Nativity, Age at Migration and Self-Rated Health Trajectories after Age 50:

Evidence from the HRS

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Abstract

This research summarizes existing explanations of immigrant health and tests them empirically by analyzing the self-rated health trajectories after age 50 among the native-born and the foreign-born older adults in the U.S. I use longitudinal data from the nine waves of the Health and Retirement Study (HRS) and estimate linear random-intercept models. Among non-Hispanic males and females, only those foreign-born who migrated before age 35 maintain better SRH compared to the native-born; those who migrated after age 35, despite a health advantage at age 50, experience faster health decline afterwards. Among Hispanic males, those foreign-born who migrated between ages 18 and 35 experience the largest health advantage at age 50 and the steepest health decline afterwards. Foreign-born who migrate in older ages are at higher risk of accelerated health declines in late life even though this might not be apparent before or at age 50.

Nativity, Age at Migration and Self-Rated Health Trajectories after Age 50: Evidence from the HRS, 1992-2008

Introduction

The "immigrant health paradox" literature describes the health of the foreign-born as comparable or superior to that of the native-born. Research findings are less consistent, however, with respect to morbidity than mortality, and large variations exist depending on health indicator, country of origin, comparison group, and control variables (Hayward, Warner, and Crimmins 2007; Markides and Gerst 2011; Palloni and Ewbank 2004; Palloni and Morenoff 2001; Riosmena and Dennis 2012; Smith and Bradshaw 2006). There is even less agreement on how health of the foreign-born in the U.S. changes over time. Many studies have found that the initial health advantage of immigrants diminishes as they spend more years in the U.S. (Antecol and Bedard 2006; Uretsky and Mathiesen 2007), but several studies, notably those that focus on older adults and use age at arrival as a proxy for duration of U.S. residence, reach the opposite conclusion (Angel, Buckley, and Sakamoto 2001; Choi 2011; Wakabayashi 2010). The explanations of the diminishing health advantage also vary. Some question its existence and point to deficiencies in the data (Eschbach, Kuo, and Goodwin 2006; Palloni and Ewbank 2004; Smith and Bradshaw 2006). Others speculate about negative changes in health behavior of the foreign-born or point at the various factors in the U.S. or home countries that might lead to accelerated health decline of the foreign-born (e.g. Abraído-Lanza, Chao, and Flórez 2005; Antecol and Bedard 2006; Finch, Do, Frank, and Seeman 2009).

To shed light on the inconsistent findings from the previous research, this paper summarizes the theoretical explanations for changes in immigrants' health over time explicitly or implicitly present in the social science literature and then tests these explanations with

longitudinal data from the nine waves of the Health and Retirement Study (HRS). Specifically, I examine the self-rated health trajectories after age 50 and explore the role of education in explaining self-rated health disparities by nativity and among the foreign-born. By providing more nuanced picture of the dynamics of self-rated health in old age among the foreign-born, this research contributes to the development of theory of immigrant health and informs public policies aimed at reducing health disparities among elderly in the U.S.

Health trajectories in later life

Health deteriorates with age although there are substantial individual and socio-demographic group differences in the dynamics of health decline in old age. *Cumulative disadvantage* theory or the "Matthew effect" suggests that socio-economic status and health inequalities increase with age because of "the systemic tendency for interindividual divergence in a given characteristic with the passage of time" (Dannefer 2003; Singh-Manoux, Ferrie, Chandola, and Marmot 2004). Similarly, the "weathering" hypothesis implies that health deteriorates faster among disadvantaged groups because of their accumulated health insults across the life course (Geronimus, Hicken, Keene, and Bound 2006; Geronimus, Hicken, Pearson, Seashols, Brown, and Cruz 2010). However, accelerated dying of the most disadvantaged in terms of health individuals means that those who survive might be more resilient and healthy, producing "mortality crossovers" (e.g. lower mortality rates of blacks compared to whites in very old age) and reduced health disparities among elderly compared to middle aged adults (Berkman, Singer, and Manton 1989; Fuller-Thomson, Nuru-Jeter, Minkler, and Guralnik 2009; Herd 2006; House, Lantz, and Herd 2005; Lynch, Brown, and Harmsen 2003).

Growing research on health of Hispanics and Asians proves that there are significant differences between the ethnic minority groups in the U.S. Hispanics and Asians often experience lower mortality and report similar or even better health not only compared to African-Americans but also compared to the native-born whites (e.g. Lauderdale and Kestenbaum 2002; Markides and Eschbach 2005) although the evidence is stronger for mortality than morbidity (Bzostek, Goldman, and Pebley 2007; Elo, Turra, Kestenbaum, and Ferguson 2004; Frisbie, Cho, and Hummer 2001; Hayward, Chiu, Gonzalez, Hummer, and Wong 2012; Markides, Eschbach, Ray, and Peek 2007) and large variations exists depending on health measure and ethnic subgroup.

Despite the fact that many foreign-born belong to ethnic minorities, there are important differences between the two groups. Research on ethnic/racial differences in health trajectories that does not distinguish between immigrants and natives (Haas and Rohlfsen 2009; Liang, QuiÃ±ones, Bennett, Ye, Xu, Shaw, and Ofstedal 2010; Quinones, Liang, Bennett, Xu, and Ye 2011; Sudano and Baker 2006) or that uses nativity as a control variable in pooled models (Warner and Brown 2011) may have limited applicability to the foreign-born. Studies that infer health trajectories from cross-sectional data on duration of U.S. residence or age at arrival (see the review on "immigrant health paradox" below) tend to produce biased estimates because the data necessarily conflate the age, period, and cohort effects. Results based on cross-sectional data may also be influenced by changes in the composition of the immigration flows to the U.S. Research with panel data that distinguish between the native-born and the foreign-born is relatively rare (Warner and Brown 2011), and even fewer studies look at differential health decline among the immigrants.

Immigrant health paradox

Immigrant health literature often finds that the foreign-born have comparable or better health and lower mortality than native-born whites and/or native-born co-ethnics despite immigrants' lower socioeconomic status (Cunningham, Ruben, and Venkat Narayan 2008; Hummer, Powers, Pullum, Gossman, and Frisbie 2007; Jasso, Massey, Rosenzweig, and Smith 2004; Lauderdale and Kestenbaum 2002; Markides and Eschbach 2005; Singh and Hiatt 2006; Swallen 1997). These findings are often labeled the "immigrant health paradox." If the mortality advantage of the foreign-born is well documented, the findings on health status and morbidity are far less conclusive. For example, foreign-born older adults are less likely to suffer from heart disease, hypertension, and cancer but more likely to report having arthritis, diabetes, disabilities, and poor self-rated health in old age (Choi 2011; Swallen 1997). A recent review of the research literature on health of the elderly Hispanics in the U.S. concluded that immigrants do seem to enjoy a mortality advantage but experience more health problems in later life compared to the native-born whites and co-ethnics (Markides, Eschbach, Ray, and Peek 2007; Markides and Gerst 2011).

With respect to health trajectories, that is, changes in immigrants' health status over time, the findings are also inconclusive. Most social scientists agree that the initial health advantage of the foreign-born results from immigrant selectivity or the "healthy immigrant effect" – the tendency of the fittest and healthiest individuals to migrate (Jasso, Massey, Rosenzweig, and Smith 2004; Palloni and Ewbank 2004) – although healthier behaviors, stronger family ties, and overall risk averseness of the foreign-born newcomers might also play a role. The smaller health advantage often found for those foreign-born who have spent more time in the U.S. is sometimes interpreted as "negative acculturation." It is hypothesized to be caused by the adoption of

unhealthy behaviors more prevalent among the native-born, such as excessive drinking, smoking, poor diet, and sedentary lifestyle (Abraido-Lanza, Dohrenwend, Ng-Mak, and Turner 1999; Abraído-Lanza, Chao, and Flórez 2005; Antecol and Bedard 2006; Kaplan, Huguet, Newsom, and McFarland 2004). The "salmon bias" explanation states that the immigrant health advantage and its reduction over time is due to outmigration of less healthy foreign-born persons (Abraido-Lanza, Dohrenwend, Ng-Mak, and Turner 1999; Palloni and Arias 2004; Turra and Elo 2008). Both explanations have found some empirical support, but they only partly account for the nativity differences in health.

At the same time, research on immigrant incorporation often finds that the foreign-born are closing the gap over time with the native-born in terms of socio-economic characteristics such as employment (Chiswick 1978; Chiswick, Yinon, and Zach 1997), English language ability (Espenshade and Fu 1997), homeownership (Myers and Lee 1998) and residential segregation (Iceland and Scopilliti 2008). This research shows that the length of the residence is positively associated with socio-economic incorporation. Given the well-documented, strong positive relationship between socio-economic status and health (Adler and Newman 2002; Adler and Rehkopf 2008; Elo 2009; Seeman and Crimmins 2001; Smith 1999), it is surprising that an improved socio-economic situation seems to be associated with *declining* health among the foreign-born. Furthermore, studies that focus on the elderly foreign-born and use age at migration as a proxy for duration of U.S. residence do not find a diminishing immigrant health advantage over time: among older immigrants, longer time in the U.S. is generally associated with better health (Angel, Buckley, and Sakamoto 2001; Choi 2011; Gonzalez, Ceballos, Tarraf, West, Bowen, and Vega 2009; Lum and Vanderaa 2011; Wakabayashi 2010).

These inconsistencies call for further development of the theory of immigrant health decline over the life course and demand closer attention to the alternative explanations of the empirical findings. For example, some reduction of the gap found in cross-sectional studies and attributed to longer residence in the U.S. could be due to cohort effects shared by both foreign-born and natives, such as increase in the obesity (Park, Myers, Kao, and Min 2009) or a decline in the disability rates (Cutler 2001; Freedman, Martin, and Schoeni 2002; Seeman, Merkin, Crimmins, and Karlamangla 2010). Furthermore, as Palloni and colleagues point out, a declining immigrant health advantage over time could be due to the differences in the frailty distributions between the selected on health immigrants and the natives (Palloni and Ewbank 2004; Palloni 2007; Palloni and Morenoff 2001).

Ultimately, the reduction in the initial health advantage, if it is real, means that the health of the foreign-born declines faster than the native-born's. This could be due to a number of reasons. They include the cumulative effect of persistent socio-economic disadvantage (Kahn and Pearlin 2006; Lynch, Kaplan, and Shema 1997), delayed effects of adverse childhood conditions (Palloni 2006), physically demanding work (Loh and Richardson 2004), past and current exposure to environmental hazards (Hunter 2000), lack of early diagnostic and preventative medical care due to underinsurance (Carrasquillo, Carrasquillo, and Shea 2000; Choi 2006), and limited access to non-emergency health services (Lasser, Himmelstein, and Woolhandler 2006; Leclere, Jensen, and Biddlecom 1994). In other words, negative health acculturation is only one of the possible explanations of the more rapidly declining health of the foreign-born in the U.S. and more research is needed to understand the magnitude and sources of health disparities in old age.

Education and health in later life

Socio-economic status (SES) is perhaps the most important health differential. It is often referred as a "fundamental cause" of health (Link and Phelan 1995), and many studies find education, income/earnings, and occupation or some combination of them to be among the strongest predictors of mortality and health status for both immigrants and natives (Adler and Newman 2002; Elo 2009; Pampel, Krueger, and Denney 2010; Schoeni, Martin, Andreski, and Freedman 2005; Seeman and Crimmins 2001; Singh and Hiatt 2006; Williams and Collins 1995).

Although all measures of SES predict health, there are key differences between them. Education is acquired relatively early in the life course. Income tends to increase over the adulthood together with work experience. In terms of their effect on health, previous research has found that education plays an important role in the delaying an onset of health conditions while income is critical when it comes to the progression of disease (House, Lantz, and Herd 2005). This has important implication for the immigrants because many of them have low levels of education (Bean, Brown, and Bachmeier 2010). Indeed, previous research has shown that Hispanics and the foreign-born have a smaller socio-economic gradient in health and a smaller health return from education (Goldman, Kimbro, Turra, and Pebley 2006; Riosmena and Dennis 2012; Turra and Goldman 2007). Even though immigrants have better health than the natives with the same low level of education, they may experience early onset of the disease and disability and/or accelerated health decline in old age. At the higher levels of education immigrant health advantage is much smaller, presumably because foreign educational credentials are not always directly convertible into comparable socio-economic status in the U.S. This

suggests the importance of looking at education as a factor explaining health disparities and differential health declines among immigrants.

Theoretical framework

Following research on health trajectories in later life and similar to some previous studies of immigrant health (Kahn and Pearlin 2006; Palloni 2006; Wakabayashi 2010), I use a *life course perspective*, which stresses that the experiences of later life are linked to the experiences and transitions in childhood and across previous adult years (Elder 1998; Elder, Johnson, and Crosnoe 2003). It is likely that the health status of the foreign-born in later life is determined by their health in childhood and young adulthood, as well as by the dynamics of health decline through adulthood, which in turn depends on their life experiences in the home countries and the U.S.

Since a bulk of the immigrant health literature finds an immigrant health advantage in health and mortality, I expect that *the foreign-born will report better health compared to the native-born*. However, because of the diversity within the foreign-born population and inconsistent findings from the previous research, I also expect to find significant *differences in health status and health trajectories among the foreign-born*. To account to some degree for heterogeneity among the foreign-born, I use age at arrival as a proxy for immigrant experiences in the U.S. and consider how major explanations of immigrant health decline might work for the foreign-born who arrived at different stages of the life course.

Immigrant selectivity or the "healthy immigrant effect" suggests that *work migrants and recent arrivals will have larger health advantage than other foreign-born*. In terms of health trajectories, there are several explanations that predict there will be a *steeper health decline* for

the foreign-born. Some explanations attribute this to the immigrants' experiences in the U.S. (e.g. "negative acculturation" to poor health habits, physically demanding jobs and poor working conditions, limited access to non-emergency health care); these explanations predict that more years spent in the U.S. and older age at arrival will be associated with a smaller health advantage or no advantage at all. Other explanations attribute a steeper health decline to unfavorable childhood conditions, challenges of life, and poorer health care in generally less developed countries of origin, thus suggesting that more years spent in the home country and older age at arrival will be associated with worse health. Alternatively, the immigrant incorporation/health perspective suggests that socio-economic incorporation of the foreign-born will have a positive effect on their health in later life and predicts that not all immigrants will experience accelerated health decline. Since those who immigrated in young age usually have more opportunities for incorporation, according to this explanation, *those immigrating at younger ages will be more likely to maintain good health in old age*. These expectations are summarized in Table 1.

Table 1 About Here

I also expect that *education will have smaller effect on health of the foreign-born*, especially those who migrated in older age, because of the different implication of low education among the immigrants and difficulties of converting foreign educational credentials into the same socio-economic status in the U.S.

Data, Measures and Method

I use the RAND HRS Data file (RAND HRS Data 2011) that includes information from the five entry cohorts of the Health and Retirement Study (HRS). The analytical sample includes all primary respondents, ages 50 and older who participated in at least one of the nine waves of the study between 1992 and 2008 and have complete information on the dependent and the key independent variables. The data is unbalanced because not all respondents participated in all waves of the study. This is mostly due to the HRS design but there was also attrition due to non-response and to the death of the subjects (see Table 2 for the details). I transform the data into a "long" form, which results in the 156,704 person-2 year observations on 29,324 individuals.

Table 2 About Here

The dependent variable – self-rated health (SRH) – was measured with the question: "Would you say your health is excellent, very good, good, fair, or poor?" The responses were coded from 1 "excellent" to 5 "poor". The question was asked in every wave and the wording was consistent over the entire study period.

I use a series of random-intercept two-level linear models with the maximum likelihood estimation. These models are preferred over the ordinary least square regression models as they account for correlated errors resulting from the repeated observations on the same individuals. Random-intercept models are also preferred over fixed-effects models because they better account for the initial individual differences in SRH. The assumption is that at age 50, SRH varies randomly around the population mean and after that declines linearly (although a square term was statistically significant in the models for non-Hispanic white males, it did not improve substantially model fit, so I opted for a simpler and more parsimonious model). The time

variable is the respondent's age at the middle of the interview period; it is centered at 50 for ease of interpretation.

Most time-invariant demographic variables (e.g., sex, race, Hispanic origin, education, place of birth and year of migration for the foreign-born) were assessed during the first interview. Race is a 3-category variable that distinguishes between "whites" (reference), "Blacks" and "other race". Measured in years, education is centered at 12 years. Nativity is based on the place of birth (foreign-born=1, native-born=0. The data on year of migration was extracted from the original HRS public use data files and merged with the RAND HRS data. Age at migration for the foreign-born was first calculated using the year of birth and the year of migration variables; then a categorical variable was created : "native-born" (reference), "foreign-born migrated between ages 1 and 17", "foreign-born migrated between ages 18 and 34", and "foreign-born migrated after age 35".

Several variables correct for biases associated with differential survival, mortality, and attrition. Age at first interview (centered at 50) accounts for the differences in SRH between those who survived until a given age and those who did not. Two dummy variables for the respondents who died during the period of the study and for the respondents who dropped out of the study help to evaluate possible biases due to mortality and attrition, respectively. I also include a dummy variable if an interview was conducted by a proxy.

Based on previous research that found significant differences in health by sex and Hispanic origin, I construct separate models for these demographic subgroups. The first set of models includes only the nativity (controlling only for race for non-Hispanic respondents and the response bias variables; race coefficients were not significant in the models for Hispanics, so they were excluded from the final models presented in this paper) to test whether there is an

immigrant health advantage at age 50 and beyond for non-Hispanic and Hispanic males and females. The second set of models substitutes the nativity variable with the categorical nativity/age-at-arrival variable to test whether the patterns found in the previous models holds for different subgroups of foreign-born. Finally, the third set of models adds education and education by age-at-arrival interaction terms to assess how differences in educational attainment affect the patterns of SRH decline and to test whether education has the hypothesized smaller effect on health for the foreign-born.

Results

Table 2 presents the descriptive statistics. Despite the fact that Hispanics are younger than non-Hispanics, non-Hispanic males and females, on average, report better self-rated heath (2.8 and 2.8 vs. 3.2 and 3.4, respectively). Not surprisingly, the share of the foreign-born is significantly higher among Hispanic compared to non-Hispanic older adults. Most of the foreign-born migrated between ages 18 and 35. Non-Hispanics males and females have about four more years of education than their Hispanic counterparts. Females (compared to males) and Hispanics (compared to non-Hispanics) were also less likely to die during the period of the survey and less likely to drop from the study.

Table 3 presents the coefficients from the multilevel models. The upper panel shows the differences in SRH by nativity controlling for race (for non-Hispanics), age at first interview, mortality, attrition, and a proxy interview. The constant may be interpreted as the estimated SRH at age 50 for the native-born. Among the native-born, Non-Hispanic white males and females report better SRH at age 50 compared to Hispanics, both males and females, and Hispanic females report the worst SRH. However, despite their health advantage at age 50, non-Hispanic

white males experience the steepest health decline among all native-born persons followed by non-Hispanic white females, Hispanic males, and Hispanic females.

Table 3 About Here

Based on this model, the immigrant health advantage in SRH at age 50 is evident only for non-Hispanic white males and females. Hispanic foreign-born males are no different than their native-born counterparts, and Hispanic foreign-born females report worse SRH at age 50 than their native-born counterparts. Non-Hispanic foreign-born females and Hispanic foreign-born males also experience steeper health declines than their native-born counterparts.

The lower panel of Table 3 presents the results from similar models but with the foreign-born disaggregated by age at arrival. Regardless of age at arrival, all non-Hispanic foreign-born show somewhat better SRH at age 50 compared to non-Hispanic native-born. However, the difference is statistically significant only for males who migrated after age 35 and females who migrated between ages 18 and 35. Additionally, the immigrant health advantage at age 50 is accompanied by a faster rate of health decline for those non-Hispanic men and women who migrated after age 35. As for the Hispanic foreign-born, only males who migrated before age 35 show some health advantage over the native-born Hispanic men, but the difference is not statistically significant, and the health of Hispanic males who migrated between ages 18 and 35 tends to decline faster than their native-born counterparts'. Foreign-born Hispanic females report worse SRH compared to the native-born Hispanic females, regardless of the age at migration.

Table 4 adds education and education-by-age-at-arrival interactions to the models presented in Table 3. Adjusting for education reduces but does not eliminate racial disparities in

SRH at age 50. It also does not change immigrant health advantage over native-born whites for non-Hispanic men who migrated after age 35 nor for non-Hispanic women who migrated between ages 18 and 35. Nor does education affect the steeper health decline of those who migrated after age 35, which was found in the previous models. Adjusting for education, however, makes a difference for Hispanics. Foreign-born men who migrated between ages 18 and 35 report better SRH at age 50 than do native-born Hispanic men with comparable levels of education. Nevertheless, their SRH deteriorates almost considerably faster than the native-born's SRH. Those Hispanic males who migrated after age 35 also experience a steeper health decline. Education fully explains the health disadvantage of foreign-born Hispanic women found in the previous models (Table 3). Hispanic foreign-born women's SRH at age 50 is about the same as that of their native-born counterparts with similar levels of education.

Table 4 About Here

The racial differences are consistent with the previous research: women and men who are black or of other race report worse health at age 50 compared to native-born whites, but their health declines more slowly over time.

As expected, education has a protective effect on health although it is smaller for native-born Hispanics compared to native-born non-Hispanic whites. High levels of education are also associated with somewhat faster declines in health. Importantly, regardless of age at migration, the effect of education on health is almost two times smaller for foreign-born non-Hispanic males compared to their native-born counterparts. The same is true for non-Hispanic foreign-

born females who migrated after age 18. The effect is even smaller for foreign-born Hispanics, although the difference is statistically significant only for males who migrated after age 35.

To better visualize these results, Figures 1-4 present predicted SRH trajectories after age 50 for the four groups. The figures are adjusted for education (held constant at 12 years), race for non-Hispanic (estimates are for whites), age at first interview (held constant at 50), mortality, attrition and proxy interview. They show clearly the disparities in SRH in old age that result from the differential rate of health decline after age 50, and how these disparities vary by ethnicity and age at migration for foreign-born. First, an older age at migration is associated with a sharper health decline after age 50. Second, for non-Hispanic white males and females, a younger age at migration is associated with better or comparable health in later life to that of the native-born. Third, at age 50, Hispanic foreign-born males who migrated between ages before age 35 report better health than the native-born Hispanic males but due to particularly steep health decline, they actually experience worse health by age 65. This is especially true for those Hispanic males who migrated between ages 18 and 35. Finally, unlike all other groups, Hispanic females show almost no differences in SRH by nativity or age at migration although they experience the worst SRH at age 50. But slow rate of decline in SRH among this group leads to smaller disparities by nativity in old age.

Figures 1-4 About Here

Discussion and Conclusion

This research examines the SRH trajectories after age 50 among the native-born and the foreign-born in the U.S. Using high quality longitudinal data and population representative

samples from the Health and Retirement Study, I explore several explanations of changes in immigrants' health over time that are explicitly or implicitly present in the immigrant health literature. Consistent with my theoretical framework, the results from the models that separate the foreign-born into the groups by age at arrival reveal more complex and nuanced patterns than previous research has usually described. Even though at age 50 an immigrant SRH advantage is present among all groups except Hispanic females, its magnitude varies significantly by age at arrival.

Moreover, the patterns are not entirely consistent with any of the proposed explanations. The relatively good health of those foreign-born who migrated between ages 18 and 35 seems to support the immigrant selectivity hypothesis, which states that work migrants (who tend to migrate in young adulthood) are a highly and positively select group on many indicators, including health. Better self-rated health at age 50 for non-Hispanic males who migrated after age 35 is consistent with both immigrant selectivity and accelerated health decline due to the negative conditions in the U.S., given that they are the most recent migrants with short exposures to the U.S. However, the steeper health decline among those immigrants who arrived after age 35 is more consistent with the incorporation/health and accelerated health decline resulting from exposure to negative factors in the home country. And, a very steep decline in SRH among Hispanic males who arrived between ages 18 and 35 is not consistent with any single explanation.

The results appear less puzzling if we assume that the proposed explanations are not necessarily mutually exclusive, but rather may hold more or less salience depending on age-at-migration. In case of non-Hispanic males, it is likely that those who migrated at younger age are selected on health and that they benefit from socio-economic incorporation, which has a

protective effect on health in later life. Those who migrated later in life are still a select group, but they spent more time in the home country and had fewer opportunities for incorporation in the U.S., which may account for the faster health decline among this group of the foreign-born. Health selectivity among the 18 to 34 age-at-arrival group of non-Hispanic females is likely to be high but so are the opportunities for incorporation. Those who migrated after age 35 are perhaps a more diverse group but similar to non-Hispanic males, their steeper health decline may be influenced by longer exposure to unfavorable conditions in the home country and by fewer opportunities for incorporation in the U.S. compared to the younger immigrants.

The case of Hispanic males is interesting. The largest health advantage at age 50 is among those who migrated between ages 18 and 34, but it is accompanied by the fastest health decline afterwards. It could be that the initial health advantage results from health selectivity and the accelerated health decline is due to hazardous jobs, poor working conditions, underinsurance, and limited access to non-emergency health care that are especially prevalent among this group of the immigrants.

Finally, consistent with the previous studies, this research found a smaller protective effect of education on health among Hispanics compared to non-Hispanics and among the foreign-born compared to the native-born. This smaller educational gradient means that Hispanics and foreign-born experience better health at lower levels of education and/or worse health at higher levels of education. More research is needed to fully understand the sources of these differences, but it is possible that the better health of the less-educated foreign-born is associated with both selectivity and healthier life-styles. Very low education among the native-born in the U.S. is associated with the host of the negative characteristics (e.g., disability, substance abuse or other antisocial behaviors) (Bean, Brown, Bachmeier, Gubernskaya, and

Smith), which is not necessarily true for the foreign-born for whom education access may have been generally limited.

These results are important from the public policy perspective. First, those foreign-born who migrate in older ages are at higher risk of accelerated health declines in late life, even though this might not be apparent before or at age 50. Second, the health of older Hispanic females – both the native-born and the foreign-born – warrants special concern. Although health disparities among this group are the smallest, they experience the worst health in their 50s and 60s compared to non-Hispanic whites and Hispanic males. Finally, higher levels of education for the foreign-born do not always translate into the same level of good health as for the native-born. This is especially true for non-Hispanic whites and those who migrated in older age.

This paper also points to opportunities for additional research. While widely used, the only health used – self-rated health – has been found to be influenced by cultural factors (Dowd and Todd 2007; Finch, Hummer, Reindl, and Vega 2002). Other indicators of health might show different trajectories for both the foreign-born and the natives. Disaggregating immigrants by gender, Hispanic origin, and age at arrival proves a constructive step toward understanding the immigrant health paradox and points to the potential of future analyses. Despite many similarities, it is possible that there are important differences within Hispanic and non-Hispanic foreign-born groups depending on country of origin and mode of migration (e.g. undocumented, refugee, work, family). Finally, it is unclear whether there are any differences in SRH by nativity or/and age at arrival before age 50. Future research that addresses these limitations will advance our understanding of changes in health in later life and the complex interplay of the factors related to immigration, health, and aging.

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Table 1: Predicted immigrant health advantage at age 50 and beyond

	Explanations of changes in immigrant health			
Age at migration	Immigrant Selectivity	Negative home country factors	Negative U.S. factors	Incorporation/ Health
Age 1-17	0	++	0	++
Age 18-34	++	+	+	+
Age 35+	++	0	++	0

"+" health advantage; "0" no health advantage.

Table 2: Descriptive statistics: Adults 50+, Health and Retirement Study, 1992-2008

Variables	non-Hispanic		Hispanic	
	Males	Females	Males	Females
Self-rated health (sd)	2.8 (1.15)	2.83 (1.15)	3.2 (1.16)	3.4 (1.12)
(sd between/sd within)	(1.01/0.68)	(1.01/0.66)	(0.97/0.74)	(0.95/0.68)
Age (sd)	66.76 (9.98)	67.37 (11.08)	64.61 (9.29)	64.98 (10.39)
(min/max)	(50/106)	(50/109)	(50/101)	(50/106)
(sd between/sd within)	(10.13/4.14)	(11.32/4.18)	(9.09/4.15)	(10.14/4.21)
Foreign-born (%)	4.97	5.2	51.6	55.16
Migrated age 1-17 (%)	1.24	1.11	6.56	8.07
Migrated age 18-34 (%)	2.25	2.73	25.93	25.97
Migrated age 35+ (%)	1.48	1.31	18.86	20.77
White (%)	83.97	81.11	-	-
Black (%)	13.77	16.79	-	-
Other (%)	2.25	2.1	-	-
Education (sd)	12.49 (3.25)	12.27 (2.9)	8.61 (4.8)	8.15 (4.65)
Age at 1st interview (sd)	61.92 (10.19)	62.06 (11.36)	59.93 (8.83)	59.72 (10.03)
(min/max)	(36/100)	(35/103)	(41/97)	(36/100)
Died (%)	25.29	20.94	21.51	14.96
Dropped off (%)	2.21	2.05	1.86	1.75
Proxy interview (%)	11.58	5.70	17.80	7.34
N	61771	82359	5319	7261
n	11835	15107	1034	1349

Table 3: Random-intercept models of self-rated health: Adults age 50+, HRS 1992-2008

	Non-Hispanic				Hispanic			
	Males		Females		Males		Females	
	At age 50	Rate of change	At age 50	Rate of change	At age 50	Rate of change	At age 50	Rate of change
Constant	2.328***	0.041***	2.292***	0.039***	2.814***	0.033***	3.000***	0.027***
	(0.019)	(0.001)	(0.015)	(0.001)	(0.068)	(0.004)	(0.056)	(0.003)
(Native-born)								
Foreign-born	-0.181**	0.001	-0.164***	0.006**	0.005	0.012**	0.258***	-0.003
	(0.058)	(0.002)	(0.048)	(0.002)	(0.078)	(0.004)	(0.067)	(0.003)
Constant	2.328***	0.041***	2.292***	0.040***	2.840***	0.031***	2.999***	0.027***
	(0.019)	(0.001)	(0.015)	(0.001)	(0.069)	(0.004)	(0.056)	(0.003)
(Native-born)								
Migrated age 1-17	-0.113	-0.005	-0.079	0.002	-0.181	0.011	0.254*	-0.005
	(0.118)	(0.004)	(0.107)	(0.004)	(0.145)	(0.008)	(0.114)	(0.006)
Migrated age 18-34	-0.121	-0.002	-0.218***	0.003	-0.028	0.017**	0.240**	-0.003
	(0.081)	(0.004)	(0.062)	(0.003)	(0.092)	(0.005)	(0.080)	(0.004)
Migrated age 35+	-0.334**	0.013**	-0.105	0.014***	0.151	0.006	0.314***	-0.002
	(0.104)	(0.005)	(0.095)	(0.004)	(0.121)	(0.005)	(0.092)	(0.004)
N	61771		82359		5319		7261	
n	11835		15107		1034		1349	

*** p<0.001, ** p<0.01, * p<0.05 Standard errors in parentheses

Models also control for race (for non-Hispanics), age at first interview, mortality, attrition, and proxy interview status.

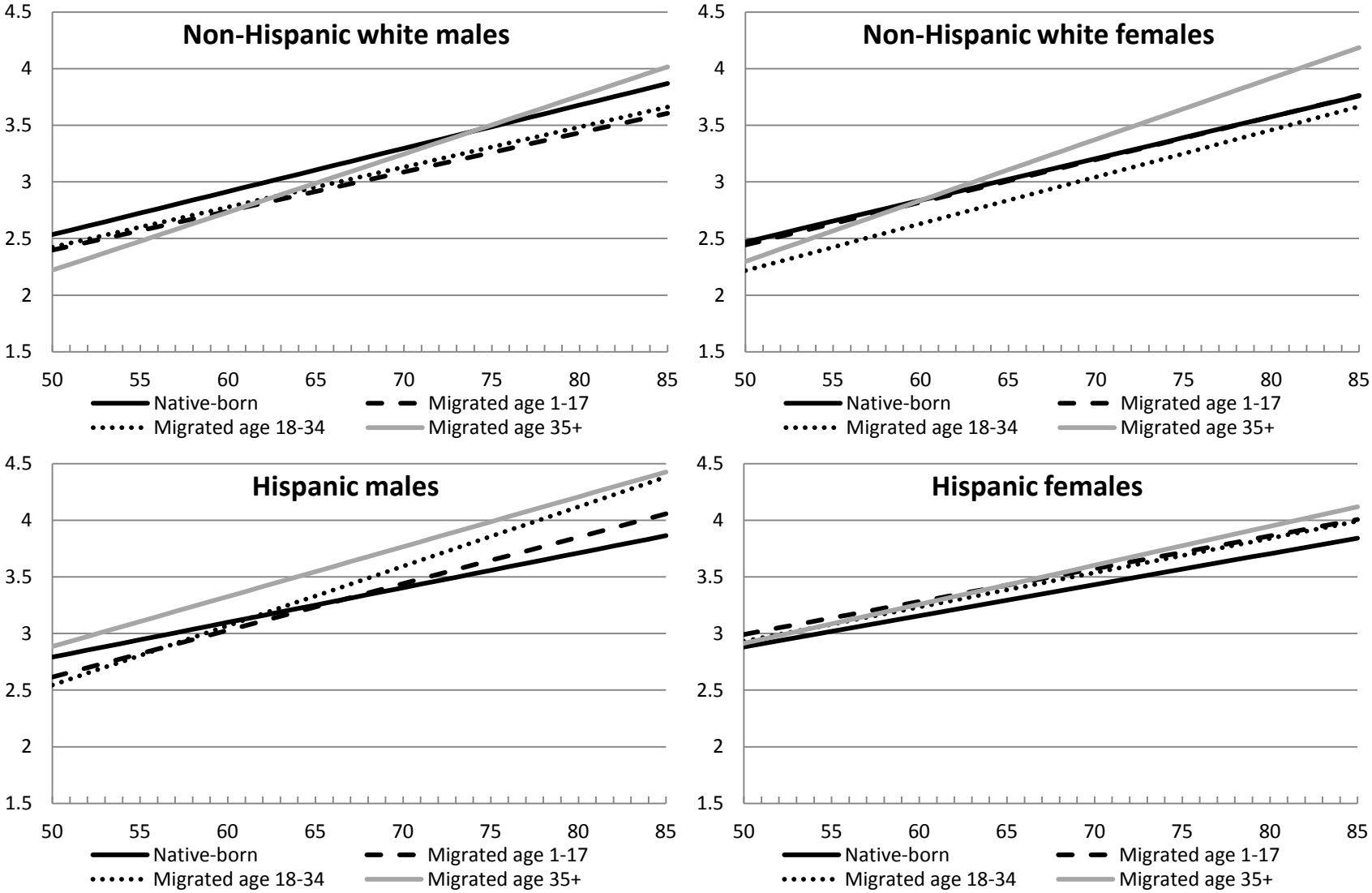
Table 4: Random-intercept models of self-rated health adjusted for education: Adults age 50+, HRS 1992-2008

	Non-Hispanic				Hispanic			
	Males		Females		Males		Females	
	At age 50	Rate of change	At age 50	Rate of change	At age 50	Rate of change	At age 50	Rate of change
Constant	2.534***	0.038***	2.470***	0.037***	2.792***	0.031***	2.882***	0.027***
	(0.020)	(0.001)	(0.015)	(0.001)	(0.067)	(0.004)	(0.054)	(0.003)
(Native-born)								
Migrated age 1-17	-0.137	-0.004	-0.026	0.001	-0.176	0.011	0.110	0.002
	(0.121)	(0.005)	(0.110)	(0.004)	(0.141)	(0.009)	(0.124)	(0.006)
Migrated age 18-34	-0.110	-0.003	-0.252***	0.004	-0.248*	0.022***	0.048	0.003
	(0.081)	(0.004)	(0.062)	(0.003)	(0.099)	(0.005)	(0.084)	(0.004)
Migrated age 35+	-0.314**	0.013**	-0.172	0.017***	0.094	0.013*	0.031	0.007
	(0.103)	(0.005)	(0.092)	(0.004)	(0.134)	(0.005)	(0.107)	(0.004)
(White)								
Black	0.298***	-0.009***	0.544***	-0.012***	-	-	-	-
	(0.034)	(0.002)	(0.027)	(0.001)				
Other	0.359***	-0.009*	0.445***	-0.010**	-	-	-	-
	(0.077)	(0.004)	(0.067)	(0.003)				
Education	-0.121***	0.002***	-0.139***	0.003***	-0.087***	0.001*	-0.098***	0.001***
	(0.004)	(0.000)	(0.004)	(0.000)	(0.011)	(0.000)	(0.010)	(0.000)
Education x Mig. 1-17	0.053*		0.018		0.012		0.021	
	(0.021)		(0.023)		(0.023)		(0.019)	
Education x Mig. 18-34	0.040**		0.060***		0.008		0.010	
	(0.014)		(0.013)		(0.014)		(0.013)	
Education x Mig. 35+	0.052**		0.062***		0.048**		0.013	
	(0.016)		(0.014)		(0.016)		(0.014)	
Age at 1st interview	-0.047***	0.000*	-0.037***	0.000	-0.042***	0.000	-0.027***	-0.000
	(0.002)	(0.000)	(0.001)	(0.000)	(0.007)	(0.000)	(0.005)	(0.000)
Died	0.558***	0.007***	0.597***	0.005***	0.544***	-0.003	0.604***	-0.009
	(0.033)	(0.002)	(0.033)	(0.001)	(0.108)	(0.005)	(0.112)	(0.005)
Dropped from sample	-0.151*	0.020***	-0.170**	0.016***	-0.873***	0.055**	-0.203	0.024

	(0.064)	(0.005)	(0.054)	(0.004)	(0.247)	(0.021)	(0.183)	(0.020)
Proxy interview	0.039	0.014***	0.176***	0.007***	0.130	0.007	-0.237*	0.015***
	(0.025)	(0.001)	(0.035)	(0.001)	(0.073)	(0.004)	(0.100)	(0.004)
SD (intercept)	0.784***		0.789***		0.733***		0.747***	
	(0.006)		(0.005)		(0.021)		(0.018)	
SD (residual)	0.724***		0.700***		0.801***		0.745***	
	(0.002)		(0.002)		(0.009)		(0.007)	
Log Likelihood	-78599		-102203		-7174		-9346	
Wald chi2	7769.82***		9871.96***		504.89***		464.29***	
df	24		24		20		20	
N	61771		82359		5319		7261	
n	11835		15107		1034		1349	

*** p<0.001, ** p<0.01, * p<0.05 Standard errors in parentheses

Figures 1-4: Predicted Self-Rated Health Trajectories, Adults age 50+, HRS 1992-2008



Based on the models in Table 4 and adjusted for education (=12), race for non-Hispanic (whites=1), age at first interview (=50), death (=0), attrition (=0), and proxy interview (=0)