Explaining the Immigrant Health Advantage: Self-selection and Protection in Health-Related Factors Among Five Major National-Origin Immigrant Groups in the United States

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RUNNING HEAD: Explaining the Immigrant Health Advantage

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Abstract Despite being newcomers, immigrants often exhibit better health relative to native-born populations in industrialized societies. We extend prior efforts to identify whether self-selection and/or protection explain this advantage. We examine migrant height and smoking levels just prior to immigration to test for self-selection; and we analyze smoking behavior since immigration, controlling for self-selection, to assess protection. We study individuals aged 20–49 from five major national origins: India, China, the Philippines, Mexico, and the Dominican Republic. To assess self-selection, we compare migrants, interviewed in the National Health and Interview Surveys (NHIS), with nonmigrant peers in sending nations, interviewed in the World Health Surveys. To test for protection, we contrast migrants' changes in smoking since immigration with two counterfactuals: (1) rates that immigrants would have exhibited had they adopted the behavior of U.S.-born non-Hispanic whites in the NHIS (full "assimilation"); and (2) rates that migrants would have had if they had adopted the rates of nonmigrants in sending countries (no-migration scenario). We find statistically significant and substantial self-selection, particularly among men from both higher-skilled (Indians and Filipinos in height, Chinese in smoking) and lower-skilled (Mexican) undocumented pools. We also find significant and substantial protection in smoking among immigrant groups with stronger relative social capital (Mexicans and Dominicans).

Keywords: Migration; Health; Selectivity; Protection; Immigrant adaptation

Introduction

As newcomers in industrialized societies, immigrants have relatively low socioeconomic status (SES) and poor access to health care (Derose et al. 2009; Park and Myers 2010). Despite these disadvantages, the foreign-born often exhibit more favorable health than the native-born populations of destinations in some important dimensions, including mortality, heart and circulatory disease, obesity, and smoking (e.g., Cunningham et al. 2008; Kennedy et al. 2014; Singh and Hiatt 2006). This phenomenon—the immigrant health advantage (IHA)—has been attributed to some combination of (1) self-selection of healthier individuals into migration (Landale et al. 2006); (2) the protection that immigrants receive from social capital embedded in migrant networks and communities (Eschbach et al. 2004); and (3) the effect of data and statistical artifacts disproportionately overstating immigrant health (Patel et al. 2004; Turra and Elo 2008). With few exceptions, this work has focused on identifying or estimating the extent of one particular explanation and has primarily examined one national-origin group at a time, mostly Puerto Ricans (Landale et al. 2000, 2006) or Mexicans (Arenas et al. 2015; Fenelon 2013; Riosmena et al. 2013; Rubalcava et al. 2008).

In this article, we study the role of self-selection and protection in the IHA, examining migrant men and women from five major contemporary sources of U.S. immigration: namely, China, India, the Philippines, Mexico, and the Dominican Republic (see Department of Homeland Security 2013: table 3d; Hoefer et al. 2012). We use a gendered, cross-national comparative approach to speculate on the possible mechanisms explaining self-selection, protection, and thus the IHA.

Building on prior analytical innovations on the study of the IHA, we assess migrant smoking levels just prior to and since immigration in order to separately identify self-selection and protection. We focus on smoking because it is an important risk factor of health and a vital risk factor explaining the IHA (Blue and Fenelon 2011; Lariscy et al. 2015). Because height is a proxy of the health and nutritional status in childhood and adolescence, and generally of premigration conditions (e.g., Crimmins et al. 2005; Riosmena et al. 2013), we also use height to better identify health (and socioeconomic) self-selection and to further control for these forms of self-selection in protection tests.

Given the likely combination of self-selection, protection, and artifacts, analytical strategies aimed at unpacking immigrant health require the use of counterfactuals in both sending and destination areas and, ideally, of prospective data. Because of the lack of longitudinal surveys with international migrant follow-ups from virtually every source of U.S. immigration (except for specific Mexican cohorts; e.g., Goldman et al. 2014), we assess self-selection by comparing immigrants in the United States interviewed in the National Health Interview Survey (NHIS) with nonmigrants in sending countries from the World Health Surveys (WHS). Using matching techniques, we test for selectivity by comparing migrant height and premigration smoking with the levels observed among nonmigrant peers in sending areas of similar characteristics. Likewise, we assess protection by comparing the observed postmigration smoking trajectories of immigrants to those they would have experienced had they followed the behavior of matched samples of U.S.-born non-Hispanic (NH) whites (an assimilation counterfactual) and nonmigrants left behind in the sending nation (a no-migration counterfactual). Before presenting these results, we describe prior research on each of the mechanisms potentially explaining the IHA and the related Hispanic health paradox (HHP),[1] elaborating on how we attempt to separately identify self-selection and protection and on how we exploit our comparative framework.

Previous Research: Potential Explanations of the IHA

Faulty Data

Given the unexpected nature of the IHA, researchers have suspected that it is produced by faulty data or statistical artifacts, which may vary across national origins and data sources. Indeed, flawed data contribute to broadening the IHA in important measures of (self-reported) chronic health. For instance, immigrants are less likely to report these conditions because of their lower access to health care (e.g., Derose et al. 2009) and thus to routine screenings (Jurkowski and Johnson 2005). However, data problems alone do not explain the IHA in chronic health: many aspects of immigrants' biological risk profiles are more favorable than (Riosmena et al. 2015b)—or at least comparable to (Crimmins et al. 2007:1308–1309)—those of NH whites.

[1] The HHP is expressed by the favorable health profile of Hispanics as a whole relative to other ethnoracial groups in the United States (see Hummer and Hayward 2015). Because the HHP is especially present among the foreign-born, it is intimately related to the IHA. Thus, we use the HHP literature to inform our study.

Still, concerns over faulty data are warranted given that many national health surveys—especially those with comparable measures across multiple countries—include only self-reported indicators. Because the validity of self-reported diagnosis is questionable in the context of our study, we only examine smoking. Analyzing this outcome is also sensible given that the better cardiovascular health and lower cardiovascular mortality of Latin American migrants (e.g., Colón-López et al. 2009) is likely largely explained by their lower smoking rates (Blue and Fenelon 2011; Fenelon 2013; Lariscy et al. 2015).

The availability of data on first smoking initiation and last cessation in the NHIS also allows for a more appropriate isolation of the mechanisms of selection and protection. With this information, we estimate the foreign-born smoking status prior to migration for self-selection tests as well as postmigration smoking trajectories in protection tests. To further bolster self-selection and protection tests, we use height as a measure of health endowments during childhood and adolescence, and thus of premigration health status, in self-selection tests (see also Crimmins et al. 2005; Riosmena et al. 2013). In addition, we use height as an additional socioeconomic control in tests of premigration smoking and as a control for self-selection in SES and health in protection tests.

Another common issue in studies of selectivity or immigrant adaptation using data sources collected in the United States—perhaps more important than differential measurement error—is differential coverage due to difficulty of contact or refusal. Undercoverage is likely to be somewhat more problematic among undocumented populations because their status likely creates a chilling effect on interaction with different U.S. institutions. Because Mexicans are the only national-origin group in our sample with a large share unauthorized,[2] we mainly deem

[2] In 2011, the estimated number of undocumented Indian, Chinese, and Filipino migrants stood,

undercoverage to be a potential problem for this group. Further, results from sensitivity tests on Mexican immigrant-nonmigrant differences in height and smoking (discussed in more detail later) suggest that possible undercoverage cannot explain the vast majority of the IHA.

Return-Related Attrition as Statistical Artifact

Data on immigrant health outcomes often come from surveys conducted years after an individual immigrated to the United States. Thus, by the time of measurement, the composition of an immigration cohort could have changed through selective attrition. For the age range in our study, that mostly means return migration. If return migration flows were nontrivial and returning migrants were considerably less healthy than those remaining in the United States, the IHA could simply be an artifact of selective return. Prior research on the topic—mostly examining Mexicans—has found return migrants to be in at least slightly worse health than their peers remaining in the United States (e.g., Arenas et al. 2015; Riosmena et al. 2013; Turra and Elo 2008; but see Diaz et al. 2016).

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respectively, at 240,000; 280,000; and 270,000 (Hoefer et al. 2012: table 3). Dominican stocks are lower than 170,000 (Hoefer et al. did not report country-specific estimates lower than this number.) Assuming a figure of approximately 150,000 and using the 2010 census total foreign-born stock figures for each country (see Hooper and Batalova 2015; McNamara and Batalova 2015; Nwosu and Batalova 2014; Zong and Batalova 2015), the percentage of immigrants from each of these nations who were undocumented circa 2011 ranged between 13 % and 17 %. In contrast, using similar calculations, the share for Mexico was approximately 57 %. Further, a majority of contemporary Mexican legal permanent residents had an undocumented spell prior to legalization (Riosmena 2010).

Although this body of work also indicates that return migration rates and selectivity therein are not large enough to explain most of the IHA (Elo et al. 2004; Hummer et al. 2007; Riosmena et al. 2013; Turra and Elo 2008:526), selectivity in return migration could still influence our estimates of both self-selection and protection. To guard against this possibility, we limit the analytical sample to migrants with 0–9 years in the United States. Given recent research showing that return migration can be health-selective even among those in the United States for less than a decade (Arenas et al. 2015), we test the sensitivity of our estimates by restricting our analytical sample to migrants with fewer than five years in the country. In the case of Mexicans and Indians—our two largest subgroups—we also limit cases to those arriving just one year before the survey. To further study the possible extent of attrition-related biases, we disaggregate migrant-nonmigrant differences in adult height and premigration smoking according to immigrants' duration of stay. Because we should not observe changes in either of these indicators after migration, any differences between immigrants with different durations in the country could be indicative of attrition-related biases, or otherwise of cohort variation in the extent of self-selection, to which we now turn.

Emigration Selection

The IHA likely also reflects positive self-selection in health among migrants. Migrants disproportionately move from specific social groups and sending contexts, resulting in relatively marked socioeconomic and (to a lesser extent) gender selectivity (Feliciano 2005, 2008). Even after controlling for socioeconomic self-selection, several studies have found at least weak support for health self-selection in health among migrants from Puerto Rico (Landale et al. 2000, 2006) and Mexico (Martínez et al. 2015; Riosmena et al. 2013; Rubalcava et al. 2008).

Few studies have examined self-selection among other national-origin groups. Akresh and Frank (2008) found positive selection in self-rated health using New Immigrant Survey (NIS) respondents' assessments of their overall health relative to what immigrants in the NIS sample themselves thought was the health status of nonmigrants in their countries of origin. We depart from their study by directly measuring health-related factors in sending areas and by using health-related indicators that are less likely to be influenced by cultural interpretations than self-rated global health (see Bzostek et al. 2007; Viruell-Fuentes et al. 2011). We also build on research by Bosdriesz et al. (2013), who found consistently lower current smoking rates among U.S. immigrants from 14 different national-origin groups than among nonmigrants from sending nations. By using retrospective smoking measures and matching by both schooling and height as proxies of SES, we aim to identify self-selection more precisely.

Our cross-national perspective also aims to provide some explanations as to the possible relevance of different mechanisms of selection. In particular, selectivity tends to rise with the costs and risks of migration (Docquier and Rapoport 2008; Feliciano 2005). Because people migrating via family reunification are, by definition, following prior migrants, national-origin groups with a higher share of immigrants sponsored by relatives may be less self-selected health-wise. Given that the vast majority of U.S. immigrant admissions are either sponsored by relatives or employers (Bergeron 2013), we hypothesize that groups with a higher share of employment-based immigrants are more likely to be self-selected than those more dominated by family-based migrants. In this sense, India has the most selective flow, followed in order by China, the Philippines, Mexico, and the Dominican Republic (cf. Hooper and Batalova 2015; McNamara and Batalova 2015; Nwosu and Batalova 2014; Zong and Batalova 2015, 2016). And indeed, selectivity in skill (proxied by schooling levels) follows a similar pecking order, with the exception that Mexican migrants have the lowest educational selection of the five national-origin groups in our study (Feliciano 2005: figure 1). With the possible exception of Mexico, we expect to see a similar ranking in terms of health-related selection.

As mentioned earlier, predictions for Mexico must also account for the forces of selectivity in undocumented migration. Stronger border enforcement and weaker economic conditions are associated with higher (educational) self-selection in unauthorized crossings (Orrenius and Zavodny 2005; Villarreal 2014). Over the last two decades, the U.S. government has ramped up its allocation of resources to police the border and deport undocumented migrants (Massey and Riosmena 2010; Villarreal 2014), while the Mexican economy has had an irregular and overall middling performance (Weisbrot et al. 2014). Thus, despite the fact that contemporary Mexican migration is fueled by network processes that may otherwise reduce selectivity (Lindstrom and López-Ramírez 2010), it may still be positively selected in terms of health. Because conditions in sending areas and destinations fluctuate, however, self-selection may vary nonmonotonically across immigration cohorts (see Lindstrom and Massey 1994).

Putting together expectations about legal and undocumented migrant selectivity, Mexican migrant health selection is likely to be higher than that of Dominican and, perhaps, Filipino flows, both of which are strongly driven by social capital (Grasmuck and Pessar 1991; Le Espiritu 1995) but are less likely to be undocumented. However, it is unclear whether Mexican migration will have lower levels of self-selection than immigration from China and India. On one hand, the weaker SES-related self-selection of Mexicans and their longer history of migration fueled by social networks would suggest weaker health-related selection than in many other flows. On the other hand, the larger proportions of undocumented migrants paired with the difficult conditions surrounding irregular migration could lead to higher health-related self-selection in contemporary Mexican migration.

Protection Versus Negative Adaptation: Immigrant Health in the Long and Medium Run

Self-selection is unlikely to be the sole driver of an advantage in smoking given that this behavior is generally highly contingent on peer effects (Christakis and Fowler 2008) and the social environment in which people live (e.g., state policies/taxes; Boardman 2009). As such, after self-selection is accounted for, immigrants may experience (smoking) trajectories that are still more favorable than those of host-country natives and nonmigrant peers in the sending country (i.e., protection).

Immigrants' modes of incorporation to destination societies are contingent on factors, such as the human and financial capital that migrants come with, the context of reception they face from other social groups and institutions, and the role of their own (ethnic) community in facilitating this incorporation (Portes and Böröcz 1989; Portes and Zhou 1993). Research on the IHA and the HHP suggests that protection may chiefly operate via this third mechanism: Latin American migrants overall have lower levels of human capital and wealth, and face overall adverse contexts of reception, but they have (arguably) high social capital and ethnic cohesion. If protection were truly operating through these mechanisms, national-origin variation in postmigration smoking should thus exhibit a pattern in which groups with higher levels of, for example, spatial clustering (such as Mexican and Dominicans) exhibit clearer advantages in postmigration smoking. Because women in some immigrant communities may be subject to stricter social control limiting social interactions (e.g., Hondagneu-Sotelo 1994), and because activities such as smoking are highly gendered, protection could be particularly effective for women.

An additional complication is that even if present, protection is very likely to be short-lived and occur mostly during the earlier part of an immigrant's time in the United States. Previous research has found that foreign-born individuals with somewhat longer U.S. residence or greater "acculturation" to U.S. society have worse health and risk factors than those with shorter residence or less acculturation (for reviews, see Hunt et al. 2004; Lara et al. 2005). The cumulative effects of these health-deleterious modes of incorporation are particularly noticeable among immigrants who have been in the United States for more than a decade (e.g., Antecol and Bedard 2006). Thus, our focus on foreign-born with 0–9 years in the United States—aimed at reducing the influence of statistical artifacts—also has the rationale of reducing the possible confounding effects of long-run negative adaptation processes.

Existing evidence of whether protection may be occurring earlier in the immigrant experience is rather mixed. For instance, research has found a curvilinear association between duration of stay and immigrant women's perinatal health outcomes, suggesting more favorable health for migrants with medium durations of stay in the United States (i.e., 3–10 years) than for both more- and less-recent arrivals (Teitler et al. 2012, 2015). Also consistent with the idea of protection, studies have found that Latin American migrants living closer to coethnics exhibit more favorable health than do individuals living in less-concentrated neighborhoods (Cagney et al. 2007; Kimbro 2009).

In contrast, research testing the joint role of protection and selection has questioned the idea that protection is really a factor in the IHA. After adjusting for return-related attrition, Riosmena et al. (2013) did not find evidence consistent with (or against) protection on current self-reported health measures among older Mexican migrant adult men. Examining changes in self-rated global health in a cohort of international migrants followed up as part of the Mexican

Family Life Survey, Goldman et al. (2014) found that young migrant adults' health reports deteriorated in the four-year interwave period after controlling for self-selection. As such, the evidence of protection found in studies of neighborhood effects or perinatal health described before could thus have been really produced by and confounded with health selectivity (or other artifacts).

Our study, using additional health-related factors and a broader set of immigrant cohorts and national origins, is warranted to build a more nuanced understanding of the circumstances under which protection may (or may not) take place. We focus on the change in smoking rates between an immigrant's arrival to the United States and the survey year and compare it with the rates of U.S.-born NH white and nonmigrant peers in sending countries, accumulated during a comparable time frame. The examination of both destination- and sending-area counterfactuals allows us to better gauge whether changes in migrant outcomes are more favorable (or less unfavorable) than those of these two important counterfactuals and understand how they relate to (lack of) assimilation to the mainstream in destinations (Alba and Nee 2004) and to processes of dissimilation from the homeland (Jiménez and Fitzgerald 2007). Most clearly, if protection were truly taking place and originated in the destination, as implied in the extant literature, one should observe an immigrant advantage in postarrival smoking, net of selection, relative to both destination and sending area counterfactuals.

In addition to analyzing net change in smoking since arrival, we use more detailed retrospective data on smoking, available in the NHIS but not in the WHS. With these data, we compare rates of smoking initiation and cessation after immigration with those of NH whites. Evidence of lower cessation rates among immigrants who did smoke at time of immigration is more likely to be a true indication of protection than an advantage in smoking initiation rates among those who did not smoke prior to migration, which could still be in some ways attributable to self-selection.

Data and Methods

Data Sources

Our analysis links data from the NHIS in the United States and WHS surveys in India, China, the Philippines, Mexico, and the Dominican Republic. The NHIS has been fielded by the National Center for Health Statistics (NCHS) since the late 1950s (NCHS 2008). Each annual cross-section is a nationally representative, multistage, stratified sample of the U.S. population, with oversamples of Hispanics since 1995, and of Asians since 2006 (see Botman et al. 2000; NCHS 2008 for further details on the NHIS methodology). We pool the 2003–2010 NHIS survey cycles to increase the efficiency of our estimates while having (current and retrospective) data in years relatively close to those of the WHS surveys. In addition to gathering basic information on all household members, NCHS personnel also interviewed one adult in the household, chosen at random, from whom they obtained more detailed health information, including the measures used here. Response rates for the adult sample, already considering nonresponse at the household level, are approximately 70 % (NCHS 2008: appendix I).

WHS was a World Health Organization (WHO) initiative designed to collect comparable individual-level health data worldwide (WHO 2008). During 2003 and 2004, 70 countries implemented the WHS questionnaire with supervision and technical assistance from the WHO, using a stratified multistage cluster sampling frame of households to randomly select people ages 18 and older. Although the strata and cluster definitions vary across countries, the WHO set clear quality standards to ensure nationally representative results. Countrywide response rates for four of the five sending countries included in our analyses were above 95 %, with 74 % response in the Dominican Republic (WHO 2008).

Our analysis begins with a sample of foreign-born individuals who had been in the United States for 0–9 years at the time of the NHIS survey. We further selected people ages 20–49, the prime life stage for migration. Depending on the analyses performed, we selected this age range according to their age at either the time of interview or at the estimated time of immigration (see analytical strategy section for description). Using the age at interview restriction yields sample sizes of 700 Indian, 321 Chinese, 219 Filipino, 3,580 Mexican, and 155 Dominican immigrants in the NHIS. For our sending-country counterfactuals, the age at interview restrictions yielded WHS data for 6,593 in India; 2,427 in China; 7,254 in the Philippines; 21,495 in Mexico; and 2,902 in the Dominican Republic. For our U.S.-born protection counterfactuals, we draw on 62,528 U.S.-born NH whites aged 20–49.

Measures

We use height standardized in *z* scores based on the sex-specific distribution of each individual's country of birth (i.e., for immigrants and WHS respondents, from the WHS; for NH whites, we use their distribution within the NHIS). Both the NHIS and WHS included only height self-reports. Individuals tend to exaggerate their height in self-reports, with small but systematic differences in misreporting by sex, age, and SES (e.g., Osuna-Ramírez et al. 2006). Assuming that the magnitude of this exaggeration is similar among migrants and nonmigrants of the same sex, age, and schooling levels (our matching variables), these biases should not influence the results of our tests.

The WHS includes only current smoking measures, while the NHIS includes retrospective questions on the age at which the person began smoking regularly—and, if s/he had smoked but then quit, the time since the last cessation. NHIS data, together with reported duration of stay, allow us to roll back an individual's estimated smoking status to before his/her arrival in the United States to study premigration and postarrival smoking behavior. Although all retrospective data are subject to recall error and left-censoring, studies have found that retrospective measures of smoking initiation are reliable when compared with estimates derived from longitudinal surveys (Kenkel et al. 2003). Differential mortality of smokers can also affect retrospective estimates for older respondents, but that problem should be minimal for the age groups we study here (Christopoulou et al. 2011; Lillard et al. 2014).

Analytical Strategy

We use exact matching to compare migrants with appropriate counterfactuals in both self-selection and protection tests. The statistical literature recommends the use of matching instead of regression approaches to account for observed confounders when (1) the propensity to engage in the treatment differs substantially between treated and control cases (as discussed in the section on emigration selection); and (2) when there is a high likelihood that a significant number of treatment or control cases would be dropped because of noncomparability (Baser 2007; Rubin 2001). This is the case in our data, where nontrivial differences in sex, age, and schooling exist between immigrants and nonmigrants (see Table 5 in the appendix). Further, because the data available to us have a limited number of covariates and the ratio of controls (nonmigrants) to cases (migrants) is high, we employ exact (as opposed to propensity score) matching techniques, as in a case-control design. With very few exceptions, our matching procedures and categorization allowed us to match virtually every migrant (i.e., 97 % to 99 %) in the NHIS sample with nonmissing information in all matching variables.

We matched migrants with nonmigrants by sex and a four-category schooling classification (less than primary, primary completed/some lower secondary, lower secondary completed/some upper secondary, and postsecondary or higher). In addition, depending on the outcome, we matched by age at interview, age at immigration, or birth cohort (all in five-year groups). When modeling height selectivity, we matched on birth cohort to account for recent systematic increases in height across cohorts in the Global South (Deaton 2007). In analyses of selectivity in smoking, we rolled back prevalence to a time briefly before migrants left the sending country, matching NHIS migrants according to their estimated age at immigration with WHS nonmigrants according to their age at interview. In postmigration smoking analyses, we matched by age at interview. Finally, we also used height as a matching factor in analyses of premigration smoking selectivity and postmigration smoking behavior, using five groupings of *z* scores: $(-\infty, -1.5z)$; $[-1.5z, -0.5z)$; $[-0.5z, +0.5z)$; $[0.5z, 1.5z)$; and $[1.5z, \infty)$.

Because we match all available WHS controls to an NHIS migration case, the same control might have been used several times. To adjust for this disproportion and estimate means and standard errors under a one-to-one case/control ratio, we downweighted controls using the case/control ratio in the sex-age-education-height group as the weight whenever the number of controls was greater than the number of cases in said group. As a further check for bias, we also tested models in which we downweighted the number of cases by the case/control ratio for the less-frequent age-sex-education(-height) groups where the number of cases outstrips the number of controls. This estimator minimizes the potential effects of outliers on tests of difference, but it also produces unrepresentative estimates of means. We therefore report estimates in which all cases receive the same weight, although our results fully hold in either case (results not shown).

Given concerns about coverage and attrition-related distortions, the different periods for NHIS and WHS data collection, and—for selectivity tests—changes in migrant health after migration, we assess whether our results vary by restricting immigrant and nonmigrant samples in different ways. First, to assess the potential role of systematic undercoverage of undocumented immigrants in the NHIS, we perform a sensitivity test to assess what the average height and smoking prevalence of those not covered by the survey would need to be in order to explain migrant-nonmigrant differences in these outcomes. Using the Mexican case (i.e., the group with the largest share undocumented by far; see footnote 2), we find our results to be robust to these possible biases.[3]

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[3] We begin with a simple setup in which X is a random variable representing the real value of height or premigration smoking for the Mexican-born population that one would obtain with perfect survey coverage. In practice, however, we observe only a certain proportion of individuals (for Mexican-born men and women, coverage errors are approximately 28 % and 15 %; Van Hook et al. 2014). As such, the real expected value is a weighted average of X_o, the observed expected value; the probability of undercoverage, $p(u)$; and X_u, the expected value of for those who are not observed: $E(X) = E(X_o) \cdot [1 - p(u)] + E(X_u) \cdot p(u)$. Using our NHIS estimates for X_o and Van Hook et al.'s (2014) estimates for $p(u)$, we calculate the value $E(X_u)$ would need to be to close the height-smoking gap between immigrants in the NHIS and nonmigrants in the WHS. Immigrant men unobserved in the NHIS would need to be 12 cm (4.7 in) shorter than individuals sampled in the NHIS to close the Mexican immigrant versus nonmigrant gap, which is a relatively large amount (e.g., three times higher than the observed migrant-nonmigrant height differences in our analyses). For women, this amount would need to be a whopping 20 cm (7.9 in), a highly implausible amount. Likewise, the raw prevalence of

Second, to assess the role of attrition on self-selection, we present results restricting matches to immigrants in the NHIS with specific durations of stay as described earlier. Although most of our results are quite robust to this examination, in a few cases (discussed in more detail when presenting results), we find evidence that attrition, or cohort differences in smoking, could be exaggerating the extent of the IHA in our broader sample. Thus, we do not use these cases when concluding on the extent of self-selection.

Results and Discussion

Height as a Proxy for Health-Related Selection and Falsification Test for Statistical Artifacts

Table 1 shows differences in height *z* scores between migrant women and men in our NHIS sample and nonmigrant counterparts in the sending country. Column 1 shows differences in means between these groups matched only by birth cohort, while column 2 shows these differences after also matching by educational attainment. With the exception of Dominican women, for whom differences are not statistically significant, immigrants are taller than nonmigrants of the same cohort (panel A, column 1; in all cases, $p < .001$). Although we find substantial differences in the socioeconomic composition of migrant versus nonmigrant groups (see Table 5 in the appendix), these do not explain most migrant-nonmigrant height differences.[4] The only exception is Dominican males, for whom migrant-nonmigrant height differences decrease substantially and lose their marginal statistical significance after matching by schooling. Column 2 in Table 1 also shows that migrant women from India, China, and Mexico are,

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smoking for both men and women not observed in the NHIS would need to average above 80 % for migrant-nonmigrant differences to be an artifact of undercoverage—highly unrealistic values.

[4] Migrant-nonmigrant differences are large and remarkably consistent across the educational groups most common in each immigrant subsample (not shown).

respectively, 0.44, 0.26, and 0.37 standard deviations taller than their nonmigrant counterparts of similar age/cohort and education ($p < .01$ for each). These differences are somewhat higher among migrant men from India, China, the Philippines, and Mexico, who are 0.90, 0.21, 0.68, and 0.44 standard deviations taller than their nonmigrant counterparts, respectively ($p < .05$ for each, see Column 2 in Panel B of Table 1).

–TABLE 1 ABOUT HERE–

For Mexicans, Filipino men, and (to a lesser extent) Indian immigrants, these differences are quite likely *not* due to selective attrition or to differences in the composition of immigrant cohorts. Comparing columns 3 and 4 in Table 1, we find higher migrant-nonmigrant differences for migrants with more U.S. experience than for those with less experience (as it is the case for all groups with a height advantage, except for Filipino women and Chinese men). Although this pattern is indeed consistent with the notion that selective attrition could exaggerate the IHA, none of these differences are statistically significant even at the .10 level (calculations not shown). Even if we took these differences at face value, artifacts (or cohort differences) would contribute substantially in magnitude only to the Chinese immigrant health advantage.[5]

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[5] To minimize attrition-related biases, we also performed these tests among immigrants reporting less than one year since arrival in the United States, using only Indians and Mexicans, the two largest national-origin groups in the data. The degree of self-selection in height among Indian men as well as Mexican men and women with less than one year of U.S. experience is overall similar to that of more experienced migrants, with the most recently arrived Indian immigrant women indeed having a lower (and nonsignificant) height advantage. Likewise, although the premigration smoking advantage of immigrants appears to be reduced in the case of, for example, Indian men and Mexican women when only examining migrants with less than five or

Selection in Premigration Smoking

Table 2 presents results of comparing the premigration smoking status of immigrants with that of nonmigrants of the same sex, age, and schooling levels. Public NHIS data provide only a range of duration of stay. For migrants with 0–9 years in the United States, these are 0–1, 1–4, and 5–9 years. Thus, for migrants with $x – x + n$ years in the United States, we estimate smoking prevalence rates $x + n$ years prior to the survey. We matched these groups using the age of migrants right before the estimated time of their arrival to the United States—that is, 10 years earlier for migrants with 5–9 years in the United States; 5 years earlier for migrants with 1–4 in the United States; and the prior year for migrants with less than 1 year in the country. With the exception of Mexicans, we find no significant differences in premigration smoking status among women after matching (at the .05 level, panel A, Table 2). Furthermore, although Mexican immigrant women have significantly lower unadjusted smoking rates than those of nonmigrants, these differences do vary considerably across durations of stay (cf. columns 3 and 4). We therefore deem these results inconclusive given the possible presence of cohort differences or attrition-related biases.

–TABLE 2 ABOUT HERE–

As in the case of height, results are more suggestive of selection for migrant men, particularly Mexican and Chinese. Except for Dominicans, immigrant men are somewhat less likely to smoke than nonmigrants in terms of unadjusted differences (column 1, Table 2, all $p < .001$). Although these differences remain large and significant among migrant men from all four

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less than one year in the United States, these differences are not statistically significant. Thus, to the extent to which there is some self-selection in smoking, this does not appear to be explained away by the combination of attrition-related biases and cohort differences.

other groups after matching for age, schooling, and height (column 2, all $p < .05$), only among migrants from Mexico and China are these differences robust to an examination by duration of stay (cf. column 2 with columns 3 and 4).

Assessing Net Protection in Smoking Relative to Populations in Destination and Sending Areas

Table 3 presents estimates aimed at assessing the role of protection in smoking since estimated time of arrival to the United States. First, we calculated the smoking prevalence at arrival for the immigrant sample (column 1) as well as their smoking prevalence at the time of the survey (column 2), the difference between these being the actual net change in smoking since arrival (net, because it presents the combined role of initiation and cessation). In addition to these, we calculated the smoking rates that immigrants would have had at the time of the survey had they, upon arrival in the United States, instantly adopted the smoking initiation and cessation patterns of U.S.-born NH whites of the same sex, age, schooling levels, and relative heights (our assimilation counterfactual, column 3). Finally, in column 4, we present results of a no-migration scenario. Because the WHS does not include information on the timing of adoption and cessation behavior like the NHIS, we calculated the smoking behavior of WHS counterfactuals twice, matching once on the migrant's estimated age at departure and once on the migrant's age at the survey year (while using all other controls in both calculations), obtaining the ratio of current to past smoking prevalence. We then assumed that migrants would have experienced the same relative rise/fall in smoking as their left-behind matches.

–TABLE 3 ABOUT HERE–

Other than Chinese and Dominican women and Filipino men, all other sex- and national-origin groups experienced a statistically significant net reduction in smoking. This is illustrated in Fig. 1 (panel a for women and panel b for men), showing considerable reductions in postmigration versus premigration smoking. Although these reductions were larger among men in absolute terms (i.e., in percentage point differences in prevalence, as shown in the three middle columns of Table 3), the reductions are somewhat higher for women because they are expressed in risk ratios,[6] which is another important metric in health and social science research. Mexican, Filipino, and Indian migrant women experienced 36 %, 24 %, and 100 % relative reductions, respectively, in smoking between arrival and the time of the NHIS survey, equivalent to 3.3 %, 2.0 %, and 0.9 % changes, respectively, in prevalence in absolute terms. Dominican women experienced virtually no changes in smoking, with Chinese women exhibiting significant increases in smoking of 54 % and 1.4 % in relative and absolute terms, respectively. Meanwhile, Dominican, Mexican, Indian, and Chinese migrants experienced reductions in smoking of 9.5 %, 3.2 %, 2.8 %, and 2.6 %, respectively, equivalent to 50 %, 12 %, 18 %, and 13 % in relative terms, respectively, with Filipino men exhibiting a 1.7 % increase (5.6 % in relative terms).

–FIGURE 1 ABOUT HERE–

Comparing these changes with assimilation and no-migration counterfactuals provides more appropriate evidence of protection than simply deeming more sizable reductions in smoking postarrival as *prima facie* evidence of protection, or increases in smoking as evidence against it. Figure 1 also shows relative differences between (1) assimilation and (2) no-migration counterfactuals and immigrants' smoking prevalence at arrival. Absolute differences between scenarios are also shown in Table 3, along with *t* tests of the significance of the difference-in-

[6] That is, we divide the difference between scenarios by the estimated smoking prevalence of immigrants upon arrival, and further subtracting this figure by 100 to express it in percentage deviations.

difference between counterfactual scenarios and time of immigration versus the actual change experienced by migrants (each significant at $p < .05$ or lower).

With a few exceptions, contrasting these reductions with the two proposed counterfactuals confirms that changes in smoking among migrants are generally more favorable or, at least, less unfavorable relative to assimilation and no-migration scenarios. First, the exceptions to this pattern are those of Chinese women as well as Indian and Filipino men. Chinese women would have indeed experienced an even larger (114 %) increase in smoking after arrival had they fully adopted NH white rates. However, they would have experienced a 68 % relative reduction in smoking had they adopted the smoking rates of their left-behind counterparts. Although more favorable outcomes relative to the destination mainstream might be a good indication that protection is taking place, the contrast with sending area counterfactuals suggests that Chinese women may be experiencing a stronger negative adaptation to the United States than one would deem by only looking at destination counterfactuals. In slight contrast, Indian and Filipino men did experience larger declines or smaller increases (respectively) relative to those in the no-migration scenario. However, this change was less favorable than what they would have experienced under the assimilation counterfactual. As such, adaptation for these individuals had been more favorable than it would appear by only comparing their trajectories with those of NH whites.

For all other migrant sex- and national-origin groups, changes in smoking after arrival are significantly different and more favorable than both assimilation and no-migration counterfactuals, suggesting that protection is more clearly at work among them.

Protection in Postmigration Smoking Initiation and Cessation

Table 4 contrasts smoking initiation and cessation throughout the migrant's estimated tenure in the United States relative to those of U.S.-born NH white individuals of the same sex, schooling levels, and relative heights. We compare these initiation and cessation probabilities of migrants who have been in the country between x and $x + n$ years with those of U.S.-born NH whites during the $x + n$ years before the survey year. We do so by (1) matching a migrant with x to $x + n$ years in the United States to a NH white of the same sex, age, schooling, and relative height; and (2) estimating the smoking status of white matches $x + n$ years before the survey based on their retrospective smoking information.

Similar to analyses of self-selection, we present estimates for immigrants with 0–4 and 5–9 years in the United States separately (columns 1 and 2, Table 4). However, these figures have a different interpretation than in selection tests: although the wider immigrant-native gaps for those with 5–9 years could suggest the presence of artifacts, the table shows cumulative probabilities of starting or quitting smoking and therefore are expected to widen even in the absence of compositional distortions or cohort differences. Finally, to facilitate interpretation, only estimates that are significant at the .10 level in Table 4 are depicted in panels a and b of Fig. 2 (for women and men, respectively).

–TABLE 4 ABOUT HERE–

Lower postmigration initiation rates could be the result of a lingering effect of self-selection in the sense that they could be an extension of the healthy habits acquired by people before migration. Although matching by self-selection variables (including height) should help, we argue earlier that higher cessation is less likely to be related to self-selection. Thus, we deem evidence of higher cessation relative to NH white controls to be clearer evidence of protection than lower initiation. Because social control over smoking should affect both of these behaviors in relatively similar ways, we further deem both higher cessation and lower initiation in both duration groups studied as the clearest evidence of protection.

–FIGURE 2 ABOUT HERE–

Based on these criteria, protection is not as evident among the different groups for which we found an advantage in net smoking changes in Table 3. Indeed, although most of these groups experience lower initiation rates than NH whites, several do not experience statistically higher cessation rates, which thus fails to provide clearer evidence of protection. Under these criteria, protection is more visible among Mexican men and women as well as Dominican men. In all three cases, migrants of both duration groups are considerably less likely to initiate and more likely to quit smoking after arrival than their NH white matches during a similar period. However, the results for Dominican men are only marginally significant at the $p < .10$ level, so they should be taken with additional caution.

In addition to these three cases, patterns in postarrival smoking for two other groups are consistent with shorter-lived or delayed protection, respectively. Dominican and Indian migrant women of both duration groups are indeed less likely to initiate smoking than NH white controls. Yet, our results suggest Dominican migrant women have higher cessation than whites during their first five years in the United States, with lower cessation in the following five years, indicating either cohort differences in postarrival smoking behavior or very short-lived protection. In contrast, our results suggest Indian women experience an initial disadvantage in cessation in the first five years after arrival relative to white controls, followed by higher rates in the five years after. This may be a protracted form of protection or, again, indicate differential adaptation in smoking across immigration cohorts.

Conclusions

Our study contributes to understandings of the IHA and to the growing literature on migrant self-selection by comparing immigrants from a wide range of national origins with left-behind counterfactuals. We find that self-selection is particularly strong and consistently significant in national-origin groups with either a large share of legal migrants sponsored through employment (Indians in height, Chinese in smoking) or a large composition of undocumented migrants (Mexicans). Dominican immigrants, with their well-established patterns of chain legal migration via family reunification (Nwosu and Batalova 2014; Riosmena 2010), stood out as the only national-origin group exhibiting no evidence self-selection in either height or smoking, among men or women. These patterns are overall consistent with our expectations of a higher degree of self-selection in populations with lower proportions of "tied" or "chain" migrants, and among the undocumented because of the rising costs and risks of migrating illegally (Orrenius and Zavodny 2005). However, this hypothesis was not fully supported by (1) the relatively weak self-selection in smoking among more recently arrived Indian migrant men (which could be the result of the recent shift away from smoking among high-SES men in India; Ng et al. 2014) and (2) the higher height selection among Filipino migrant men (also see De Castro et al. 2005). Additional research examining a larger set of outcomes, going deeper into the mechanisms of selection in each nation, or using data from a larger cross-section of destination and sending nations measuring more premigration factors (e.g., Akresh and Frank 2008), should help shed further light into selectivity processes.

Our study also contributes to the study of the IHA and the broader literature on immigrant adaptation by better devising protection tests concurrent with those of selection. With few exceptions, we find that migrants of most sex- and national-origin groups had more favorable (or at least, less unfavorable) smoking trajectories after immigration relative to a comparable time frame for U.S.-born NH white peers. This advantage seemed to be particularly robust among Mexican migrants (especially women) for smoking initiation and cessation behavior, with weaker evidence for Dominicans and Indian women.

Although we found evidence of protection also when comparing smoking since immigration relative to no-migration counterfactuals, comparisons with assimilation scenarios yielded larger differences. This finding suggests that studies focusing only on destinations could misattribute the extent and nature of adaptation in a given outcome. This potential misattribution may be particularly important for behaviors with strong social regulations, such as smoking and other consequential health risk factors (e.g., obesity).

Despite the great relevance of smoking in influencing chronic health and racial/ethnic disparities therein (Blue and Fenelon 2011; Fenelon 2013; Lariscy et al. 2015), immigrants may not be self-selected in or protected from problems in other important health-related outcomes. As a preliminary piece of evidence, we found no evidence of self-selection in obesity for either men or women while examining a subset of Indian and Mexican migrants with less than one year in the United States, which allowed us to avoid confounding self-selection with postmigration weight gain. (See Table 6 in the appendix; we focused only on these two groups because sample size restrictions.) Moreover, a comparison of migrant-nonmigrant differences in obesity across duration groups (also shown in Table 6) suggests a swift weight gain among migrant populations, higher than no-migration counterfactuals (see also Akresh 2007; Antecol and Bedard 2006). This finding calls for more research aimed at concurrently understanding self-selection and protection in a broader set of health dimensions.

Finally, by situating results for Mexico alongside those of other countries and constructing new tests of protection, our study illustrates a complex but potent combination of selection and protection driving the Mexican IHA in particular. As discussed earlier, prior studies on migrant health have found mixed but perhaps clearer evidence of selection than protection among Mexican-born migrants (Riosmena et al. 2013; also cf. Goldman et al. 2014; Rubalcava et al. 2008). Yet, our study shows evidence of both self-selection (mainly among men) and protection (particularly for women, but also present for men) in other national-origin groups. This finding suggests that the IHA more generally—but especially that pertaining to Latin American migrants—is produced by overlapping, mutually reinforcing mechanisms, including different types of artifacts that additionally exaggerate the IHA beyond its likely true extent.

Our study thus contributes to clarifying some of the paradoxical nature of the IHA, by showing that it is in no small part driven by expected (even if not fully understood) processes of self-selection, further offering some tentative explanations on its mechanisms by exploiting sex and national-origin variation. Our study also suggests that some aspects of health do appear to improve during the earlier stages of the immigrant experience, even if others worsen in the long run (Riosmena et al. 2015a) and in the short run (Goldman et al. 2014). A more nuanced (and gendered) understanding of these effects thus needs research to move beyond simple, linear, unidimensional, and negative duration and acculturation effects (Abraido-Lanza et al. 2006; Viruell-Fuentes 2007).

Appendix

Table 5 Weighted means by sample/country of residence, national origin/nativity/ethnicity, and sex, adults ages 20–49 at survey year

	India		China		Philippines		Mexico		Dominican Republic		U.S.-born, non-Hispanic whites	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
A. Residents in the United States (2003–2010 National Health Interview Survey)												
Smoked at time of the survey	0.121	0.007	0.168	0.015	0.330	0.055	0.187	0.039	0.186	0.040	0.294	0.259
Smoked prior to migration	0.143	0.007	0.161	0.011	0.331	0.058	0.208	0.066	0.184	0.038	0.304	0.286
Started smoking since immigrating	0.043	0.002	0.069	0.012	0.182	0.005	0.059	0.010	0.064	0.007	0.105	0.078
Quit smoking since immigrated	0.481	0.317	0.434	0.672	0.370	0.385	0.355	0.552	0.518	0.114	0.282	0.295
Obesity (BMI >30 kg/m^2)	0.047	0.057	0.012	0.010	0.020	0.041	0.159	0.227	0.134	0.162	0.258	0.225
Height (cm.)	174.4	160.6	173.0	161.2	170.2	158.5	171.1	159.6	174.5	161.6	179.4	164.6
Age	30.5	30.4	32.4	33.2	33.2	32.2	29.7	29.7	30.6	33.5	35.2	35.3
Schooling levels												
Less than primary	0.003	0.011	0.025	0.008	0.000	0.006	0.091	0.086	0.069	0.068	0.003	0.002
Primary completed /some junior high	0.000	0.004	0.012	0.027	0.048	0.000	0.245	0.265	0.000	0.025	0.004	0.002
Some HS/graduate or Equivalent	0.144	0.254	0.272	0.297	0.190	0.263	0.573	0.578	0.777	0.678	0.580	0.530
Some postsecondary and higher	0.851	0.725	0.657	0.664	0.763	0.730	0.060	0.065	0.155	0.164	0.407	0.460
N	406	294	148	173	87	132	1,843	1,737	53	102	29,282	33,246
B. Residents of Country of Origin (2003–2004 World Health Survey)												
Smoking at time of the survey	0.486	0.138	0.594	0.018	0.601	0.111	0.377	0.171	0.148	0.095		
Obesity (BMI >30 kg/m^2)	0.012	0.020	0.011	0.009	0.026	0.038	0.115	0.174	0.132	0.133		
Height (cm.)	164.5	154.0	168.6	157.9	164.2	155.9	167.2	156.3	171.6	162.2		
Age	31.1	31.9	35.8	35.0	32.4	33.5	32.3	32.7	33.1	32.3		
Schooling levels												

Less than primary	0.287	0.627	0.070	0.121	0.161	0.115	0.044	0.060	0.473	0.423
Primary completed /some junior high	0.172	0.151	0.198	0.240	0.284	0.289	0.319	0.378	0.268	0.257
Some HS/graduate or equivalent	0.340	0.155	0.592	0.530	0.445	0.449	0.500	0.459	0.199	0.252
Some postsecondary and higher	0.192	0.062	0.139	0.109	0.111	0.147	0.137	0.103	0.059	0.068
N	3,133	3,460	1,170	1,257	3,385	3,869	9,059	12,436	1,320	1,582

Table 6 Matched differences in height *z* scores, premigration smoking, and obesity at survey year between immigrants in NHIS and nonmigrants in India and Mexico's WHS, by sex and immigrants' duration of stay in the United States

	Differences Between Matches Within Area of Common Support[a]		
	Less Than 10 Years	Less Than 5 Years	Less Than 1 Year
India			
Women			
Height (*z* score)	0.442***	0.403***	0.263
Premigration smoking	–0.018†	–0.020	–0.030
Obesity (BMI >30 kg/m^2)	0.038**	0.041*	0.061
Men			
Height (*z* score)	0.898***	0.817***	0.751**
Premigration smoking	–0.063*	–0.031	–0.023
Obesity (BMI >30 kg/m^2)	0.012	–0.005	–0.021
Mexico			
Women			
Height (z score)	0.371***	0.363***	0.324*
Premigration smoking	–0.031*	–0.009	0.000
Obesity (BMI >30 kg/m^2)	0.062***	0.042*	–0.024
Men			
Height (z score)	0.436***	0.433***	0.423**
Premigration smoking	–0.080***	–0.080**	–0.119*
Obesity (BMI >30 kg/m^2)	0.054***	0.015	–0.058†

Notes: Premigration smoking also matched by height *z* score deciles. For raw means and sample sizes, see Table 5.

[a]Matched by sex, schooling levels; and age (obesity) or birth cohort (height, smoking).

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

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Table 1 Matched immigrant/nonmigrant differences in height *z* scores by sex and national origin, ages 20–49 in 2003

	Differences Between NHIS and WHS After Matching			
	Matches NHIS (0–9 Years in U.S.) to All WHS[a] (1)	Matches NHIS (0–9 Years in U.S.) to All WHS[b] (2) \	Matches NHIS (0–4 Years in U.S.) to All WHS[b] (3) \	Matches NHIS (5–9 Years in U.S.) to All WHS[b] (4) \
A. Women				
India	0.665***	0.442***	0.403***	0.488***
China	0.345**	0.264**	0.200†	0.299*
Philippines	0.288**	0.139	0.192	0.064
Mexico	0.369***	0.371***	0.363***	0.376***
Dominican Republic	–0.034	–0.183†	–0.285†	–0.143
B. Men				
India	1.042***	0.898***	0.817***	0.999***
China	0.418***	0.210*	0.223†	0.197
Philippines	0.974***	0.680***	0.673***	0.685***
Mexico	0.398***	0.436***	0.433***	0.441***
Dominican Republic	0.270†	0.090	0.118	0.126

[a] Matched by sex and birth cohort (five-year groups; see the text).
[b] Matched by sex, birth cohort, and schooling levels (see the text for a description).
†$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$

Table 2 Matched migrant/nonmigrant differences in smoking prevalence at year of immigration (NHIS) versus survey year (WHS) by sex and national origin

	Differences Between NHIS and WHS After Matching			
	Matches NHIS (0–9 Years in U.S.) to All WHS[a] (1)	Matches NHIS (0–9 Years in U.S.) to All WHS[b] (2)	Matches NHIS (0–4 Years in U.S.) to All WHS[b] (3)	Matches NHIS (5–9 Years in U.S.) to All WHS[b] (4)
A. Women				
India	–0.072***	–0.018†	–0.020	–0.006
China	0.012	0.007	–0.015	0.031
Philippines	–0.008	0.000	0.004	–0.005
Mexico	–0.045***	–0.031*	–0.009	–0.048**
Dominican Republic	–0.007	–0.004	0.042	–0.020
B. Men				
India	–0.240***	–0.063*	–0.031	–0.058
China	–0.363***	–0.228**	–0.243**	–0.182*
Philippines	–0.307***	–0.160*	–0.249*	–0.056
Mexico	–0.082***	–0.080***	–0.080**	–0.081**
Dominican Republic	0.052	0.102	0.110	0.096

[a]Matched by sex and five-year groups for age at immigration (NHIS) versus age at survey year (WHS) (see the text for details).
[b] Matched by sex, birth cohort, schooling levels, and relative height groups (see the text for a description).
†$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$

Table 3 Immigrant smoking prevalence prior to migration, at year of the survey, and under assimilation and no-migration counterfactuals, by sex and national origin (percentages)

	Prior to Arrival (1)	At Survey Year, Under…. Scenario			Δ in Smoking Since Arrival Under ….			Significance Level of Differences (*t* test)		
		Actual (2)	Full Assimilation (3)	No-Migration (4)	Actual ((2) – (1))	Assimilation ((3) – (1))	No-Migration ((4) – (1))	Actual vs. None	Assimilation vs. Actual	No-Migration vs. Actual
A. Women										
India	0.9	0.0	3.1	1.1	–0.9	2.2	0.2	***	***	***
China	2.6	4.1	5.7	0.8	1.4	3.0	–1.8	***	***	***
Philippines	8.1	6.1	7.5	7.5	–2.0	–0.6	–0.6	***	***	***
Mexico	9.2	5.9	15.1	9.8	–3.3	5.9	0.6	***	***	***
Dominican Republic	7.3	7.3	9.7	9.2	0.0	2.5	2.0	NS	***	***
B. Men										
India	15.6	12.8	12.1	20.1	–2.8	–3.5	4.5	***	***	***
China	20.4	17.8	19.2	18.9	–2.6	–1.2	–1.5	***	***	***
Philippines	29.7	31.3	21.8	34.1	1.7	–7.9	4.4	***	***	***
Mexico	27.8	24.6	29.5	28.4	–3.2	1.7	0.5	***	***	***
Dominican Republic	19.0	9.5	16.6	18.9	–9.5	–2.4	–0.2	***	***	***

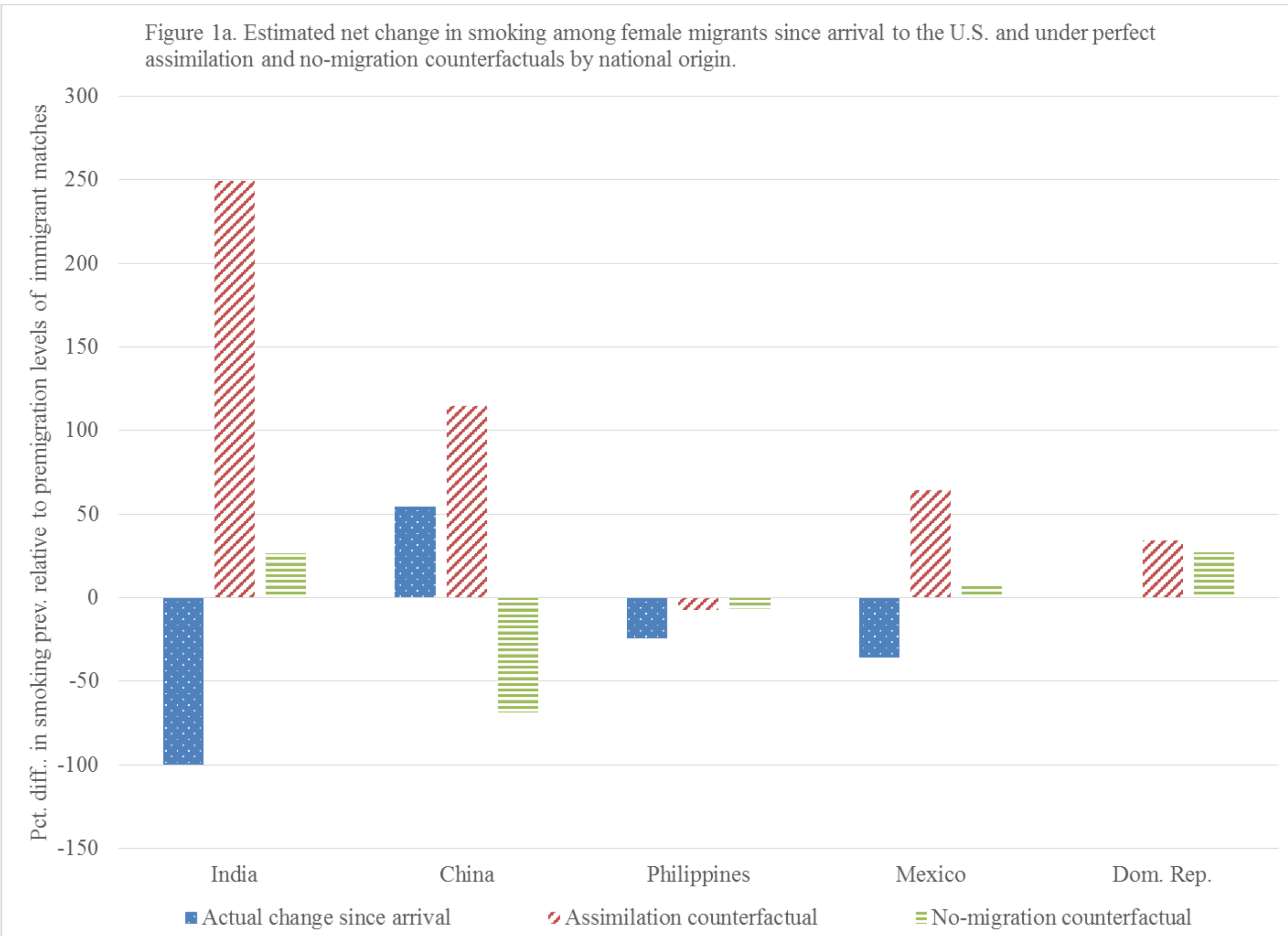
Source: 2003–2010 National Health Interview Surveys and 2003–2004 World Health Surveys.
****p* < .001; NS = not significant at *p* < .10

Table 4 Differences in immigrant smoking initiation and cessation postarrival relative to U.S.-born non-Hispanic white matches by sex and national origin, adults ages 20–49 at survey year

	Differences Between Immigrants and U.S.-born Non-Hispanic Whites After Matching			
	Foreign-born (0–4 years in U.S.) to Non-Hispanic White Matches (1)		Foreign-born (5–9 years in U.S.) to Non-Hispanic White Matches (2)	
	Smoking Initiation	Smoking Cessation	Smoking Initiation	Smoking Cessation
A. Women				
India	–0.038*	–0.239*	–0.029**	0.130**
China	–0.040	0.211	–0.027	0.211
Philippines	–0.046*	–0.023*	–0.020	0.103
Mexico	–0.169***	0.359***	–0.129***	0.311***
Dominican Republic	–0.041*	0.092*	–0.042*	–0.046*
B. Men				
India	0.036	0.152	0.018	0.029
China	–0.008	0.106	–0.001	0.098
Philippines	0.116	0.072	0.107*	0.020*
Mexico	–0.139***	0.236***	–0.092***	0.173***
Dominican Republic	–0.135†	0.431†	–0.102†	0.327†

Note: Matched by sex, birth cohort, and schooling level (see the text for a description).
†$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$

Fig. 1 Estimated net change in smoking prevalence among migrants since arrival in the United States and under perfect assimilation and no-migration counterfactuals by gender and national origin



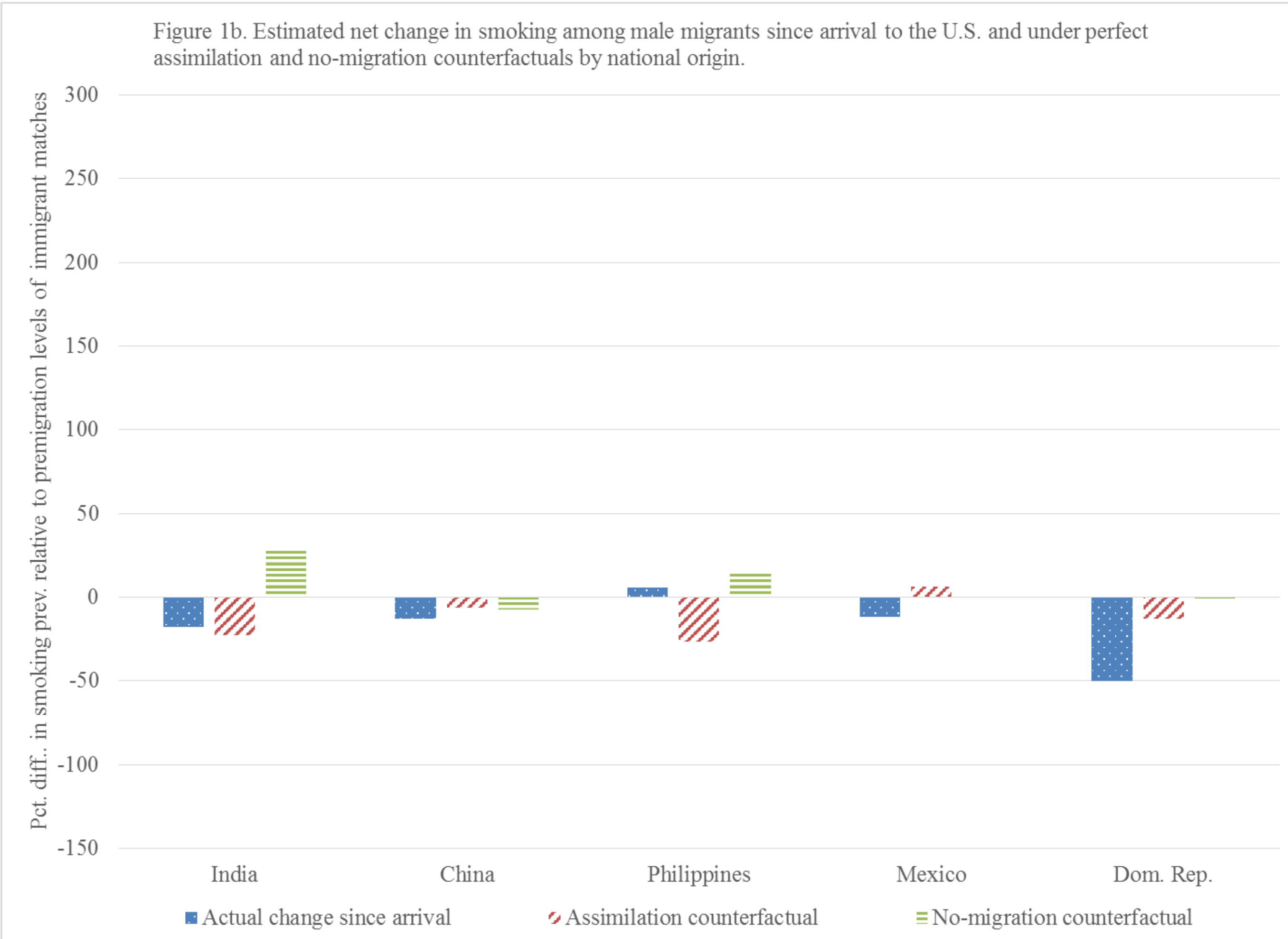
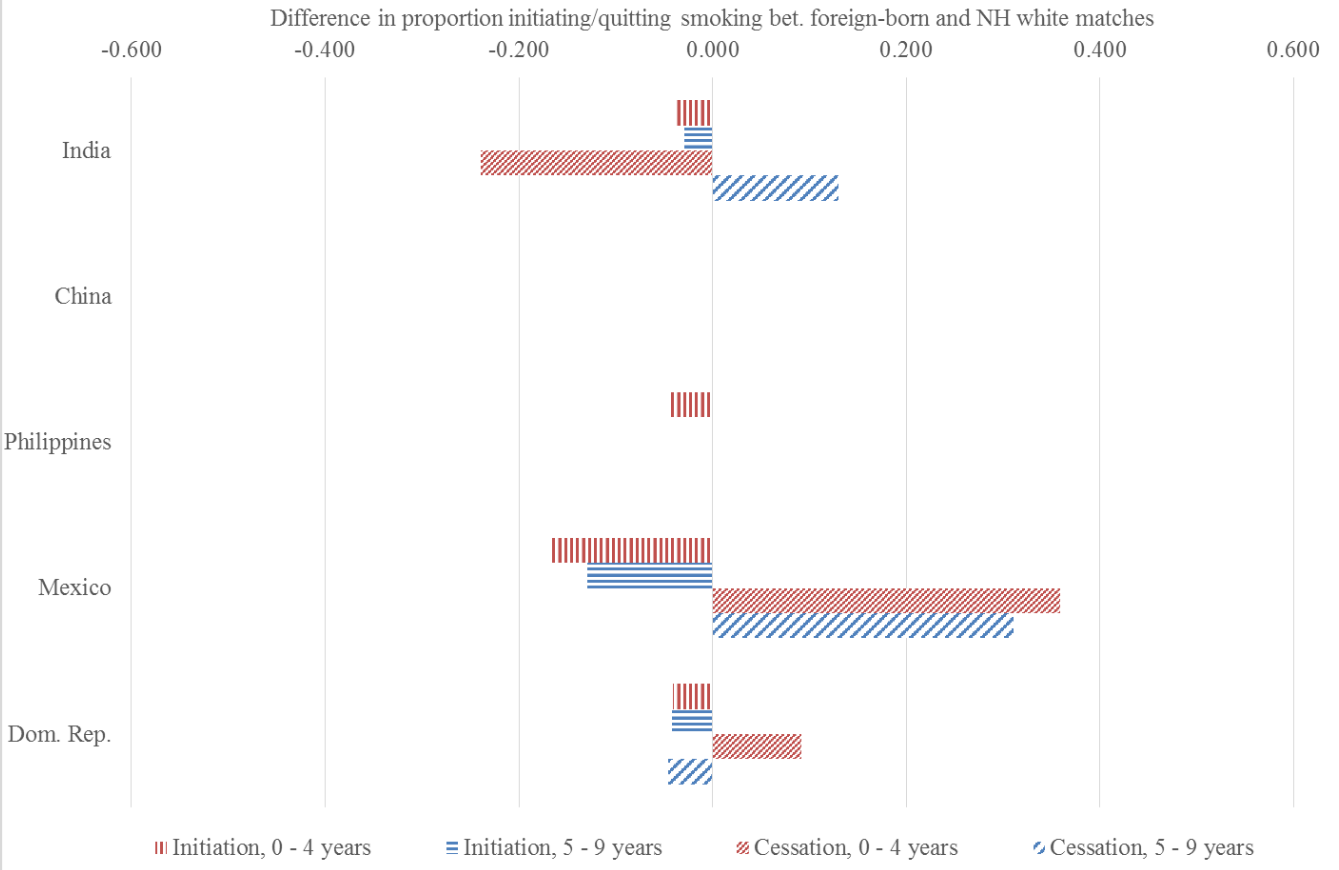


Fig. 2 Differences in postmigation smoking initiation and cessation between migrants and matched sample of U.S.-born non-Hispanic whites by migrants' duration of stay, gender, and national origin

Figure 2a. Differences in post-migation initiation and cessation between female migrants and matched sample of U.S.-born non-Hispanic whites by migrants' duration of stay and national origin.



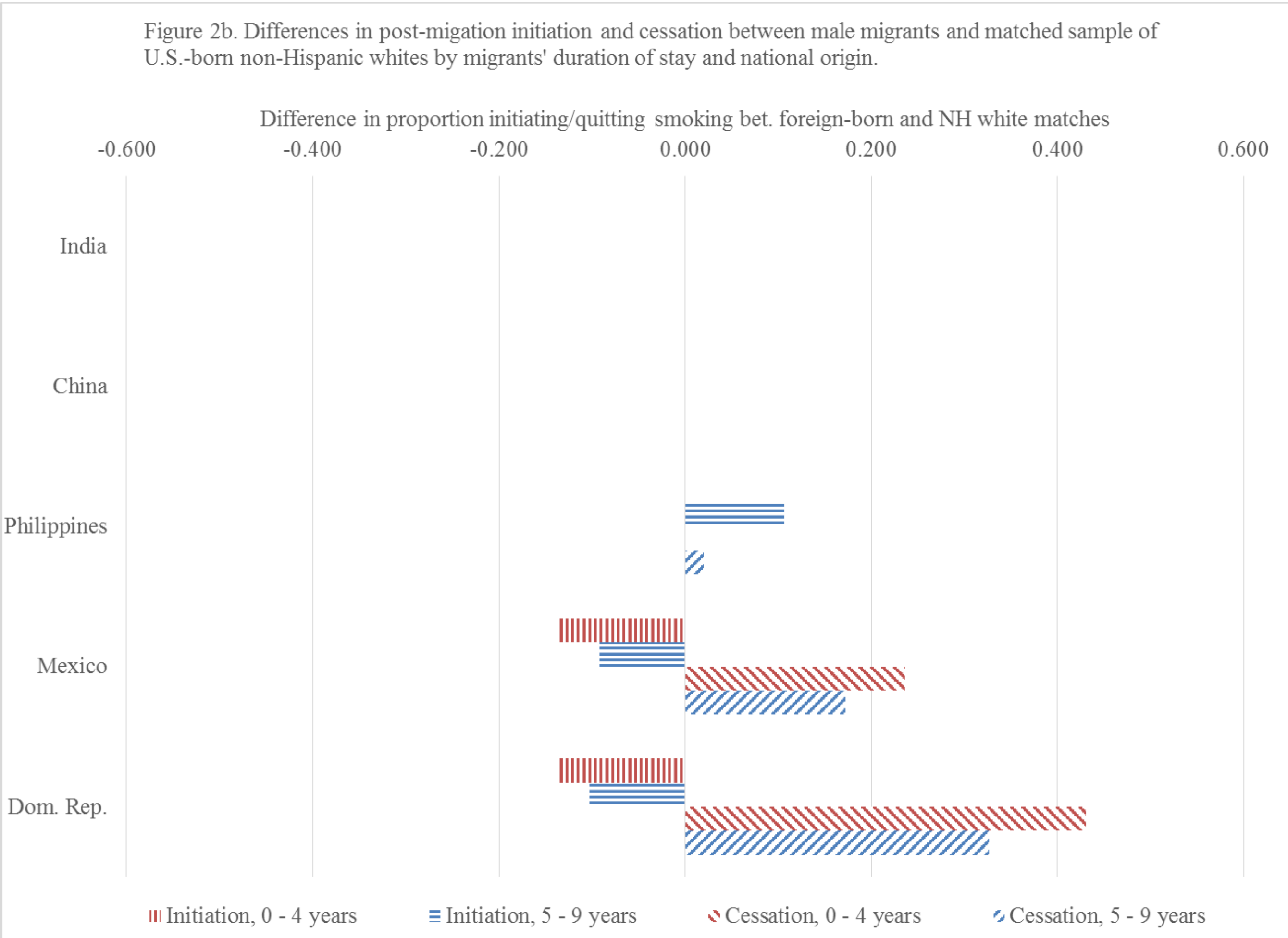


Figure 2b. Differences in post-migation initiation and cessation between male migrants and matched sample of U.S.-born non-Hispanic whites by migrants' duration of stay and national origin.
Difference in proportion initiating/quitting smoking bet. foreign-born and NH white matches
-0.600
-0.400
-0.200
0.000
0.200
0.400
0.600
India
China
Philippines
Mexico
Dom. Rep.
Initiation, 0 - 4 years
Initiation, 5 - 9 years
Cessation, 0 - 4 years
Cessation, 5 - 9 years