***
Central American	0.45 ***	0.42 ***	0.26 ***	0.37 ***	0.40 ***	0.34 ***	0.31 ***
Dominican	0.80 ***	0.80 ***	0.54 ***	0.65 ***	0.75 ***	0.66 ***	0.25 ***
Mexican	0.66 ***	0.64 ***	0.35 ***	0.50 ***	0.64 ***	0.49 ***	0.44 ***
Age	0.08 ***	0.08 ***	0.07 ***	0.05 ***	0.08 ***	0.07 ***	0.04 ***
Gender (Female=1)	0.41 ***	0.42 ***	0.40 ***	0.17 ***	0.42 ***	0.38 ***	0.10 ***
Duration of Residence							
Ref = >=20							
10-19		-0.20 ***	-0.30 ***	-0.22 ***	-0.20 ***	-0.37 ***	-0.27 ***
Less than 10		-0.44 ***	-0.57 ***	-0.57 ***	-0.44 ***	-0.66 ***	-0.55 ***
Education			0.46 ***				0.218 ***
Ref=College or above							
Less than 9th			0.28 ***				0.133 **
9-12 (No Diploma)			0.19 ***				0.071 +
High School			0.17 ***				0.127 **
Some College							
Income to Poverty Ratio							
Ref= High Income >=500% IPR							
Poor (<100% IPR)			1.10 ***				0.795 ***
Low Income (100%-299% IPR)			0.61 ***				0.495 ***
MiddleIncome (300%-499% IPR)			0.26 ***				0.198 ***
Occupation							
Ref=Not demanding/not exp. to hazards							
Physically Demanding				0.24 ***			0.10 **
Exposed to Hazards				0.06			-0.04
Unemployed/NLF/Unknown				1.33 ***			1.07 ***
Race							
Ref=White							
Black					0.26 ***		0.268 ***
Some Other Race					0.04 +		0.006
American Indian/Asian/Two or more					0.09 **		0.125 **
English ability							
Ref=Does not speak English							
Not Well						-0.26 ***	-0.16 ***
Very Well/Well						-0.65 ***	-0.38 ***
Only Eng						-0.47 ***	-0.30 ***
Intercept	-7.77 ***	-7.56 ***	-7.66 ***	-6.19 ***	-7.58 ***	-6.73 ***	-6.06 ***

****p<.001; **p<.01; *p<.05; +p<0.10*

Source: American Community Survey 2008-2012

Notes: Model 7 also includes health insurance, marital status, U.S. region and year of survey

Table 3. Logged-Odds of Physical Disability among Hispanic Immigrants by Duration of Residence (N=208,171)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Immigrant Group						
Ref=South Americans						
Cuban	0.33 ***	0.24 ***	0.26 ***	0.34 ***	0.29 ***	0.18 ***
Central American	0.44 ***	0.28 ***	0.40 ***	0.42 ***	0.36 ***	0.34 ***
Dominican	0.81 ***	0.54 ***	0.66 ***	0.77 ***	0.67 ***	0.27 ***
Mexican	0.68 ***	0.40 ***	0.55 ***	0.68 ***	0.52 ***	0.48 ***
Duration of Residence (Ref >=20)						
10-19	-0.11	-0.20 **	-0.10	-0.11	-0.27 ***	-0.15 *
Less than 10	-0.30 **	-0.40 ***	-0.38 ***	-0.30 **	-0.52 ***	-0.35 ***
Cuban						
10-19	0.11	0.07	0.09	0.11	0.07	-0.03
<10	0.08	0.00	0.01	0.08	0.01	-0.14
Central American						
10-19	0.01	-0.02	-0.02	0.01	-0.01	-0.02
<10	-0.22	-0.30	-0.30	-0.22	-0.25	-0.32 +
Mexican						
10-19	-0.20 *	-0.21 **	-0.25 **	-0.20 **	-0.20 *	-0.20 *
<10	-0.19	-0.21 +	-0.24 *	-0.19 +	-0.16	-0.22 +
Dominican						
10-19	0.00	0.07	0.02	0.00	0.02	0.01
<10	-0.32 +	-0.30 +	-0.27 +	-0.33 +	-0.32 +	-0.32 +
Age	0.08 ***	0.07 ***	0.05 ***	0.08 ***	0.07 ***	0.04 ***
Female	0.43 ***	0.40 ***	0.17 ***	0.43 ***	0.39 ***	0.10 ***
Education						
Ref=College or above						
Less than 9th		0.46 ***				0.22 ***
9-12 (No Diploma)		0.28 ***				0.13 **
High School		0.19 ***				0.07 +
Some College		0.18 ***				0.13 **
Income to Poverty Ratio						
Ref= High Income >=500% IPR						
Poor (<100% IPR)		1.10 ***				0.79 ***
Low Income (100%-299% IPR)		0.61 ***				0.49 ***
MiddleIncome (300%-499% IPR)		0.25 ***				0.19 ***
Occupation						
Ref=Not demanding/not exp. to hazards						
Physically Demanding			0.24 ***			0.10 **
Exposed to Hazards			0.06 +			-0.04
Unemployed/NLF/Unknown			1.33 ***			1.07 ***
Race						
Ref=White						
Black				0.26 ***		0.27 ***
Some Other Race				0.04 +		0.01
American Indian/Asian/Two or more				0.09 *		0.13 **
English ability						
Ref=Does not speak English						
Not Well					-0.26 ***	-0.16 ***
Very Well/Well					-0.65 ***	-0.38 ***
Only Eng					-0.47 ***	-0.30 ***
Intercept	-7.59 ***	-7.96 ***	-6.24 ***	-7.62 ***	-6.77 ***	-6.10 ***

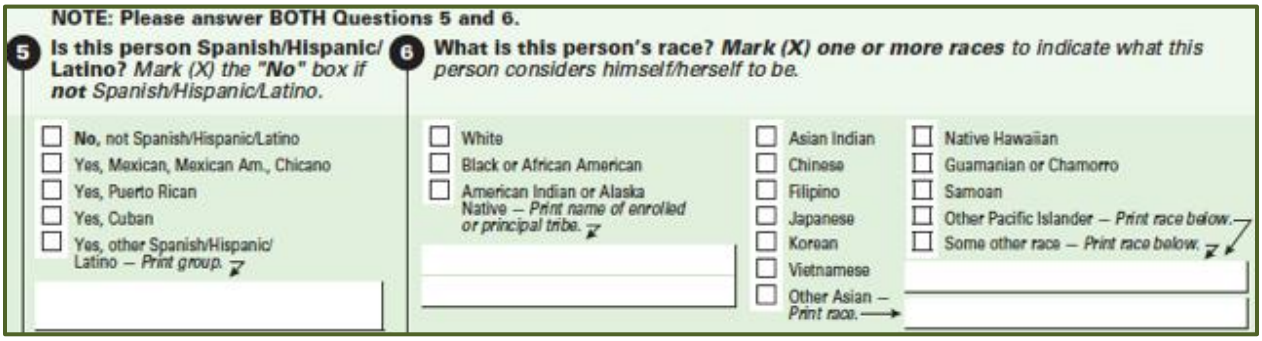
****p<.001; **p<.01; *p<.05; +p<0.10*

Source: American Community Survey 2008-2012

Notes: Model 6 also includes health insurance, marital status, U.S. region and year of survey

APPENDIX B

FIGURE 1: ACS 2007 Hispanic and Race Questions



NOTE: Please answer BOTH Questions 5 and 6.

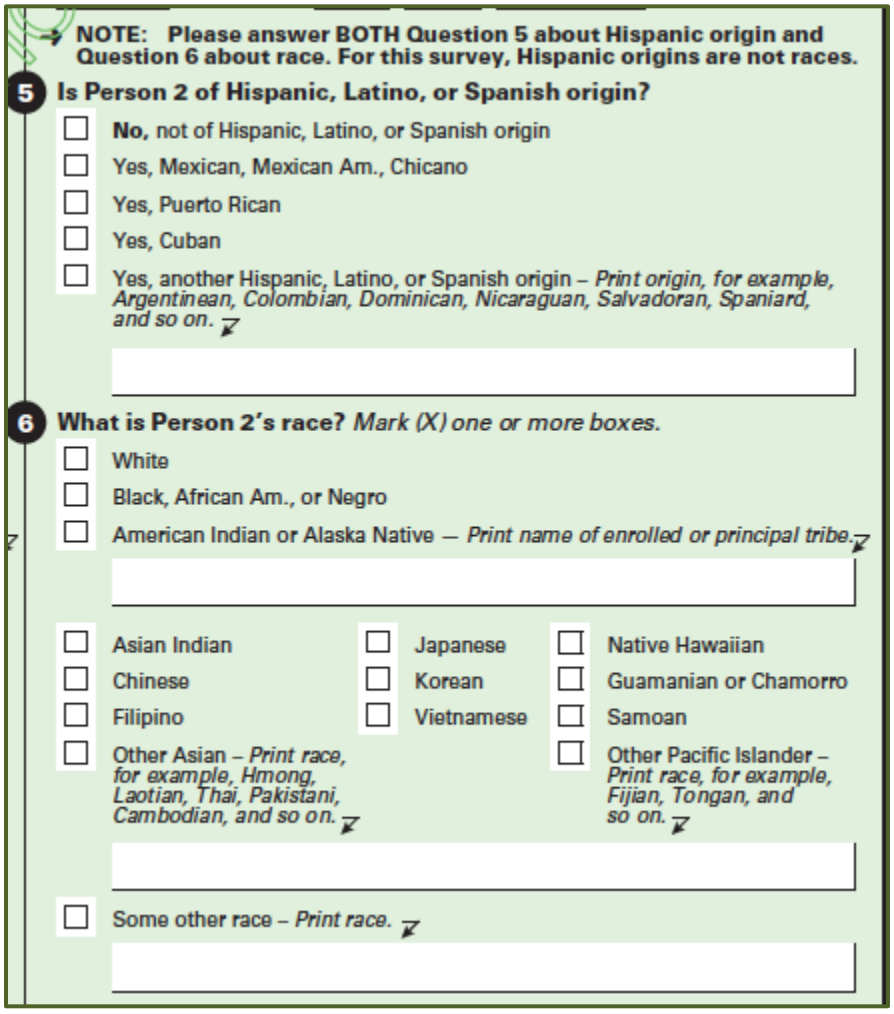
5 **Is this person Spanish/Hispanic/ Latino?** *Mark (X) the* ***"No"*** *box if* ***not*** *Spanish/Hispanic/Latino.*

- ☐ **No,** not Spanish/Hispanic/Latino
- ☐ Yes, Mexican, Mexican Am., Chicano
- ☐ Yes, Puerto Rican
- ☐ Yes, Cuban
- ☐ Yes, other Spanish/Hispanic/ Latino – *Print group.*

6 **What is this person's race?** ***Mark (X) one or more races*** *to indicate what this person considers himself/herself to be.*

- ☐ White
- ☐ Black or African American
- ☐ American Indian or Alaska Native – *Print name of enrolled or principal tribe.*
- ☐ Asian Indian
- ☐ Chinese
- ☐ Filipino
- ☐ Japanese
- ☐ Korean
- ☐ Vietnamese
- ☐ Other Asian – *Print race.*
- ☐ Native Hawaiian
- ☐ Guamanian or Chamorro
- ☐ Samoan
- ☐ Other Pacific Islander – *Print race below.*
- ☐ Some other race – *Print race below.*

FIGURE 2: ACS 2008 Hispanic and Race Questions



NOTE: Please answer BOTH Question 5 about Hispanic origin and Question 6 about race. For this survey, Hispanic origins are not races.

5 **Is Person 2 of Hispanic, Latino, or Spanish origin?**

- ☐ **No,** not of Hispanic, Latino, or Spanish origin
- ☐ Yes, Mexican, Mexican Am., Chicano
- ☐ Yes, Puerto Rican
- ☐ Yes, Cuban
- ☐ Yes, another Hispanic, Latino, or Spanish origin – *Print origin, for example, Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, and so on.*

6 **What is Person 2's race?** *Mark (X) one or more boxes.*

- ☐ White
- ☐ Black, African Am., or Negro
- ☐ American Indian or Alaska Native – *Print name of enrolled or principal tribe.*
- ☐ Asian Indian
- ☐ Chinese
- ☐ Filipino
- ☐ Other Asian – *Print race, for example, Hmong, Laotian, Thai, Pakistani, Cambodian, and so on.*
- ☐ Japanese
- ☐ Korean
- ☐ Vietnamese
- ☐ Native Hawaiian
- ☐ Guamanian or Chamorro
- ☐ Samoan
- ☐ Other Pacific Islander – *Print race, for example, Fijian, Tongan, and so on.*
- ☐ Some other race – *Print race.*

Figure 3: Predicted Probabilities of Physical Disability among Hispanic Immigrants by Duration of Residence (based on Table 3 , Model 6)

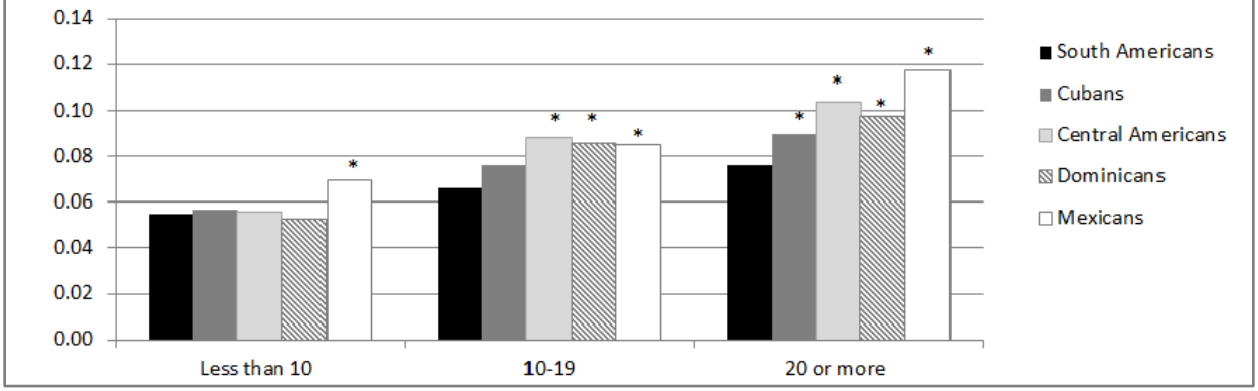
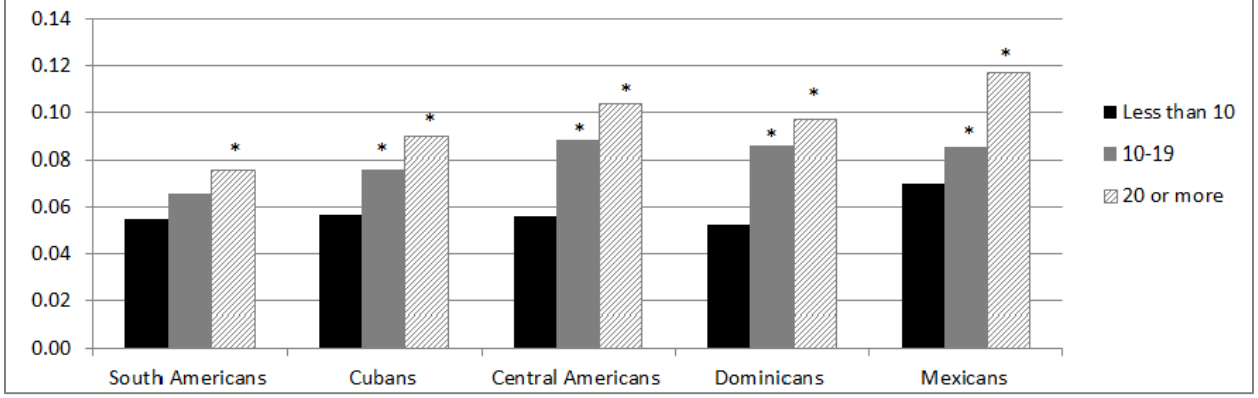


Figure 4: Predicted Probabilities of Physical Disability among Hispanic Immigrants by Subgroup (based on Table 3, Model 6)



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