

Migration Selection, Protection, and Acculturation in Health: A Binational Perspective on Older Adults

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Abstract In this article, we test for four potential explanations of the Hispanic Health Paradox (HHP): the “salmon bias,” emigration selection, and sociocultural protection originating in either destination or sending country. To reduce biases related to attrition by return migration typical of most U.S.-based surveys, we combine data from the Mexican Health and Aging Study in Mexico and the U.S. National Health Interview Survey to compare self-reported diabetes, hypertension, current smoking, obesity, and self-rated health among Mexican-born men ages 50 and older according to their previous U.S. migration experience, and U.S.-born Mexican Americans and non-Hispanic whites. We also use height, a measure of health during childhood, to bolster some of our tests. We find an immigrant advantage relative to non-Hispanic whites in hypertension and, to a lesser extent, obesity. We find evidence consistent with emigration selection and the salmon bias in height, hypertension, and self-rated health among immigrants with less than 15 years of experience in the United States; we do not find conclusive evidence consistent with sociocultural protection mechanisms. Finally, we illustrate that although ignoring return migrants when testing for the HHP and its mechanisms, as well as for the association between U.S. experience and health, exaggerates these associations, they are not fully driven by return migration-related attrition.

Keywords International migration · Health · Immigrant adaptation · Mexico · United States

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Introduction

Many aspects of the health of Latinos in the United States appear better than expected relative to other race/ethnic groups, such as U.S.-born non-Hispanic whites (hereafter, “NH whites”). As higher socioeconomic status (SES) is generally associated with better health (Goldman 2001) and Hispanics have below-average SES (Jiménez 2011), this phenomenon is thus commonly known as the Hispanic Health Paradox (HHP). The HHP is first and foremost found in adult mortality (Markides and Eschbach 2005) and is strongest among immigrants (Hummer et al. 2000), particularly those from Mexico, who have consistently lower mortality than NH whites (Palloni and Arias 2004).

Although there is somewhat less systematic research on the existence of the HHP among Latino immigrants in chronic health outcomes and health behaviors (for a metastudy on various immigrant national origin groups, see Cunningham et al. 2008), foreign-born Hispanics do seem to have favorable health profiles (e.g., Singh and Siahpush 2002). Despite this advantage, the health risk profiles and physical health of immigrants with lower durations of stay in the United States and acculturation scores tend to be better than those of more experienced or “acculturated” individuals (for a review and meta-study on Latinos, see Lara et al. 2005). Scholars have argued that these results imply that health deteriorates throughout the immigrant adaptation process (see Abraído-Lanza et al. 2006). Given the types of immigrant adaptation measures used in these studies, or the interpretation given to them, scholars have labeled this phenomenon as “negative acculturation in health” (NAH). In addition to being very much relevant in its own right, this suggests that U.S. experience should be considered when testing for different mechanisms of the HHP.

Substantive explanations for the immigrant advantage in health point to selection and protection mechanisms. However, most studies looking at the health of the immigrant population are based on cross-sectional data representing people living in the United States at the time of the survey. This approach fails to provide more appropriate counterfactuals for emigration and return selection and could further cloud the identification of selection separately from protection. In addition, some artifacts potentially driving (part of) the HHP could also explain (part of) the NAH because ignoring return migrants from the calculation of the effects of variables such as duration of stay and acculturation scales could (upwardly) bias these estimates.

We attempt to reduce these problems substantially by using comparable, nationally representative data collected in the United States and Mexico to contrast several health outcomes among U.S.-born Mexican American, NH white, and Mexican-born older adult men (ages 50 and older) (1) living in the United States for varying lengths of time, (2) living in Mexico after returning from the United States in the recent past, and (3) living in Mexico, with no previous U.S. experience. We look at five indicators: self-reported diabetes, hypertension, current smoking, obesity, and self-rated health. As we explain in more detail later in the article, these are relevant (yet imperfect) markers or risk factors of chronic health in older adults, some of which may also be particularly suited for testing for selection, protection, or acculturation. As health (and self-reports of health) may change through the immigrant experience, thereby making it difficult to identify selection from protection mechanisms (as explained in more detail later), we further use height—a general indicator of nutrition

in childhood and adolescence that may eventually translate to better adult health—in an attempt to separately identify selection from protection. Because the use of cross-sectional data does not allow for the separate identification of duration and immigrant cohort effects (e.g., Borjas 1987), we also use height to assess whether the estimated duration effects could be signaling cohort differences in our NAH tests.

In the next section, we briefly summarize what is known about the Hispanic paradox and its main explanations, including hypotheses about selection and protection mechanisms. We further discuss them in the context of the negative acculturation hypothesis and elaborate on how the cross-sectional association between U.S. experience and health might be overestimated when researchers use only data collected in the United States.

Previous Research

The Hispanic Paradox and the Immigrant Health Advantage

Hispanics in the United States have had a longstanding and well-documented history of relatively low mortality (Elo et al. 2004; Hummer et al. 1999; Markides and Coreil 1986; Sorlie et al. 1993). In its strongest version, the HHP entails higher survival and better health for Hispanics than for NH whites before SES is taken into account. This is generally an advantage exclusive of the foreign-born (i.e., it is not found in U.S.-born Latinos; Abraído-Lanza et al. 1999; Borrell and Crawford 2009; Singh and Hiatt 2006), and Mexican immigrants in particular (Abraído-Lanza et al. 1999; Hummer et al. 2000; Palloni and Arias 2004).

The paradoxical nature of the HHP, however, does not necessarily imply that Hispanics have better health relative to NH whites, but that the former's health is better *than expected* relative to the latter given the lower socioeconomic standing of Hispanics in U.S. society (Hummer et al. 2007; Markides and Eschbach 2005). That is, weaker versions of the HHP may imply that the immigrant advantage is apparent only net of SES; or that Hispanic immigrants have less unfavorable health vis-à-vis NH whites only *relative* to how other racial/ethnic groups fare vis-à-vis NH whites (Markides and Eschbach 2005). To test for the weaker version of the HHP, we also examine differences between Mexican immigrants and NH whites after controlling for SES. Further, we improve on other HHP tests by presenting contrasts using a combined sample of Mexican immigrants interviewed in the United States and return migrants in Mexico, thereby reducing the potential biases brought by attrition (as discussed further later).

Epidemiologically, the immigrant mortality advantage must come from a relatively favorable chronic health profile (Cunningham et al. 2008; Singh and Siahpush 2002) and favorable health behaviors (e.g., in obesity (Antecol and Bedard 2006) and smoking (Blue and Fenelon 2011; Singh and Siahpush 2002)). However, the advantage is not observed in some important chronic conditions, most notably in diabetes (e.g., Beard et al. 2009) and disability in old age (e.g., Eschbach et al. 2007).

There are four noncompeting explanations for the immigrant advantage, which in turn should explain the full extent of the HHP (for more detailed reviews, see Markides and Eschbach 2005; Palloni and Morenoff 2001): data artifacts, return

migration selection, emigration selection, and sociocultural protection. In addition to these four, more commonly addressed in the literature, we add a fifth—international differences in epidemiological regimes—which could partially explain the immigrant advantage in specific chronic conditions and may be consistent with a particular brand of protection mechanisms originating in the sending country.

Data Artifacts

Given the puzzling nature of the HHP, it is logical to suspect data artifacts could be artificially overstating migrant health. Data artifacts are measurement errors that disproportionately affect immigrant health measures relative to how they bias measurement of health in other racial/ethnic/nativity groups. Estimates of the immigrant advantage based on self-reported health measures, including some used in this article, could be exaggerated the more these measures depend on previous diagnosis, which is ultimately contingent on access to health care. Given that foreign-born Hispanics have relatively low access to health insurance and health care both in their country of origin (e.g., Pagán et al. 2007) and in the United States (Derose et al. 2007), part of the immigrant advantage could indeed be related to data artifacts.

However, the HHP does not seem to be solely driven by these biases: studies looking at chronic health conditions and their biological risk factors based on biomarkers and anthropometric measures have found evidence somewhat consistent with the (weak version of the) HHP. Based on these measures, Mexican immigrants have substantially healthier profiles than those of U.S.-born Mexican Americans (Barquera et al. 2008; Crimmins et al. 2007) and similar to those of NH whites (Crimmins et al. 2007).¹

Because our study uses self-reported measures, we cannot provide much evidence on this particular issue. However, at the end of this article, we discuss why we do not deem data artifacts large enough to fully explain our results and conclusions. We also attempt to provide a more nuanced/conservative interpretation of our results regarding the role of selection and protection than one taking our results at face-value (i.e., assuming data artifacts were not at play).

Return Migration Selection

The immigrant advantage could also be partially explained by negative health selection in return migration, also known as the (Pacific) “salmon bias” hypothesis, a statistical artifact that overstates the health of a particular immigrant cohort when researchers observe only those remaining in the receiving country, as it is the case of the vast majority of HHP studies.

Although the presence of a salmon bias might indeed widen the immigrant advantage over NH whites, it does not fully explain it. Studies directly testing for the salmon bias have generally found a *moderate* degree of return migration selection among older adults. Using Social Security data that allowed for identification of the country location of the beneficiaries, Turra and Elo (2008) found that the mortality of

¹ Also note that the Latino immigrant advantage in mortality seems to be robust to the existence of various kinds of data artifacts (Elo et al. 2004; Markides and Eschbach 2005).

foreign-born Hispanics leaving the United States was higher than that of those remaining in the country. However, given that return migration rates are low at older ages, Turra and Elo (2008:526) posited that the magnitude of the salmon bias was “too small to explain a significant part of the Hispanic mortality advantage in the United States among primary social security beneficiaries.” In addition, the immigrant advantage in mortality has been observed in studies examining groups for whom return migration is unviable (Abraído-Lanza et al. 1999; Hummer et al. 2007). As such, the salmon bias cannot be the only (nor, perhaps, the main) explanation for the HHP in mortality.

At any rate, differences between return migrant older adults and those remaining in the destination country do seem to exist in self-rated health. Using data from the National Health Interview Survey (NHIS) and from the Mexican Health and Aging Study (MHAS, both described in the next section), Palloni and Arias (2004) assessed the relative health status of Mexican-born individuals living in the United States compared with that of return migrants living in Mexico. Consistent with the salmon bias hypothesis, immigrants observed in the United States reported better self-rated health than return migrants interviewed in Mexico.

Self-rated health reports may partially reflect a migrant’s degree of acculturation to U.S. society (Bzostek et al. 2007; Finch et al. 2002). As such, differences between migrants interviewed in the United States and return migrants in this indicator may be a reflection of differences in both well-being and U.S. experience between groups. We build on the approach used by Palloni and Arias by comparing immigrants and return migrants with similar levels of U.S. experience. Although we recognize the problems with the use of self-rated health even after this adjustment, the results of most of our tests (including those for return migration selection) using this measure were consistent with those using other indicators, perhaps as self-rated health is a more valid measure among older immigrant adults.

Emigration Selection

The HHP could be further explained by positive emigration selection, a set of processes whereby health itself or (unmeasured) characteristics positively correlated with health are associated with emigration to the United States. Given that Mexican immigrants have better-than-expected health outcomes relative to NH whites, it follows that their health should then be better than that of nonmigrants left behind (Jasso et al. 2004).

Ideally, one would measure these conditions just prior to emigration. The study that comes to the closest to doing this, by Rubalcava et al. (2008), used longitudinal data for individuals ages 15–29 from the Mexican Family Life Survey to examine the likelihood of U.S. migration between survey waves (2002–2005) as a function of socioeconomic and health conditions measured at baseline. Rubalcava and colleagues (2008:81) found some but “weak support for the healthy migrant hypothesis” in their more “objective” health measurements.

Other studies considering a broader range of immigrant cohorts but comparing the health of immigrants observed in the United States with nonmigrants in sending countries have also found evidence consistent with positive emigration selection. Crimmins et al. (2005) used nationally representative data from older adults from the

1999–2002 National Health and Nutrition Examination Survey and the 2001 MHAS to study the association between migration status and various health indicators. In agreement with the emigration selection hypothesis, Crimmins and colleagues found that foreign-born Mexicans interviewed in the United States were taller than nonmigrants interviewed in Mexico after they controlled for age, sex, and educational attainment.²

A more recent study by Barquera et al. (2008), looking at the prevalence, awareness, and control of hypertension, performed more comparisons between nationally representative surveys in the United States and Mexico. In agreement with the migration selection hypothesis, Barquera and colleagues found lower hypertension prevalence among migrants interviewed in the United States than among individuals interviewed in Mexico.

Likewise, Landale and colleagues (2006) found lower mortality among the infants of Puerto Rican-born women living in the United States relative to those remaining in Puerto Rico and found that controlling for unmeasured characteristics (within sibling pairs) explained away the difference in migrant vis-à-vis nonmigrant infant mortality, which is consistent with the existence of emigration selection (see also Landale et al. 2000).

These three studies compared nonmigrants with immigrants living in the United States, thus providing evidence of health selection in emigration *net* of return selection. We test for emigration selection processes by comparing health outcomes among nonmigrants in Mexico with a combined sample of Mexican-born individuals living in the United States and those with U.S. migration experience living Mexico, thereby reducing the potential biases brought by return migration attrition when only using data on immigrants observed in the U.S. side.

Further, even if return migration selection were absent, these studies did not identify emigration selection separately from sociocultural protection mechanisms (discussed in the next section). Although our study design does not allow us to measure health before emigration, and thus cannot separately identify selection from protection neatly either, we use height to indirectly assess whether selection may be at play above and beyond any protection mechanisms, and perform additional tests attempting to identify protection, explained next.

Sociocultural Protection

Sociocultural protective factors, originating either in the receiving or sending country, could also be a contributing factor enabling migrants to cope better with stress and promoting better health outcomes and behaviors in the United States (Landale et al. 2000). Some forms of protection could be originating or reproducing more strongly in the United States owing to the social support of the immigrant and ethnic community, a likely possibility given that migrant networks tend to be instrumental in both facilitating migration (Curran and Rivero-Fuentes 2003; Davis et al. 2002; Massey et al. 1994) and adaptation to the new setting (Livingston 2003; Munshi 2003).

² It is unclear whether the same patterns hold for the various other health outcomes that Crimmins et al. (2005) examined because the analytical strategy they followed did not involve similar cross-sample comparisons allowing separate tests for emigration and return migration selection.

These processes seem to be embedded in space. Several studies have found better health outcomes among Latinos living in neighborhoods with higher concentrations of coethnics than those of Latinos living in less-concentrated neighborhoods. This has been found for mortality (Eschbach et al. 2004), cancer (Eschbach et al. 2005), depressive symptoms (Ostir et al. 2003), and self-rated health (Patel et al. 2003). However, these studies have not strictly provided evidence of protection among the foreign-born because they did not distinguish whether the “*barrio effect*” differs by nativity. The evidence from studies that have made this distinction or that have looked exclusively at foreign-born Latinos is mixed (cf. Cagney et al. 2007; Lee and Ferraro 2007), suggesting perhaps that *barrio effects* are weaker among foreign-born than among U.S.-born Latinos.

Regardless of whether protection mechanisms in the receiving country operate through social interactions in neighborhoods, at least one study has tried to identify them by examining differences in the health outcomes of people of the same national origin in both the United States and their places of origin. In their study of infant mortality among mothers of Puerto Rican origin living in both the mainland and Puerto Rico, Landale et al. (2000) found that, net of socioeconomic and family characteristics, the infant children of island-born women (with low levels of U.S. experience) living on the mainland had lower mortality than both mainland-born Puerto Rican women and island-born women living in Puerto Rico. Although this immigrant advantage is consistent with a combination of protection and selection, Landale and colleagues also noted that protection mechanisms specific to the Puerto Rican community in the United States must be operating in addition to any potential selection given that both island-born and mainland-born women living on the mainland experienced better outcomes than those living in Puerto Rico. Following this logic, we test for sociocultural protection in the destination country by comparing the outcomes of U.S.-born Mexican Americans with those of nonmigrants in Mexico.

In addition, if sociocultural protection in the United States were operating above and beyond selection, immigrant health outcomes and behaviors would be more favorable (the first few years) after emigration compared with those measured before (or, less ideally, shortly after) coming to the United States (also see Teitler et al. 2012). As such, and given that we do not observe the health of individuals just prior to emigration in our data, if protection were operating, we would expect immigrants with medium durations of stay to have better health outcomes than more recently arrived immigrants in conditions or risk factors that can either improve or worsen over time, such as smoking, obesity, and self-rated health. We posit this will be discernible among immigrants with medium durations of stay and not among those with the most experience given that migrant health is negatively correlated with duration in the United States “in the long run,” as discussed further later in the article.

Differences in Epidemiological Regimes

Other forms of protection could originate in the sending country if (1) immigrant health profiles were similar to those of nonmigrants and (2) the risk profile and epidemiological regime in the country of origin were more favorable than in the United States. These differences may exist in the case of Mexicans (relative to U.S.-born

NH whites) because of the later onset of the epidemiological and nutritional transitions in Mexico (Rivera et al. 2002).

Although we do not argue that differences in epidemiological regimes explain the full HHP in mortality³ and many chronic conditions (e.g., diabetes is somewhat higher in Mexico; Barquera et al. 2003), they may indeed contribute to explaining part of the HHP in specific chronic conditions (such as hypertension) and risk factors (such as obesity and smoking) given that both of these types of indicators tend to be used to define the occurrence of the nutrition and epidemiological transitions (Frenk et al. 1996; Popkin 2001). As such, these differences may account for part of the immigrant health advantage in addition to selection, at least in older adults, because factors such as obesity have only increased (quite rapidly) in recent years and mostly among younger Mexicans (World Health Organization WHO 2009). Note, however, that differences in epidemiological regimes may not translate to better chronic health in old age in places experiencing the transition earlier if poor early-life conditions eventually translate into poor adult health (e.g., McEniry and Palloni 2010).

Negative Acculturation in the Context of the Hispanic Health Paradox

Many studies have found a negative correlation between health outcomes and measures of acculturation and exposure to U.S. society, such as duration of stay. Explanations of this negative association tend to posit that immigrant incorporation into the cultural mainstream, which is positively correlated with immigrant U.S. experience, includes the adoption of unhealthier lifestyles that are arguably more pervasive in the United States than in sending areas. Increased acculturation and U.S. experience are associated with unfavorable dietary changes, such as a lower consumption of fruits, vegetables, and fiber (Akresh 2007). Most likely as a result, these indicators are also associated with weight gain, higher body mass index (BMI), and obesity (Antecol and Bedard 2006; Oza-Frank and Cunningham 2010). Similarly, acculturation and experience measures are associated with unhealthy behaviors, such as smoking and alcohol use (Abraído-Lanza et al. 2005; Cho et al. 2004). Chronic disease is also correlated with both duration (Cho et al. 2004; Singh and Siahpush 2002) and acculturation (Gorman et al. 2010) measures. Allostatic load, an index of cumulative biological risk, is also higher among immigrants with longer durations of stay and higher acculturation scores (Finch et al. 2009).

These results have several implications for our study. First, testing for the HHP and its mechanisms without considering immigrant levels of U.S. experience or acculturation could spuriously attenuate these tests. To reduce this problem, we look at migrants with shorter durations of stay in our tests.

Second, estimates of the association between duration of stay and health based on cross-sectional data cannot separately identify duration and migration cohort effects (see Borjas 1987). We use height to assess whether duration effects may be signaling cohort differences in health. Height should not vary by level of U.S. experience, assuming that most growth takes place before emigration (or, more loosely,

³ Life expectancy for both sexes in the United States is 78 years, while in Mexico, it is two years lower (World Health Organization WHO 2009). Although this difference is nontrivial, it is perhaps less than expected given the large income and development gap between the two countries (Kuhn 2010).

settlement in the United States). As such, if there were any duration effects in height, this would suggest that cohort effects may be at play.

Third, estimates of the association between U.S. experience on self-reported measures may be exaggerated given that health insurance coverage, health care access, and health screening increase with U.S. experience (e.g., Akresh 2009). In the Discussion section, we briefly reflect on how data artifacts could be affecting our results.

Finally, estimates of the association between duration of stay and health based on cross-sectional data only collected in the United States omit the experience of return migrants, which may exaggerate the role of negative acculturation processes. Because return rates are highest during the first few years after emigration (Riosmena 2005: chapter 4), thus altering the composition of U.S. experience among immigrants interviewed in the United States, ignoring return migration attrition (even in the absence of a substantial amount of return migration health selection) could also alter the correlation between health and U.S. experience. We illustrate the extent of this potential bias by comparing duration effects for immigrants interviewed in the United States (the conventional approach) with those estimated using our combined sample of Mexican immigrants interviewed in the United States and return migrants in Mexico.

Data and Methods

We use roughly comparable data sources on both sides of the border: namely, the National Health Interview Survey (NHIS) in the United States and the Mexican Health and Aging Study (MHAS) in Mexico. Both studies are nationally representative and include self-reported chronic health problems (hypertension, diabetes); sociobehavioral risk factors (obesity, smoking); and sociodemographic correlates, such as age, gender, educational attainment, and amount of U.S. experience.

The NHIS has been fielded by the National Center for Health Statistics, Centers for Disease Control and Prevention since the late 1950s. Each annual cross-section is a nationally representative, multistage, stratified sample of the U.S. population oversampling Hispanics since 1995 and experiencing major questionnaire changes in 1997. We pooled the 1997–2007 waves to increase the efficiency of our estimates, thus yielding a robust snapshot of the U.S. population around the midpoint of the period (i.e., around mid-2002, not too long from the dates of MHAS interviews). See Botman et al. (2000) for a more detailed description of the NHIS.

The MHAS is a multistage, stratified probability sample of the Mexican population born before 1952 and alive by the survey date. The baseline questionnaire, fielded in 2001, thus included individuals ages 50 and older. The study oversampled residents of six central-western states that have historically high emigration to the United States (Durand et al. 2001), which helped yield a larger migrant sample.⁴ See Wong et al. (2007) for a more detailed description of the MHAS.

⁴ About 60 % to 70 % of U.S. migrants came from this region between 1925 and 1980, the period in which the members of the cohorts under study emigrated to the United States for the first time (Durand and Massey 2003: chapter 3). In analyses not shown, we restricted the MHAS sample to individuals living in high-migration states, finding similar results to those using the full sample.

We focus on the experience of individuals ages 50 and older, the range sampled in the MHAS. We also restrict the analysis to men because the number of migrant women in the MHAS sample is too small to warrant reliable analyses and because pooling men and women together is problematic given that health selection (Markides et al. 2007) and acculturation (Gorman et al. 2010) vary by sex. Given our interest in comparing the experience of immigrants and return migrants belonging to roughly similar migration cohorts, we include only MHAS interviewees with previous U.S. experience who returned to Mexico after age 40.⁵ These criteria limit the MHAS sample to 5,138 men at baseline, including 382 with U.S. migration experience. With these restrictions, the subsamples of NH whites, U.S.-born Mexican Americans, and Mexican immigrants in the NHIS consist of 39,985; 1,729; and 1,328 individuals, respectively (see Table 7 in the appendix for weighted means and standard deviations).

Outcomes Studied, Measures Used, and Comparability Between Surveys

We look at six indicators: self-reported hypertension, diabetes, obesity, current smoking, fair/poor self-rated health, and height. Both the NHIS and MHAS used similar questions (and wording) to measure these indicators (see Table 8 in the appendix for wording in both surveys). The first two, based on questions of whether an individual has ever been diagnosed with these diseases, are morbid conditions and potent risk factors for more immediate major causes of death among Mexicans on both sides of the border, including renal failure and stroke. Smoking and obesity (based on self-reported weight and height, and defined as having a BMI of 30 kg/m² or higher) are in turn important risk factors for several morbid conditions, such as lung cancer, circulatory impairments, heart disease, type 2 diabetes, and some forms of neoplasia, of which Mexican populations exhibit high death rates as well (Barquera et al. 2003, 2008; Durazo-Arvizu et al. 2006, 2008; Monteverde et al. 2010; Palloni et al. 2006; Rivera et al. 2002).

Based on the typical question asking people how they rate their health, we use an indicator of unfavorable self-rated health separating individuals with fair or poor health from those with excellent, very good, or good health. Further, while the wording of the self-rated health question and response options are similar in both surveys (appendix Table 8), research has noted that the translation of the English “fair” to the Spanish “*regular*” may imply a larger percentage of people choosing this option in Spanish than in English (Viruell-Fuentes et al. 2011). Because we find similar results with self-rated health as with other indicators, we do not deem translation differences to be substantial enough to drive our self-rated health results.

In addition, we supplement our analyses using height as a measure of child and adolescent nutrition, health, and well-being. Although height is a weak/questionable measure of adult health (Ben-Shlomo and Smith 1991), we use it (as we explained earlier) as a somewhat imperfect indicator of past accumulated imbalances between nutritional intake and load of disease that individuals experienced during their growth

⁵ Our results do not change substantially if we ignore this restriction, which eliminates 36 % of all return migrants. We deem these tests, however, as more conservative than those using the full sample of return migrants.

phases (before ages 20–25) in an attempt to separately identify more general selection effects that are free of protection, and (as explained before) in an attempt to identify duration from cohort effects.

Despite the general comparability of our health indicators, there are further differences in our sociodemographic variables and samples worth noting. First, the NHIS and MHAS measure U.S. experience in different ways. In the NHIS, foreign-born individuals are asked the year in which they “came to stay,” whereas the MHAS asks, “In total, about how many years have you worked or lived in the U.S.?,” which might render a more exact measure of U.S. experience. Although the duration of stay variable tends to underestimate the amount of U.S. experience among migrant groups with a nontrivial component of circular and undocumented migration (as is the case with Mexicans), these biases are generally lower than 4 years (Redstone and Massey 2004). Given that our study pertains to older immigrant adults, who are more established in the United States, and because most of our analyses use broad duration categories (mainly less than 15 years), our results should be less sensitive to differences in the measurement of U.S. experience between surveys.

Second, U.S. surveys seem to have differing systematic coverage biases, which may partially explain why, for instance, Mexican immigrants in the United States report considerably higher educational attainment than return migrants and nonmigrants captured in Mexican surveys beyond selection (Ibarraran and Lubotsky 2007; Moraga 2010). While our study design may not be exempt from these biases—which could, for instance, exaggerate the amount of emigration selection (while downplaying the amount of salmon bias)—our focus on older adults (a more settled population) should reduce undercoverage biases in U.S. data sources (Ibarraran and Lubotsky 2007:171).

Methods

We estimate logistic regressions to predict the probability that an individual reports diabetes, hypertension, current smoking, obesity, and fair/poor self-rated health, and ordinary least square (OLS) models predicting height. Note that the working sample and racial-ethnic/nativity/duration groups that we contrast vary according to the mechanism being tested, which we explain before presenting each model. (For a summary of groups, contrasts, and working samples, see Table 9 in the appendix.) In all models, we control for age and age squared to standardize for differences in age compositions between these groups. When examining the outcomes of Mexicans with U.S. experience, we also control for U.S. experience. When presenting each model, we also explain which additional controls are included, if any.

Results

An Immigrant Advantage?

We test for the strong version of the HHP by comparing U.S.-born Mexican Americans and Mexican migrants living in the United States for less than 15 years

Table 1 Adjusted odds ratios for men of Mexican origin according to nativity, migration status, and U.S. experience, relative to U.S.-born non-Hispanic whites

	A. U.S.-born Mexican Americans	B. Mexican Immigrants Interviewed in the U.S., <15 Years of U.S. Experience	C. Mexican Immigrants With U.S. Experience Living on Either Side of the Border, <15 Years of U.S. Experience
Diabetes	2.22***	0.96	1.04
Hypertension	1.03	0.32***	0.39***
Current Smoking	1.19**	1.04	1.23 [†]
Obesity	1.14*	0.92	0.80 [†]
Poor/Fair Health	1.90***	1.11	1.96***

Note: All models also control for age, age squared, and (for return migrants) duration since return.

[†] $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

with NH whites (columns A and B, respectively, in Table 1). As found in other studies, there is no evidence of a strong HHP for U.S.-born Mexicans (column A), who report worse health than NH whites in all outcomes. Although their higher odds of hypertension are not statistically significant, they have 122 %, 19 %, 14 %, and 90 % higher odds of reporting diabetes, smoking, obesity, and fair/poor global health, respectively, compared with NH whites.

For Mexican immigrants interviewed in the NHIS with less than 15 years of U.S. experience (column B, Table 1), there is no clear advantage in any of our measures except for hypertension, for which immigrants have 68 % lower odds of reporting this condition relative to NH whites ($p < .001$). Although there seems to be a mild advantage for immigrants on diabetes and obesity, these differences are not statistically significant. Similarly, although Mexican immigrants have a slightly higher smoking prevalence and are more likely to report unfavorable global health, these differences are not statistically significant.

Even though the evidence supporting the strong version of the HHP among immigrants holds for hypertension only, our results are consistent with the weak version of the HHP. As shown in Table 1, despite their lower SES, Mexican immigrants do not have significantly or substantially worse health outcomes than do NH whites. More importantly, Mexican immigrants have better health outcomes than NH whites in all five indicators after SES (i.e., educational attainment) is controlled for (see Table 10 in the appendix).

As we mentioned earlier, the HHP could be exaggerated if return migrants had unfavorable health relative to those remaining in the United States. In addition to directly comparing these two groups in Table 2, we use a combined sample of Mexican-born individuals with U.S. experience from the NHIS and MHAS in Table 1, column C. As found by Turra and Elo (2008) on mortality, while return attrition does reduce the HHP, it does not explain it away. Although including return migrants in the calculation resulted in a significant disadvantage in smoking and self-rated health and a nonsignificant one in diabetes, it did not substantially reduce the advantage in hypertension (in Table 1, the 0.39 odds ratio in column C is not

Table 2 Adjusted odds ratios (for height, coefficient differences) for return migrants interviewed in Mexico relative to Mexican immigrants interviewed in the U.S. according to level of U.S. experience

	A. Return Migrants in Mexico With <15 Years of U.S. Experience vs. Migrants Interviewed in the U.S. With <15 Years of U.S. Experience	B. Return Migrants in Mexico With 15+ Years of U.S. Experience vs. Migrants Interviewed in the U.S. With 15+ Years of U.S. Experience
Diabetes	1.35	0.52
Hypertension	1.83 [†]	0.43*
Current Smoking	2.25**	1.60
Obesity	0.63	0.70
Poor/Fair Health	5.72***	1.56
Height	-3.00**	-1.88

Note: All models also control for age, age squared, education, and (for return migrants) duration since return.

[†] $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

substantially larger than the 0.31 in column B). Further, note that the weak, nonsignificant immigrant advantage in obesity in column B *widened* and became statistically significant after including return migrants. Finally, except for self-rated health, adding return migrants to the calculations did not alter the general existence of a weak version of the HHP (see Table 10 in the appendix).

Return Selection

Although return selection seems to explain only a small share of the HHP, we present explicit tests comparing return migrants living in Mexico (from MHAS) relative to foreign-born Mexicans interviewed in the United States (NHIS) in Table 2. These models differ from those presented in Table 1 in a few ways. First, they include Mexican-born individuals only. Second, they additionally control for educational attainment. Third, instead of focusing only on migrants with lower levels of U.S. experience, we compare return migrants and immigrants with similar U.S. experience in two broad groups (less than and more than 15 years). We also control for duration since return for those doing so in an attempt to control for factors that might have caused health changes after return. Finally, we also include height as an additional outcome.

Among migrants with lower levels of U.S. experience (column A, Table 2), we find evidence consistent with negative health selection in return migration. Return migrants with less than 15 years of U.S. experience have 83 %, 125 %, and 472 % higher odds of reporting hypertension, smoking, and unfavorable global health (respectively) compared with immigrants interviewed in the United States with similar levels of U.S. experience. Likewise, less-experienced return migrants are 3 cm (1.18 inches) shorter than immigrants with similar levels of experience who

remained in the United States, suggesting that the differences in the other indicators may not be an artifact of changes in the health of return migrants after their move to Mexico that are not captured by our measure of duration since return.

In contrast, return migrants with more than 15 years of U.S. experience do not appear to be unhealthier than immigrants with similar experience levels remaining in the United States (column B, Table 2). Although these return migrants are indeed slightly shorter and more likely to smoke and to report worse global health, none of these differences are significant. Moreover, they have, in fact, 57 % lower odds of reporting hypertension than immigrants remaining in the United States. This could suggest the salmon bias may not be prevalent among migrants with more U.S. experience. Alternatively, these two groups might differ considerably in terms of U.S. experience and acculturation, which are not controlled for within groups. Unfortunately, duration of stay in the NHIS public release file was top-coded at 15 years and, as such, we cannot control for the level of U.S. experience more specifically for this group.

Emigration Selection

To test for emigration selection, we compare a combined sample of Mexican-born individuals with U.S. experience from both NHIS and MHAS with nonmigrants from MHAS (Table 3). We use this combined sample because using the NHIS sample alone would ignore any of the return migration selection found in the preceding analyses and, as such, we would be effectively testing for the net consequences of emigration and return selection. We also focus on people with lower levels of U.S. experience only (i.e., less than 15 years) to reduce the potential effects of acculturation processes taking place in the receiving country.

Our results indeed show some evidence consistent with emigration selection. Mexicans with previous U.S. experience have 35 % and 64 % lower odds, respectively, of reporting hypertension and poor/fair global health. Although they seem less likely to report diabetes, obesity, and smoking, these differences are not statistically significant.

Table 3 Adjusted odds ratios (for height, coefficient differences) for Mexican migrants with less than 15 years of U.S. experience living on either side of the border relative to nonmigrants in Mexico

	Odds Ratio/Coefficient Differences
Diabetes	0.74
Hypertension	0.65**
Current Smoking	0.96
Obesity	0.90
Poor/Fair Health	0.36***
Height	2.99***

Note: All models also control for age, age squared, education, and (for return migrants) duration since return.

** $p < .01$; *** $p < .001$

In our height analyses, we find that Mexican migrants with less than 15 years of U.S. experience are 3 cm (1.18 in.) taller than nonmigrants, suggesting that at least part of the immigrant advantage relative to nonmigrants may be due to selection and not exclusively to protection processes taking place in the receiving country.

Sociocultural Protection Originating in the Receiving Country

To further test for protection mechanisms originating in the United States, we hypothesized that migrants with medium levels of U.S. experience would have better health outcomes than those with lower levels of U.S. experience. Table 4 shows these tests by comparing the likelihood of reporting current smoking, obesity, and poor/fair global health between Mexican migrants (living on either side of the border) with different levels of U.S. experience. To test for a gradient in migrant health by level of U.S. experience, we compare migrants with 5–9 years in the U.S. with those with less than 5 years, those with 10–14 years with those with 5–9 years, and those with 15 or more years with those with 10–14 years.

Overall, we find no conclusive evidence of protection in the receiving country. Migrants with more experience have slightly (5 % to 15 %) lower odds of smoking than those spending less time in the United States (depending on the group compared), but none of these differences are statistically significant. Likewise, migrants with 5–9 years of U.S. experience have lower odds of being obese and reporting poor/fair health than those with less than 5 years in the United States, and migrants with 10–14 years also have lower odds of being obese than those with 5–9 years. Yet, none of these differences are statistically significant.

Another test for protection proposed above was to compare the health of U.S.-born Mexican Americans, particularly those living in neighborhoods with high concentrations of coethnics, with that of nonmigrants in Mexico. Lacking neighborhood (or even city or state) identifiers in the NHIS public-release file, we compare all Mexican Americans in the NHIS with nonmigrants in Mexico (Table 5, column A). Although Mexican Americans have 15 % lower odds of reporting smoking and 67 % lower odds of reporting poor/fair health, they have 87 %, 83 %, and 71 % higher odds of reporting diabetes, hypertension, and obesity (respectively). As such, there is no clear evidence of protection in the United States using this rough test, either.

Table 4 Adjusted odds ratios for Mexicans with U.S. experience living on either side of the border according to level of U.S. experience

U.S. Experience	Current Smoking	Obesity	Poor/Fair Health
5–9 Years (ref. = <5 years)	0.90	0.90	0.89
10–14 Years (ref. = 5–9 years)	0.95	0.50	1.41
15+ Years (ref. = 10–14 years)	0.86	2.90	1.15

Notes: All models also control for age, age squared, education, and (for return migrants) duration since return. None of the odds ratios are statistically significant at the .10 level.

Table 5 Adjusted odds ratios for US-born non-Hispanic whites and Mexican Americans relative to nonmigrants in Mexico

	A. U.S.-born Mexican Americans	B. U.S.-born NH Whites
Diabetes	1.87***	0.84***
Hypertension	1.83***	1.77***
Current Smoking	0.85*	0.71***
Obesity	1.71***	1.50***
Poor/Fair Health	0.33***	0.17***

Note: All models also control for age and age squared.

* $p < .05$; *** $p < .001$

Sociocultural Protection Originating in the Home Country and International Differences in Epidemiological Regimes

Other forms of protection could be originating in the sending country. An indication of this would be that nonmigrants in Mexico had a more favorable health profile than NH whites in the United States, especially in indicators for which migrants do not exhibit an advantage relative to nonmigrants, such as was the case in smoking, obesity and, to a lesser extent, diabetes (see Table 3). Column B of Table 5 shows tests comparing NH whites with nonmigrants in Mexico. NH whites indeed have 77 % and 50 % higher odds of reporting hypertension and obesity, respectively ($p < .001$). As such, differences in epidemiological regimes, which can constitute a form of sociocultural protection, could explain the immigrant advantage in health relative to NH whites in outcomes such as obesity, at least for the cohorts studied here. However, NH whites also have 16 %, 29 %, and 83 % lower odds of reporting diabetes, smoking, and poor/fair health, respectively (in all, $p < .001$). Thus, international differences in epidemiological regimes are not responsible for other aspects of the (weak version of the) HHP documented here (Table 1 and appendix Table 10).

Potential Biases in Calculations of Negative Acculturation Brought by Return Attrition

In addition to testing for selection and protection, our research design also helps illustrate the potential problems of testing for negative acculturation in health using data collected in the United States that do not include return migrants. Table 6 shows the effects of U.S. experience from models using Mexican immigrants interviewed in the NHIS (panel A) and our combined sample of Mexican-born individuals with previous U.S. experience from both NHIS and MHAS (panel B). In these tests, we present estimates of duration effects for five-year age groups (top-coded at 15 years) using the least experienced as the reference category.

Although we find no clear monotonic pattern of health deterioration in most of our measures for immigrants interviewed in the NHIS, we do find evidence consistent with negative acculturation in health in the long run. Most of the contrasts between

Table 6 Adjusted odds ratios (for height, coefficient differences) for (A) migrants interviewed in the United States and (B) migrants with U.S. experience living on either side of the border according to level of U.S. experience

	Diabetes	Hypertension	Currently Smokes	Obesity	Poor/Fair Health	Height
A. Migrants interviewed in the United States (ref. = <5 years of U.S. experience)						
5–9 years	3.04	1.49	1.47	1.20	0.73	–0.89
10–14 years	1.72	0.42	0.89	0.48	1.30	0.70
15+ years	4.63*	3.18*	0.96	1.41	2.53*	–0.78
B. Mexicans with U.S. experience living on either side of the border (ref. = <5 years of U.S. experience)						
5–9 years	1.87	1.31	0.90	0.90	0.89	–0.27
10–14 years	0.60	0.81	0.85	0.45 [†]	1.26	1.30
15+ years	2.02*	1.79*	0.74	1.30	1.44	0.11

Note: All models also control for age, age squared, education, and (for return migrants) duration since return.

[†] $p < .10$; * $p < .05$

immigrants with 5–9 and 10–14 years versus those with less than 5 years spent in the United States are not significant (and in the case of hypertension, smoking, and obesity, they imply lower prevalence for immigrants with 10–14 years of experience). In contrast, those with 15 or more years of U.S. experience have 363 %, 318 %, and 253 % higher odds of reporting diabetes, hypertension, and poor/fair health, respectively, than those with less than 5 years of experience (all $p < .05$).

After we include return migrants in the estimation of duration effects, these odds reduce considerably for most of these measures to 102 % for diabetes, 79 % for hypertension, and 44 % for self-rated health, suggesting that return migration attrition upwardly biases estimates of duration effects. Although differences in self-rated health lose statistical significance after return migrants are added to the calculations, they remain significant and sizable for diabetes and hypertension. As such, as in the case of the HHP, duration “effects” seem to be for the most part robust to return migration biases as well.

Despite the usefulness of looking at a combined sample of migrants, our analyses are still based on cross-sectional data, in which it is not possible to identify duration and cohort effects separately. To assess whether cohort effects could be driving our results, we also perform a falsification test by looking at duration effects in height, also shown in Table 6. Because duration is not significantly (and for the most part, substantially) associated with height, we find no indication of the presence of cohort effects, particularly in the combined sample of Mexican migrants in panel B of Table 6.

Discussion

In this article, we tested four mechanisms that might explain the immigrant health advantage (which in turn explains a sizable portion of the HHP): negative return

migration selection, positive emigration selection, and sociocultural protection mechanisms originating in the host and sending country. Although we found evidence of a strong immigrant advantage relative to NH whites only for hypertension and obesity, we did find evidence consistent with a weaker version of the HHP among less-experienced immigrants in all five outcomes even after considering the experience of return migrants in our HHP tests. Indeed, we found evidence consistent with the salmon bias in hypertension, smoking, self-rated health, and height among return migrants with less than 15 years of experience in the United States relative to immigrants with similar levels of U.S. experience.

We also found evidence consistent with emigration selection in hypertension and self-rated health. Although our tests for emigration selection could alternatively indicate the presence of sociocultural protection mechanisms operating in the United States, our height results suggest selection may be operating above and beyond any protection mechanisms potentially at play. Further, our two tests for protection mechanisms in the receiving country, comparing migrants with medium vis-à-vis shorter durations of stay and Mexican Americans in the United States with nonmigrants in Mexico, did not yield conclusive evidence consistent with sociocultural protection mechanisms in our data. Having said that, the fact that we did not find a monotonic pattern of health deterioration, as one could expect in light of negative acculturation, may be a possible indication that a weak form of sociocultural protection is at play—and, as such, could help explain why negative acculturation is not an unequivocal outcome and a linear process (Lara et al. 2005; Rumbaut 1997). Future research should further attempt to verify whether these patterns hold with other tests of protection in the country of destination.

In addition to selection and despite the lack of conclusive evidence on U.S.-based protection, we found evidence consistent with the notion that protection mechanisms originating in the home country may indeed play a (minor) role in explaining the immigrant health advantage. However, because the epidemiological and nutritional transitions are taking place at a particularly rapid pace in Mexico (Rivera et al. 2002) and other sending countries (Popkin 2003), this apparent protection may not be present among younger cohorts of migrants, who have, for instance, experienced very rapid increases in body mass and associated chronic diseases.

In sum, emigration and return selection mechanisms may be more relevant for explaining the immigrant health advantage given the absence of evidence consistent with most types of protection, although we recognize that our protection tests may be less rigorous than our selection tests. Even if we take the degree of either emigration or return selection in health as moderate (e.g., resulting the potential role of data artifacts, and because height differences were moderate at 3 cm, about 1.1 inches, in emigration and 3 cm in return), they are nontrivial when taken together. Thus, the HHP may be the result of the combination of (modest) emigration and return selection, at least among older adults.

Data artifacts indeed may play a role in reinforcing these trends (e.g., Jurkowski and Johnson 2005; Patel et al. 2004). Our study design did not permit us to look at the role of artifacts further. Our (self-reported) health measures are not shielded by them and thus could exaggerate the role of selection mechanisms in explaining the HHP

and overestimate the association between duration of stay and health. However, given that we found evidence of selection and acculturation in several self-reported measures of chronic health, sociobehavioral risk factors, and self-rated health (which, although subject to other problems mentioned earlier, is not subject to the same kinds of data artifacts), we do not consider that data artifacts alone are driving our results and, thus, our conclusions. However, we recognize that data artifacts may be playing a role and thus conclude that the role of selection processes found in our study is likely (at least slightly) smaller than the one estimated in our models. Future research and data collection efforts should attempt to perform these tests with less subjective health indicators.

We also aimed to illustrate how studies of acculturation that ignore the experience of return migrants, particularly studies that use cross-sectional data, could exaggerate the health-eroding effects of acculturation, regardless if it is measured using U.S. experience or acculturation scales (given that the latter are correlated with the former). Although we did find that immigrants with the most U.S. experience tend to have worse health outcomes than their less-experienced counterparts (even after including return migrants in the calculations), including the experience of return migrants reduced these effects by a nontrivial amount. Future research should take these potential biases into account, ideally by collecting longitudinal information on both sides of the border, or by considering the sensitivity of the estimated effects to potential return migration attrition and selection.

Despite the skepticism that the immigrant advantage in health generally arises among some health practitioners, researchers, and the general public, it is *both* artificial and real, caused by a peculiar combination of data errors and selection processes, which also affect but do not solely drive the negative correlation between health and measures of exposure to U.S. society. Scholars and policy makers should recognize the multiplicity of mechanisms contributing to the immigrant health advantage, attempt to understand each while considering how the others might be at play, and keep in mind that the process of adaptation to the United States may imply both health deterioration and improvement (Teitler et al. 2012) and ultimately present challenges for migrant health beyond an “acculturation” story (Abraído-Lanza et al. 2006).

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Appendix

Table 7 Means (and SDs) of health and sociodemographic indicators among U.S.-born NH whites and Mexican-origin groups observed in the United States and Mexico, men ages 50 and older (weighted estimates)

	1997–2007 NHIS in the United States			2001 MHAS in Mexico		
	Non-Hispanic Whites	U.S.-born Mexicans	Foreign-born Mexicans	Return Migrants	Nonmigrants	
Health Indicators (self-reported):						
Diabetes	0.127 (0.333)	0.237 (0.424)	0.188 (0.391)	0.123 (0.328)	0.129 (0.335)	
Hypertension	0.435 (0.496)	0.443 (0.497)	0.297 (0.457)	0.289 (0.453)	0.274 (0.446)	
Current smoking	0.178 (0.382)	0.219 (0.414)	0.186 (0.389)	0.276 (0.447)	0.264 (0.441)	
Obesity (BMI >30 kg/m ²)	0.269 (0.443)	0.319 (0.466)	0.291 (0.454)	0.176 (0.381)	0.192 (0.394)	
Height (cm)	177.8 (7.5)	172.8 (8.1)	171.1 (8.4)	167.7 (8.4)	166.9 (13.1)	
Poor/fair global health	0.186 (0.389)	0.267 (0.443)	0.272 (0.445)	0.602 (0.489)	0.569 (0.495)	
Sociodemographic Characteristics						
Age	63.6 (10.1)	61.9 (11.3)	59.9 (8.7)	66.0 (10.1)	62.6 (9.5)	
Educational attainment (ref. = lower) ^a						
Medium attainment	0.062 (0.241)	0.089 (0.285)	0.121 (0.327)	0.046 (0.209)	0.123 (0.329)	
Higher attainment	0.747 (0.435)	0.418 (0.493)	0.149 (0.356)	0.091 (0.288)	0.095 (0.293)	
U.S. Experience (ref. = 0–4 years)						
5–9 years	N/A	N/A	0.046 (0.210)	0.156 (0.363)	N/A	
10–14 years	N/A	N/A	0.050 (0.218)	0.071 (0.257)	N/A	
15 years or more	N/A	N/A	0.844 (0.363)	0.191 (0.393)	N/A	
N	39,985	1,729	1,328	382	4,756	

^a Schooling levels for U.S.-born Mexicans and NH whites are less than high school; high school diploma/GED; more than high school. Those for foreign-born Mexicans in the NHIS and MHAS are 0–6 years, 7–11 years, and high school or more.

Table 8 Wording in select questions measuring health indicators used in the 1997–2007 National Health Interview Surveys (NHIS) and the 2001 Mexican Health and Aging Study (MHAS)

	1997–2007 NHIS	2001 MHAS
Diabetes	Have you EVER been told by a doctor or health professional that you have diabetes or sugar diabetes?	<i>¿Alguna vez le ha dicho un doctor o personal médico que usted tiene diabetes o un nivel alto de azúcar en la sangre?</i>
Hypertension	Have you EVER been told by a doctor or health professional that you have hypertension, also called high blood pressure?	<i>¿Alguna vez le ha dicho un doctor o personal médico que usted tiene hipertensión o la presión alta?</i>
Current Smoking	Have you smoked at least 100 cigarettes in your ENTIRE LIFE? [If so.] Do you now smoke cigarettes every day, some days or not at all? [We collapsed “every day” and “some days” in one category].	<i>¿Alguna vez ha fumado cigarros? (Incluya más de 100 cigarros o 5 cajetillas [20 cigarettes per cajetilla]. No incluya puros o pipa [If so,]; ¿Fuma cigarros actualmente?</i>
Obesity (BMI >30 kg/m ²)	Both surveys ask for the interviewee height without shoes; only the NHIS asks for weight without shoes as well.	
Self-rated Health	Would you say your health in general is excellent, very good, good, fair, or poor?	<i>¿Diría Ud. que su salud es excelente, muy buena, buena, regular, mala?</i>

Sources: NHIS: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2002/qsamadt1.pdf. MHAS: <http://www.mhas.pop.upenn.edu/espanol/documentos/Cuestionarios/Cuestionario-Basico.pdf>.

Table 9 Summary of groups and hypothesis tests

A. Subgroup Definition and Sample Composition		
Sample ID	Data Source	Group Being Represented
NHW	NHIS	U.S.-born non-Hispanic Whites ($N = 39,985$)
NBM	NHIS	U.S.-born Mexican Americans ($N = 1,729$)
FBM	NHIS	Mexican migrants interviewed in the United States ($N = 1,328$)
RetMig	MHAS	Mexican migrants returning to Mexico after age 40 ($N = 382$)
USMig = FBM + RetMig	NHIS + MHAS	Mexicans with U.S. experience living on either side of border ($N = 1,710$)
NonMig	MHAS	Nonmigrants living in Mexico ($N = 4,756$)
B. Contrasts for Each Hypothesis		
Hypothesis and Table Where Shown		
Table 1. Hispanic Health Paradox		Appropriate Contrasts and Expected Direction of Health Advantage
Table 2. Salmon bias		FBM vs. NHW (+); USMig vs. NHW (+)
Table 3. Emigration selection		RetMig vs. FBM (-)
Table 4. Sociocultural protection in the U.S.		USMig vs. NonMig (+)
Table 5. Sociocultural protection in the home country		USMig of medium vs. short durations (-); NBM vs. NonMig (+)
Table 6. Negative acculturation and potential biases from attrition		NHW vs. NonMig (-)
		Least vs. most experienced FBM (-); least vs. most experienced USMig (-)

Note: Models for each test only include subset of groups involved in the test.

Table 10 Adjusted odds ratios for men of Mexican origin according to nativity, migration status, and U.S. experience, relative to U.S.-born non-Hispanic whites

	A. U.S.-born Mexican Americans	B. Mexican Immigrants Interviewed in the U.S., <15 Years of U.S. Experience	C. Mexican Immigrants With U.S. Experience Living on Either Side of the Border, <15 Years of U.S. Experience
Diabetes	1.91***	0.56 [†]	0.71 [†]
Hypertension	1.10	0.22***	0.33***
Current Smoking	1.09	0.57**	0.78 [†]
Obesity	1.04	0.59**	0.51***
Poor/Fair Health	1.31**	0.41***	0.95

Note: All models also control for age, age-squared, education, and (for return migrants) duration since return.

[†] $p < .10$; ** $p < .01$; *** $p < .001$

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