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Rethinking the Effect of Duration on Immigrant Health: Evidence from the National Health Interview Survey (2006-2008) and the New Immigrant Survey (2003)

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Rethinking the Effect of Duration on Immigrant Health: Evidence from the National Health Interview Survey (2006-2008) and the New Immigrant Survey (2003)

by

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Dissertation

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Doctor of Philosophy

The University of Texas at Austin

August 2011

Dedication

This dissertation is gratefully dedicated to
my devoting parents Jiaguang Li and Cuilan Jiang;
my dear husband, Matthew M. Yang; and
my baby daughter, Isis L. Yang.

Acknowledgements

First and foremost, I would like to thank my advisor, Dr. Robert A. Hummer, for his generous support, timely guidance and understanding. During my six years in the Department of Sociology and the Population Research Center, he has always been a positive influence on my study and life. This dissertation was challenging given the nature of the work and the timing, but working with him helped me keep focused and his encouragement constantly motivated me. In particular, I am deeply indebted to him for guiding my dissertation to the right direction and his interest in my professional life.

I also would like to sincerely thank my committee members, Dr. Catherine E. Ross, Dr. Ronald J. Angel, and Dr. Daniel A. Powers, and Dr. Su Yeong Kim, for their constructive comments and suggestions for this dissertation. Among them I am especially grateful to Dr. Powers and Dr. Kim for their warm support for my graduate study in the University of Texas at Austin.

Rethinking the Effect of Duration on Immigrant Health: Evidence from the National Health Interview Survey (2006-2008) and the New Immigrant Survey (2003)

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The University of Texas at Austin, 2011

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Past studies often find that, upon arrival U.S. immigrants generally have favorable health profiles than native-born persons, but their health deteriorates with prolonged stay. The classical explanations of this phenomenon are healthy immigrant selection and negative acculturation. With the number of foreign-born people living in the United States reaching an all-time high, the health and financial costs of this "negative acculturation" is substantial. Meanwhile, the negative duration effect on health is contradictory to expectations from classic assimilation theory and what has been observed by labor economists. This study aims to empirically study the effect of duration on immigrant health, with particular attention given to how socioeconomic status differentiates the duration-health relationship.

Results based on two national datasets confirmed that immigrants, especially recent arrivals, have a considerably lower risk of worse health relative to native-born

adults. I also found that socioeconomic status plays an essential role in the varying level of initial health selectivity among immigrants. The analysis of the interaction effect between duration and SES reveals that duration effects on health vary significantly by socioeconomic status. High SES immigrants tend to experience a non-negative duration effect regardless of their length of U.S. residence, while immigrants with lower socioeconomic standing are more likely to experience a negative duration effect on health with longer duration. Moreover, this study also shows that the initial foreign-born advantages in health are typically larger for persons with low SES than for persons with high SES. However, little evidence suggests there is a health convergence between long-term immigrants and their native-born counterparts with similar socioeconomic status. Potential explanations and implications of these findings are also discussed.

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Chapter 1: Introduction

There is compelling evidence for the "healthy immigrant effect" such that immigrants have more favorable health profiles than native-born Americans and their children are healthier and less likely to die (Kandula, Kersey and Lurie 2004; Argeseanu Cunningham, Solveig and Narayan 2008). The primary explanations include positive migration selection on health and cultural buffering (Jasso, Massey, Rosenzweig and Smith 2004; Landale, Oropesa and Gorman 2000; Palloni and Ewbank 2004; Abraido-Lanza, Dohrenwend, Ng-Mak and Turner 1999; Scribner 1996). Nevertheless, this health advantage does not seem to last. It is also well documented that the longer immigrants live in the U.S., the worse their health and the higher the risk of death to their infants (e.g., Markides and Coreil 1986; Cho, Frisbie, Hummer and Rogers 2004; Frisbie, Cho and Hummer 2001; Antecol and Bedard 2006).

The strong association between immigrant duration of residence and health decline was typically interpreted as evidence to support "negative acculturation," which argued that as immigrants became more acculturated, the protective culture buffering began to dissipate and thus their health deteriorated (Abraido-Lanza, Dohrenwend, Ng-Mak and Turner 1999; Scribner 1996; Jasso et al. 2004). As this contention emphasized a behavioral view of acculturation, the strongest evidence pointed towards increased unhealthy behaviors and weakened social support over time (Landale et al. 1999; Guendelman and Abrams 1995; Guendelman and English 1995; Lopez-Gonzalez,

Aravena and Hummer 2005; Singh and Siahpush 2002; Antecol and Bedard 2006; Akresh 2007; Lauderdale and Rathouz 2000).

These findings are intriguing, given that most immigrants are healthy upon arrival and their goal is to improve their economic future. According to assimilation theory, time spent in the U.S. is positively correlated with higher levels of social integration and economic advancement (Gordon 1964; Alba and Nee 1997). Studies in labor economics also confirm that the earnings of immigrants who have resided in the United States for many years are substantially greater than the earnings of recent immigrants (Borjas and Friedberg 2009; Batalova, Fix and Creticos 2008). As immigrants become more adapted, the resources and experiences they accumulate over time also facilitate access to medical insurance and improve health care, which are closely associated with better health attitudes, behaviors and outcomes (Lara et al. 2005; Echeverria and Carrasquillo 2006; Carrasquillo, Carrasquillo and Shea 2000; LeClere, Jensen and Biddlecom 1994; Frisbie et al. 2001; Pol et al. 2001). Surprisingly, when duration was used to operationalize acculturation, with few exceptions, previous studies consistently evidenced a negative association between duration and immigrant health (e.g., Frisbie et al. 2001; Cho et al. 2004; Akresh 2007).

The proposed study aims to investigate this contradiction. First of all, I theoretically examine how the choice of using duration to measure acculturation constitutes a methodological weakness and thus compromises the conclusions reached. By looking at acculturation as a process, I elucidate why the relationship between length of duration and health should not be directly translated as the association between

acculturation and health. Next, I argue that, in order to gain a complete understanding of duration effects and better guide immigration and health research, it is imperative to adopt a socioeconomic approach with an emphasis on socioeconomic diversity among immigrants and the effect of socioeconomic factors on health. Thirdly, by employing two national datasets, I further take this question apart and provide an evidence-based explanation why we observe what we have observed regarding negative duration effects. Specifically, my study uses a socioeconomic approach to analyze the following two aspects of duration effects.

The first aspect concerns immigrants' initial health status. Recent decades have witnessed rapid growth and diversification of the U.S. immigrant population. Once chiefly consisted of western Europeans, the post-1965 influx is increasingly from countries in Latin America, the Caribbean, the former USSR, the Middle East and Asia. One key dimension of heterogeneity is immigrants' distinctive socioeconomic background (Portes and Rumbaut 2006). This diversity within the immigrant population may exert a substantial influence on directions and levels of health selectivity (Jasso et al. 2004; Palloni and Ewbank 2004; Kennedy, McDonald and Biddle 2006). Because subsequent health trajectory is not independent from initial health status, my examination of duration effects starts with investigating the variability of "the healthy immigrant effect". To reach that goal, both differences between immigrants and natives as well as differences within immigrants will be examined to present a more complete picture of immigrant baseline health.

Subsequent health trajectory is what the duration variable tries to directly measure but often fails to. Even if immigrants are equally healthy upon arrival, they are still likely to experience distinctive health trajectories over time. In this part of the analysis, my goal is to show how duration is related with immigrant health in the complex process of acculturation and how socioeconomic status ultimately determines the direction and the magnitude of the duration effect. There are two advantages to adopting a socioeconomic approach in studying the duration effect in relation to health trajectories. One is associated with the idea that SES serves as an effect modifier of acculturation on health; another concerns inherent measurement problems of the duration variable.

Data for my analysis come from multiple years of the National Health Interview Survey (NHIS) from 2006 to 2008 and the 2003 New Immigrant Survey (NIS). A series of generalized linear models will be carried out to shed light on immigrant health selection and subsequent health differences. Besides socio-demographic variables, both datasets have multiple health measures, including self-reported health, functional limitations, and a range of specific health conditions.

As the U.S. immigrant population continues to grow, the proposed study is important and timely research for understanding the impact of migration on the health of the nation. My findings will have significant implications on studies of immigration and health. First, they will reveal how much duration actually reflects the effect of acculturation and how much previous studies have failed to interpret other factors included in the measure of duration. Second, my results will clearly show whether duration has a deleterious effect on immigrant health or not. If it does, we will be able to

tell whether this effect is universal to all immigrants, or only applies to certain subgroups. Taken together, the results from this study should help researchers to explore the validity of the "negative acculturation" argument and figure out how to approach immigrant health differentials in a more advanced way.

The dissertation will be composed of seven chapters in total. The first chapter is a brief introduction to my research topic, the relevance of my study and a summary of what follows. The second chapter first provides a background to aid with the understanding of recent immigration and studies of immigration and health. Subsequently, Chapter Two presents a critical review of prior work on immigrant health and builds a theoretical framework with a focus on socioeconomic factors. Specific hypotheses are also formulated at the end of Chapter Two. Chapter Three introduces the datasets that are to be used in the empirical analysis, together with sample descriptions, measures, statistical methods, analytic plans and descriptive results. Chapters Four, Five, and Six are devoted to testing three sets of specific research hypotheses, respectively. I will summarize results, discuss possible explanations for the findings and make conclusions in Chapter Seven. Limitations of the study and future research directions will also be discussed.

Chapter 2: Background and Research Hypotheses

ACCULTURATION AND DURATION

The "culture" lens has provided an important framework for studying immigrant health. On the one hand, it stresses that the protective home culture, which buffers stress and fosters healthy behaviors through strong family ties and social support, explains the healthy immigrant effect (Abraido-Lanza et al. 1999; Scribner 1996; Jasso et al. 2004). On the other hand, this argument extends to the "negative acculturation" hypothesis, which posits that the protective culture buffering begins to dissipate and thus health deteriorates as immigrants become acculturated to an American lifestyle (e.g., Hao and Kim 2008; Guendelman and English 1995; Lopez-Gonzalez et al. 2005).

This negative acculturation effect has been examined in a wide variety of health outcomes, including infant and adult mortality, self-reported health, chronic diseases, functional limitations, and mental health (e.g., Landale et al. 1999; Singh and Siahpush 2002; Cho and Hummer 2001; Dey and Lucas 2006; Harker 2001). Researchers have identified a number of mechanisms to explain the causal link between acculturation and worsened health, including acculturative stress (e.g. Finch, Frank and Vega 2004; Finch and Vega 2003), weakened family and social support (e.g., Landale et al. 1999), adoption of an unhealthy lifestyle (e.g. Akresh 2007; Lopez-Gonzalez et al. 2005), and lack of access to modern health care (e.g., LeClere et al. 1994; Frisbie et al. 2001).

These studies significantly contributed to our understanding of acculturation and immigrant health. Nonetheless, there are deeply rooted methodological difficulties in acculturation and health research (e.g., Frisbie et al. 2001; Cho et al. 2004). There are two

types of acculturation measurements. Acculturation scales directly measure the underlying construct through a battery of questions that are directed at language use and proficiency, social contacts/relationships and cultural participation (Salant and Lauderdale 2003). Because these questions are usually lengthy and time-consuming, it is not practical for most large-scale health surveys to include acculturation scales. As a result, the majority of studies using acculturation scales are conducted at the community level (e.g., Franzini and Fernandez-Esquer 2004; Cuellar, Bastida and Braccio 2004; Markides et al. 1990). In contrast, non-scale measures, such as nativity, generational status, English language, citizenship, and duration in the U.S., used individually or in combination, have become increasingly favored among studies conducted at the national level (e.g., Singh and Siahpush 2002; Cho and Hummer 2001; Hao and Kim 2008; LeClere et al. 1994; Angel Buckley and Finch 2001). Compared to acculturation scales, these simple variables place the least burden on respondents during primary data collection and are generally available in large-scale national datasets. However, non-scale measures, often referred to as "proxy variables", do not reflect explicit theoretical constructs (Salant and Lauderdale 2003). Furthermore, whether or not they can tap into the multi-dimensional construct of acculturation depends on assumptions that are largely untested (Hunt et al. 2004; Weigers and Sherraden 2001).

Length of duration in the United States is the most routinely used proxy variable for acculturation. Besides its general availability, duration is typically measured by the number of years that the respondent has lived in the U.S., so it is innately quantitative for analysis. In testing acculturation hypotheses, a typical analysis plan involves categorizing

duration in combination with nativity and comparing immigrants with varying length of residence to native-born Americans (e.g., Frisbie et al. 2001; Cho et al. 2004; Finch and Vega 2003; Cho and Hummer 2001; LeClere et al. 1994). If results reveal a gradient such that health is less favorable with longer duration in the United States, then researchers typically claim that the "negative acculturation" hypothesis is supported (e.g., Frisbie et al. 2001; Cho et al. 2004; Finch and Vega 2003; Cho and Hummer 2001).

However, interpreting duration is not as straightforward as previous studies have assumed. An underlying presumption in using duration in acculturation studies is that length of residence positively correlates with higher levels of acculturation. This presumption is problematic for several reasons (Salant and Lauderdale 2003; Palinkas and Pickwell 1995; Hunt et al. 2004). Above all, it merely views acculturation as structure, while in fact acculturation is also a dynamic process with a complex interplay of forces. As will be discussed later, acculturation into broader U.S. society may be accompanied by positive health outcomes as a result of increased economic well-being and adoption of health-promoting behaviors, or negative health outcomes through adoption of poor health behaviors and decreased social support. These two forces work in opposite directions. As immigrants live in the U.S. longer, both forces may develop and come into operation, so whether immigrant health will improve or deteriorate in the long term is determined by relative strength of the two counteracting forces. Thus, what the duration variable captures is not the level of acculturation, but the net effect of two forces of acculturation on immigrant health over time. That is, if the health gains outweigh the losses, the relationship of duration and health appears to be positive. When the two

opposing forces are equal, they cancel each other out and duration shows no effect. Empirically, what researchers have found most often was a negative duration effect. It suggests that the costs of changes in health behaviors and social support override health benefits from improvement of socioeconomic conditions, hence resulting in a net health loss over time.

Unfortunately, past studies directly interpreted negative duration effects as evidence to support "negative acculturation". As the duration variable became increasingly available in national datasets, more researchers were attracted by the convenience of studying acculturation through comparing groups with different duration status. Gradually, this analytical and interpretive practice became commonly accepted and broadly used in studies of immigration and health, and thus the "negative acculturation" hypothesis was confirmed and emphasized in various studies. On the other hand, little attention was given to evidence that might suggest otherwise. For example, a wealth of empirical evidence confirms that English language usage has a strong positive association with more favorable health outcomes, including better self-reported health, higher levels of emotional well-being and lower likelihood of being disabled (e.g., Angel, Buckley and Finch 2001; Franzini and Fernandez-Esquer 2004; Finch and Vega 2003; Cho and Hummer 2001). Given that linguistic adaptation is an important aspect of acculturation, these findings run directly contrary to the "negative acculturation" hypothesis, but this contradiction was rarely addressed in the literature.

It should be noted that some scholars have criticized the overly simplified approach of using duration of residence to approximate acculturation, and raised concerns

about the validity of this measurement (e.g., Hunt et al. 2004; Weigers and Sherraden 2001; Salant and Lauderdale 2003). Meanwhile, some researchers have also questioned the conclusion that American culture is "toxic" for immigrants and looked for alternative explanations for negative duration effects (e.g., Cho et al. 2001). However, few studies asked the key question what duration truly stands for in relation to acculturation and immigrant health. My study aims to fill this gap.

DURATION EFFECTS

Provided that duration represents the net effect of two opposite acculturative forces and previous studies often found a negative association between duration and health, does it lead to a conclusion that acculturation results in a net negative impact on immigrant health? That is not necessarily the case. It depends on several variables, but above all, socioeconomic factors are crucial determinants.

Background

Since 1965, changes in U.S. immigration policies have inadvertently led to mass waves of immigrants. By the year of 2007, the number of foreign-born people living in the United States reached an all-time high and exceeded 37.9 million, or about 12.5% of the total U.S. population (Camarota 2007). Compared with the "old" inflow of the twentieth century, who were overwhelmingly European and white, post-1965 immigrants are predominantly non-white and from low income countries. Hispanics are the largest immigrant group, accounting for 48 percent of the foreign-born population in the United States, while Asians are the second largest group and constitute 23 percent of all foreign-born persons (Camarota 2007). White immigrants only make up about 21 percent of the

foreign-born population (Camarota 2007). They come from traditional sending countries in Western Europe, but also increasingly from Eastern Europe and countries of the former Soviet Union. Lastly, the share of black immigrants, who are mainly from the Caribbean and Africa, has also been rising, accounting for 7.6 percent of post-2000 immigrants (Camarota 2007).

The population size of Hispanics provided the earliest fertile ground for studies of immigration and health. Influential findings such as the Hispanic mortality paradox have, to a large extent, laid the foundation for research of this kind. Later studies looked beyond Hispanics and extended interest to other major racial groups in the United States (e.g. Singh and Yu 1996; Frisbie et al. 2001; Singh and Siahpush 2001, 2002; Read and Emerson 2005; Antecol and Bedard 2006). However, with few exceptions, this growing body of research was conducted using traditional race and ethnicity groupings. They almost exclusively relied on comparisons between immigrants and native-born non-Hispanic whites, or between foreign-born and U.S.-born individuals of the same broad race or ethnic group (See Argeseanu Cunningham et al. 2008 for a review).

Given significant racial differences between the immigrant and native populations, as well as the importance of race in American society, these studies provided valuable insight. Nevertheless, the racial labels – Hispanics, Asians and blacks –also mask huge differences across immigrant subpopulations, which prompted researchers to further differentiate immigrants and look for health variations across major ethnic groups. For example, Hispanics are broken down to Mexicans, Cubans, Puerto Ricans and sometimes, Dominicans (e.g., Cho et al. 2004; Zsembik and Fennell 2005), while Asians

are divided into Chinese, Koreans, Japanese, Filipinos, Vietnamese and Asian Indians (e.g., Frisbie et al. 2001; Lauderdale and Rathouz 2000).

This approach, however, has one major weakness because the residual category inevitably includes small and diverse subgroups. A case in point is "other Hispanics." According to Census data, "Other Hispanics" are the second largest Hispanic group, but it is a highly mixed collective, including Central and South Americans, Dominicans, Spaniards, and perhaps some Filipinos (Guzmán 2001). The largest subgroups are Central American political refugees (e.g. from Nicaragua, Guatemala, El Salvador, and Honduras) and low-skilled Caribbean economic immigrants (especially from the Dominic Republic), but there are also many educated professionals and technicians, especially from South America, who immigrated under formal U.S. employment preferences and not as traditional labor immigrants. As a result, not only are "Other Hispanics" a population of mixed background, there are also enormous differences in socioeconomic origin within this group. Its heterogeneity precludes meaningful interpretations. For example, in examining the "Hispanic mortality paradox," Palloni and Arias (2004) divided Hispanics into Mexicans, Puerto Ricans, Cubans, and other Hispanics, and discovered that "Other Hispanics" were the only immigrants whose adult mortality advantages were not accounted for by return migration or other mechanisms proposed in their study. Nonetheless, because little is known about this "Other Hispanic" group, their finding was not only difficult to comprehend, but had limited use from a public policy perspective (Markides and Eschbach 2005).

Socioeconomic Status in Immigration and Health Studies

Diversity within "other Hispanics" reveals the limits of using race/ethnicity as the organizing concept for studying immigration and health. It also points to the need to look at socioeconomic heterogeneity among immigrants and the effect of socioeconomic indicators on immigrant health. However, it should be noted that immigration and health research has traditionally sidetracked the importance of socioeconomic status. Although researchers often include SES indicators in their analysis, little published work has a focal interest in how SES influences health selection or subsequent health trajectories (Hunt et al. 2004; Salant and Lauderdale 2003; Argeseanu Cunningham et al. 2008). Instead, SES factors are typically used for sample description, or presented independently as control variables, while only migration-related variables such as nativity and duration of U.S. residence are placed at the center of analysis (Hunt et al. 2004). This inattention to the effect of SES is puzzling, especially given that the development of immigration and health studies has paralleled an explosion of interest in the association between socioeconomic status and health in medical sociology, epidemiology and public health.

To understand why SES has been neglected in immigration and health research, we first should take a close look at the historical backdrop of immigration and health research. Immigration and health research began to gain momentum during the 1980s, when Latin America and Asia surpassed Europe and became the largest immigrant-sending regions to the United States. Meanwhile, there was a marked change in the socioeconomic composition of immigrants. On the one hand, family reunification emphasis by the provision of the 1965 Amendments, coupled with high population

growth rates and an economic crisis in Mexico in the early 1980s, propelled millions of Mexicans to migrate to the U.S. for economic reasons (Martin and Midgley 2006). Most of them were from rural areas and had little formal education; the volume of undocumented immigration also grew. On the other hand, as U.S.-supported governments in Southeast Asia fell in 1975, over 2 million refugees fled Vietnam, Laos and Cambodia as part of the largest refugee program in U.S. history, which peaked in 1980. Most of these refugees were also of low socioeconomic origin. Therefore, based on the social reality of the 1980s, early research largely treated immigrants as a homogeneously poor group without distinguishing them. It was also during this period that some scholars concluded that the labor market quality of post-1965 immigrants had declined substantially compared with those who came from advanced industrial societies in Europe decades earlier (e.g., Borjas 1985; Borjas and Tienda 1987).

Second, a lack of interest in socioeconomic status also reflects strong influence from early findings of immigration and health studies. As mentioned earlier, Hispanics represent an important and special case for research on immigrant health. In a seminal review on Hispanic health, Markides and Coreil (1986) coined the concept "epidemiological paradox" to refer to the fact that the health status of Southwestern Hispanics (a high percentage of whom were foreign-born Mexican Americans) was more comparable with that of non-Hispanic whites than with that of African Americans, whom they closely resembled with respect to socioeconomic characteristics. This finding has roused immense scientific interest and thus the underlying causes of the "epidemiological paradox" have been a source of considerable research and debate since then, which to a

large extent stimulated later development of this area. However, by showing that immigrants were far less susceptible to health risks associated with lower SES than the native-born, the "epidemiological paradox" also inadvertently diverted attention from socioeconomic factors. Instead, migration selection and the "culture" argument – two non-SES mechanisms –have dominated the debate and became the major themes of later studies on immigration and health.

Socioeconomic Approach

In summary, the lack of attention to socioeconomic factors in immigration and health studies is a response to immigration composition in the 1980s and a continuation of earlier work based on the "epidemiological paradox". The past twenty years, however, witnessed a shift in the socioeconomic composition of the immigrant population. Compared to those who came to the U.S. during the 1970s and the 1980s, recent arrivals are characterized by much greater socioeconomic heterogeneity. Accordingly, I argue that, in order to gain a full understanding of duration effects and a better handle on immigration and health research, it is imperative to adopt a socioeconomic approach – an approach that takes into account socioeconomic diversity among immigrants and emphasizes the effect of socioeconomic status on health.

A complex array of factors accounts for this recent change of immigrants' socioeconomic composition, including "older immigrant" stock, the growing presence of dependent kin in some migration flows, and an increasing number of undocumented workers. Although a full examination of causes is beyond the scope of this dissertation, a dramatic rise of professional immigrants since the 1990s is definitely a major factor.

First, the Immigration Act of 1990 raised the share of employment-based visas that was originally set in 1965. Table 2.1 shows the number of employment-based immigrants and the total number of U.S. immigrants from 1986 to 2007. Despite fluctuations, it is clear that the inflow of high-skilled immigration has been increasing steadily over this period, both in absolute numbers and in share. The trend is more evident for immigrants who came after 2000, with an annual average of 158,044 professionals, or 15.5 percent of all legal immigrants. Another significant policy change was the creation and later expansion of the H-1B program in the 1990s[1], which has become another major channel for the arrival of tens of thousands of foreign engineers, high-tech workers and medical personnel in recent years. As shown in Table 2.2, the number of H-1B visa admissions more than quadrupled during the 1990s, and remained at a high level afterwards. Although H-1B is officially a temporary visa category, the evidence indicates that the majority of H-1B holders desire to stay permanently (Johnson and Regets 1998; Lowell 2000). The exact number of H-1Bs who successfully adjusted to permanent resident status is unknown, but estimates show that the cohort adjustment rates are never below 20 percent, with over 40 percent both in the mid-1990s and during the 2000s[2] (Lowell 2000). Finally, some refugee groups who arrived in recent decades, such as Iranians, Ethiopians, Iraqis, Afghans and those from the former Soviet Union, also included high

[1] The H-1B visa category was formally established by the 1990 Immigration Act and had an annual cap of 65,000. This limit was later raised to 67,000 in 1992, 115,000 in 1999 and eventually to 195,000 in 2001. In 2004, the cap was brought back to 65,000, but another 20,000 foreigners with U.S. graduate degrees were exempted in 2005. The H-1B guest workers employed by nonprofit organizations such as universities were also exempted from the cap.

2 Estimated rates of adjustment dipped precipitously in the mid 1990s but rose again afterwards. See Lowell (2000) for details.

proportions of educated and professional immigrants. Recent Russian immigrants are the most notable case. Their arrival in large numbers started in 1989, but quickly intensified after the demise of the Soviet Union. Peaking in 1992, 527,297 refugees from the former Soviet Union entered the U.S. from 1975 to 1999, marking the second largest refugee program in the U.S. (after Vietnam) (Gold 2007). In strong contrast to Southeast Asian refugees, Russians tend to be very highly educated and have made rapid progress in adjusting to the U.S. labor market (Gold 2007; Portes and Rumbaut 2006).

The large inflow of recent professionals injected new blood into the U.S. immigration stream and changed the overall socioeconomic profile of immigrants. Clearly, today's immigrants should not be described as predominantly low-educated and unskilled. The 2000 U.S. census shows that the proportions of foreign-born and native-born college graduates are the same, and that 20 percent of foreign-born individuals work in professional occupations, also on a par with the native-born. Interestingly, immigrants are also found to be in a strikingly disadvantageous situation at the low end of the socioeconomic spectrum; they are 3.4 times less likely to complete high school education and 1.4 times more likely to fall into or near poverty than native-born adults (Camarota 2007). Detailed analyses further reveal substantial heterogeneity among immigrants with respect to educational attainment, labor force participation, self-employment and household income (Portes and Rumbaut 2006; Fernandez and Kim 1998; Yang 1999; Feliciano 2005).

Socioeconomic Approach and Duration Effects

In light of fundamental cause theory (Link and Phelan 1995), if health disparities are deeply rooted in differences in socioeconomic factors for immigrants, as for the native-born, high levels of socioeconomic diversity among immigrants point to the need to place SES at the center of immigration and health research. In particular, provided that duration indeed taps into the net effects of immigrant health gains and losses over time, inattention to SES may even lead to questionable conclusions because both health gains and losses are susceptible to the influence of SES.

A small set of studies is beginning to take SES into serious account for some groups of immigrants (Turra and Goldman 2007; Kimbro, Bzostek, Goldman and Rodriguez 2008; Goldman, Kimbro, Turra and Pebley 2006). The focus of these studies was socioeconomic gradients in health among race/ethnic groups, with nativity taken into consideration. The major finding from these studies is that socioeconomic differentials in health are typically more modest for immigrants than for the native-born population, especially for Hispanics. Although the effect of duration was not even included in the analyses, some results indicate that the beneficial SES effect on health is not uniformly distributed among population subgroups, including immigrants (Turra and Goldman 2007).

To fully examine the effect of duration on health, I propose that a socioeconomic approach be applied to two aspects of immigrant health –initial health selectivity and subsequent health trajectory. Initial health selectivity reflects the variability in health at the time of migration, while subsequent health trajectory concerns how immigrant health

changes after arrival to the United States. Jasso and colleagues (2004) were the first to clearly define and model these two aspects. They further argued that health selection and health trajectory are not independent of each other. In my study of duration effects, this dependence between initial selection and subsequent trajectory has specific theoretical implications in that health selection provides a baseline and a point of reference that later changes should be compared to. Given inaccuracy in the measurement of duration, if health selection and subsequent changes are not analyzed separately, both mechanisms will contribute to observed health variability that is ultimately reflected as a duration effect. Therefore, my investigation of duration effects starts with an examination of initial health selectivity.

Initial Health Selectivity

It is well documented that upon arrival immigrants have significantly better health than native-born Americans, and prior literature largely attributes this advantage to positive migration selection (e.g., Frisbie et al. 2001; Landale et al. 2000; Singh and Siahpush 2001; Antecol and Bedard 2006). Immigrants' superior health includes physical healthiness, mental robustness, and possibly a common "hardy" personality (Kennedy, McDonald and Biddle 2006; Kuo and Tsai 1986).

Despite the attention that the healthy immigrant effect has received in the literature, there has been little theoretical research on health selectivity. Ideally, bi-national and longitudinal datasets are required to unambiguously compare the health of movers and the health of stayers in the home country. In practice, however, with few exceptions (Landale et al. 2001; Kennedy et al. 2006; Weeks, Rumbaut and Ojeda 1999),

evidence of migratory selectivity is mostly inferred by comparisons between immigrants and the native-born in the receiving country (e.g., Cho et al. 2004; Frisbie et al. 2001). Consequently, although researchers agree that positive selection is a major contributor to the "healthy immigrant" effect, comprehensive evidence on the extent of health selection is difficult to obtain.

Immigrants are selected on various measurable and unmeasurable characteristics in addition to health, such as age, gender, education, skills, occupation, ambition and resourcefulness. A number of authors have advanced studies of migration selection, typically in terms of selection effects on labor market outcomes and not specifically on health. They mostly studied migration selectivity by national origin, with an assumption that immigrants from the same sending area were more or less homogeneous on education or skill levels (e.g. Borjas and Friedberg 2009; Batalova, Fix and Creticos 2008; Jasso et al. 2004; Feliciano 2005). Despite disagreement on whether all immigrants were positively selected, a consensus was reached that the degree of selectivity varies considerably by country of origin.

Along the same line, Jasso and colleagues (2004) built a model of health selection based on labor market considerations and hypothesized that selectivity varies across countries of origin. They further provided evidence that the average magnitude of the health selection effect was very large, and immigrants from some countries were more positively selected than others. Similarly, by grouping immigrants into broader world regions, Akresh and Frank (2008) also found support for this hypothesis. Their results indicated that immigrants from all other regions were more likely than Mexicans to be

positively selected, with a range of magnitude of 2.7 times as high for Western Europeans to 26% higher for Asians. Moreover, South/Central American and Asian immigrants are less likely than Mexicans to have experienced negative health selection.

The selection process operates at multiple complex levels. Surprisingly, despite the significance of self-selection, little is known about the degree to which migration selection differs by immigrants' individual characteristics such as SES. In particular, this question is worth asking because members of the same immigrant group are not necessarily homogeneous in their socioeconomic backgrounds. For example, the bimodal distribution on many social and economic indicators within some Asian immigrant groups, such as Chinese and Vietnamese, and the reasons for the bimodality have been well established (Yin 2007; Liang, Miao, Zhuang and Ye 2008; Portes and Rumbaut 2006; Rumbaut 2007). Furthermore, for large immigrant groups that have a seemingly uniform distribution of SES indicators, even a small degree of heterogeneity may warrant close examination. For example, although only 4.2 percent of foreign-born Mexicans reported earning a bachelor's degree or better in 2000, less known is that 384,865 persons, or over five percent of all foreigners who had at least a college degree, were Mexicans (U.S. Census 2000). This large number of college graduates ranked Mexico the 4th largest country in contributing highly educated immigrants, calling for differentiating individual socioeconomic backgrounds in health studies.

The literature leads to two competing hypotheses about SES and immigrant health selectivity. On the one hand, even if immigrants are all positively selected on health, there may be substantial variability in the intensity of selectivity in that migration

selection is especially prevalent among the socioeconomically disadvantaged. Since health is an important form of human capital (Grossman 1972), one could imagine that a poor and poorly educated person who is very healthy would be more likely to migrate to the U.S., and to take a heavy manual job. In contrast, wealthier potential immigrants have access to more resources to facilitate their migration and professional immigration is more selective on education and skill levels. Goldman and colleagues (2006) speculated that varying levels of selectivity may account for the weak education differentials in health outcomes among Mexican immigrants. However, since their study was not designed to distinguish health variability between selection and subsequent changes, there is no supporting or refuting evidence for this hypothesis.

On the other hand, the effect of health selection may not differ significantly by individual SES. Regardless of their socioeconomic background, immigrants must meet a minimum health level that would make migration worthwhile, so the dispersion in health outcomes among immigrants should be less than among the general population (in the home country or in the receiving country). As a result, although the levels of health selectivity vary by immigrants' socioeconomic status, the difference may not reach statistical significance. For example, through comparisons of immigrants from the United States, Canada, United Kingdom and Australia and their non-immigrant home-country peers, Kennedy, McDonald and Biddle (2006) showed that there were health differences between immigrants without a university degree and those with a university degree, but that this education-health gradient was small in magnitude for every health measure and significantly smaller compared to the native-born. However, since their study was only

based on evidence from immigrants from four developed countries, it is impossible to know whether such findings are generalizable to other groups.

Subsequent Health Trajectory

Subsequent health trajectory is what the duration variable tries to directly measure. As discussed earlier, duration does not capture the complexity of acculturation, but rather the net effect of two acculturation forces that work in opposite directions. Here I further argue that socioeconomic status ultimately determines the direction and the magnitude of the duration effect by controlling the relative impact of two forces. That is, even if immigrants are equally healthy upon arrival, they are still likely to experience distinctive health trajectories as a result of their differentials in socioeconomic standing. There are two advantages to adopting a socioeconomic approach in studying the duration effect and its association with immigrant health trajectories. One is related to the idea that SES serves as an effect modifier for the relationship between acculturation and health; another concerns inherent measurement problems of the duration variable.

The strongest evidence for negative acculturation and declining health pointed toward a positive association between length of duration and the adoption of unhealthy behaviors and weakened family ties. Abundant studies show that recent immigrants tend to retain protective aspects from their home culture, are more likely to be married, are less likely to have a birth out of wedlock, are less likely to be incarcerated, and they tend to live in more extended family situations than the native-born (e.g., Landale et al. 1999; Akresh 2007; Guendelman and Abrams 1995; Guendelman and English 1995; Lopez-

Gonzalez et al. 2005; Zambrana et al. 1997; Singh and Siahpush 2002). However, the more years in the U.S., the weaker their family ties (Landale et al. 1999). Furthermore, recent arrivals are less likely to smoke or drink heavily, use illegal drugs, be sedentary, and eat an unhealthy diet, but the longer immigrants have lived in the U.S., the more likely they are to smoke, drink alcohol, eat less nutritious food, and the more likely they are to be overweight (Dey and Lucas 2006; Guendelman and Abrams 1995; Guendelman and English 1995; Landale et al. 1999; Lopez-Gonzalez et al. 2005; Zamrana et al. 1997; Singh and Siahpush 2002; Akresh 2007; Lauderdale and Rathouz 2000; Antecol and Bedard 2006).

Despite many studies that point to the negative effect of acculturation, studies also suggest that acculturation can render health benefits (e.g., Salant and Lauderdale 2003; Hao and Johnson 2000; Franzini and Fernandez-Esquer 2004). First of all, the strongest evidence points towards increased access to resources and a lower risk of economic disadvantages for more acculturated immigrants (e.g., Borjas and Friedberg 2009; Batalova, Fix and Creticos 200; Portes and Rumbaut 2006). As immigrants reside in the U.S. longer, they are more adjusted in terms of language skills, employment networks and other aspects of social life. They also speak better English and are more capable of negotiating with their living environments. In turn, these accumulated resources and experiences can facilitate access to medical insurance and improve health care, which are related to better health attitudes, behaviors and outcomes (Mutchler, Prakash and Burr 2007; Lara et al. 2005; Angel, Buckley and Sakamoto 2001; Angel, Buckley and Finch 2001). Unsurprisingly, mounting evidence shows that, compared to recent arrivals and

noncitizens, long-term immigrants and those who have become U.S. citizens are more apt to report regular health screening and receive employer-sponsored health insurance or government coverage (Echeverria and Carrasquillo 2006; Carrasquillo, Carrasquillo and Shea 2000; LeClere and Biddlecom 1994; Frisbie et al. 2001; Pol, Adidam and Pol 2001).

However, acculturation is not a simple function of time; nor is a positive relationship between length of residence and socioeconomic resources present in every segment of the immigrant population. Key factors such as SES can modify the acculturation process, leading to divergent paths of integration into American society. In their qualitative study of birth weight among women of Mexican descent, Weigers and Sherraden (2001) argued that acculturation is a response to exogenous forces and concluded that "without the pressure, the need or the opportunity to adapt to a new environment, the process of acculturation will be much slower" (P. 832). Although the authors failed to elaborate on what factors fundamentally produce the pressure, the need and the opportunity of integration, their examples clearly point to significance of socioeconomic factors. For instance, immigrants who participate in the U.S. education system or are employed in a working setting where English is spoken and interactions with non-immigrants are required are more likely to build relationships with native-born teachers, classmates and coworkers and be exposed to a broader array of what the host society offers. Conversely, immigrants who live in an ethnic enclave and work in occupations that are predominantly with co-ethnics have minimal need or opportunity to meet people outside of their immediate group. As a result, their exposure to broader U.S. society may be very limited. Over time, two distinctive patterns of acculturation emerge.

On the one hand, immigrants with better education and who are employed in the mainstream society tend to experience a quicker process of acculturation. As they stay in the U.S. longer, they speak better English, expand their social network and develop a more comprehensive understanding of the host society. On the other hand, for poorly educated and low skilled immigrants, regardless of how long they might have lived in the U.S., their progress of acculturation may be quite delayed.

This heterogeneity in the acculturation process is consistent with segmented assimilation theory in that immigrants' socioeconomic characteristics and their immediate assimilation context lead to unequal development of socioeconomic advances and an uneven distribution of socioeconomic resources, which are closely related with health (Portes and Zhou 1993; Zhou 1997). Furthermore, the influence of acculturation on immigrants' health behaviors may not be homogeneous, either. In the United States, lower socioeconomic status is more closely associated with unhealthy lifestyles including a diet high in saturated fat, sugar and refined foods, heavy smoking and drinking. If low SES immigrants are more likely to adopt these health and dietary behaviors, they are more likely to experience worse health over time. On the other hand, recent decades have also witnessed increasing institutional and individual efforts to develop a healthy lifestyle with an emphasis on good eating habits and exercise (Popkin 2002). This pattern mainly involves educated native-born people. However, given that this segment of population is what professional immigrants assimilate into, foreign-born individuals with high SES are also more likely to be exposed to this emerging trend. As a result, they may be more

likely to become selective in adopting new health behaviors and thus develop a lifestyle that promotes health.

Health behavior assimilation is relatively less researched, but a number of studies suggest divergent paths for different groups of immigrants. For example, compared to whites, Latino immigrants are less likely to engage in any leisure-time physical activity, but Abraido-Lanza, Chao and Flórez (2005) found that both female and male Latino immigrants with longer duration are more likely to engage in physical fitness activity than recent arrivals. This positive relation between exercise activity and greater acculturation is confirmed by Kandula and Lauderdale (2005) in their study on Asian Americans. Meanwhile, results from these studies reveal the importance of socioeconomic indicators such as English usage and education in determining levels of physical activity. The United States has experienced a decline in physical activity and a rise in the relative price of physical exercise. As a result, leisure time physical activity may be viewed as a commodity that requires income and discretionary time (Popkin 2002; Philipson and Posner 2003). As immigrants stay in the U.S. longer, they tend to have more income and leisure time, so they may be more likely to participate in physical exercise. Moreover, because immigrants with higher socioeconomic status are more likely to experience an increase in income and free time, they may be more likely to engage in routine physical exercise than those who are poor and less educated. This hypothesis has not been directly tested in the literature, but research on Latinas shows that as lower SES immigrants move to higher socioeconomic neighborhoods and report

greater acculturation, there is an increasing level of physical exercise and decreasing BMI (Stern, Knapp, Hazuda, Haffner, Patterson and Mitchell 1991).

In contrast, in studying dietary assimilation among Hispanic immigrants to the United States, Akresh (2007) provided direct evidence on divergent patterns of health behaviors and their respective consequences. She discovered that two distinctive types of dietary changes are possible as a result of acculturation – immigrants may consume more junk food or they may eat more fruits and vegetables. As a result, longer U.S. residence is found to be associated with a greater degree of dietary change, but these changes are strongly related to both deterioration in health and improved health, depending on the socioeconomic stratum of society into which individuals assimilate (Akresh 2007). Influenced by their native-born counterparts, immigrants with high SES may quickly learn how to read nutrition fact labels and thus deliberately avoid processed food. They may also make extra efforts to maintain their traditional diet, provided it is healthy. While recent arrivals with low socioeconomic status may also adhere to traditional meals based on their habits, it is often less of a lifestyle choice and therefore more subject to change as they stay in the U.S. longer. Furthermore, immigrants residing in low-income neighborhoods are particularly exposed to fast food, alcohol and tobacco through heavy advertisement and easy accessibility. Accordingly, they are more likely to adopt an unhealthy lifestyle.

Figure 2.1 summarizes the theoretical discussion above on socioeconomic status, acculturation forces and immigrant health. It shows that acculturation into broader U.S. society may be accompanied by positive health outcomes as a result of increased

economic well-being and adoption of health-promoting behaviors, or negative health through adoption of poor health behaviors and decreased social support. Because there is little research on change of social support by socioeconomic status among immigrants, in this study I assume social support decreases over time at the same rate across socioeconomic groups. As immigrants reside in the U.S. longer, they are likely to experience increased access to socioeconomic resources and changed health behaviors. Therefore, how duration is related with long-term health depends on the net effect of two counteracting forces of acculturation. That is, while more socioeconomic resources and adoption of health promoting behaviors are positive forces, drinking, smoking, a sedentary lifestyle and an unhealthy diet harm health in the long run.

Next, the question comes why empirical evidence often shows a negative relationship between duration and immigrant health. So far I have discussed how socioeconomic factors can differentiate the process of acculturation and determine the relative impact of two counteracting forces. Everything else being equal, immigrants with high socioeconomic status are likely to have more socioeconomic resources and maintain a healthy lifestyle, while immigrants with low SES tend to have fewer resources and adopt poor health behaviors. Consequently, immigrant health trajectories are likely to vary across socioeconomic groups. By lumping together groups that follow different trajectories, researchers may be unable to identify the circumstances in which increased duration in the U.S. is associated with either healthy or unhealthy outcomes.

However, a negative association between length of duration and health is likely observed because this is the direction in which the relationship is dominant. First,

compared to immigrants with high SES, a substantially larger proportion of immigrants are in low socioeconomic strata where a negative relationship between duration and health is expected. Second, given that immigrants are generally young and in optimal health upon arrival, if duration is not correlated with health decline, the ceiling effect makes it more likely that duration is associated with health maintenance rather than health improvement in the long run. This is especially true for immigrants with high socioeconomic status. Finally, a negative duration effect cannot be fully understood without examining the duration variable itself. Considering significant heterogeneity in socioeconomic status among immigrants and their experiences in the U.S., what else duration may stand for in relation to health warrants special attention.

Compared to natives and immigrants with high socioeconomic status, less educated and low skilled immigrants are more likely to hold physically demanding and strenuous jobs that can lead to injury and diseases. They tend to concentrate in industries that have high occupational hazards and perform riskier tasks within a given industry; they tend to work irregular shifts and for long hours, which is often correlated with worse health outcomes. Despite full-time work, they are less likely to have private health insurance or government health coverage (LeClere, Jensen and Biddlecom 1994; Peek-Asa, Erickson and Kraus 1999; Pransky et al. 2002; Orrenius and Zavodny 2009; Dong and Platner 2004; Sandhaus 1998; Holmes 2006). Furthermore, while immigrants with high resource levels are likely to enjoy better self-esteem and a sense of mastery from active coping with difficult psychosocial and environmental barriers to success, immigrants with low SES may not have adequate resources to make their high effort

coping successful even if they try, thus leaving them with a strong sense of "demoralization" (Haritatos, Mahalingam and James 2007; Angel and Guarnaccia 1989). These fundamental social determinants have a direct impact on health, but they are not directly related with acculturation (Link and Phelan 1995). People with higher socioeconomic status are less likely to be unhealthy, regardless of immigration status (Franzini and Fernandez-Esquer 2004; Hao and Johnson 2000; Cho et al. 2004; Frisbie et al. 2001). Importantly, the influence of these socioeconomic variables is cumulative, so their long-term effect can be considered as a function of time (Cho and Hummer 2001). Because length of duration is essentially a temporal measure that indicates the passage of time, as duration increases, immigrants with lower SES are likely to experience elevated risk of illness and disability as a result of their disadvantaged social conditions. Consequently, compared to high SES immigrants, they are particularly prone to poor health.

The emphases on social forces and their long-term effects are broadly in line with cumulative disadvantage theory in that socioeconomic inequality is critical to how immigrant health becomes differentiated over time (Dannefer 2003; Ross and Wu 1996). Accordingly, the duration variable represents different underlying forces for immigrants depending on which socioeconomic strata they are in. For immigrants with low SES, duration reflects a combination of the effect of cumulative disadvantage and the net effect of acculturation over time, while for immigrants with higher socioeconomic standing, the duration effect is less likely to be confounded and may only capture the net effect of acculturation. Therefore, given the fact that a large percentage of immigrants are poor

and poorly educated, the finding of health decline over time may also be partially driven by the power of socioeconomic factors and the composition of the immigrant population.

To summarize, Figure 2.2 depicts the theoretical relationship between duration, SES and immigrant health that has been discussed above. It shows a negative overall association between duration and health as well as a positive SES effect on health. Moreover, the net effect of duration also depends on which socioeconomic strata an immigrant is from. That is to say, the direction and magnitude of the interaction between SES and duration ultimately determines how duration and health are related.

SES Indicators and How to Measure SES among Immigrants

Health researchers traditionally consider socioeconomic status as a composite measure that incorporates income, education, occupation, and sometimes, wealth (Dutton and Levine 1989; Pollack et al. 2007). These indicators are moderately correlated but only partially overlap. Together they indicate access to resources that can be used to avoid health risks or to minimize the consequences of diseases once it occurs; these resources include money, knowledge, power, prestige and social connections (Link and Phelan 1995).

Practically, many studies use a single socioeconomic variable as the measure of SES, while some work has explored the independent and interactive relationships between multiple dimensions of SES and health. In addition, composite measures also have been used to tap the complex and multifactorial nature of SES.

In general, compared with other markers of socioeconomic status, educational attainment is preferred for health studies for several important reasons. First, education

attainment is mostly established in early adulthood and remains constant thereafter. Thus, it can be considered as a precursor to health outcomes measured beyond early adulthood as well as other SES indicators such as occupation, income and wealth. In contrast, "reverse causation" – pathways from health to changes in occupational status, income levels and wealth accumulation – makes a causal interpretation of the health-SES association problematic (Smith 2004). Second, information about education level is more readily available. Compared with occupation, income and wealth, education attainment may be more relevant for people who are unemployed or out of labor force, such as homemakers and retired people. This distinction is especially important for recent immigrants who moved to the United States for reasons other than employment (i.e., family immigrants, refugees, diversity immigrants, etc.) because they are less likely to participate in the labor market immediately after arrival. Meanwhile, because many highly skilled immigrants also experience temporary downward occupational mobility after moving to the U.S, educational attainment may serve as a more robust indicator in reflecting the socioeconomic group that immigrants will eventually assimilate into compared to current occupation and income (Batalova, Fix and Creticos 2008). Furthermore, English ability, a strong predictor of labor market success and overall adaptation to American society, is also highly correlated with years of formal schooling (Akresh 2006; Espenshade and Fu 1997). Lastly, compared with questions about income and wealth, education is a less sensitive topic for respondents and thus tends to result in less missing or imprecise data.

However, despite the benefits of using education as the only SES measure in general health studies and for immigrants, there are a couple of potential problems. The first is the issue of educational quality. No matter whether education is measured in credentials of formal schooling or years completed, neither can capture the dramatic differences across schools in prestige or resources (Braveman et. al 2005). This variation in educational quality is magnified when immigrants are included in our analysis. Therefore, the comparisons become more difficult when the same level of education may mean very different things across social groups based on their nativity status, country of origin and other immigration-related variables. For example, research shows that the place of education plays such a crucial role in the economic stratification of Asian Americans; once place of education is taken into consideration, race and nativity per se have no significant effect on earnings (Zeng and Xie 2004). Secondly, a single education variable may not be sufficient in representing relevant aspects of socioeconomic status. As a multidimensional construct, SES reflects different aspects of social stratification in terms of economic resources, power and prestige (Krieger, Williams and Moss 1997; Braveman et al. 2005). Although studies using individual SES indicators are useful in identifying specific socioeconomic resources that have implications for health, "socioeconomic status may function most powerfully in terms of combinations of variables" (Adler et al. 1994: 21). Sometimes, comprehensive SES grouping variables are thus preferred because of their usefulness for classification and overall comparisons. For example, it may not be that immigrants with less than a high school education show a negative duration effect, but those who have less than a high school education and work

in blue collar jobs and live in poverty experience a dramatic health decline as they reside in the U.S. longer. In other words, the joint influence of SES variables may be the force that drives divergent health trajectories among immigrants.

HYPOTHESES

The above reasoning incorporated immigration, assimilation and socioeconomic inequality research and theories to better understand the duration effect on immigrant health. The following hypotheses are therefore formulated.

First, the link between initial health and subsequent trajectory points toward the need to consider immigrants' baseline health in order to better understand the duration effect. Based on the healthy immigrant effect, I hypothesize that immigrants with a short duration after arrival have a health advantage over the native-born. I further ask whether there is substantial variability in the level of health selection across socioeconomic standing *among immigrants*. The literature leads to two competing hypotheses about SES and immigrant health selectivity. On the one hand, even if immigrants are all positively selected on health, there may be substantial variability in the intensity of selectivity in that migration selection is especially prevalent among the socioeconomically disadvantaged. On the other hand, because immigrants must meet a minimum health level that would make migration a rewarding experience, selection differences in health by socioeconomic status may not achieve statistical significance.

The second set of hypotheses focuses on directly testing the theoretical model shown in Figure 2.2. Socioeconomic heterogeneity among immigrants and their distinctive experience in the U.S. suggests that duration effects are different depending on

immigrants' socioeconomic status. Consistent with prior literature, I expect to find a negative overall association between duration and immigrant health, as well as a positive relationship between socioeconomic status and health among immigrants. More importantly, an interaction effect is anticipated between duration and socioeconomic status. I further hypothesize that the net effect of duration on health will indicate that the deleterious effect of long duration on health is relatively large for low SES immigrants but is small, or even absent or reversed, for high SES immigrants.

Lastly, in light of segmented assimilation theory and cumulative disadvantage theory, my last set of hypotheses calls for segmenting the study population by socioeconomic status and making intergroup comparisons. I hypothesize that, regardless of socioeconomic strata, the initial foreign-born advantages in health are larger for the low SES group than for the high SES group. Furthermore, I predict that after a considerable time in the U.S., immigrants will converge toward the health levels of the native population they assimilate into. That is, the health of long-term immigrants is not distinguishable from the health of natives with comparable socioeconomic status.

Chapter 3: Data, Measures and Methodology

DATA AND SAMPLES

The empirical analysis uses two different datasets to examine the duration effect on immigrant health. One is the National Health Interview Survey (NHIS) for 2006-2008. NHIS is a multipurpose health survey conducted annually since 1957 by the National Center for Health Statistics and Centers for Disease Control and Prevention, and administered by the U.S. Census Bureau. It uses a multi-stage, stratified, cluster sample design to obtain information about the non-institutionalized population of the United States. The information gathered includes socio-demographic background characteristics, health status, health care services and behaviors. NHIS data consists of a Basic Core (including the Family Core, the Sample Adult Core and Sample Child Core) and various supplements. This analysis will mainly draw data from the sample adult files, where most socio-demographic variables and detailed health outcomes and behaviors are available, and then link them with corresponding family files when necessary. From 2006 to 2008 the final response rate for the sample adult core was 70.8%, 67.8%, and 62.6%, respectively, and the total sample size was 24,275, 23,393, and 21,781, respectively (U.S. Dept. of Health and Human Services, National Center for Health Statistics 2007, 2008, 2009).

I choose to use the 2006-2008 surveys for three major reasons. Above all, they contain the most recent population and health information available from NHIS. Second, the sampling frame and questionnaires over this time period are consistent and more suitable to answer my research questions. Indeed, a new sample design that includes

Asian persons in the oversampling of minority populations was implemented in 2006 and has been used since then. Earlier data from NHIS (e.g., 1997-2005) was obtained by means of a different sampling frame and only households with black and Hispanic persons were oversampled (U.S. Dept. of Health and Human Services, National Center for Health Statistics 2009). Considering that a large proportion of Asians are foreign-born, the new sample design is a better choice for my research on immigration. The consistency of the sampling frame over these years also enables my analyses to easily apply weights and adjust for strata and clusters to reflect the sampling design (U.S. Dept. of Health and Human Services, National Center for Health Statistics 2009). Finally, by pooling three years of the NHIS, it is possible to generate nationally representative estimates for relatively small subpopulations and make comparisons within immigrants.

I also use the first round of the New Immigrant Survey (NIS) 2003 cohort, a nationally representative survey of immigrants with newly acquired legal permanent residence (LPR) and their children. The sampling frame of NIS-2003 was based on electronic administrative records compiled by the United States Citizenship and Immigration Services and consisted of all adults admitted to LPR between May and November of 2003 and two types of child immigrants who would not be found in the households of adult immigrants. The response rate was 69% (Jasso, Massey, Rosenzweig and Smith 2005). The NIS-2003 sample was stratified in order to obtain reliable information on the visa categories of interest. In the adult sample, from which this analysis will mainly draw data, four strata were identified: spouses of U.S. citizens, employment principals, diversity principals, and other immigrants, with the first two

strata oversampled. The NIS survey instruments cover a variety of topics including migration history, schooling, employment, earnings, marriage and family, language skills, as well as health, health behaviors and health care. One of the distinctive characteristics of the NIS is that interviews were conducted in the language of the respondent's choice to ensure data quality, so more than half (52%) of the interviews were conducted in languages other than English. It is also worth mentioning that although the first round of NIS-2003 is cross-sectional in nature, the New Immigrant Survey is a longitudinal study. Round 2 was in the field in 2007 and is expected to be publicly released in late 2011. Future longitudinal analysis will shed more light on immigrant health changes over time.

The use of two datasets is justified for this study. Above all, their distinctive target populations suit different needs of my analysis. The NHIS samples all non-institutionalized civilians, including foreign-born and native-born individuals, so it is useful for immigrant-native comparisons. In contrast, the NIS is comprised entirely of immigrants. Due to its exclusive focus, the NIS has more theoretically rich questions that are not available in the NHIS, such as visa categories, which makes it especially desirable for within-immigrant comparisons. As a result of their different sampling frames, the NHIS and the NIS datasets exhibit varying sample characteristics. The foreign-born in the NHIS sample differ greatly in terms of their legal status, ranging from naturalized U.S. citizens, legal permanent residents, and temporary workers to the undocumented. They are predominantly long-term residents who have lived in the U.S. for more than 15 years. In contrast, the NIS sample only includes legal permanent residents and the

majority of them have resided in the U.S. for less than 5 years and arrived at an age younger than 30 years old. Given that the immigrant population is characterized by its heterogeneity, it is my goal to take advantage of the differences between these two datasets and gain robust findings with regard to duration effects on immigrant health. In case of conflicting results, however, close examination that takes into account differences in the two data sources may provide additional insight for alternative explanations.

It warrants mention that I will restrict both samples to working age adults (25-64 years old), while also controlling for age as a continuous variable. Limiting the age variability of the samples helps make the inclusion of SES variables such as education more meaningful. Furthermore, it also excludes late-life immigrants, whose health experiences may share little in common with immigrants who arrive at younger ages (Gee et al. 2004; Cho and Hummer 2001; Angel et al. 1996; Black et al. 1998). For both datasets, missing cases on health outcomes and education are dropped from the analysis, together with immigrants with unknown length of residence. Additionally, in order to avoid potential bias in my analysis, those NIS respondents who were overseas at the time of interview are also excluded (n=204). With about 6.4 percent of possible cases (n=448) deleted due to missing values, the final NIS sample has 6,541 immigrants. Similarly, the deleted subjects from NHIS account for about 3.5 % of the total eligible cases. The final NHIS sample has 37,253 native-born persons (79.62%) and 9,538 immigrants (20.38%).

MEASURES

Health Outcomes

I focus on three dimensions of health status: self-rated health, activity limitation status and chronic medical conditions. Both NHIS and NIS allow the respondents to self-report their overall health as poor, fair, good, very good and excellent. In order to better capture threshold effects, I code self-rated health as a dichotomous variable and conduct analysis to distinguish respondents reporting fair or poor health from those reporting good, very good or excellent health.

In comparison to self-rated health, activity limitation status is a more objective health measure and less subjective to reporting differences across social/cultural groups. Each NHIS respondent was first asked whether he/she experienced any difficulty with 12 major functional activities such as “walking”, “standing”, “sitting”, “shopping” and “relaxing at home for leisure”. NHIS then integrated all of these questions into one variable called activity limitation status. I recode this variable into two categories to distinguish those who indicated any degree of difficulty from those with no limitation. NIS does not have a comprehensive variable of activity limitation status. Instead, it has 10 individual questions about activity limitations that are especially due to chronic diseases. To be as consistent as possible with the NHIS measure, I consolidate these questions into one dummy variable and code 1 if the respondent indicated any degree of activity limitation and 0 for those with no limitation. Although this measure does not equate to the one from NHIS, it is the closest match that can be obtained from NIS. The

detailed comparison between the NHIS and the NIS measures of activity limitation status is in Table 3.1.

Finally, this study also considers a variety of chronic medical conditions. Both NHIS and NIS ask respondents whether they were diagnosed with life-threatening diseases such as cancer, emphysema/lung disease, heart disease (inclusive of coronary heart disease, angina pectoris, heart attack and other heart condition/disease), stroke and diabetes, as well as diseases such as arthritis and asthma. Because immigrants are often quite healthy and the proportion of immigrants having a particular chronic disease is very low, my dependent variable is whether each respondent has any of the chronic diseases or not.

Duration

NHIS asks respondents who were not born in the United States to report their length of residence in the following five categories: 1) less than 1 year, 2) 1 year, less than 5 years, 3) 5 years, less than 10 years, 4) 10 years, less than 15 years and 5) 15 years or more. Table 3.2 shows that the majority of the immigrants in the NHIS sample are long-term residents. Over half of them (n=5,322, 55.80%) have lived in the United States for at least 15 years, and more than two-thirds have lived in the U.S. for at least 10 years (n=6,723, 70.49%). Due to the small number of immigrants who have been in the U.S. for less than a year (n=127, 1.33% of all immigrants), I combine the first two categories together so that my recoded variable has only four categories: 1) 0-4 years, 2) 5-9 years, 3) 10-14 years and 4) 15 years or more. The reference group of this variable varies across statistical models depending on the goal of analysis. When comparing immigrants with

non-immigrants, I treat the U.S.-born as the reference category. When the objective is to model health differentials across immigrant groups, those with the longest duration become the reference category.

However, the question about duration of residence, like the one in NHIS, is ambiguous and not based on concrete behavior (Redstone and Massey 2004). In comparison, NIS provides an alternative approach by asking respondents a series of questions about specific migration events. Using the date of the first entry into the United States, I derive a numeric measure of years of U.S. residence (sample mean=5.69, SD=6.76, min=0, max=44). To take full advantage of this finer-grained measure, I choose to assess the relationship between duration and immigrant health in a way that integrates linear and curvilinear expressions of duration effects. Besides preserving available information, this method also makes it easier to gauge the interaction effect of duration and socioeconomic status on health, which is more difficult when categorical expressions of duration are employed. Descriptive statistics show that in comparison with those in the NHIS sample, NIS subjects have shorter duration of stay with over half (n=3,601, 55.06%) having lived in the U.S. for less than 5 years (Table 3.2).

Socioeconomic Status

When education is the only SES indictor, I choose years of completed schooling in regression analyses. I prefer using a continuous variable because dichotomized or trichotomized education levels often lead to a loss of information and possibly a poorer model fit (Ross and Mirowsky 1999). Additionally, since both NHIS and NIS also provide information on educational credentials, the following three education categories

will be used in stratified analyses: 1) 0-12 grades (no diploma), 2) high school graduate, General Educational Development (GED) diploma or equivalent, associate degree or some college, 3) college degree or advanced degree.

Meanwhile, when SES is the focal concept of interest, to better capture the bimodal distribution of socioeconomic status in the immigrant population, this study proposes to measure socioeconomic status in two different ways and conduct analysis using both measures in order to compare differences in results. My second SES measure integrates education credentials and occupation to create a dummy grouping variable, indicating whether an individual belongs to the high SES group or not. It is coded 1 if a person has at least a college degree *and* works in a white-collar occupation and 0 otherwise.

Since neither NHIS nor NIS has a comprehensive measure of occupation status, it is worth mentioning how I construct the "white-collar job" variable. NHIS obtains information on occupation from respondents who worked during the week before their interview or "have ever worked". In comparison, NIS has richer questions that are specifically geared towards immigrants, including "current U.S. jobs", "the first U.S. job" and "the last job abroad". I first draw occupation information from "current U.S. jobs". Because NIS allows respondents to report up to two current U.S. jobs, I choose the higher occupation category if the respondent had more than one job. For those who were unemployed at the time of interview, I look for their "first U.S. job". However, because many immigrants in NIS are recent arrivals and do not have any U.S. labor force experience, I often use the occupation of their "last job abroad". For both datasets, I

recode occupation information to align with the U.S. Standard Occupation Classification system. Following standard practice, I group the standard occupational classifications into four categories: white collar, service groups, farm workers, and blue collar (Barbeau, Krieger and Soobader 2004; Giovino, Peterson and Trosclair 2000). In addition, I create two more categories for both datasets to indicate people who had unknown jobs or who were out of labor force. The detailed explanations for the occupational measures for NHIS and NIS are in Table 3.3 and 3.4.

Demographic Variables

The demographic controls for the NHIS include age, gender, race/ethnicity, and marital status and region of origin. Age is measured in years. Sex is coded 1 for male and 0 for female. Respondents are classified into five mutually exclusive racial/ethnic groups: non-Hispanic whites (whites hereafter), non-Hispanic blacks (blacks hereafter), non-Hispanic Asians (Asians hereafter), Hispanics and others, with whites being the reference group. Marital status is coded as currently married or living as married (assigned as the reference category), formerly married (widowed, separated, or divorced), and never married. Geographic region of birth is collapsed into 4 categories: Latin America and the Caribbean, Africa and Middle East, Asia and other[3]. Due to multicollinearity between race/ethnicity and region of origin, only one of the two can be included in the analyses using the NHIS data. Thus, race/ethnicity is controlled when immigrants are compared with the U.S.-born, while region of origin is included when the comparison is within

[3] Other includes Europe, Central Asia, elsewhere or unknown. Europe and Central Asia are included in this category because of their small sample sizes.

immigrants.

NIS has the same demographic control variables with one exception. Instead of race/ethnicity, I include visa admission categories in analysis using NIS. The original variable categorized the respondents into 13 visa classes depending on the visa type they used to migrate to the United States. I further collapsed them into 4 categories: family preferences, employment preferences, refugees, and diversity and others.

Health Behaviors

Health behaviors are measured by smoking, leisure-time physical activity (LTPA) and body mass index (BMI) in both datasets. Because both health outcomes and health behaviors are assessed at the same point in time, I note here that reverse causation is possible – for example, a healthier lifestyle may be a response to the discovery of an illness. It is worth emphasizing that my study is interested in health behaviors as one of the key mechanisms between SES and health, rather than the causal relationship between health behaviors and outcomes.

Smoking in NHIS is approximated by three dichotomous variables: never smoked, current smoker, and former smoker[4], while it is measured by only one dummy variable in NIS, coded 1 if the respondent has smoked at least 100 cigarettes in his/her lifetime and 0 otherwise.

LTPA status is divided into three mutually exclusive categories for the NHIS data: inactive, active but not regular, and active and regular. Individuals are classified as

[4] There are 325 (0.7%) cases with unknown smoking status in NHIS. Preliminary analysis shows that people who did not report smoking status also are more likely to have better health. Hence, these missing cases are imputed using mode substitution and collapsed with the "never smoked" category.

inactive if they do not engage in any light/moderate or vigorous LTPA for as long as ten minutes per session. Individuals are classified as active if they engage in any live/moderate or vigorous LTPA for at least ten minutes at a time. For respondents who are classified as active, they are further defined as "active and regular" if they engage in light/moderate activity five times or more per week for at least thirty minutes at a time, or engage in vigorous activity for three times or more per week for at least twenty minutes at a time. Individuals identified as active but not meeting either criterion for regular activity are considered active and "active but not regular". In comparison, LTPA status in NIS is measured by one dichotomous variable called inactive, coded 1 if the respondent does not participate in any light or vigorous physical exercise and 0 otherwise.

Finally, BMI status is measured in the same way for both datasets. There are five mutually exclusive categories: underweight (BMI < 18.5), healthy weight (BMI 18.5 to <25), overweight (BMI > = 25 to <30), obese (BMI > = 30), and a missing category[5].

Analytic Design

My major analytical strategy is to use binomial logistic regressions, since dichotomous self-rated health, functional limitation status and chronic medical conditions are the dependent variables (Powers and Xie 2009). For both datasets, all analyses will be adjusted for the sampling design, which includes using weighted estimates and taking strata and clusters into account for calculating the standard errors (U.S. Dept. of Health and Human Services, National Center for Health Statistics 2007, 2008, 2009; Jasso,

[5] There are 1940 (1.24%) and 405 (6.19%) cases with unknown BMI status in NHIS and NIS, respectively. Analysis shows that unknown BMI status is associated with worse self-rated health for both datasets. In NHIS, missing BMI status is also significantly correlated with activity limitation.

Massey, Rosenzweig and Smith 2005). Progressive adjustment will also be used to facilitate the understanding of how health behavior factors mediate the effect of SES or duration on the health disparity in question (Mirowsky 1999).

First, I will use the NHIS sample to compare immigrants with natives to test the healthy immigrant effect. In order to check variability in the level of health selection across socioeconomic status, both datasets will be used. I will regress each health outcome on socioeconomic status using samples that only contain recent immigrants (duration <5 years).

Next, within-immigrant analyses are appropriate for the second set of hypotheses. Models including duration, SES and the interaction term between duration and SES address the question whether duration has a deleterious effect on immigrant health and whether this effect varies by socioeconomic status. Furthermore, such models will also reveal health disparities based on socioeconomic status and tell us whether this difference can be explained by the differential distribution of other risk factors across groups. However, the assessment of the duration effect is incomplete without examining intra-immigrant disparities in health, so SES-specific models are expected to provide additional evidence to confirm earlier findings. I will use both the high SES grouping variable and level of education in the analysis.

Finally, my last set of hypothesis requires comparisons between immigrants and their native-born counterparts, so only the NHIS data will be used. Again I will employ SES-stratified models to estimate differential "return to risk" for the nativity/duration effect. The results will reveal whether the foreign-born advantages in health are larger for

the low SES group than for the high SES group, as well as whether immigrants will eventually converge toward the health level of the socioeconomic group they assimilate into, as predicted by segmented assimilation theory.

Descriptive Results

Table 3.5 provides weighted descriptive statistics for all the independent variables in the entire NHIS sample and by immigration/duration status. It shows that compared with the native-born, immigrants tend to be younger, more predominately male and married. The composition of the NHIS immigrant sample corresponds well with what is anticipated on the basis of recent immigration trends. Over half of the immigrants in this sample are Hispanic or from Latin America and the Caribbean, about one-fifth are Asians or from Asian countries, and immigrants from Africa, Middle East and other world regions are much smaller groups.

Table 3.5 shows that immigrants, as a group, have 1.44 years of formal schooling less on average than natives. Interestingly, it is also true that immigrants are on a par with the native-born at the high end of education spectrum: about 30 percent of both groups have a college degree. Hence, the immigrant-native education gap is mainly due to the fact that about one-third of immigrants do not hold a high school diploma, compared with only 10 percent of U.S.-born adults without a high school education. The disadvantage of immigrants is also reflected in a smaller percentage of foreign-born in the high SES group than natives. The socioeconomic patterns by duration status are generally consistent with the overall patterns except that the most recent arrivals (duration <5 years) tend to be the most educated and more likely to have high SES, while those who

have stayed in the U.S. for 10 to 15 years are the least educated and least likely to have high SES.

Table 3.6 presents weighted descriptive statistics for all the independent variables in the entire NIS sample and by duration status. In comparisons to immigrants and natives in the NHIS sample, NIS immigrants tend to be even younger, more predominantly female and married. It is important to remember that all individuals in the NIS sample are legal permanent residents, so they may display quite different characteristics from the general foreign-born population. One striking difference is that the overall averages mask tremendous variation by duration status for most of the sociodemographic variables. Specifically, although about half of all LPRs are family immigrants, around 40 percent of those with less than 1 year of stay used diversity or other preferences. This is also true for LPRs with longer than 10 years of U.S. residence. Refugees and employment immigrants are much smaller groups among the most recent arrivals (duration <1 year), but they make up a considerably larger proportion than diversity immigrants among LPRs with 1 to 10 years of residence. Particularly, a quarter of all the LPRs with 5 to 10 years of U.S. residence gained their legal permanent residency through employment preferences, hinting at a long wait for this admission category. These potentially highly educated, professional immigrants also seem to have a direct impact on the percentage distribution of education and SES variables: LPRs with 1 to 10 years of residence appear to have the most years of formal schooling, are most likely to have a college degree and are most likely to have high SES among all immigrants.

As expected, most LPRs are from Latin America, the Caribbean and Asia. Nevertheless, long-term immigrants and short-term immigrants have distinctive patterns of geographic origin. Over two-thirds of all LPRs with 10+ years of residence are from Latin America and the Caribbean, while only about one-third of immigrants with less than 10 years of stay are from the same region. In comparison, Asians account for 45 percent of all LPRs with less than 1 year of duration, and 27 percent and 31 percent for all LPRS with duration of 1-5 years and 5-10 years, respectively. This shift of region of origin by duration status also partially coincides with the high concentration of employment immigrants among LPRs with 1 to 10 years of residence.

To summarize, descriptive results suggest interesting composition differences between natives and immigrants, as well as between the two immigrant samples. Although sociodemographic patterns are straightforward and fairly consistent across different duration categories for the NHIS sample, the most recent immigrants (duration <5 years) are by far the most highly educated group. Furthermore, because NIS is a sample of legal permanent residents, the built-in mechanisms of the U.S. official immigration system leads to more prominent variability of sociodemographic characteristics by duration status. Special attention should be paid to the LPRs with duration of 1-5 years and especially, 5-10 years, because they have the highest proportions of employment visa immigrants and they have the most years of schooling. In terms of health behaviors, both datasets indicate a larger percentage of immigrants are non-smokers and have healthy body weights, but they also tend to be physically inactive in leisure time. Furthermore, with increased duration, immigrants are more likely to

become smokers, to be obese and they are less likely to engage in leisure time physical activities.

Chapter 4: Initial Health Status and Its Variability

The health trajectories of immigrants are not independent from initial health status at the time of immigration. The close link between immigrants' health upon arrival and their subsequent change adds one more layer of complexity to understanding the relationship between length of residence and health. Therefore, my investigation of duration effects starts with an examination of initial immigrant health selectivity.

As stated in Chapter Two, based on the healthy immigrant effect, I first hypothesize that immigrants with a short duration after arrival have a health advantage over native-born adults. I further ask whether there is substantial variability in the level of health selection across socioeconomic standing *among immigrants*. The literature leads to two competing hypotheses about SES and immigrant health selectivity. On the one hand, even if immigrants are all positively selected on health, there may be substantial variability in the intensity of selectivity in that migration selection is especially pronounced among the socioeconomically disadvantaged. On the other hand, because immigrants must meet a minimum health level that would make migration a rewarding experience, selection differences in health by socioeconomic status may not achieve statistical significance.

DESCRIPTIVE RESULTS

Table 4.1 summarizes the weighted percentage distributions of age-standardized health outcomes by immigration/duration status for the NHIS sample. Age-adjusted rates are calculated by using the direct method of standardization with the 2000 US census population as the standard population. Consistent with the healthy immigrant effect,

immigrants show a lower percentage of reporting poor or fair health, any activity limitation, or any chronic health condition compared to U.S.-born adults. Furthermore, comparisons of immigrants with varying length of duration also indicate that the health of immigrants is less positive among those who have resided in the U.S. longer, with the most recent arrivals being the healthiest and those with duration of over 15 years being the least healthy. However, one deviation from this general linear trend is activity limitation status for immigrants with 10-15 years of stay. The proportion of activity-limited immigrants in this category (11.31%) is lower than those with 5-10 years of duration (12.30%) and very similar to that of recent arrivals (11.05%).

Table 4.2 displays the weighted percentage distributions of age-standardized health outcomes by immigrant duration status for the NIS sample. As expected, the results echo those from NHIS. Long-term LPRs generally include a higher proportion of reporting worse health than do short-term LPRs, with recent arrivals and immigrants with longest residence at the two extreme ends of the spectrum. Nevertheless, the relationship between duration and health seems a bit less linear in this NIS sample. Immigrants with 5-10 years of stay have a lower percentage of reporting any activity limitation (7.95%) or chronic health conditions (11.15%) than those with 1-5 years of duration (10.29% and 11.45%).

Table 4.3 shows the weighted percentage distributions of health outcomes by three education levels for immigrants with less than 5 years of duration in both datasets. Generally speaking, the same pattern is evident across datasets: more educated recent immigrants tend to report better health and are less likely to have any activity limitation

or chronic health conditions compared to less educated recent immigrants. The association between education and better health among recent immigrants seems particularly notable for self-rated health; 12.26% of NHIS immigrants and 12.53% of new LPRs with less than high school education report poor or fair health, compared with less than 5% of NHIS and NIS immigrants with at least a high school diploma. Furthermore, close inspection reveals greater difference in health between education levels for NIS immigrants than for NHIS immigrants, especially for activity limitation status and chronic health conditions.

THE HEALTHY IMMIGRANT EFFECT

Tables 4.4-4.6 present the results of the multivariate logistic regressions using the total NHIS sample for poor self-reported health, activity limitation status and chronic health conditions, respectively. Model 1 includes age and sex in additional to nativity/duration status. Consistent with previous findings, immigrants in general show a significantly lower risk of reporting poor/fair health, any functional limitation or chronic health conditions compared to natives. The magnitude of health advantage are large, too, especially for recent immigrants – approximately 30 percent lower odds for poor/fair self-rated health, over 50 percent lower odds for any functional limitation and over 60 percent lower odds for chronic health conditions. While immigrants with 10+ years of duration still have significantly lower odds of experiencing functional limitation or health conditions, they are at the similar level of reporting poor/fair overall health as the native-born. Further comparisons among immigrants also reveal statistically significant

differentials between immigrants with the longest tenure in the U.S. and other duration groups.

Model 2 adds race, education and marital status, and Model 3 adds health behavior and life style variables into the regressions. The differences between immigrants and natives persist across all three health outcomes, and sometimes become larger as more control variables are included. For example, Model 2 shows a considerable decrease of odds ratios for nativity/duration from those in Model 1 for self-rated health, indicating an increase of immigrant-native differentials in this health outcome and the importance of taking race, education and marital status into consideration. That is, for most recent arrivals, the odds of reporting poor/fair health decreased 49% [i.e., ((0.705-0.358)/0.705)*100%] from the baseline model. A similar, yet less dramatic pattern is also displayed for functional limitations and health conditions. Furthermore, even previous insignificant differences between long-term immigrants and natives become statistically significant once more controls are included in the analysis. As shown in the full model of Table 4.4, immigrants with 10-15 years duration and 15+ years duration have significantly 40 and 27 percent lower odds of reporting poor/fair overall health than their native-born counterparts, respectively.

Although duration is a discrete variable, there does appear to be a duration gradient for most of the results in Tables 4.4-4.6. That is, the most recent immigrants have the lowest odds of poor health, while those with longer duration have a higher risk of reporting poor/fair health. This pattern is particularly strong for functional limitations, less so for chronic health conditions, and weak for self-reported health. The odds ratio

comparisons between immigrants with shorter duration and those with the longest U.S. residence provide evidence for this pattern in terms of statistical significance. For example, compared with immigrants who spent at least 15 years in the U.S., immigrants in all other duration groups have significant lower odds of having chronic health conditions, while only immigrants in some other duration groups have lower odds of reporting poor/fair health or any functional limitation than the 15+ year group.

Results for all covariates are in the expected directions. Generally speaking, the likelihood of being in poor health increases with age, and it is smaller for whites than for blacks. Hispanics appear to have higher risk of self-reported poor health, but they also have lower risk of functional limitations and health conditions than whites. The odds of experiencing poor health are lower as years of education increase. Smoking, being physically inactive, and having an unhealthy BMI are all highly associated with elevated risk of poor health.

HEALTH SELECTION AMONG RECENT IMMIGRANTS

NHIS

Tables 4.7-4.9 show the results of multivariate logistic regressions for the effect of education level on health selection among recent immigrants for three outcome variables using the NHIS dataset. Only recent immigrants whose duration is less than 5 years are included in the analysis (N=1,095).

The baseline model only has age and sex covariates in addition to education level. Strikingly, Table 4.7 shows that immigrants with less than high school education are more than four times as likely to report poor/fair overall health as their counterparts with

high school diploma, whose self-rated health is as good as that of immigrants with a college degree or above. Model 2 adds marital status and region of origin covariates, and Model 3 adds health behavior and life style variables into the regression. The tremendous health advantage of individuals with at least a high school diploma diminishes somewhat as more controls are included, but even net of all the control variables, recent immigrants with less than high school education still exhibit 3.5 times higher odds of reporting poor health than their more educated peers. The strong effect of education level on immigrant health upon arrival seems particularly incredible given that none of the control variables are significant at the 0.05 level in Table 4.7, including age, sex, being a current smoker and being obese. Further comparisons between the least educated group and the most educated group reveal statistically significant difference, but the differential between immigrants with a high school diploma and those with at least a college degree remains statistically insignificant for all three models.

However, Tables 4.8 and 4.9 tell a totally different story with regarding the educational effect among recent immigrants. Although immigrants with a high school education appear to be the healthiest among all education groups, education level does not have a statistically significant impact on health selection in terms of functional limitations and chronic health conditions. Compared with those with less than a high school education, recent immigrants are not healthier if they have a high school diploma, or even a college degree. This result holds in baseline models as well as in more complex models.

In contrast, a few control variables are significant in Tables 4.8 and 4.9. Older and obese immigrants are more likely to have functional limitations and chronic health conditions. Immigrants who once were smokers and who are overweight show higher odds of having health conditions. Oddly, compared with those who regularly participate in physical activities, immigrants who are inactive or participate in physical activities irregularly are less likely to have a chronic health condition, suggesting possible reverse causation.

NIS

Tables 4.10-4.12 present the results of multivariate logistic regressions for the effect of education level on health selection among recent immigrants for three outcome variables using the NIS sample. To be consistent with previous analysis, only recent immigrants with less than 5 years duration are included, but it should be noted this sample (N=3,601) is much larger because a large proportion of LPRs in the NIS are very recent arrivals.

The baseline model only has age and sex covariates in addition to education level. A similar, albeit less dramatic pattern is found in Table 4.10 with regard to the effect of education on immigrant self-rated health. Recent LPRs who did not complete a high school education are 1.6 times more likely to report poor/fair overall health in comparison to those with a high school diploma. LPRs with a college degree or above have better self-rated health than those with less than a high school education, but they are not significantly healthier than high school graduates. Consistent with the findings in Table 4.7 that uses the NHIS data, this pattern holds across models as more covariates are

introduced; the magnitudes of the odds ratios for education variables do not change much as covariates are added to the model.

Table 4.11 shows that compared with those with a high school diploma, LPRs in the NIS data with less or more education are both less likely to report functional limitations. However, this difference does not reach statistical significance, so health selection by functional limitations does not vary across education levels among immigrants. Furthermore, controlling more socio-demographic characteristics and lifestyle variables does not change this finding, which is consistent with the pattern of results from Table 4.8 that uses the NHIS data.

Similarly, compared with those with a high school diploma, LPRs with less or more education are both less likely to report chronic conditions, but as we can see from Table 4.12, the health differential between immigrants with less than a high school education and those with a high school diploma is the only one that reaches statistical significance in Model 1. Adding marital status, region of origin and visa admission category in Model 2 does not change the pattern of results for education; controls for health behavior and lifestyle variables in Model 3 results in slightly weaker effects of education. Overall, though, the magnitude of the odds ratios change very little in the last two models. Net of all control variables, LPRs with less than a high school education are still 26 percent [i.e., (1-0.74)*100%] less likely than LPRs with a high school diploma to report a chronic health condition. Further comparisons between the least educated and the most educated groups reveal no statistical differences in chronic conditions, suggesting

that health selection of chronic conditions is strongest for the least educated, less so for the most educated, and weak for the middle group.

Finally, although most control variables do not have significant odds ratios in Tables 4.10-4.12, those that have significant results are in line with previous literature. Older age and obesity increase the likelihood of having all three negative health outcomes. Male immigrants are less likely to report functional limitations and health conditions. Recent immigrants who have ever been a smoker are 1.82 times more likely to have a functional limitation and 2.23 times more likely to have a chronic health condition than those who never smoked. Strikingly, in comparison to family-sponsored immigrants, refugees are three times more likely to report poor/fair overall health and to have a functional limitation, and 1.7 times more likely to have a chronic condition.

SUMMARY

In this chapter, I tested the healthy immigrant effect with the NHIS dataset and assessed the effect of education levels on health selection among recent immigrants using samples from both NHIS and NIS. In terms of the healthy immigrant effect, the results from multivariate logistic regression models show that:

1) Immigrants, especially recent arrivals, have a considerably lower risk of reporting poor/fair overall health, a functional limitation or a chronic health condition, relative to native-born adults; and
2) A linear duration gradient is more pronounced for functional limitations and chronic health conditions than self-reported health.

In terms of the variability of health selection among immigrants, the results from multivariate logistic regression models show that:

1) Both datasets support that the intensity of health selectivity varies across educational level when self-reported health is considered, so that immigrants with less than a high school education have worse overall health than their more educated peers, but college graduates are not healthier than high school graduates;
2) Both datasets find no health variation across education levels for recent immigrants when functional limitations are considered; and
3) The two datasets provide contradictory results about chronic health conditions. The NHIS sample shows no education impact on immigrant health, but the NIS sample shows that health selection for chronic conditions is strongest for the least educated, less so for the most educated, and weak for the moderately educated.

Chapter 5: Duration, Immigrant Health, and Socioeconomic Status

The second set of hypotheses directly tests the theoretical model shown in Figure 2.2. Consistent with prior literature, I expect to find a negative overall association between duration and immigrant health, as well as a positive relationship between socioeconomic status and health among immigrants. More importantly, because socioeconomic heterogeneity within immigrants suggests that the impact of duration depends on socioeconomic status, an interaction effect is anticipated between duration and SES. Specifically, I expect that the net effect of duration on health will indicate that the deleterious effect of long duration on health is relatively large for low SES immigrants but is small, or even absent or reversed, for immigrants with high SES. To achieve that analytic goal, I first examine the interaction effect as well as the main effects of duration and SES on immigrant health using models including duration, SES and the duration-SES interaction term as covariates. Secondly, a series of SES-specific models are estimated to further investigate duration effects for each SES category.

This chapter focuses on within-immigrant comparisons. Thus, I use the NIS data as well as only the foreign-born in the NHIS dataset. Both samples are limited to working age adults (i.e., 25-64 years old). Both years of completed schooling and the SES grouping variable will be used as measures of SES in this chapter.

IMMIGRANT DURATION AND HEALTH: MAIN EFFECTS FROM THE NHIS

Tables 5.1-5.3 summarize the results of multivariate logistic regression models testing the negative duration effect among immigrants for three outcome variables using the NHIS dataset (N=9,538). This set of results is comparable to Tables 4.4-4.6, but the

reference group here is immigrants with over 15 years of U.S. duration instead of native-born adults.

The baseline model includes age and sex in additional to duration status. Model 2 adds education, marital status, and region of origin. Model 3 adds health behavior and life style variables into the regressions. Table 5.1 shows that compared with those with the longest tenure in the U.S., immigrants with less than 5 years duration exhibit reduced risk of poor/fair overall health while immigrants with 10-15 years duration display elevated risk of reporting poor/fair overall health; however, neither of these differences are statistically significant until more covariates are included in the analysis as seen in Models 2 and 3. Adjusted for all covariates in Model 3, compared with the most long-term immigrants, recent arrivals have 29 percent lower odds of reporting poor/fair overall health, while immigrants with 10-15 years duration have 1.6 percent higher odds. In contrast, in Model 1 immigrants with 5-10 years duration are the only group that has statistically significant lower odds of reporting poor/fair health than those with longest U.S. residence. Although the protective effect of shorter duration persists in Model 2, it becomes insignificant in Model 3. Further comparisons reveal that there is a statistically significant difference between immigrants with 5-10 years duration and those with 10-15 years duration that persists across models. Taken together, the results above indicate that shorter duration is associated with better self-rated health, but the negative duration effect does not seem to be graded. The healthiest group appears to be the persons who have resided in the U.S. for 5-10 years, followed by the most recent arrivals. Those with longer

than 10 years of duration seem to be the least healthy among all immigrants, but are not all that different from immigrants who have lived in the U.S. for 15 or more years.

However, the results with regard to activity limitation status tell a much different story. According to Table 5.2, with only one exception discussed below, there is no statistically significant difference between any two groups of immigrants in activity limitation status. In other words, duration exerts little influence on the likelihood of being activity-limited; long-term immigrants are not more prone to activity limitation than recent arrivals. Although immigrants with 10-15 years of duration show over 20 percent lower odds of reporting any activity limitation than those with 15+ years of U.S. residence, this health advantage is fully explained away once health behavior and lifestyle variables are introduced in Model 3.

On the contrary, Table 5.3 shows that immigrants with over 15 years of duration experience a substantially higher risk of chronic health conditions than their counterparts with shorter stays, with or without control variables. The magnitude of this health differential is relatively stable across duration groups, ranging from 29 percent to 39 percent lower odds of reporting a chronic health condition. Although immigrants with 10-15 years duration appear to have the lowest odds ratios across models, further tests reveal no statistically significant differences between any two duration groups with less than 15 years of U.S. residence.

Years of formal schooling[6] shows a highly significant negative relationship with reporting poor/fair health and any activity limitation (Tables 5.1 and 5.2). Specifically, net of all other independent variables, for every one year increase in education, immigrants have 10 percent lower odds of reporting poor/fair health and 3 percent lower odds of having any activity limitation. That is to say, an additional four years of education lowers the odds of reporting poor/fair health by 40 percentage points; it also reduces the risk of having any activity limitation by 12 percentage points. To put that effect into perspective, the magnitude of the effect of four years of schooling is larger in size than being male (odds ratio=0.75) in terms of reporting poor/fair overall health and is comparable to being two years younger (odds ratio=1.057). These are by no means trivial effects. Contrastingly, socioeconomic status, measured either by years of education or by a high-SES dummy variable (results not shown), shows no significant effect on chronic health conditions (Table 5.3). This unanticipated result may indicate a potential problem related to how this particular dependent variable is constructed. It is possible that, conditional on having a disease, more educated individuals are likely to pay more attention to their health, are more likely to see a doctor if they do not feel well, and thus are more likely to be diagnosed. Such differential diagnosis and knowledge may mask the true relationship between education and self-reports of chronic health conditions.

Results for other covariates are mostly in the expected directions. Generally speaking, the likelihood of being in poor health increases with age, and is lower for men

[6] Additional analyses using the dummy variable to indicate whether the respondent is from the high SES group yield similar findings as those currently shown in Tables 5.1-5.3.

than for women. Compared with the married, the never married and especially the formerly married are in worse health. The odds of having poor/fair overall health or any activity limitation is significantly higher for immigrants who are obese, inactive or do not regularly participate in leisure physical activity. Smoking is highly associated with an elevated risk of being activity-limited or having chronic health conditions. Interestingly, immigrants from Asia exhibit 60 percent higher odds of being activity-limited than those from Latin America and the Caribbean, but this health disadvantage is entirely due to health behavior and lifestyle differences. Adjustment for smoking, exercise and BMI status leads to a reversal in risk for Asian immigrants; in the final model they have 27 percent lower odds of having any activity limitation than immigrants from Latin America and the Caribbean. Lastly, similar to the finding in Table 4.9, the physically inactive once again show lower odds of having a chronic health condition in comparison to those who regularly participate in physical activities (Table 5.3), suggesting possible reverse causation.

IMMIGRANT DURATION AND HEALTH: MAIN EFFECTS FROM THE NIS

Tables 5.4-5.6 replicate the analyses summarized in Tables 5.1-5.3 using the NIS sample (N=1,095). However, a major difference between these two sets of analysis is the measurement of the duration variable. As discussed in Chapter 3, duration is coded as a numeric variable in the NIS, and more importantly, both linear and curvilinear expressions of the duration variable are used in the analysis.

The baseline model only includes age and sex as well as duration. A surprising pattern of results emerges – both the linear and quadratic terms of duration are

statistically significant for all three outcome variables, suggesting that the relationship between time in the U.S. and poor health may not be linear, as expected from the literature. The odds ratios of the linear duration term for self-rated health, activity limitation status and chronic health conditions are 1.112, 1.088, and 1.060, respectively, while the odds ratios for the quadratic term are 0.997, 0.997 and 0.998, respectively. This indicates that the curves depicting the duration-health relationship are slightly concave downward. Because this is not a longitudinal study, it is critical not to interpret this finding as direct support for a curvilinear growth model. Rather, it provides strong evidence that differentials in self-rated health by duration groups are not always graded such as depicted in some of the immigrant health literature (e.g. Cho, Frisbie, Hummer and Rogers 2004; Finch and Vega 2003; Antecol and Bedard 2006; Frisbie, Cho and Hummer 2001). Specifically, immigrants with longer duration report worse overall health, are more likely to be activity-limited, and are more likely to have a chronic health condition than recent arrivals, but only up to a time point, after which more time in the U.S. is associated with slightly better health. Again, this pattern is similar for all three health outcomes. Figure 5.1 graphs the predicted probabilities from Model 1 for all three dependent variables based on a male immigrant of age 40. As we can see, the predicted probability of reporting poor/fair overall health increases precipitously for LPRs whose U.S. residence is longer and reaches its highest when duration is 20 years (probability=0.114). However, for immigrants with more than 20 years of stay, longer duration is associated with a slightly decreased probability of self-rated poor/fair health. Activity limitation status and chronic health conditions also follow the same pattern. The

probability of having any activity limitation peaks at duration=15 years (probability=0.098) while immigrants with 18 years of U.S. residence are estimated to have the highest probability of having a chronic health condition (probability=0.115).

Model 2 of Tables 5.4-5.6 adds education, marital status, region of origin and visa admission category covariates, and Model 3 introduces health behavior and life style variables into the regression analysis in addition to the variables in Model 2. For self-reported health and activity limitation status, both the linear and quadratic terms of duration remain statistically significant as more control variables are included. The quadratic term becomes borderline significant ($p<0.1$) in Models 2 and 3 for chronic health conditions. The magnitude of the odds ratios for the duration terms also remains at the same level for all three dependent variables as the model becomes more inclusive, indicating that the curves in Figure 5.1 still roughly describe the relationship between duration and poor health in the full model.

Meanwhile, the overall pattern of the SES effect on immigrant health is consistent with findings from the NHIS data. Tables 5.4-5.6 show a protective effect of years of formal schooling on immigrants' self-rated health and activity limitation status, but no effect on chronic health conditions (regardless of how SES is measured[7]). Furthermore, for self-rated health and activity limitation status, the magnitudes of the education effect in the final models are also surprisingly similar to those from the NHIS sample (i.e., 0.895 vs. 0.903, 0.964 vs. 0.974).

[7] Additional analyses using the high SES dummy variable show similar findings as those in Table 5.6.

Finally, although most control variables do not have a statistically significant effect on immigrant health, those with significant results are in the expected direction and consistent with expectations. Older age, being female, and obesity are all positively related with the likelihood of reporting poor health. Immigrants who have ever been a smoker have significantly higher odds of having activity limitations or chronic health conditions. Furthermore, in comparison with family-sponsored immigrants, refugees experience an elevated health risk for all three outcome variables, while immigrants who obtained LPR status via diversity and other visa admission categories also have 41 percent higher odds of reporting poor/fair health compared to family-sponsored immigrants.

INTERACTION EFFECT OF DURATION AND SOCIOECONOMIC STATUS ON HEALTH

First of all, it should be noted that the interaction between duration and SES is sensitive to how duration and SES are measured. It is not statistically significant when SES is measured by years of education regardless of how duration is measured. This is true for both the NHIS and the NIS datasets. Furthermore, when duration is coded as a categorical variable and SES is measured by a dummy variable indicating whether the immigrant has at least a college degree and works in a white-collar occupation, as in the NHIS sample, no significant interaction effect is found, either. The following pages discuss results of the duration-SES interaction effect when SES is measured by the high SES dummy variable and duration is measured as a continuous variable. The NIS sample (N=1,095) is used for this analysis.

Tables 5.7-5.9 present the results of multivariate logistic regression models examining whether the duration effect varies across socioeconomic status for the three health outcome variables. Socioeconomic status is measured by a dummy variable that indicates whether an immigrant has at least a college degree and a white-collar job. Model 1 only includes age, sex, duration (both linear and quadratic terms) and SES. Model 2 introduces interaction term(s) between SES and duration. Model 3 adds marital status, region of origin, and visa admission category to the regression models, and Model 4 adds health behavior and lifestyle control variables.

Model 1 in Table 5.7 shows that, compared to those with low socioeconomic status, immigrants who have at least a college degree and work in white-collar occupations have a striking advantage. They have 68 percent lower odds of reporting poor/fair health. However, the inclusion of the interaction terms between SES and the linear as well as the quadratic expressions of the duration variable alters the interpretation above. According to Model 2, the health differential between immigrants with different socioeconomic status is no longer a constant, but depends on how long they have resided in the United States. Because both interaction terms are significant, it becomes difficult to interpret the odds ratios. Thus, I use Figure 5.2 to illustrate the predicted probabilities of self-rated poor/fair health for two SES groups based on the coefficients from Model 2. However, due to the cross-sectional nature of the NIS 2003 dataset, I again emphasize the between-group and within-group differences instead of interpreting the curves as over-time trajectories.

First, as expected from one of my hypotheses, Figure 5.2 shows that immigrants do not necessarily experience negative duration effects the longer they stay in the U.S. For immigrants who are from middle or low socioeconomic strata, their estimated probability of reporting poor/fair health is 0.019 at arrival, then rises dramatically among those with up to 19 years of U.S. duration. Among persons residing in the U.S. for more than 13 years, the chances are at least one out of ten immigrants in this SES category reports poor/fair overall health. However, after reaching a peak of 0.114 for immigrants with 19 years of duration, the probability of reporting poor/fair health drops slightly.

In contrast, self-rated health among immigrants with high socioeconomic status is not affected by the length of U.S. residence. The bottom curve in Figure 5.2 is almost flat; the range of the predicted probability of poor/fair health is very small (range=0.014). If there is any visible pattern of the duration effect for this group, it is different from that of low/middle SES immigrants. Specifically, the most recent immigrants with high SES seem to have the highest probability of reporting poor/fair overall health, but longer duration is associated with slightly better self-rated health up to the point when duration reaches 15 years. The probability goes up just slightly afterward. However, the substantial differences (maximum= 0.033, minimum= 0.019) of these changes are tiny, so even if they are statistically significant, it does not change the overall pattern of almost no duration effect on self-rated health among high-SES immigrants.

Second, Figure 5.2 also demonstrates the varying differences between SES groups among immigrants with different duration. Even upon arrival, immigrants with high SES already have a health advantage: they have a 0.019 [i.e., 0.052-0.033] lower probability

of reporting poor/fair health. This initial advantage is much bigger among longer-term immigrants. For immigrants with 19 years of duration, the difference in the probability of reporting poor/fair self-rated health between the two SES groups reaches the maximum of 0.114 [i.e., 0.134-0.020]. The gap for immigrants with more than 19 years of U.S. residence narrows, but only to a small extent. In comparison to those who have at least a college degree and work in white-collar occupations, immigrants from middle or lower socioeconomic strata still have a 0.097 higher probability of reporting poor/fair health.

Summarizing the within and the between differences discussed above, we can easily find that the top curve in Figure 5.2 looks very similar to the self-reported health curve in Figure 5.1, but the bottom curve appears to be vastly different. This indicates that if the two SES groups are pooled together, the duration effect for immigrants from the middle and low SES strata will dominate the findings, while the unique experiences of high SES immigrants will be masked. It is also the exact reason why the main SES effect is significant in Model 1 of Table 5.7 but becomes statistically insignificant in Model 2.

Going back to Table 5.7, as more control variables are added in the model, the basic pattern of results described above persists. The only change is that the interaction between SES and the quadratic duration term becomes marginally significant ($p<0.1$) in both Models 3 and 4. This result suggests that the inclusion of socio-demographic and lifestyle variables only partially explain the interaction effect between duration and SES.

This set of findings is intriguing, but does it apply to other health outcomes? Tables 5.8 and 5.9 provide some clues. It is worth mentioning that because the interaction

effect between SES and the quadratic term of duration is not significant for activity limitation status and chronic health conditions, analyses in Tables 5.8 and 5.9 only include the interaction between SES and the linear duration term.

With that difference in mind, Table 5.8 presents a somewhat different pattern of results. Similar to Table 5.7, Model 1 shows a huge SES main effect on activity limitation status favoring immigrants with high SES. Although the main SES effect also becomes statistically insignificant in Model 2, the interaction between SES and the linear duration term is only borderline significant ($p<0.1$), indicating that the evidence for varying effect of duration by SES is not as strong. Figure 5.3 graphs the predicted probabilities of activity limitation status for the two SES groups based on coefficients from Model 2. Compared to Figure 5.2, one major difference is the shape of the high-SES curve. It is no longer the reverse of the middle/low–SES curve; rather, they resemble each other. Thus, according to Figure 5.3, new immigrants from both socioeconomic groups have lower probabilities of being activity-limited. However, after a certain time point, longer duration is actually negatively associated with activity limitations. Specifically, middle/low-SES immigrants' probability of having any activity limitation is 0.063 at arrival, but longer-term immigrants in this SES category experience much higher probabilities of activity limitation; the probability peaks at 0.110 when duration is 14 years. On the other hand, immigrants with high SES have a 0.18 [i.e., 0.063-0.045] lower probability of being activity limited at arrival, but the difference of predicted probabilities between new immigrants and longer-term immigrants is little. Persons with 7 years of duration have the highest probability of reporting any activity limitation (P=0.049)

among all high-SES immigrants, but longer duration is associated with smaller chances of being activity-limited. This is particularly true for immigrants with 15+ years of U.S. residence, whose probability of having activity limitations drops precipitously, even much lower than the at-arrival level. Surprisingly, similar to poor/fair self-reported health, the largest difference in the probability of activity limitation status between two groups of immigrants is also found when duration is 19 years (AR=0.134 -0.020=0.114).

Contrastingly, Table 5.9 tells a totally different story. Neither SES nor the interaction between SES and duration is statistically significant when the outcome variable is chronic health conditions, with the only exception being the marginally significant interaction effect in Model 2 ($p<0.1$). However, this finding is consistent with the results in the Table 5.3 where NHIS data is analyzed and Table 5.6, where years of education is used as the SES indicator.

Estimated effects of all of the covariates are in the expected directions. Specifically, the odds of having poor health increase with age and they are lower for men than for women. In comparison to people with healthy bodyweight, those who are obese have highly elevated risk of poor health. Physical inactivity is positively related with the likelihood of reporting poor/fair self-reported health, while having been a smoker increases the odds ratios of having activity limitations and chronic health conditions. In comparison with family-sponsored immigrants, refugees are consistently found to have a health disadvantage for all three outcome variables. Immigrants who used diversity and other visa admission preferences also have 38 percent higher odds of reporting poor/fair health when all other variables are controlled.

SES-SPECIFIC MODELS FROM NHIS

The findings about the interaction effects from the NIS are interesting, but still complicated and somewhat unstable. For example, after adding the interaction term between duration and socioeconomic status, SES has no significant effect on activity limitation in Model 2. Furthermore, the interaction term later also becomes statistically insignificant in the full model. To further explore the duration effect, the following two sections focus on SES-specific models using both datasets and both SES measures. The rationale is, because duration tends to have a varying impact on immigrants with different socioeconomic backgrounds, as shown in earlier results, SES-stratified analysis should provide the most straightforward findings on duration effects. A clear SES health advantage is expected.

Tables 5.10-5.12 report results from multivariate logistic regression models for the three health outcomes by education level using the NHIS immigrant sample. Table 5.13 replicates the analyses in Tables 5.10-5.12 using the SES grouping variable. Because there is little difference between the simple models and more complex models, only those with all the independent variables are presented in these tables. To be precise, the education categories used in this section are: 1) 0-12 grades (no diploma), 2) high school graduate, General Educational Development (GED) diploma or equivalent, associate degree or some college, and 3) college degree or advanced degree. Only immigrants aged 25-64 years are included.

According to Table 5.10, among immigrants with less than a high school education, only those with 5 to 10 years of U.S. residence have statistically significant

(37.2 percent) lower odds of reporting poor/fair health than their counterparts with the longest duration, and there is no other pairwise difference among this group of immigrants. However, for immigrants with at least a high school diploma but less than a college degree, the most recent immigrants are definitely least likely to rate their health poor or fair. They have 55.5 percent lower odds of reporting poor/fair overall health than their longest-term counterparts, followed by the second most recent group with 5-10 years duration. More importantly, consistent with my earlier findings from the NIS sample, Table 5.10 shows that self-rated health does not vary among immigrants with at least a college degree regardless of their length of duration. This set of stratified analysis is a nice supplement to the result of Model 3 in Table 5.1, which treats immigrants as an undifferentiated group. It is obvious that due to the relatively small sample size of the highly educated immigrants (N=2,620), the other two less educated groups dominate the statistical results.

Confirming the results from Model 3 in Table 5.2, Table 5.11 shows that the likelihood of being activity-limited is mostly constant regardless of immigrants' duration of stay at a given education level. One strong exception is that among the least educated immigrants, those with 5-10 years duration have 32.4 lower odds of reporting any activity limitation than their counterparts with over 15 years of U.S. residence.

Table 5.12 shows that the better educated two immigrant groups have very similar patterns of results with regard to chronic health conditions. Specifically, among immigrants with at least a high school diploma, those with 15+ years of duration experience a considerably higher risk of chronic health conditions than their counterparts

with shorter stays. The health differentials between the longest-term immigrants and shorter-term immigrants are similar in magnitude for these two education groups; the odds ratios do not vary much. However, among immigrants with less than high school education, immigrants with 10-15 years duration are as likely to have chronic health conditions as their longest-term counterparts. Again, among the least educated immigrants, those with 5-10 years duration have 33.8 lower odds of having a chronic health condition than their longest tenured counterparts. Here it is worth noting the unique health experiences of the 5-10 year duration group. Although not the most recent arrivals, Tables 5.10-5.12 show that across each of the three outcomes considered, this group of immigrants consistently displays a substantial health advantage over their longest-term counterparts with the same level of education. This finding is further confirmed in Table 5.13, where the SES grouping variable is used in analysis. Taken together, these results suggest a curvilinear relationship between duration and health for the least educated/low-SES immigrants, again echoing my findings from the NIS sample.

With an alternative measure of SES using the grouping dummy variable, Table 5.13 largely confirmed the findings from Tables 5.10-5.12. Duration among immigrants who have at least a college degree and work in white-collar occupations has virtually no effect on the odds of self-reported health. No matter whether immigrants are from the high-SES strata or not, no duration effect is found on activity limitation status. However, regardless of socioeconomic status, the duration effect is evident for chronic health conditions so that immigrants with less than 15 years duration are better off than their counterparts who have spent longer periods of time in the United States.

Results for covariates in Tables 5.10-5.13 are mostly consistent with what I have found in Tables 5.1-5.3. The likelihood of being in poor health increases with age, and tends to be lower for men than for women. Compared with the married, the never married and especially the formerly married are more likely to be in worse health. Smoking is highly associated with activity limitations and chronic health conditions, but not with self-reported overall health. Obese immigrants display an overwhelmingly high risk of poor health across all three health outcomes, which is particularly true for high-SES immigrants with respect to activity limitations. For example, Table 5.11 shows that obese immigrants with at least a college degree have almost 2.5 times higher odds of reporting any activity limitation than their counterparts with healthy body weight. Meanwhile, according to Table 5.13, among immigrants with a college degree and who are working in white-collar occupations, those who are obese have 3.3 times higher odds of being activity-limited. Consistent with earlier findings, physical activity has a protective effect on self-rated health and activity limitation status, but inactive immigrants once again show lower odds of having a chronic health condition in comparison to those who regularly participate in physical activities. Interestingly, the SES-specific models reveal that this unexpected finding is especially strong for high-SES immigrants, which further strengthens my speculation of possible reverse causation.

SES-SPECIFIC MODELS FROM NIS

Tables 5.14-5.16 report results from multivariate logistic regression models for the three health outcomes by education level using the NIS sample. Table 5.17 replicates the analyses in Tables 5.14-5.16 using the SES grouping variable. Since there is little

difference between the baseline models and the final models, only the latter are presented in these tables. The three education categories are: 1) 0-12 grades (no diploma), 2) high school graduate, General Educational Development (GED) diploma or equivalent, associate degree or some college, and 3) college degree or advanced degree. Only immigrants aged 25-64 years are included in the analyses.

First of all, additional analyses (not shown) finds out that the curvilinear relationship between duration and self-reported overall health, as shown in Table 5.7, is no longer supported in SES-stratified models. Instead, Table 5.14 shows a statistically significant linear duration effect on the odds of reporting poor/fair health for all immigrants without a college degree. In fact, the two less educated immigrant groups even have the same odds ratios, indicating that one more additional year of U.S. residence is associated with an average 2.7 percent increase in odds of reporting poor/fair health among immigrants who are not college graduates. This effect is not trivial. For example, immigrants with 15 years of duration report 40 percent lower odds of poor/fair health compared with new arrivals; a similarly wide disparity is evident when comparing male and female immigrants in the same education category. This finding is consistent with the expectation of a graded duration effect from previous literature (e.g. Cho, Frisbie, Hummer and Rogers 2004; Finch and Vega 2003; Antecol and Bedard 2006; Frisbie, Cho and Hummer 2001) that used categorical duration variables. Nevertheless, Table 5.14 also shows that a linear duration effect does not apply for all immigrants; duration has no effect on immigrants with at least a college degree. These results confirm

the earlier patterns from Table 5.10 with additional evidence, suggesting the robustness of those findings.

Interestingly, the duration effects as presented in Tables 5.14 and 5.15 are surprisingly similar. Among immigrants with at least a high school diploma, duration exerts no impact on activity limitation status or chronic health conditions. In contrast, for each of these two outcomes, there is a curvilinear relationship between duration and health among immigrants who did not complete high school education. The odds ratios of the linear duration term for activity limitation status and chronic health conditions are 1.083, and 1.110, respectively, while the odds ratios for the quadratic term are both 0.997. This indicates that the curves depicting the duration-health relationship are concave downward, as expected from earlier results. Figure 5.4 visually illustrates how duration influences the predicted probability of activity limitation status and chronic health conditions for immigrants with less than high school education based on the coefficients from the baseline model (not shown). Although poorly educated immigrants enjoy a very low risk of reporting any functional limitations and chronic health conditions at arrival, the likelihood of being in poor health increases considerably for immigrants with longer duration. Poorly educated immigrants who have spent 14 and 15 years in the U.S. have the highest estimated probability of being activity-limited (Probability=0.125) and having at least one chronic health condition (Probability=0.137), respectively. However, for poorly educated immigrants with more than 15 years duration, longer U.S. residence is associated with lowered risk of activity limitations and chronic conditions.

Using the SES dummy grouping variable instead of the levels of education, Table 5.17 again demonstrates that, across all three health outcomes considered, duration has no effect among immigrants with high SES. It also shows that duration has a curvilinear relationship with all three outcomes, instead of just activity limitation status and chronic health conditions, among immigrants with low or middle SES. As depicted in Figure 5.5, the shapes of the curves are similarly concaved downward, echoing earlier findings from the NIS sample.

Estimated effects of all the control variables are largely in line with what I have found in Tables 5.7-5.9. Specifically, the odds of having poor health increase with age and they are generally lower for men than for women. In comparison to people with healthy bodyweight, those who are obese have highly elevated risk of poor health, especially among immigrants with lower socioeconomic status. However, in comparison with family-sponsored immigrants, the health disadvantage of being a refugee is not prominent any more among high-SES immigrants, while low-SES refugees still suffer a strikingly higher risk of being in worse health. Moreover, among immigrants who have at least a college degree and who are working in white-collar occupations, physical activity has an overwhelmingly strong protection effect on self-reported overall health; the physically inactive have 3.4 times higher odds of reporting poor/fair health compared with those who are inactive.

SUMMARY

In this chapter, I investigated the effect of duration on immigrant health with both the NHIS and the NIS datasets. To understand the interplay between duration, socioeconomic status and health, I tested the interaction between duration and SES and studied SES-specific models. In terms of the negative duration effect, the results from multivariate logistic regression models show that:

1) Although some of the results are quite different, both datasets provide evidence against a monotonic decline in immigrant health with longer U.S. residence.
2) According to the NHIS dataset, the relationship between duration and health depends on the health outcome. While the results of self-reported health suggest some degree of curvilinear association, there seems to be little effect of duration on activity limitation status. Finally, immigrants with over 15 years of duration experience a substantially higher risk of chronic health conditions than more recent immigrants, but there is no statistically significant difference between any two duration groups with less than 15 years of U.S. residence.
3) The NIS dataset reveals a consistent pattern of results for all three outcome variables. It shows that immigrants with longer duration report worse overall health, are more likely to be activity-limited, and are more likely to have a chronic health condition than recent arrivals, but only up to a certain time point, after which more time in the U.S. is associated with slightly better health.

In terms of interaction effects between duration and SES, the results from multivariate logistic regression models show that:

1) The interaction effect between duration and SES is sensitive to how duration and SES are measured. When SES is only measured by education, no interaction is found regardless of how duration is measured. The NHIS sample also shows no interaction effect when duration is coded as a categorical variable.
2) According to the NIS results based on a continuous duration measure and a high-SES indicator, there is statistically significant evidence supporting the interaction effect between socioeconomic status and duration on self-reported health and activity limitation status. The net effect of duration indicates that the deleterious effect of long duration on health is relatively large among low SES immigrants, but is small for activity limitation status and reversed for self-reported health among immigrants with high SES. However, neither SES nor the interaction effect is significant for chronic health conditions.

Finally, in terms of SES-specific models, the multivariate logistic regressions show that:

1) Results from the NHIS dataset are robust with two different SES measures. Evidence from the NHIS sample suggests the duration effect varies across health outcomes. Immigrants with high socioeconomic status experience no duration effect on self-reported health while immigrants with less than a college degree experience a negative, but not graded duration effect. However, regardless of immigrants' socioeconomic status, no duration effect is found on activity limitation status. Furthermore, independent of socioeconomic status, immigrants with less than 15 years duration are less likely to have a chronic health condition than their counterparts who have spent longer periods of time in the United States. However, this negative duration effect is not graded, either.

2) According to the NIS results, no negative duration effect on health is found among immigrants with at least a high school diploma. And there is definitely no negative duration effect among immigrants who are college graduates and work in white-collar occupations. There seems to be a curvilinear relationship between duration and health among immigrants with lower socioeconomic status. However, there is a question where to draw the line to define the less socioeconomically advantageous. The duration effect on self-rated health could be linear depending on the SES measure.

To sum up, results from this chapter reveal that, as hypothesized, the duration effect on immigrant health varies across socioeconomic status. High SES immigrants tend to experience no duration effect regardless of their length of U.S. residence, while immigrants with less socioeconomic resources are more likely to experience worse health with longer duration. However, in contrast to findings from prior literature, evidence suggests that the negative duration effect tends to be curvilinear or constant, instead of being graded.

In the next chapter, I further explore the interplay between nativity/duration, socioeconomic status and immigrant health. In light of segmented assimilation theory, I will focus on intergroup comparisons of immigrant-native health differentials by socioeconomic status.

Chapter 6: Nativity, Duration and Immigrant-Native Health Differentials

Chapter Four studied the healthy immigrant effect and health selectivity among immigrants. Chapter Five researched the interaction effect between duration and socioeconomic status on immigrant health. Finally, to connect the dots, this last analytical chapter examines immigrant-native health differentials by socioeconomic status.

It has been confirmed in Chapter Four that immigrants have better health upon arrival to the United States than their native-born counterparts, presumably due to selection. In this chapter, I further hypothesize that the initial foreign-born advantages in health are larger for the low SES group than for the high SES group. Moreover, guided by segmented assimilation theory and cumulative disadvantage theory, I predict that after a considerable time in the U.S., immigrants will converge toward the health level of the native population they assimilate into. That is, the health of long-term immigrants is not distinguishable from that of the native-born with comparable socioeconomic status.

This chapter focuses on comparisons between immigrants and natives. Only the NHIS dataset is used for analysis since the NIS only includes immigrants. The sample is limited to working age adults (i.e., 25-64 years old). Both years of completed schooling and the SES grouping variable are used to test the robustness of the results.

RESULTS

Tables 6.1-6.3 display the results of multivariate logistic regression models comparing immigrant-native health differentials by education level for the three outcome variables using the NHIS dataset (N=46,791). The three education categories used in

analyses are: 1) 0-12 grades (no diploma), 2) high school graduate, General Educational Development (GED) diploma or equivalent, associate degree or some college, and 3) college degree or advanced degree.

Model 1 in the left panel of Table 6.1 shows the baseline odds ratios of duration groups for persons with less than a high school education in comparison to their native-born counterparts, adjusted for age and sex composition. Among the least educated, being a recent immigrant with less than 5 years of duration lowers the odds of reporting poor/fair overall health by 0.45, and this protective effect is statistically significant. The addition of race and marital status variables results in little change in this foreign-born advantage in Model 2. However, recent arrivals end up with the same likelihood of reporting poor/fair overall health as their native-born counterparts in Model 3, suggesting the potential mediating effect of health behavior and lifestyle variables. Furthermore, the same story also applies for immigrants with 10-15 years of U.S. residence. With full controls, the least educated immigrants with 5-10 years of duration and with 15+ years of duration still demonstrate significantly lower odds of poor/fair self-rated health than U.S.-born individuals, so the evidence for immigrant-native health convergence is weak for this group of less educated immigrants.

A similar story also applies to persons who are high school graduates and/or have attended college (but without a degree). Immigrants tend to enjoy a dramatic risk reduction in reporting poor/fair self-reported health in comparison to their native-born counterparts, and this advantage changed little as the model includes more independent variables. This is true for both recent arrivals and immigrants with more than 15 years of

U.S. residence. The only exception is the group with 10-15 year duration. Although not the longest-term immigrants, those who have spent 10-15 years in the U.S. and who are high school graduates share the same level of risk in reporting poor/fair self-rated health as their native counterparts and have a significantly higher odds ratio than the most recent immigrants. Therefore, we are again left with little evidence to support immigrant-native health convergence.

The right panel on Table 6.1 shows that among highly educated people, being foreign-born does not provide additional protection for self-reported health, regardless of duration status. Indeed, Model 1 in Table 6.1 shows that immigrants with more than 15 years of duration show 42 percent higher odds of reporting poor/fair overall health, but progressive adjustment indicates that this difference is largely due to the difference in race and marital status composition. Therefore, the health of immigrants with at least a college degree is mostly indistinguishable from the native-born with the same level of education, and duration has virtually no effect on immigrant-native health differentials. This result supplements well the findings from Chapter Five, providing a more complete view of the health of highly educated immigrants. However, my overall hypothesis is still not supported; no immigrant-native health convergence has been found.

Comparing the three sets of results in Table 6.1, most notable is that the effect of being a recent immigrant is statistically significant for the less educated two groups, but insignificant for college graduates. Therefore, my hypothesis that foreign-born health advantages are larger for the low SES group than for the high SES group is partially supported in terms of self-reported overall health. In contrary to the expectation from the

healthy immigrant hypothesis, however, the inclusion of health behavior and lifestyle variables largely explains away the foreign-born advantage of self-rated health among the least educated group.

Model 1 in the left panel in Table 6.2 shows that compared with recent immigrants, the native-born have a fourfold higher risk of activity limitations. Although this gap narrows down as more independent variables are added in Models 2 and 3, immigrants still demonstrate less than half the likelihood of being activity limited in comparison to the U.S.-born in the final model. Moreover, even with full controls, all immigrants with less than high school education enjoy a strong protective effect against activity limitations from their foreign-born status, regardless of length of duration. Thus, no health convergence between long-term immigrants and natives is found.

The middle panel in Table 6.2 tells a similar story: no immigrant-native health convergence is evidenced. Immigrants with a high school education are less apt to be activity-limited than their native-born counterparts, regardless of the length of U.S. duration. This advantage remains for all three longer duration groups as the model becomes more complex, but results in statistical insignificance for the most recent immigrants once health behavior and lifestyle variables are taken into account.

Interestingly, the pattern of results for the highly educated immigrants appears to be very similar to what have been observed in the other two education groups. Immigrants with at least a college degree exhibit considerable lower odds of having activity limitations than their native-born counterparts. With the exception of the most recent arrivals, these immigrant-native health differentials persist across models. Recent

arrivals with less than 5 years of duration display a baseline advantage over natives, but the inclusion of race and marital status variables leads to a loss of statistical significance. Again, no health convergence between immigrants and natives is observed.

Comparing these three sets of results in Table 6.2, a pattern different from the one for self-rated health emerges. In terms of activity limitation status, the protective effect of being a recent immigrant is statistically significant for all three education groups. However, with full controls, only the least educated immigrants still have this advantage. Among persons with at least a high school education, the difference in the likelihood of activity limitations between recent immigrants and the native-born can be explained by variables other than recency of immigration status. These results indicate that the effects of being a recent immigrant on activity limitation status are more similar for the two groups who have at least a high school education. Although inconsistent with the findings from self-rated health, this finding supports my hypothesis that foreign-born health advantages are larger for the low SES group than for the high SES group.

Table 6.3 shows that immigrants have a significantly lower likelihood of having chronic health conditions than their U.S.-born counterparts with the same level of education, regardless of length of residence. This strong protection also persists across models, indicating that the explanatory variables in the model can hardly "explain" the impact of nativity on chronic health conditions. For example, everything else being equal, immigrants with less than 5 years of residence still only display one-third to two-thirds of the risk of having chronic health conditions compared to their native counterparts with the same level of education. Although the odds ratios in the full model appear to be larger

for the two less educated groups than for college graduates (odds ratios=0.375, 0.399, and 0.602, respectively), two-tailed adjusted Wald tests show no statistically significant group differences among these three groups[8]. Therefore, the foreign-born health advantage is not larger for the low SES group than for the high SES group; my hypothesis is rejected.

Is there an immigrant-native convergence in the risk of chronic health conditions? As discussed earlier, the longest-term immigrants still clearly demonstrate considerably lower odds of chronic health conditions than their native counterparts with the same level of education. Thus, no health convergence is evidenced. It should be noted that the differential between the native-born and immigrants with 15+ years of duration among the highly educated is largely due to health behavior and lifestyle factors.

Tables 6.4-6.6 replicate the analyses summarized in Tables 6.1-6.3 using the SES grouping dummy variable. The sample is still from the NHIS dataset (N=46,791). These three sets of analysis largely confirm findings from Tables 6.1-6.3. There is enough evidence showing that, in terms of self-rated overall health and activity limitation status, foreign-born health advantages are larger for the low SES group than for the high SES group, but no difference is found for chronic health conditions. Immigrant-native health differentials in activity limitations and chronic health conditions do not converge with longer U.S. residence, so immigrants with more than 15 years of duration still exhibit much lower risk than their U.S.-born counterparts with the same level of socioeconomic status. No immigrant-native difference in self-rated health is found among people with at

[8] Williams (2009) suggests using heterogeneous choice models to correct for the problem of unequal residual variation when comparing logistic coefficients across groups. His method is also used and results in no change in the findings.

least a college degree and who are working in white-collar occupations. Finally, with this alternative SES measure, immigrants with more than 10 years of U.S. residence and the native-born from low or middle socioeconomic strata do show the same level of likelihood of reporting poor/fair overall health, which supports my hypothesis and also indicates the limited success in applying segmented assimilation theory to health.

Results for covariates in Tables 6.1-6.6 are mostly consistent with what have been observed in earlier findings. The risk of poor health increases with age, and tends to be lower for men than for women. Interestingly, the advantage of being male is not as strong and sometimes not statistically significant for the highly educated/ high-SES group, especially with respect to self-reported health and chronic health conditions. Compared with the married, the never married and especially the formerly married are more likely to be in worse health. Smoking and obesity are highly associated with poor health. Physical activity displays an overwhelmingly strong protection against reporting poor/fair overall health for the highly educated/high-SES group. For example, Table 6.4 shows that among persons with at least a college degree and who are working in white-collar occupations, those who are physically inactive have more than six-fold higher odds of reporting poor/fair health compared to individuals who regularly participate in physical activities, while those who are physically active but exercise irregularly have more than three times higher odds of reporting poor/fair overall health.

SUMMARY

In this chapter, I asked whether the initial foreign-born advantages in health are larger for persons with low SES than for persons with high SES. In light of segmented assimilation theory and cumulative disadvantage theory, I also tested the hypothesis of health convergence among immigrants and natives with similar socioeconomic status. The results from multivariate logistic regression models show that:

1) Analyses using both SES measures show that recent immigration status has a strong and significant protective effect on self-reported health and activity limitations among the low SES/less educated group, but no significant effect on the high SES/highly educated group. However, among recent immigrants, the immigrant-native health differential in the risk of chronic health conditions is not larger for the low SES/less educated than for the high SES group/highly educated.
2) Little evidence supports the health convergence between long-term immigrants and the native-born. The only exception is that when the SES grouping variable is used, immigrants with more than 10 years of U.S. residence and the native-born from low or middle socioeconomic strata exhibit the same level of likelihood of reporting poor/fair overall health.

Therefore, consistent with prior literature, recent immigrants exhibit a health advantage over the native-born, but the evidence from analyses above also shows that the size of this comparative advantage sometimes depends on socioeconomic status. Furthermore, holding socioeconomic status constant, the healthy immigrant effect still

tends to persist as immigrants reside in the U.S. longer, contrary to what is hypothesized from segmented assimilation theory (Portes and Zhou 1993; Zhou 1997).

Chapter 7: Summary and Conclusions

Past studies often find that upon arrival the foreign-born generally have favorable health profiles than native-born persons, but their health deteriorates with prolonged stay in the US (for example, Kandula, Kersey and Lurie 2004; Argeseanu Cunningham, Solveig and Narayan 2008; Cho, Frisbie, Hummer and Rogers 2004; Frisbie, Cho and Hummer 2001; Antecol and Bedard 2006). The classical explanations of this phenomenon are healthy immigrant selectivity and negative acculturation, which argue that immigrants are positively selected on health, but over time the force of unhealthy acculturation takes effect, leading to later health deterioration (Jasso, Massey, Rosenzweig and Smith 2004; Abraido-Lanza, Dohrenwend, Ng-Mak and Turner 1999; Scribner 1996; Alberto and Ewbank 2004).

However, the "negative acculturation" contention is contradictory to expectations from assimilation theory and what has been observed by labor economists that longer U.S. residence is associated with higher levels of social integration and economic advancement (Gordon 1964; Alba and Nee 1997; Borjas and Friedberg 2009; Batalova, Fix and Creticos 2008). With the number of foreign-born people living in the United States reaching an all-time high and exceeding 37.9 million in recent years (Camarota 2007), the cost of this "negative acculturation" is substantial. Some researchers questioned the conclusion that American culture is "toxic" for immigrants and looked for alternative explanations (e.g., Cho and Hummer 2001), but little effort has been made to understand this duration effect from a socioeconomic perspective.

This study aims to fill this gap by theoretically investigating the problematic nature of the duration measure and empirically focusing on the role of socioeconomic status in differentiating immigrant health experiences with respect to self-reported overall health, activity limitation status and chronic health conditions. Based on data from the pooled National Health Interview Surveys (NHIS) 2006-2008 and the New Immigrant Survey (NIS) 2003, this dissertation first tested the healthy immigrant effect and examined variability in the level of health selection across socioeconomic groups, followed by an in-depth study of the interaction effect between socioeconomic status and duration on immigrant health. Finally, I also compared recent immigrant health advantages among groups with distinctive socioeconomic status and investigated whether immigrants will eventually converge toward the health level of the socioeconomic group they assimilate into, as predicted by segmented assimilation theory.

Consistent with the healthy immigrant hypothesis (Kandula, Kersey and Lurie 2004; Jasso, Massey, Rosenzweig and Smith 2004; Landale, Oropesa and Gorman 2000; Palloni and Ewbank 2004), this study found that immigrants, especially recent arrivals, have a considerably lower risk of worse health relative to native-born adults. Moreover, although there are mixed results with regard to health selectivity variability across socioeconomic status when activity limitation status and chronic health conditions are the outcome variables, sufficient evidence indicates that the intensity of selectivity in self-reported health varies across educational level. Specifically, immigrants with less than a high school education have worse overall health than their more educated peers, but college graduate immigrants are not healthier than high school graduate immigrants. This

finding underscores the importance of SES differentials in health, even in the case of the migration selection process. However, it does not support either of my hypotheses, which predict that immigrants across socioeconomic status are equally healthy or that less educated immigrants are healthier than their more educated counterparts. Although it also contradicts some other researchers' speculation (for example, Goldman, Kimbro, Turra and Pebley 2006; Kimbro, Bzostek, Goldman and Rodriguez 2008), there is virtually no supporting or refuting evidence in prior literature.

The analyses of the interaction effect between duration and SES on immigrant health reveal that, as hypothesized, duration effects vary across socioeconomic status. High SES immigrants tend to experience a non-negative duration effect regardless of their length of U.S. residence, while immigrants with lower socioeconomic standing are more likely to experience a negative duration effect on health with longer duration. This finding is in line with previous research that highlights an uneven distribution of health advantage by socioeconomic status among Hispanics, most of whom are foreign-born (Turra and Goldman 2007). Furthermore, in contrast to findings from prior literature (e.g. Cho, Frisbie, Hummer and Rogers 2004; Finch and Vega 2003; Antecol and Bedard 2006; Frisbie, Cho and Hummer 2001), evidence suggests that the negative duration effect tends to be curvilinear or constant, instead of being graded. One potential mechanism that may contribute to this observed pattern is selective return migration or salmon bias (Abraido-Lanza, Dohrenwend, Ng-Mak, and Turner 1999; Markides and Eschbach 2005). That is, return migration may be selective of those in poor health, especially for persons with low SES.

Finally, as expected, this study also found that the initial foreign-born advantages in health for U.S. immigrants are larger for persons with low SES than persons with high SES when self-rated overall health and activity limitation status are considered. This finding is consonant with previous work by Goldman, Kimbro, Turra and Pebley (2006), who found that less educated Hispanics fare better than their White counterparts in health and more educated Hispanics sometimes fare worse. In addition, contrary to the prediction from segmented assimilation theory (Portes and Zhou 1993; Zhou 1997), little evidence suggests there is a health convergence between long-term immigrants and their native-born counterparts with similar socioeconomic status. Instead, my results show that after a considerable time in the U.S., the health of immigrants, especially those with low SES, is still more favorable than that of natives with comparable socioeconomic status. Thinking from another perspective, this finding also provides strong evidence against negative duration effects (Jasso, Massey, Rosenzweig and Smith 2004; Abraido-Lanza, Dohrenwend, Ng-Mak and Turner 1999; Scribner 1996; Alberto and Ewbank 2004).

Overall, these results highlight the importance of treating socioeconomic status as a focal factor in studies of immigration and health. The most important take-home finding from this dissertation is that immigrant health is influenced by socioeconomic status, starting from the selection process. Subsequently, the magnitude and the direction of duration effects also depend on which socioeconomic strata immigrants are from. These findings suggest that the negative acculturation argument (Abraido-Lanza, Dohrenwend, Ng-Mak and Turner 1999; Scribner 1996; Jasso, Massey, Rosenzweig and Smith 2004) is overly simplistic; immigrants with higher socioeconomic status do not seem to

experience a health decline associated with longer U.S. residence, while immigrants with fewer socioeconomic resources may exhibit a curvilinear, instead of a negative, relationship between duration and health. Furthermore, my findings again confirm the healthy immigrant hypothesis, and also provide evidence that this initial foreign-born advantage tends to be stronger among people with lower socioeconomic status than among high-SES individuals.

As the U.S. immigrant population continues to grow, this dissertation is important and timely research for understanding the impact of international migration on the health of the nation. Positive heath selection does not mean that social policies aimed at promoting immigrant health are unnecessary. This study suggests that although immigrants with the longest tenure may not be the unhealthiest foreign-born group, the health of immigrants with low socioeconomic status, especially those who have been in the U.S. for a while, may become especially vulnerable. Therefore, social policies aimed at promoting immigrant health need to be accompanied by a more general effort to improve immigrants' socioeconomic resources and integrate immigrants into the mainstream of U.S. society. This may be especially important for the 10-12 million undocumented immigrants. Furthermore, due to the long-lasting positive migration selection effect, more effort should be made to create and expand social programs aimed at preserving immigrants' positive health behaviors and lifestyles.

This study also showed the usefulness of employing both the National Health Interview Surveys (NHIS) and the New Immigrant Survey (NIS). The comparisons between immigrants and natives as well as within the foreign-born population provide a

more complete picture of immigrant health. Meanwhile, despite the distinctiveness of two foreign-born samples and two types of duration measures, the empirical results from this dissertation are mostly consistent, suggesting the robustness of my findings. Two different SES measures also proved useful; they produced statistical results that largely echo each other.

Furthermore, this study also demonstrates that integrating several health outcomes in a single study is a valuable way to investigate immigration and health. For example, the NHIS sample shows that the relationship between duration and health depends on the health outcome. While there may be some degree of curvilinear association between duration and self-reported health, there seems to be little effect of duration on activity limitation status. Furthermore, immigrants with over 15 years of duration experience a substantially higher risk of chronic health conditions than more recent immigrants, but there is no statistically significant difference between any two duration groups with less than 15 years of U.S. residence. The diversity of the findings indicates that the difficulty of assessing the duration effect on health may also partially lie in the multi-faceted concept of health. Therefore, the mechanisms associated with the duration effect for one health outcome may not apply to another.

Several limitations of this dissertation should be acknowledged. First and foremost, this study suffers from the cross-sectional nature of the data. One methodological problem is that despite its theoretical significance (Angel and Angel 1992; Angel, Angel, Lee and Markides 1999), the "age at migration" variable cannot be included in the regression models. To clearly sort out the effect of duration on health,

longitudinal data are needed. However, the NHIS is a repeated cross-sectional survey, and while the NIS will eventually include more waves, only the first wave is available at this point of time. Therefore, although my study brings a new perspective to the understanding of duration and immigrant health, the evidence is only suggestive. With the expectation that Round 2 of the NIS will be publicly released in late 2011, future analysis with the longitudinal component will permit a better examination of the duration effect, including taking "age at migration" into consideration.

Second, it is difficult to assess differences in reporting behavior among immigrants. Past literature indicates that immigrants may be affected by different interpretations of the question on self-reported health (Angel, and Guarnaccia, 1989). Moreover, the reporting of chronic health conditions depends on clinical diagnosis, and it is unclear whether immigrants are less aware of their conditions due to under-diagnosis.

Thirdly, my study sample is limited to adults of 25-64 years old, so cautions should be taken when interpreting the results beyond this age range. Indeed, future work should also look at both younger and older immigrants. Immigrants who are 65 years and older may be at particularly high risk of worse health because they may be late-life immigrants and many of them may have worked in dangerous jobs for many years in the U.S. or abroad.

Finally, more work is needed to better understand how socioeconomic status plays a role in influencing immigrant health over time. Although both SES measures employed in this dissertation are useful, my results show that the interaction effect between duration and SES is sometimes sensitive to how SES is measured. The immigrant population has

substantial heterogeneity in socioeconomic factors such as educational attainment, labor force participation, self-employment and household income. Thus, carefully choosing a SES measure to tap into socioeconomic diversity is an important next step to better understanding immigration and health. Furthermore, it might also be interesting to conduct race/ethnicity-specific or region-of-origin-specific analyses, given the complexity of migration streams.

Despite these and other limitations, this dissertation makes it clear that immigrants are a really special group. They are highly select, healthy and very valuable for the U.S. There is considerable support for the proposition that immigrant status has a strong protection effect on health, even many years after migration. Thus, helping immigrants to best preserve their superior health would benefit themselves and the nation as a whole.

Tables

Table 2.1. Employment-based Immigrants and Total Immigrants to the United States, 1986-2009

Year	Employment-based		Total
	Number	Percentage	
1986	56,617	9.41	601,708
1987	57,519	9.56	601,516
1988	58,727	9.13	643,025
1989	57,741	5.29	1,090,924
1990	58,192	3.79	1,536,483
1991	59,525	3.26	1,827,167
1992	116,198	11.93	973,977
1993	147,012	16.26	904,292
1994	123,291	15.44	798,394
1995	85,336	11.84	720,461
1996	117,499	12.83	915,900
1997	90,607	11.35	798,378
1998	77,413	11.85	653,206
1999	56,678	8.79	644,787
2000	106,642	12.68	841,002
2001	178,702	16.88	1,058,902
2002	173,814	16.41	1,059,356
2003	81,727	11.62	703,542
2004	155,330	16.22	957,883
2005	246,877	22	1,122,257
2006	159,081	12.56	1,266,129
2007	162,176	15.41	1,052,415
2008	166,511	15.04	1,107,126
2009	144,034	12.74	1,130,818
Avg. Number of Employment-based Immigrants			
Since 1992			928,268
Since 2000			1,029,943
Avg. Percentage of Employment-based Immigrants			
Since 1992			13.99
Since 2000			15.16

Source: INS Statistical Yearbook, 1996, 1997 and 2009; U.S. Department of Homeland Security, Office of Immigration Statistics Yearbook.

Table 2.2. Immigrants Admitted to the U. S. via an H-1B Visa, 1985-2009

Year	H-1B Visa
1985	47,322
1990	100,446
1993	92,795
1994	105,899
1995	117,574
1996	144,458
1998	240,947
1999	302,421
2000	355,605
2001	384,191
2002	370,490
2003	360,498
2004	386,821
2005	407,418
2006	431,853
2007	461,730
2008	409,619
2009	339,243

Source: INS Statistical Yearbook, 1997, 2007 and 2009; U.S. Department of Homeland Security, Office of Immigration Statistics Yearbook.

Table 3.1: Detailed Questions for NHIS and NIS Activity Limitation Status Measures

NHIS
By yourself, and without using any special equipment, how difficult is it for you to… 1. Walk a quarter of a mile - about 3 city blocks? 2. Walk up 10 steps without resting? 3. Stand or be on your feet for about 2 hours? 4. Sit for about 2 hours? 5. Stoop, bend, or kneel? 6. Reach up over your head? 7. Use your fingers to grasp or handle small objects? 8. Lift or carry something as heavy as 10 pounds such as a full bag of groceries? 9. Push or pull large objects like a living room chair? 10. Go out to things like shopping, movies, or sporting events? 11. Participate in social activities such as visiting friends, attending clubs and meetings, going to parties...? 12. Do things to relax at home or for leisure (reading, watching TV, sewing, listening to music...)?
NIS
1. How much does high blood pressure limit your normal daily activities? 2. How much does diabetes or high blood sugar limit your normal daily activities? 3. How much does cancer limit your normal daily activities? 4. How much does chronic lung disease limit your normal daily activities? 5. Does your lung condition limit your usual activities, such as household chores or work? 6. How much does the heart problem limit your normal daily activities? 7. How much does the psychiatric condition limit your normal daily activities 8. How much does arthritis limit your normal daily activities? 9. How much does asthma limit your normal daily activities? 10. Do you have any physical or nervous condition that limits the type of work or the amount of work you can do?

Table 3.2: Sample Composition Comparison by Duration: NHIS 2006-2008 Immigrant Sample vs. NIS 2003

	NHIS immigrant sample		NIS	
DURATION	Frequency	Percent	Frequency	Percent
< 1 year	127	1.33	2,488	38.04
1 year, less than 5 years	968	10.15	1,113	17.02
5 years, less than 10 years	1,720	18.03	1,284	19.63
10 years, less than 15 years	1,401	14.69	921	14.08
15 years or more	5,322	55.80	735	11.24
	N=9,538		N=6,541	

Table 3.3: NHIS Occupation Measures

All the newly constructed NHIS occupational measures are based on the variable OCCUP1. It includes 93 detailed civilian occupational categories, nested within 22 broader occupational groups.

Broad occupation group	Occupations and codes
MANAGEMENT OCCUPATIONS	01 Chief executives; general and operations managers; legislators 02 Advertising, marketing, promotions, public relations, and sales managers 03 Operations specialties managers 04 Other management occupations
BUSINESS AND FINANCIAL OPERATIONS OCCUPATIONS	05 Business operations specialists 06 Financial specialists
COMPUTER AND MATHEMATICAL OCCUPATIONS	07 Computer specialists 08 Mathematical science occupations
ARCHITECTURE AND ENGINEERING OCCUPATIONS	09 Architects, surveyors, and cartographers 10 Engineers 11 Drafters, engineering, and mapping technicians
LIFE, PHYSICAL AND SOCIAL SCIENCE OCCUPATIONS	12 Life scientists 13 Physical scientists 14 Social scientists and related workers 15 Life, physical, and social science technicians
COMMUNITY AND SOCIAL SERVICES OCCUPATIONS	16 Counselors, social workers, and other community and social service specialists 17 Religious workers
LEGAL OCCUPATIONS	18 Lawyers, judges, and related workers 19 Legal support workers
EDUCATION, TRAINING, AND LIBRARY OCCUPATIONS	20 Postsecondary teachers 21 Primary, secondary, and special education school teachers 22 Other teachers and instructors 23 Librarians, curators, and archivists 24 Other education, training, and library occupations
ARTS, DESIGN, ENTETAINMENT, SPORTS, AND MEDIA OCCUPATIONS	25 Art and design workers 26 Entertainers and performers, sports and related workers 27 Media and communication workers 28 Media and communication equipment workers

Table 3.3 (*Continued*)

HEALTHCARE PRACTITIONER AND TECHNICAL OCCUPATIONS	29 Health diagnosing and treating practitioners 30 Health technologists and technicians 31 Other healthcare practitioners and technical occupations
HEALTHCARE SUPPORT OCCUPATIONS	32 Nursing, psychiatric, and home health aides 33 Occupational and physical therapist assistants and aides 34 Other healthcare support occupations
PROTECTIVE SERVICE OCCUPATIONS	35 First-line supervisors/managers, protective service workers 36 Fire fighting and prevention workers 37 Law enforcement workers 38 Other protective service workers
FOOD PREPARATION AND SERVING RELATED OCCUPATIONS	39 Supervisors, food preparation, and serving workers 40 Cooks and food preparation workers 41 Food and beverage serving working 42 Other food preparation and serving related workers
BUILDING AND GROUNDS CLEANING AND MAINTENANCE OCCUPATIONS	43 Supervisors, building and grounds cleaning and maintenance workers 44 Building cleaning and pest control workers 45 Grounds maintenance workers
PERSONAL CARE AND SERVICE OCCUPATIONS	46 Supervisors, personal care and service workers 47 Animal care and service workers 48 Entertainment attendants and related workers 49 Funeral service workers 50 Personal appearance workers 51 Transportation, tourism, and lodging attendants 52 Other personal care and service workers
SALES AND RELATED OCCUPATIONS	53 Supervisors, sales workers 54 Retail sales workers 55 Sales representatives, services 56 Sales representatives, wholesale and manufacturing 57 Other sales and related workers
OFFICE AND ADMINISTRATIVE SUPPORT OCCUPATIONS	58 Supervisors, office and administrative support workers 59 Communications equipment operators 60 Financial clerks 61 Information and record clerks 62 Material recording, scheduling, dispatching, and distributing workers 63 Secretaries and administrative assistants 64 Other office and administrative support workers

Table 3.3 (*Continued*)

FARMING, FISHING, AND FORESTRY OCCUPATIONS	65 Supervisors, farming, fishing, and forestry workers 66 Agricultural workers 67 Fishing and hunting workers 68 Forest, conservation, and logging workers
CONSTRUCTION AND EXTRACTION OCCUPATIONS	69 Supervisors, construction and extraction workers 70 Construction trades workers 71 Helpers, construction trades 72 Other construction and related workers 73 Extraction workers
INSTALLATION, MAINTENANCE, AND REPAIR OCCUPATIONS	74 Supervisors of installation, maintenance, and repair workers 75 Electrical and electronic equipment mechanics, installers, and repairers 76 Vehicle and mobile equipment mechanics, installers, and repairers 77 Other installation, maintenance, and repair occupations
PRODUCTION OCCUPATIONS	78 Supervisors, production workers 79 Assemblers and fabricators 80 Food processing workers 81 Metal workers and plastic workers 82 Printing workers 83 Textile, apparel, and furnishings workers 84 Woodworkers 85 Plant and system operators 86 Other production occupations
TRANSPORTATION AND MATERIAL MOVING OCCUPATIONS	87 Supervisors, transportation and material moving workers 88 Air transportation workers 89 Motor vehicle operators 90 Rail transportation workers 91 Water transportation workers 92 Other transportation workers 93 Material moving workers
MILITARY SPECIFIC OCCUPATIONS	94
REFUSED; CLASSIFIED	97
NOT ASCERTAINED	98
DON'T KNOW	99
NOT IN UNIVERSE	<BLANK>

Table 3.3 (*Continued*)

Using these data, the occupational measures are operationalized as follows:

Occupation groups	NHIS occupational codes
White collar	1 through 34
Service groups	35 through 64
Farm workers	65 through 68
Blue collar	69 through 93
Unknown	94, 97, 98, 99
Not in labor force	<blank>

Table 3.4: NIS Occupation Measures

All the newly constructed NHIS occupational measures are derived from section B (pre-immigration experiences) and section C (employment) of NIS.

Occupation groups	NIS occupations and codes
White collar	10 to 430: Executive, administrative and managerial 500 to 950: Management related 1000 to 1240: Mathematical and computer scientists 1300 to 1530: Engineers, architects, and surveyors 1540 to 1560: Engineering and related technicians 1600 to 1760: Life and physical scientists 1800 to 1860: Social scientists and related workers 1900 to 1960: Life, physical, and social science technicians 2000 to 2060: Counselors, social, and religious workers 2100 to 2150: Lawyers, judges, and legal support workers 2200 to 2340: Teachers 2400 to 2550: Education, training, and library workers 2600 to 2760: Entertainers and performers, sports and related workers 2800 to 2960: Media and communication workers 3000 to 3260: Health and diagnosis and treating practitioners 3300 to 3650: Health care technicial and support
Service Groups	3700 to 3950: Protective service 4000 to 4160: Food preparation and serving related 4200 to 4250: Cleaning and building service 4300 to 4430: Entertainment attendants and related workers 4500 to 4650: Personal care and service workers 4700 to 4960: Sales and related workers 5000 to 5930: Office and administrative support workers 7800 to 7850: Food preparation
Farm workers	6000 to 6130: Farming, fishing, and forestry
Blue collar	6200 to 6940: Construction trades and extraction workers 7000 to 7620: Installation, maintenance, and repair workers 7700 to 7750: Production and operation workers 7900 to 8960: Setter, operators, and tenders 9000 to 9750: Transportation and material moving workers
Unknown	9800 to 9840: Military specific occupations 9990: Uncodable in labor force but missing occupation <=blank>
Not in labor force	9950: Not in labor force

Table 3.5: Weighted Descriptive Statistics by Duration of Stay, U.S. Adults Aged 25-64, NHIS 2006-2008

Characteristics	Immigration status					
	Native	All immigrants	0 to <5 years	5 to <10 years	10 to <15 years	>=15 years
Age (mean) (years)	44.11	41.47	35.10	36.28	37.74	45.26
Sex (%)						
Male	48.68	51.34	55.05	50.49	54.73	50.01
Female	51.32	48.66	44.95	49.51	45.27	49.99
Race (%)						
White	78.33	18.04	14.00	14.71	12.54	21.29
Black	12.58	7.27	7.18	8.32	6.82	7.08
Hispanic	6.09	51.48	47.85	57.84	57.00	48.74
Asian	1.05	22.40	30.15	18.81	23.43	21.77
Other	1.95	0.81	0.82	0.32	0.20	1.12
Marital status (%)						
Married or cohabitating	69.44	75.55	74.96	75.07	78.73	74.97
Never married	14.81	13.10	19.58	16.19	12.01	11.21
Formerly married	15.75	11.35	5.46	8.74	9.26	13.82
Years of school completed (mean)	13.73	12.29	12.66	12.13	11.90	12.37
Education level (%)						
Less than high school	9.76	31.15	31.55	32.82	37.33	28.94
High school graduate, GED, associate degree or some college	59.20	38.78	27.98	37.04	35.12	42.32
College degree or more	31.04	30.07	40.48	30.14	27.55	28.74
Socioeconomic grouping (%)						
High SES	22.06	18.49	26.69	16.63	16.24	18.12
Middle or low SES	77.94	81.51	73.31	83.37	83.76	81.89

Table 3.5 (*Continued*)

Characteristics	Immigration status					
	Native	All immigrants	0 to <5 years	5 to <10 years	10 to <15 years	>=15 years
Region of origin (%)						
Latin America and the Caribbean	\	56.69	49.65	62.69	60.40	55.18
Africa and Middle East	\	5.64	8.63	7.14	5.14	4.75
Asia	\	23.00	30.16	18.47	23.79	22.85
Other	\	14.67	11.55	11.70	10.66	17.23
Smoking status (%)						
Current smoker	24.39	13.50	12.37	12.29	10.29	14.93
Former smoker	21.04	14.27	12.82	10.60	12.50	16.16
Never smoked	54.56	72.23	74.81	77.10	77.22	68.92
Exercise status (%)						
Inactive	31.18	44.96	46.95	47.92	48.49	42.73
Active but not regular	35.16	30.26	30.17	29.78	28.11	30.99
Active and regular	33.66	24.79	22.88	22.30	23.40	26.28
BMI status (%)						
Unknown BM	3.98	3.66	5.96	5.60	3.89	2.56
Underweight (BMI < 18.5)	1.12	1.67	3.50	1.98	1.62	1.24
Healthy weight (BMI 18.5 to <25)	31.69	37.48	45.45	42.03	37.88	34.45
Overweight (BMI > = 25 to <30)	33.72	37.70	35.43	33.69	39.60	38.88
Obese (BMI > = 30)	29.50	19.48	9.65	16.70	17.00	22.86
All persons (no.)	37,253	9,538	1,095	1,720	1,401	5,322

Table 3.6: Weighted Descriptive Statistics by Duration of Stay, U.S. Immigrants Aged 25-64, NIS 2003

Characteristics	Total sample	Duration				
		<1 Year	1 to <5 years	5 to <10 years	10 to <15 years	>=15 years
Age (mean) (years)	38.43	40.64	36.16	35.77	37.44	41.46
Duration (mean)(years)	6.02	\	\	\	\	\
Sex (%)						
Male	44.06	42.70	35.18	46.69	50.72	50.24
Female	55.94	57.30	64.82	53.31	49.28	49.76
Marital status (%)						
Married or cohabitating	81.04	75.13	88.75	87.16	78.84	77.72
Never married	12.27	18.26	5.61	7.18	13.68	12.99
Formerly married	6.69	6.60	5.65	5.66	7.48	9.30
Years of school completed (mean)	12.49	12.00	14.09	13.86	11.45	10.32
Education level (%)						
Less than high school	30.17	32.15	16.19	19.13	42.80	49.38
High school graduate, GED, associate degree or some college	32.83	32.88	35.26	33.01	30.26	31.53
College degree or more	37.00	34.97	48.54	47.86	26.94	19.08
Socioeconomic grouping (%)						
High SES	16.55	9.65	20.38	29.88	15.46	9.87
Middle or low SES	83.45	90.35	79.62	70.12	84.54	90.13
Region of origin (%)						
Latin America and the Caribbean	43.70	27.57	34.58	39.03	69.19	78.94

Table 3.6 (*Continued*)

Characteristics	Total sample	Duration				
		<1 Year	1 to <5 years	5 to <10 years	10 to <15 years	>=15 years
Africa and Middle East	10.46	13.66	11.16	12.30	3.92	5.75
Asia	29.81	45.30	26.98	31.43	15.46	7.16
Other	16.02	13.47	27.29	17.24	11.43	8.15
Visa admission category (%)						
Family preferences	53.34	52.87	65.42	54.21	44.14	44.64
Refugee	7.16	0.13	14.75	13.46	8.64	2.34
Diversity and others	27.90	41.68	6.05	7.99	36.79	46.04
Employment preferences	11.60	5.32	13.79	24.34	10.44	6.98
Smoking status (%)						
Never smoked	75.40	79.38	74.26	75.21	73.73	68.66
Have being a smoker	24.60	20.62	25.74	24.79	26.27	31.34
Exercise status (%)						
Inactive	78.93	76.13	80.17	81.37	78.19	81.70
Active	21.07	23.87	19.83	18.63	21.81	18.30
BMI status (%)						
Underweight (BMI < 18.5)	2.89	3.91	3.90	2.68	1.24	0.75
Healthy wegight (BMI 18.5 to <25)	45.92	52.32	51.58	47.34	34.53	30.84
Overweight (BMI > = 25 to <30)	33.01	28.12	31.01	35.62	37.10	40.69
Obese (BMI > = 30)	11.63	7.56	8.36	10.47	19.68	20.06
Unknown BMI	6.55	8.09	5.14	3.90	7.45	7.66
All persons (no.)	6,541	2,488	1,113	1,284	921	735

Table 4.1: Age-Adjusted Weighted Percentage Distributions of Health Status Indicators, by Duration of Stay, U.S. Adults Aged 25-64, NHIS 2006-2008

Self-reported health status	Native	All immigrants	0 to <5 years	5 to <10 years	10 to <15 years	>=15 years
Poor or fair	11.11	9.75	5.82	5.96	8.67	12.14
Good, very good, or excellent	88.89	90.25	94.18	94.04	91.33	87.86
Activity limitation status						
Yes	28.79	16.00	11.05	12.30	11.31	19.87
No	71.21	84.00	88.95	87.70	88.69	80.13
Chronic health conditions						
Yes	49.44	31.04	19.14	20.06	22.06	40.15
No	50.56	68.96	80.86	79.94	77.94	59.85
All persons (no.)	37,253	9,538	1,095	1,720	1,401	5,322

Table 4.2: Age-Adjusted Weighted Percentage Distributions of Health Status Indicators, by Duration of Stay, U.S. Adult Aged 25-64, NIS 2003

Self-reported health status	<1 year	1 to <5 years	5 to <10 years	10 to <15 years	>=15 years
Poor or fair	5.07	6.24	7.6	11.09	18.12
Good, very good, or excellent	94.93	93.76	92.4	88.91	81.88
Activity limitation status					
Yes	5.01	10.29	7.95	11.03	14.12
No	94.99	89.71	92.05	88.97	85.88
Chronic health conditions					
Yes	7.53	11.45	11.15	12.74	17.94
No	92.47	88.55	88.85	87.26	82.06
All persons (no.)	2,488	1,113	1,284	921	735

Table 4.3: Weighted Percentage Distributions of Health Status Indicators, by Education Level for Recent Immigrants (Duration <5 Years), NHIS 2006-2008 and NIS 2003

Health outcome	Less than high school		High school graduate, GED, associate degree or some college		College degree or more	
	NHIS	NIS	NHIS	NIS	NHIS	NIS
Self-reported health status						
Poor or fair	12.26	12.53	3.19	5.59	2.27	3.87
Good, very good, or excellent	87.74	87.47	96.81	94.41	97.73	96.13
Activity limitation status						
Yes	11.97	12.41	11.64	8.68	8.85	5.87
No	88.03	87.59	88.36	91.32	91.15	94.13
Chronic health conditions						
Yes	18.79	12.83	18.56	11.18	17.78	8.45
No	81.21	87.17	81.44	88.82	82.22	91.55
All persons (no.)	366	839	274	1,174	455	1,588

Table 4.4: Odds Ratios for the Effect of Nativity/Duration on Poor/Fair Self-Reported Health, U.S. Adults Aged 25-64, NHIS 2006-2008

	MODEL 1	MODEL 2	MODEL 3
Age	1.064***	1.063***	1.062***
Male	0.904***	0.913***	0.815***
Nativity/duration status			
Native (ref.)			
0 to <5 years	0.336***[C]	0.363***[C]	0.464***[C]
5 to <10 years	0.341***[C]	0.364***[C]	0.441***[C]
10 to <15 years	0.365***[C]	0.391***[C]	0.472***[C]
>=15 years	0.594***	0.635***	0.712***
Race			
White (ref.)			
Black		1.113**	1.055
Hispanic		0.823***	0.801***
Asian		0.870*	1.026
Other		1.360***	1.254**
Years of education		0.959***	0.981***
Marital Status			
Married or cohabitating (ref.)			
Never married		1.046	1.055
Formerly married		1.219***	1.194***
Smoking status			
Never smoked (ref.)			
Current smoker			1.499***
Former smoker			1.492***
Exercise status			
Active and regular (ref.)			
Inactive			0.942*
Active but not regular			1.115***
BMI Status			
Healthy weight (ref.)			
Underweight (BMI < 18.5)			1.020
Overweight (BMI > = 25 to <30)			1.390***
Obese (BMI > = 30)			2.892***
Unknown BMI			1.221**

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1

C denotes significant results compared with immigrants with 15+ years of U.S. residence at .05 level

N=46,791

Table 4.5: Odds Ratios for the Effect of Nativity/Duration on Activity Limitation Status, U.S. Adults Aged 25-64, NHIS 2006-2008

	MODEL 1	MODEL 2	MODEL 3
Age	1.052***	1.052***	1.051***
Male	0.678***	0.677***	0.611***
Nativity/duration status			
Native (ref.)			
0 to <5 years	0.428***	0.416***	0.549***
5 to <10 years	0.454***	0.429***C	0.532***
10 to <15 years	0.409***C	0.388***C	0.488***C
>=15 years	0.552***	0.536***	0.612***
Race			
White (ref.)			
Black		0.888***	0.824***
Hispanic		0.837***	0.838***
Asian		0.701***	0.824*
Other		1.596***	1.468***
Years of education		0.903***	0.933***
Marital Status			
Married or cohabitating (ref.)			
Never married		1.272***	1.276***
Formerly married		1.344***	1.286***
Smoking status			
Never smoked (ref.)			
Current smoker			1.766***
Former smoker			1.397***
Exercise status			
Active and regular (ref.)			
Inactive			1.360***
Active but not regular			1.700***
BMI Status			
Healthy weight (ref.)			
Underweight (BMI < 18.5)			1.145
Overweight (BMI > = 25 to <30)			1.323***
Obese (BMI > = 30)			2.632***
Unknown BMI			1.403***

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
C denotes significant results compared with immigrants with 15+ years of U.S. residence at .05 level
N=46,791

Table 4.6: Odds Ratios for the Effect of Nativity/Duration on Chronic Health Conditions, U.S. Adults Aged 25-64, NHIS 2006-2008

	MODEL 1	MODEL 2	MODEL 3
Age	1.064***	1.063***	1.062***
Male	0.904***	0.913***	0.815***
Nativity/duration status			
Native (ref.)			
0 to <5 years	0.336***C	0.363***C	0.464***C
5 to <10 years	0.341***C	0.364***C	0.441***C
10 to <15 years	0.365***C	0.391***C	0.472***C
>=15 years	0.594***	0.635***	0.712***
Race			
White (ref.)			
Black		1.113**	1.055
Hispanic		0.823***	0.801***
Asian		0.870*	1.026
Other		1.360***	1.254**
Years of education		0.959***	0.981***
Marital Status			
Married or cohabitating (ref.)			
Never married		1.046	1.055
Formerly married		1.219***	1.194***
Smoking status			
Never smoked (ref.)			
Current smoker			1.499***
Former smoker			1.492***
Exercise status			
Active and regular (ref.)			
Inactive			0.942*
Active but not regular			1.115***
BMI Status			
Healthy weight (ref.)			
Underweight (BMI < 18.5)			1.020
Overweight (BMI > = 25 to <30)			1.390***
Obese (BMI > = 30)			2.892***
Unknown BMI			1.221**

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1

C denotes significant results compared with immigrants with 15+ years of U.S. residence at .05 level

N=46,791

Table 4.7: Odds Ratios for the Effect of Education on Poor/Fair Self-Reported Health among Recent Immigrants (Duration <5 Years), NHIS 2006-2008

	MODEL 1	MODEL 2	MODEL 3
Age	1.029	1.026	1.022
Male	0.545	0.546	0.635
Education level			
Less than high school	4.426**[C]	4.426***[C]	3.921***[C]
High school graduate, GED, associate degree or some college (ref.)			
College degree or more	0.752	0.852	0.861
Marital Status			
Married or cohabitating (ref.)			
Never married		1.098	1.031
Formerly married		1.829	1.874
Region of origin			
Latin America and the Caribbean (ref.)[a]			
Africa and Middle East		1.355	1.388
Asia		0.717	0.741
Smoking status			
Never smoked (ref.)			
Current smoker			0.400+
Former smoker			0.416
Exercise status			
Active and regular (ref.)			
Inactive			0.974
Active but not regular			0.884
BMI Status			
Healthy weight (ref.)[a]			
Overweight (BMI > = 25 to <30)			1.763
Obese (BMI > = 30)			1.525
Unknown BMI			1.681

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1

a The "other regions" category is collapsed with the reference category for this set of analysis because of its small sample size.

b The "underweight" category is collapsed with the reference category for this set of analysis because of its small sample size.

C denotes significant results compared with immigrants with at least a college degree at .05 level

N=1,095

Table 4.8: Odds Ratios for the Effect of Education on Activity Limitation Status among Recent Immigrants (Duration<5 Years), NHIS 2006-2008

	MODEL 1	MODEL 2	MODEL 3
Age	1.061**	1.062**	1.059***
Male	0.713	0.679	0.651+
Education level			
Less than high school	1.075	1.047	1.158
High school graduate, GED, associate degree or some college (ref.)			
College degree or more	0.923	1.156	1.169
Marital Status			
Married or cohabitating (ref.)			
Never married		0.913	0.859
Formerly married		0.967	1.035
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East		1.666	1.804
Asia		0.602	0.699
Other		0.377+	0.399
Smoking status			
Never smoked (ref.)			
Current smoker			1.270
Former smoker			1.579
Exercise status			
Active and regular (ref.)			
Inactive			0.665
Active but not regular			1.09
BMI Status			
Healthy weight (ref.)			
Underweight (BMI < 18.5)			0.549
Overweight (BMI > = 25 to <30)			0.891
Obese (BMI > = 30)			2.294*
Unknown BMI			1.468

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1

C denotes significant results compared with immigrants with at least a college degree at .05 level

N=1,095

Table 4.9: Odds Ratios for the Effect of Education on Chronic Health Conditions among Recent Immigrants (Duration <5 Years), NHIS 2006-2008

	MODEL 1	MODEL 2	MODEL 3
Age	1.085**	1.081***	1.078***
Male	1.203	1.245	1.089
Education level			
Less than high school	1.073	1.141	1.18
High school graduate, GED, associate degree or some college (ref.)			
College degree or more	1.382	1.415	1.271
Marital Status			
Married or cohabitating (ref.)			
Never married		0.828	0.856
Formerly married		1.709+	1.937*
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East		1.490	1.801
Asia		0.821	1.212
Other		1.771	1.742
Smoking status			
Never smoked (ref.)			
Current smoker			0.989
Former smoker			2.298**
Exercise status			
Active and regular (ref.)			
Inactive			0.513*
Active but not regular			0.527*
BMI Status			
Healthy weight (ref.)			
Underweight (BMI < 18.5)			0.331
Overweight (BMI > = 25 to <30)			2.074**
Obese (BMI > = 30)			2.598*
Unknown BMI			3.238**

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1

C denotes significant results compared with immigrants with at least a college degree at .05 level

N=1,095

Table 4.10: Odds Ratios for the Effect of Education on Poor Self-Reported Health among Recent Immigrants (Duration < 5 Years), NIS 2003

	MODEL 1	MODEL 2	MODEL 3
Age	1.058***	1.061***	1.057***
Male	0.764	0.730+	0.734+
Education level			
Less than high school	1.567*[C]	1.699**[C]	1.655**[C]
High school graduate, GED, associate degree or some college (ref.)			
College degree or more	0.737	0.793	0.804
Marital status			
Married (ref.)			
Never married		1.170	1.150
Formerly married		0.992	1.001
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East		0.997	1.008
Asia		0.782	0.897
Other		1.318	1.337
Visa admission category			
Family preferences (ref.)			
Refugee		3.114***	3.109***
Diversity and others		0.860	0.882
Employment preferences		1.024	1.040
Have Being a Smoker			1.192
Physically Inactive			0.920
BMI Status			
Healthy Weight (ref.)			
Underweight (BMI < 18.5)			0.635
Overweight (BMI > = 25 to <30)			1.173
Obese (BMI > = 30)			1.907**
Unknown BMI			1.808*

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
C denotes significant results compared with immigrants with at least a college degree at .05 level
N=3,601

Table 4.11: Odds Ratios for the Effect of Education on Functional Limitation among Recent Immigrants (Duration <5 Years), NIS 2003

	MODEL 1	MODEL 2	MODEL 3
Age	1.065***	1.065***	1.065***
Male	0.608***	0.600***	0.503
Education level			
Less than high school	0.886	0.916	0.928
High school graduate, GED, associate degree or some college (ref.)			
College degree or more	0.718+	0.775	0.800
Marital status			
Married (ref.)			
Never married		1.162	1.200
Formerly married		1.256	1.237
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East		0.989	1.056
Asia		0.835	0.940
Other		1.118	1.052
Visa admission category			
Family preferences (ref.)			
Refugee		2.994***	3.069***
Diversity and others		0.759	0.773
Employment preferences		0.974	0.978
Have Being a Smoker			1.815**
Physically Inactive			0.919
BMI Status			
Healthy Weight (ref.)			
Underweight (BMI < 18.5)			0.815
Overweight (BMI > = 25 to <30)			1.169
Obese (BMI > = 30)			1.562*
Unknown BMI			1.050

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
C denotes significant results compared with immigrants with at least a college degree at .05 level
N=3,601

Table 4.12: Odds Ratios for the Effect of Education on Chronic Health Conditions among Recent Immigrants (Duration <5 Years), NIS 2003

	MODEL 1	MODEL 2	MODEL 3
Age	1.063***	1.062***	1.063***
Male	0.736*	0.744*	0.564***
Education level			
Less than high school	0.710*	0.718*	0.739+
High school graduate, GED, associate degree or some college (ref.)			
College degree or more	0.796	0.821	0.862
Marital status			
Married (ref.)			
Never married		1.407+	1.499*
Formerly married		1.351	1.330
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East		1.091	1.200
Asia		0.874	1.032
Other		1.250	1.162
Visa admission category			
Family preferences (ref.)			
Refugee		1.653*	1.697*
Diversity and others		0.743+	0.757
Employment preferences		1.070	1.066
Have Being a Smoker			2.225***
Physically Inactive			0.909
BMI Status			
Healthy Weight (ref.)			
Underweight (BMI < 18.5)			0.856
Overweight (BMI > = 25 to <30)			1.396*
Obese (BMI > = 30)			1.743**
Unknown BMI			0.931

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1

C denotes significant results compared with immigrants with at least a college degree at .05 level

N=3,601

Table 5.1: Odds Ratios for the Effect of Nativity/Duration on Poor/Fair Self-Reported Health among Immigrants, NHIS 2006-2008

	MODEL 1	MODEL 2	MODEL 3
Age	1.055***	1.056***	1.055***
Male	0.758**	0.751**	0.750**
Duration status			
0 to <5 years	0.724	0.685+	0.712**
5 to <10 years	0.711*[d]	0.662**[d]	0.659[b]
10 to <15 years	1.026	0.979	1.016**
>=15 years (ref.)			
Years of education		0.894***	0.903***
Marital Status			
Married or cohabitating (ref.)			
Never married		1.593**	1.614***
Formerly married		1.455***	1.485***
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East		0.921	0.928
Asia		0.741*	0.854
Other		0.729*	0.738+
Smoking status			
Never smoked (ref.)			
Current smoker			1.219
Former smoker			1.23
Exercise status			
Active and regular (ref.)			
Inactive			1.717***
Active but not regular			1.605***
BMI Status			
Healthy weight (ref.)			
Underweight (BMI < 18.5)			1.769
Overweight (BMI > = 25 to <30)			0.941
Obese (BMI > = 30)			1.986***
Unknown BMI			1.801**

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1

b denotes significant results compared with immigrants with 10 to 15 years of U.S. residence at .05 level

d denotes significant results compared with immigrants with 10 to 15 years of U.S. residence at .10 level

N=9,538

Table 5.2: Odds Ratios for the Effect of Nativity/Duration on Activity Limitation Status among Immigrants, NHIS 2006-2008

	MODEL 1	MODEL 2	MODEL 3
Age	1.059***	1.059***	1.057***
Male	0.553***	0.548***	0.486***
Duration status			
0 to <5 years	0.828	0.848	0.933
5 to <10 years	0.866	0.842	0.886
10 to <15 years	0.776*	0.787*	0.835
>=15 years (ref.)			
Years of education		0.965***	0.974***
Marital Status			
Married or cohabitating (ref.)			
Never married		1.206	1.209
Formerly married		1.223*	1.219*
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East		1.145	1.143
Asia		1.612***	0.727**
Other		1.009	0.986+
Smoking status			
Never smoked (ref.)			
Current smoker			1.639***
Former smoker			1.403**
Exercise status			
Active and regular (ref.)			
Inactive			1.287*
Active but not regular			1.488***
BMI Status			
Healthy weight (ref.)			
Underweight (BMI < 18.5)			0.860
Overweight (BMI > = 25 to <30)			1.174+
Obese (BMI > = 30)			2.110***
Unknown BMI			1.316**

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
N=9,538

Table 5.3: Odds Ratios for the Main Effect of Duration on Chronic Health Conditions, U.S. Adult Immigrants Aged 25-64, NHIS 2006-2008

	MODEL 1	MODEL 2	MODEL 3
Age	1.074***	1.073***	1.073***
Male	0.876*	0.891+	0.752***
Duration status			
0 to <5 years	0.614***	0.629***	0.710**
5 to <10 years	0.615***	0.616***	0.668***
10 to <15 years	0.652***	0.666***	0.713***
>=15 years (ref.)			
Years of education		1.004	1.008
Marital Status			
Married or cohabitating (ref.)			
Never married		1.128	1.167+
Formerly married		1.344***	1.344***
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East		1.013	1.011
Asia		0.882+	1.114
Other		1.268*	1.206+
Smoking status			
Never smoked (ref.)			
Current smoker			1.484***
Former smoker			1.786***
Exercise status			
Active and regular (ref.)			
Inactive			0.763***
Active but not regular			0.925
BMI Status			
Healthy weight (ref.)			
Underweight (BMI < 18.5)			0.356**
Overweight (BMI > = 25 to <30)			1.417***
Obese (BMI > = 30)			2.673***
Unknown BMI			1.506*

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
N=9,538

Table 5.4 Odds Ratios for the Main Effect of Duration on Poor/Fair Self-Reported Health, U.S. Adult Immigrants Aged 25-64, NIS 2003

	MODEL 1	MODEL 2	MODEL 3
Age	1.062***	1.047***	1.045***
Male	0.697***	0.768*	0.734**
Duration	1.112***	1.073***	1.069***
Duration (squared)	0.997***	0.998*	0.998*
Years of education		0.888***	0.895***
Marital status			
Married (ref.)			
Never married		1.005	1.012
Formerly married		0.893	0.903
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East		0.690	0.706
Asia		0.860	0.985
Other		1.114	1.142
Visa admission category			
Family preferences (ref.)			
Refugee		2.452***	2.377***
Diversity and others		1.409**	1.412**
Employment preferences		0.758	0.752
Have Being a Smoker			1.257+
Physically Inactive			1.197
BMI Status			
Healthy Weight (ref.)			
Underweight (BMI < 18.5)			0.559
Overweight (BMI > = 25 to <30)			1.198
Obese (BMI > = 30)			1.576**
Unknown BMI			1.720**

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
N=6,541

Table 5.5 Odds Ratios for the Effect of Duration on Activity Limitation Status among Immigrants, NIS 2003

	MODEL 1	MODEL 2	MODEL 3
Age	1.068***	1.061***	1.061***
Male	0.730**	0.764*	0.680***
Duration	1.088***	1.072***	1.067***
Duration (squared)	0.997***	0.998**	0.998**
Years of education		0.962***	0.964**
Marital status			
Married (ref.)			
Never married		1.331+	1.382*
Formerly married		1.115	1.114
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East		1.025	1.080
Asia		0.865	0.969
Other		1.115	1.109
Visa admission category			
Family preferences (ref.)			
Refugee		1.952***	1.913***
Diversity and others		0.936	0.925
Employment preferences		0.747	0.749
Have Being a Smoker			1.481**
Physically Inactive			1.22
BMI Status (ref.=Healthy Weight)			
Underweight (BMI < 18.5)			0.935
Overweight (BMI > = 25 to <30)			1.151
Obese (BMI > = 30)			1.778***
Unknown BMI			0.889

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
N=1,095

Table 5.6 Odds Ratios for the Effect of Duration on Chronic Health Conditions among Immigrants, NIS 2003

	MODEL 1	MODEL 2	MODEL 3
Age	1.064***	1.064***	1.063***
Male	0.682***	0.670***	0.599***
Duration	1.060***	1.048**	1.044*
Duration (squared)	0.998*	0.999+	0.999+
Years of education		0.999	1.001
Marital status			
Married (ref.)			
Never married		1.250	1.285+
Formerly married		1.017	1.011
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East		1.029	1.077
Asia		0.837	0.928
Other		1.024	1.012
Visa admission category			
Family preferences (ref.)			
Refugee		1.681**	1.676**
Diversity and others		1.024	1.022
Employment preferences		0.926	0.932
Have Being a Smoker			1.464***
Physically Inactive			1.069
BMI Status (ref.=Healthy Weight)			
Underweight (BMI < 18.5)			0.958
Overweight (BMI > = 25 to <30)			1.167
Obese (BMI > = 30)			1.599***
Unknown BMI			0.979

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
N=1,095

Table 5.7 Odds Ratios for the Interaction Effect between Duration and SES on Poor/Fair Self- reported Health, U.S. Adult Immigrants Aged 25-64, NIS 2003

	MODEL 1	MODEL 2	MODEL 3	MODEL 4
Age	1.060***	1.060***	1.062***	1.058***
Male	0.729**	0.729**	0.699**	0.690**
Duration	1.117***	1.128***	1.091***	1.087***
Duration (squared)	0.997***	0.997***	0.998**	0.998**
High SES	0.319***	0.768	0.902	0.924
Duration*High SES		0.814**	0.849*	0.856*
Duration (squared)*High SES		1.006*	1.005+	1.004+
Marital status				
Married (ref.)				
Never married			1.045	1.045
Formerly married			0.940	0.952
Region of origin				
Latin America and the Caribbean (ref.)				
Africa and Middle East			0.538**	0.564*
Asia			0.676**	0.804
Other			0.712+	0.779
Visa admission category				
Family preferences (ref.)				
Refugee			2.295***	2.214***
Diversity and others			1.388**	1.384*
Employment preferences			0.671+	0.674+
Have Being a Smoker				1.207
Physically Inactive				1.328*
BMI Status				
Healthy Weight (ref.)				
Underweight (BMI < 18.5)				0.634
Overweight (BMI > = 25 to <30)				1.216
Obese (BMI > = 30)				1.702***
Unknown BMI				2.156***

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
N=6,541

Table 5.8 Odds Ratios for the Interaction Effect between Duration and SES on Activity Limitation Status among Immigrants, NIS 2003

	MODEL 1	MODEL 2	MODEL 3	MODEL 4
Age	1.066***	1.067***	1.066***	1.065***
Male	0.753**	0.752**	0.744**	0.671***
Duration	1.093***	1.098***	1.082***	1.076***
Duration (squared)	0.997***	0.997***	0.997**	0.998**
High SES	0.524***	0.730	0.815	0.839
Duration*High SES		0.951+	0.949+	0.954
Marital status				
Married (ref.)				
Never married			1.374*	1.419*
Formerly married			1.147	1.144
Region of origin				
Latin America and the Caribbean (ref.)				
Africa and Middle East			0.977	1.028
Asia			0.828	0.936
Other			1.027	1.035
Visa admission category				
Family preferences (ref.)				
Refugee			1.901***	1.864***
Diversity and others			0.912	0.905
Employment preferences			0.787	0.779
Have Being a Smoker				1.455**
Physically Inactive				1.249+
BMI Status (ref.=Healthy Weight)				
Underweight (BMI < 18.5)				0.966
Overweight (BMI > = 25 to <30)				1.147
Obese (BMI > = 30)				1.800***
Unknown BMI				0.963

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1

N=1,095

Table 5.9 Odds Ratios for the Interaction Effect between Duration and SES on Chronic Health Conditions among Immigrants, NIS 2003

	MODEL 1	MODEL 2	MODEL 3	MODEL 4
Age	1.064***	1.064***	1.064***	1.064***
Male	0.683***	0.683**	0.668***	0.597***
Duration	1.060***	1.061***	1.049**	1.044*
Duration (squared)	0.998*	0.998*	0.999+	0.999+
High SES	0.974	1.047	1.140	1.159
Duration*High SES		0.990	0.989+	0.994
Marital status				
Married (ref.)				
Never married			1.254+	1.286+
Formerly married			1.017	1.009
Region of origin				
Latin America and the Caribbean (ref.)				
Africa and Middle East			1.024	1.069
Asia			0.832	0.920
Other			1.010	0.996
Visa admission category				
Family preferences (ref.)				
Refugee			1.685**	1.684**
Diversity and others			1.024	1.026
Employment preferences			0.904	0.899
Have Being a Smoker				1.467***
Physically Inactive				1.075
BMI Status (ref.=Healthy Weight)				
Underweight (BMI < 18.5)				0.959
Overweight (BMI > = 25 to <30)				1.169
Obese (BMI > = 30)				1.602***
Unknown BMI				0.979

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1

N=1,095

Table 5.10: Odds Ratios for the Effect of Duration on Poor/Fair Self-Reported Health by Education Level, U.S. Adult Immigrants Aged 25-64, NHIS 2006-2008

	Less than High School	High School	College Degree
Age	1.058***	1.059***	1.054***
Male	0.807	0.667*	0.849
Duration status			
0 to <5 years	0.891	0.445*[d]	0.646
5 to <10 years	0.628*	0.794[b]	0.599
10 to <15 years	0.873	1.500+	0.703
>=15 years (ref.)			
Marital Status			
Married or cohabitating (ref.)			
Never married	1.606*	1.447+	2.085
Formerly married	1.582**	1.479*	1.253*
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East	0.651	1.132	1.133
Asia	0.812	0.825	1.150
Other	0.403*	0.893	0.803
Smoking status			
Never smoked (ref.)			
Current smoker	1.056	1.260	1.704
Former smoker	1.096	1.438+	1.126
Exercise status			
Active and regular (ref.)			
Inactive	1.110	2.419***	2.406**
Active but not regular	1.256	1.933**	1.651+
BMI Status			
Healthy weight (ref.)			
Underweight (BMI < 18.5)	1.465	0.695	3.360*
Overweight (BMI > = 25 to <30)	1.022	0.683+	1.136
Obese (BMI > = 30)	1.792**	1.967***	2.169*
Unknown BMI	1.343	2.429*	3.675*
Sample size	3,325	3,593	2,620

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1

b denotes significant results compared with immigrants with 10 to 15 years of U.S. residence at .05 level

d denotes significant results compared with immigrants with 10 to 15 years of U.S. residence at .10 level

Total N=9,538

Table 5.11: Odds Ratios for the Effect of Duration on Activity Limitation Status by Education Level, U.S. Adult Immigrants Aged 25-64, NHIS 2006-2008

	Less than High School	High School	College Degree
Age	1.062***	1.062***	1.048***
Male	0.390***	0.553***	0.508***
Duration status			
0 to <5 years	0.761	0.930	1.110
5 to <10 years	0.676*	1.107	0.896
10 to <15 years	0.953	0.807	0.669+
>=15 years (ref.)			
Marital Status			
Married or cohabitating (ref.)			
Never married	1.146	1.394+	0.971
Formerly married	1.088	1.385*	1.087
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East	0.893	1.075	1.210
Asia	1.120	0.551**	0.829
Other	0.647	1.000	1.074
Smoking status			
Never smoked (ref.)			
Current smoker	1.839***	1.521**	1.819*
Former smoker	1.363	1.541*	1.256
Exercise status			
Active and regular (ref.)			
Inactive	1.333	1.493**	1.044
Active but not regular	1.790**	1.453*	1.34
BMI Status			
Healthy weight (ref.)			
Underweight (BMI < 18.5)	0.197+	1.039	1.083
Overweight (BMI > = 25 to <30)	0.992	1.059	1.548*
Obese (BMI > = 30)	1.689***	1.922***	3.484***
Unknown BMI	1.322	1.336	1.108
Sample size	3,325	3,593	2,620

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1

Total N=9,538

Table 5.12: Odds Ratios for the Effect of Duration on Chronic Health Conditions by Education Levels, U.S. Adult Immigrants Aged 25-64, NHIS 2006-2008

	Less than High School	High School	College Degree
Age	1.086***	1.076***	1.056***
Male	0.496***	0.833+	0.962
Duration status			
0 to <5 years	0.738+	0.624+	0.697+
5 to <10 years	0.662*	0.665**	0.657**
10 to <15 years	0.845	0.638**	0.658*
>=15 years (ref.)			
Marital Status			
Married or cohabitating (ref.)			
Never married	1.024	1.221	1.171
Formerly married	1.223	1.483***	1.155
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East	1.291	0.957	0.886
Asia	0.917	1.334*	0.934
Other	1.090	1.152	1.184+
Smoking status			
Never smoked (ref.)			
Current smoker	1.290+	1.689***	1.527*
Former smoker	1.727***	1.943***	1.740***
Exercise status			
Active and regular (ref.)			
Inactive	0.879	0.804+	0.642**
Active but not regular	1.085	0.988	0.787+
BMI Status			
Healthy weight (ref.)			
Underweight (BMI < 18.5)	0.287	0.348*	0.427+
Overweight (BMI > = 25 to <30)	1.276+	1.502**	1.457**
Obese (BMI > = 30)	2.035***	3.028***	2.762***
Unknown BMI	1.424	1.832*	1.029
Sample size	3,325	3,593	2,620

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
Total N=9,538

Table 5.13: Odds Ratios for the Effect of Duration on Health by High-SES Status, U.S. Adult Immigrants Aged 25-64, NHIS 2006-2008

	Self-Reported Health		Activity Limitation Status		Chronic Health Conditions	
	Not High SES	High SES	Not High SES	High SES	Not High SES	High SES
Age	1.059***	1.056**	1.061***	1.046***	1.077***	1.055***
Male	0.749**	0.832	0.473***	0.532***	0.717***	0.905
Duration status						
0 to <5 years	0.760	0.804	0.868	1.242	0.695**	0.640+
5 to <10 years	0.692*[b]	0.379+	0.870	0.949	0.698***	0.531**
10 to <15 years	1.090	0.711	0.878	0.606	0.762*	0.512**
>=15 years (ref.)						
Marital Status						
Married or cohabitating (ref.)						
Never married	1.588**	2.120*	1.286+	0.911	1.155	1.156
Formerly married	1.471***	1.492	1.197+	1.369	1.389***	1.086
Region of origin						
Latin America and the Caribbean (ref.)						
Africa and Middle East	0.670	1.301	1.145	0.883	0.922	1.226
Asia	0.604***	1.922	0.589***	1.133	1.181+	0.971
Other	0.553***	0.890	0.920	0.999	1.198+	1.227
Smoking status						
Never smoked (ref.)						
Current smoker	1.161	1.978	1.632***	1.785+	1.479***	1.693*
Former smoker	1.192	1.373+	1.373*	1.521+	1.839***	1.680**
Exercise status						
Active and regular (ref.)						
Inactive	1.768***	2.419**	1.378**	1.074	0.844*	0.506***
Active but not regular	1.567**	3.237*	1.532***	1.462*	1.057	0.636**

Table 5.13 (*Continued*)

	Self-Reported Health		Activity Limitation Status		Chronic Health Conditions	
	Not High SES	High SES	Not High SES	High SES	Not High SES	High SES
BMI Status						
Healthy weight (ref.)						
Underweight (BMI < 18.5)	1.747	2.430	0.971	0.510	0.306**	0.489
Overweight (BMI > = 25 to <30)	0.939	1.646	1.115	1.603*	1.458***	1.442*
Obese (BMI > = 30)	2.020***	2.520+	1.931***	4.317***	2.712***	2.377***
Unknown BMI	1.939**	3.854*	1.428+	0.484	1.629**	0.809
Sample size	7,888	1,650	7,888	1,650	7,888	1,650

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1

b denotes significant results compared with immigrants with 10 to 15 years of U.S. residence at .05 level

d denotes significant results compared with immigrants with 10 to 15 years of U.S. residence at .10 level

Total N=9,538

Table 5.14 Odds Ratios for the Effect of Duration on Poor/Fair Self-Reported Health by Education Level, U.S. Adult Immigrants Aged 25-64, NIS 2003

	Less than High School	High School	College Degree
Age	1.041***	1.053***	1.071***
Male	0.693*	0.564*	0.966
Duration	1.027**	1.027*	1.011
Marital status			
Married (ref.)			
Never married	0.833	1.346	1.484
Formerly married	0.792	1.294	1.128
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East	0.417*	1.105	0.788
Asia	0.752	1.040	1.040
Other	0.338*	1.959*	0.900
Visa admission category			
Family preferences (ref.)			
Refugee	3.118***	2.382**	1.608
Diversity and others	1.494*	1.506	0.776
Employment preferences	1.007	0.548	0.525+
Have Being a Smoker	1.160	1.295	1.5
Physically Inactive	1.124	1.275	1.806
BMI Status			
Healthy Weight (ref.)			
Underweight (BMI < 18.5)	0.451	0.893	0.606
Overweight (BMI > = 25 to <30)	1.149	1.468	1.072
Obese (BMI > = 30)	1.407	3.001***	0.992
Unknown BMI	1.872**	2.051	1.384
Sample size	1,741	1,955	2,845

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
Total N=6,541

Table 5.15 Odds Ratios for the Effect of Duration on Activity Limitation Status by Education Level, U.S. Adult Immigrants Aged 25-64, NIS 2003

	Less than High School	High School	College Degree
Age	1.071***	1.058***	1.061***
Male	0.721+	0.653*	0.703
Duration	1.083*	1.018	1.009
Duration (squared)	0.997*		
Marital status			
Married (ref.)			
Never married	1.317	1.334	1.588**
Formerly married	1.013	1.357	0.962
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East	1.689+	1.071	0.701
Asia	0.830	1.035	0.903
Other	0.813	1.379	0.809
Visa admission category			
Family preferences (ref.)			
Refugee	2.257*	2.210**	1.454***
Diversity and others	1.064	0.853	0.72
Employment preferences	1.568	0.554	0.624+
Have Being a Smoker	1.429+	1.607	1.386**
Physically Inactive	1.197	1.309*	1.055
BMI Status			
Healthy Weight (ref.)			
Underweight (BMI < 18.5)	0.423	1.181	1.142
Overweight (BMI > = 25 to <30)	1.090	0.954	1.565+
Obese (BMI > = 30)	2.220***	1.623+	0.972
Unknown BMI	0.981	1.154	0.173+
Sample size	1,741	1,955	2,845

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1

Total N=6,541

Table 5.16 Odds Ratios for the Effect of Duration on Chronic Health Conditions by Education Level, U.S. Adult Immigrants Aged 25-64, NIS 2003

	Less than High School	High School	College Degree
Age	1.082***	1.052***	1.061***
Male	0.769	0.471***	0.626**
Duration	1.110**	1.001	1.015
Duration (squared)	0.997*		
Marital status			
Married (ref.)			
Never married	1.432	1.014	1.402+
Formerly married	0.860	1.229	0.971
Region of origin			
Latin America and the Caribbean (ref.)			
Africa and Middle East	1.297	0.934	1.353
Asia	0.822	1.023	1.063
Other	1.727	0.750	1.161
Visa admission category			
Family preferences (ref.)			
Refugee	2.073*	2.151**	1.175
Diversity and others	1.183	1.114	0.640*
Employment preferences	0.885	0.705	0.895
Have Being a Smoker	0.952	1.747**	1.874***
Physically Inactive	1.277	0.846	0.980
BMI Status			
Healthy Weight (ref.)			
Underweight (BMI < 18.5)	1.089	1.087	0.726
Overweight (BMI > = 25 to <30)	1.076	1.282	1.205
Obese (BMI > = 30)	1.820**	1.618+	1.101
Unknown BMI	1.112	0.958	0.495
Sample size	1,741	1,955	2,845

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1

Total N=6,541

Table 5.17: Odds Ratios for the Effect of Duration on Health by High-SES Status, U.S. Adult Immigrants Aged 25-64, NIS 2003

	Self-Reported Health		Activity Limitation Status		Chronic Health Conditions	
	Not High SES	High SES[a]	Not High SES	High SES[b]	Not High SES	High SES
Age	1.057***	1.080**	1.067***	1.059***	1.064***	1.067***
Male	0.658***	1.364	0.678**	0.519+	0.577***	0.673+
Duration	1.086***	0.960	1.076***	0.988	1.049*	1.010
Duration (squared)	0.998**		0.998**		0.999+	
Marital status						
Married (ref.)						
Never married	1.065	0.695	1.448*	1.070	1.294+	1.253
Formerly married	0.954	0.934	1.179	0.553	1.052	0.626
Region of origin						
Latin America and the Caribbean (ref.)						
Africa and Middle East	0.618*		1.113	0.433	1.137	0.788
Asia	0.787	0.867	0.888	1.340	0.898	0.958
Other	0.775	0.533	1.042	1.234	1.072	0.818
Visa admission category						
Family preferences (ref.)						
Refugee	2.265***	1.570	1.938***	1.300	1.737***	1.250
Diversity and others	1.418**	0.596	0.931	0.492	1.060	0.611
Employment preferences	0.628+	0.568	0.683+	0.782	0.740	0.924
Have Being a Smoker	1.220	1.408	1.560***	0.665	1.494**	1.382
Physically Inactive	1.236+	4.361**	1.245+	0.993	1.038	1.320

Table 5.17 (*Continued*)

	Self-Reported Health		Activity Limitation Status		Chronic Health Conditions	
	Not High SES	High SES[a]	Not High SES	High SES[b]	Not High SES	High SES
BMI Status						
Healthy Weight (ref.)						
Underweight (BMI < 18.5)	0.544	2.825	1.079	0.248	1.117	0.347
Overweight (BMI > = 25 to <30)	1.171	1.780	1.096	2.065*	1.178	1.098
Obese (BMI > = 30)	1.683**	1.379	1.833***	1.179	1.568**	1.922
Unknown BMI	2.120***	1.846	1.001		1.003	0.547
Sample size	5,031	1,510	5,031	1,510	5,031	1,510

a The "Africa and Middle East" category is collapsed with the "other" category for this set of analysis because of its small sample size.
b The "unknown BMI" category is collapsed with the reference category for this et of analysis because of its small sample size.
Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
Total N=6,541

Table 6.1: Odds Ratios for the Effect of Nativity/Duration on Poor/Fair Self-Reported Health by Education Level, U.S. Adults Aged 25-64, NHIS 2006-2008

	Less than High School			High School Degree /Some College			College Degree and above		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Age	1.058***	1.059***	1.060***	1.042***	1.046***	1.044***	1.055***	1.058***	1.050***
Male	0.724***	0.751***	0.737***	0.823***	0.844**	0.799***	0.937	1.003	0.983
Nativity/duration status									
Native (ref.)									
0 to <5 years	0.549*	0.553*	0.728	0.304**[d]	0.273**[d]	0.316**[d]	1.085	1.065	0.874
5 to <10 years	0.428***	0.413***	0.507**	0.564**	0.507**	0.574*	0.923	0.896	0.755
10 to <15 years	0.565**	0.562**	0.697	0.924	0.875	1.022	0.980	0.992	0.88
>=15 years	0.656***	0.648***	0.763*	0.778**	0.714***	0.788*	1.418*	1.353	1.264
Race									
White (ref.)									
Black		1.264*	1.256*		1.577***	1.486***		1.543***	1.179
Hispanic		1.215+	1.238+		1.435***	1.451***		1.153	1.049
Asian		0.798	0.948		1.033	1.221		1.157	1.303
Other		1.379	1.513		1.830***	1.685***		2.059+	1.678
Marital Status									
Married or cohabitating (ref.)									
Never married		1.529***	1.540***		1.577***	1.565***		2.004***	1.840***
Formerly married		1.673***	1.637***		1.667***	1.570***		2.161***	1.962***

Table 6.1 (*Continued*)

	Less than High School	High School Degree /Some College	College Degree and above
Exercise status			
Active and regular (ref.)			
Inactive	1.692***	2.890***	5.354***
Active but not regular	1.612***	2.117***	2.588***
BMI Status			
Healthy weight (ref.)			
Underweight (BMI < 18.5)	2.339**	1.963***	2.732**
Overweight (BMI > = 25 to <30)	1.052	1.117	1.117
Obese (BMI > = 30)	1.998***	2.351***	2.698***
Unknown BMI	0.953	1.405**	1.425
Sample size	7,227	25,745	13,819

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
d denotes significant results compared with immigrants with 10 to 15 years of U.S. residence at .05 level

Table 6.2: Odds Ratios for the Effect of Nativity/Duration on Activity Limitation Status by Education Level, U.S. Adults Aged 25-64, NHIS 2006-2008

	Less than High School			High School Degree/ Some College			College Degree and above		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Age	1.059***	1.058***	1.059***	1.049***	1.050***	1.050***	1.054***	1.053***	1.050***
Male	0.553***	0.552***	0.527***	0.672***	0.674***	0.608***	0.749***	0.753***	0.646***
Nativity/duration status									
Native (ref.)									
0 to <5 years	0.248***	0.335***	0.435***	0.391**	0.450***	0.577	0.631*	0.769	0.841
5 to <10 years	0.240***	0.318***	0.389***	0.496***	0.560*	0.682**	0.540**	0.624*	0.675+
10 to <15 years	0.312***	0.425***	0.548***	0.327***	0.390***	0.473***	0.411***	0.488***	0.512**
>=15 years	0.362***	0.480***	0.567***	0.502***	0.566***	0.623***	0.631***	0.724**	0.753*
Race									
White (ref.)									
Black		0.867	0.861		0.839***	0.803***		0.876	0.722***
Hispanic		0.734**	0.743**		0.937	0.931		0.954	0.882
Asian		0.546*	0.702		0.622***	0.754*		0.680**	0.777*
Other		1.907*	2.098**		1.501***	1.381**		1.620**	1.440+
Marital Status									
Married or cohabitating (ref.)									
Never married		1.188+	1.237*		1.357***	1.373***		1.161+	1.097
Formerly married		1.302***	1.290***		1.359***	1.313***		1.223**	1.162*

Table 6.2 (*Continued*)

	Less than High School	High School Degree/ Some College	College Degree and above
Smoking status			
Never smoked (ref.)			
Current smoker	1.707***	1.799***	1.479***
Former smoker	1.388***	1.474***	1.228**
Exercise status			
Active and regular (ref.)			
Inactive	1.502***	1.325***	1.362***
Active but not regular	2.064***	1.618***	1.736***
BMI Status			
Healthy weight (ref.)			
Underweight (BMI < 18.5)	0.622	1.376*	0.988
Overweight (BMI > = 25 to <30)	1.064	1.328***	1.452***
Obese (BMI > = 30)	1.955***	2.669***	3.004***
Unknown BMI	1.288	1.420***	1.421**
Sample size	7,227	25,745	13,819

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
Total N=46,791

Table 6.3: Odds Ratios for the Effect of Nativity/Duration on Chronic Health Conditions by Education Level, U.S. Adults Aged 25-64, NHIS 2006-2008

	Less than High School			High School Degree/ Some College			College Degree and above		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Age	1.077***	1.075***	1.075***	1.064***	1.063***	1.063***	1.058***	1.059***	1.056***
Male	0.658***	0.665***	0.627***	0.875***	0.884***	0.796***	1.083*	1.090*	0.936
Nativity/duration status									
Native (ref.)									
0 to <5 years	0.237***	0.286***	0.375***	0.285***	0.311***	0.399***	0.455***	0.542**	0.602*
5 to <10 years	0.229***	0.272***	0.337***	0.323***	0.348***	0.424***	0.446***	0.522***	0.578***
10 to <15 years	0.277***	0.333***	0.418***	0.318***	0.348***	0.419***	0.468***	0.546***	0.583***
>=15 years	0.382***	0.458***	0.533***	0.585***	0.628***	0.695***	0.727***	0.832*	0.885
Race									
White (ref.)									
Black		0.959	0.930		1.066	1.044		1.228**	1.101*
Hispanic		0.812+	0.772*		0.887*	0.867*		0.843	0.785
Asian		0.67+	0.843		0.931	1.125		0.746**	0.871
Other		0.842	0.865		1.448***	1.329**		1.348	1.226
Marital Status									
Married or cohabitating (ref.)									
Never married		0.938	0.990		1.041	1.054		1.111+	1.083
Formerly married		1.258*	1.283**		1.205***	1.193***		1.136+	1.104

Table 6.3 (*Continued*)

	Less than High School	High School Degree/ Some College	College Degree and above
Smoking status			
Never smoked (ref.)			
Current smoker	1.426***	1.545***	1.267**
Former smoker	1.378**	1.578***	1.378***
Exercise status			
Active and regular (ref.)			
Inactive	1.042	0.937+	0.911
Active but not regular	1.042**	1.125**	1.034
BMI Status			
Healthy weight (ref.)			
Underweight (BMI < 18.5)	0.956	1.216	0.778
Overweight (BMI > = 25 to <30)	1.424***	1.357***	1.415***
Obese (BMI > = 30)	2.515***	2.961***	2.846***
Unknown BMI	1.282	1.203*	1.215+
Sample size	7,227	25,745	13,819

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
Total N=46,791

Table 6.4: Odds Ratios for the Effect of Nativity/Duration on Poor/Fair Self-Reported Health by SES, U.S. Adults Aged 25-64, NHIS 2006-2008

	Low or middle SES			High SES		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Age	1.047***	1.051***	1.050***	1.061***	1.062***	1.055***
Male	0.813***	0.837***	0.795***	0.841	0.923	0.917
Nativity/duration status						
Native (ref.)						
0 to <5 years	0.673+	0.562**	0.653+	1.345	1.433	1.184
5 to <10 years	0.658**	0.531***	0.602***[d]	0.551	0.59	0.497
10 to <15 years	0.955	0.808	0.636	0.918	1.005	0.916
>=15 years	0.980	0.819**	0.900	1.365+	1.377	1.390
Race						
White (ref.)						
Black		1.654***	1.530***		1.617**	1.183
Hispanic		1.730***	1.678***		1.120	1.009
Asian		0.950	1.162		0.944	1.076
Other		1.862***	1.726***		1.031	0.869
Marital Status						
Married or cohabitating (ref.)						
Never married		1.637***	1.607***		2.032***	1.949***
Formerly married		1.732***	1.617***		2.341***	2.104***
Smoking status						
Never smoked (ref.)						
Current smoker			2.141***			2.025***
Former smoker			1.370***			1.476**
Exercise status						
Active and regular (ref.)						
Inactive			2.903***			6.365***
Active but not regular			2.069***			3.287***
BMI Status						
Healthy weight (ref.)						
Underweight (BMI < 18.5)			2.159***			2.661+
Overweight (BMI > = 25 to <30)			1.134*			1.050
Obese (BMI > = 30)			2.379***			2.683***
Unknown BMI			1.358**			0.898
Sample size		7,227			25,745	

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
d denotes significant results compared with immigrants with 10 to 15 years of U.S. residence at .05 level
Total N=46,791

Table 6.5: Odds Ratios for the Effect of Nativity/Duration on Activity Limitation Status by SES, U.S. Adults Aged 25-64, NHIS 2006-2008

	Low or middle SES			High SES		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Age	1.051***	1.052***	1.051***	1.056***	1.056***	1.053***
Male	0.657***	0.660***	0.596***	0.744***	0.752***	0.658***
Nativity/duration status						
Native (ref.)						
0 to <5 years	0.383***	0.434***	0.548**	0.694	0.835	0.940
5 to <10 years	0.419***	0.457***	0.553***	0.568*	0.669	0.712
10 to <15 years	0.391***	0.445***	0.544***	0.406***	0.484**	0.487*
>=15 years	0.521***	0.575***	0.642***	0.639***	0.732*	0.760*
Race						
White (ref.)						
Black		0.914*	0.854***		0.858	0.710
Hispanic		0.999	0.959		0.882	0.807
Asian		0.601***	0.745**		0.705*	0.806
Other		1.715***	1.604***		0.963	0.843
Marital Status						
Married or cohabitating (ref.)						
Never married		1.323***	1.331***		1.156+	1.102
Formerly married		1.369***	1.307***		1.262**	1.195*
Smoking status						
Never smoked (ref.)						
Current smoker			1.899***			1.365**
Former smoker			1.451***			1.246**
Exercise status						
Active and regular (ref.)						
Inactive			1.436***			1.357***
Active but not regular			1.710***			1.789***
BMI Status						
Healthy weight (ref.)						
Underweight (BMI < 18.5)			1.277+			0.641
Overweight (BMI > = 25 to <30)			1.345***			1.296**
Obese (BMI > = 30)			2.678***			2.756***
Unknown BMI			1.450***			1.309+
Sample size		7,227			25,745	

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
Total N=46,791

Table 6.6: Odds Ratios for the Effect of Nativity/Duration on Chronic Health Conditions by SES, U.S. Adults Aged 25-64, NHIS 2006-2008

	Low or middle SES			High SES		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Age	1.065***	1.065***	1.064***	1.059***	1.058***	1.055***
Male	0.867***	0.876***	0.790***	1.035	1.052	0.902+
Nativity/duration status						
Native (ref.)						
0 to <5 years	0.303***	0.335***	0.430***	0.458**	0.547*	0.606+
5 to <10 years	0.325***	0.354***	0.431***	0.391***	0.465***	0.510***
10 to <15 years	0.353***	0.391***	0.475***	0.393***	0.467***	0.483**
>=15 years	0.552***	0.601***	0.672***	0.767**	0.885	0.935
Race						
White (ref.)						
Black		1.105*	1.061		1.234*	1.088
Hispanic		0.919+	0.874*		0.765*	0.693**
Asian		0.857+	1.051		0.733**	0.864
Other		1.410***	1.304**		1.134	1.023
Marital Status						
Married or cohabitating (ref.)						
Never married		1.043	1.057		1.094	1.065
Formerly married		1.216***	1.197***		1.244**	1.186*
Smoking status						
Never smoked (ref.)						
Current smoker			1.554***			1.368***
Former smoker			1.547***			1.359***
Exercise status						
Active and regular (ref.)						
Inactive			0.981			0.905
Active but not regular			1.162***			1.017
BMI Status						
Healthy weight (ref.)						
Underweight (BMI < 18.5)			1.133			0.709
Overweight (BMI > = 25 to <30)			1.385***			1.431***
Obese (BMI > = 30)			2.945***			2.787***
Unknown BMI			1.225**			1.253
Sample size		7,227			25,745	

Two-tailed tests: ***p<.001; **p<.01; *p<.05; +p<0.1
Total N=46,791

Figures

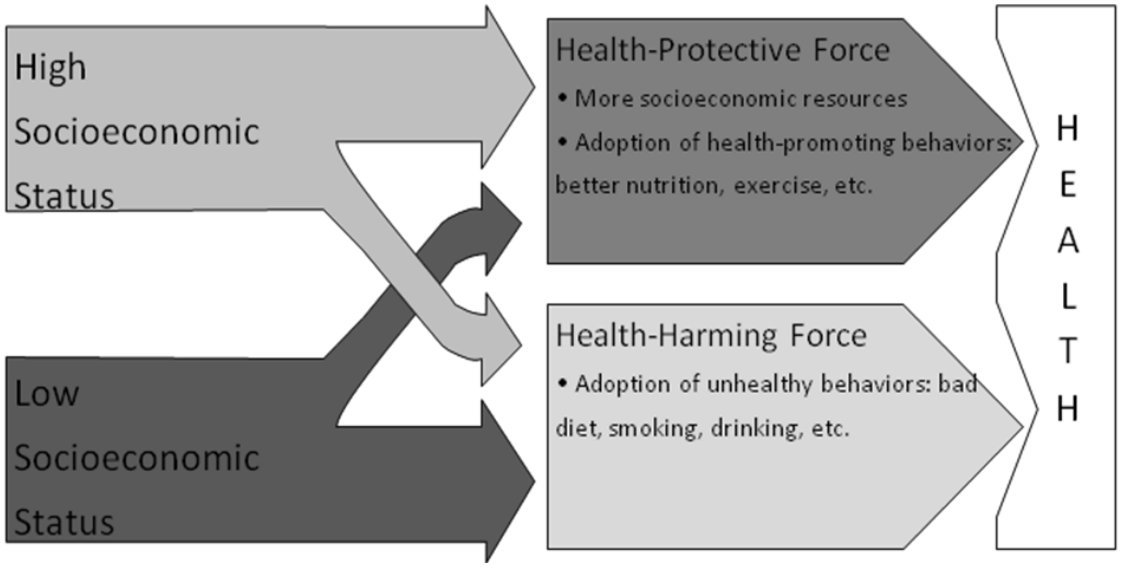
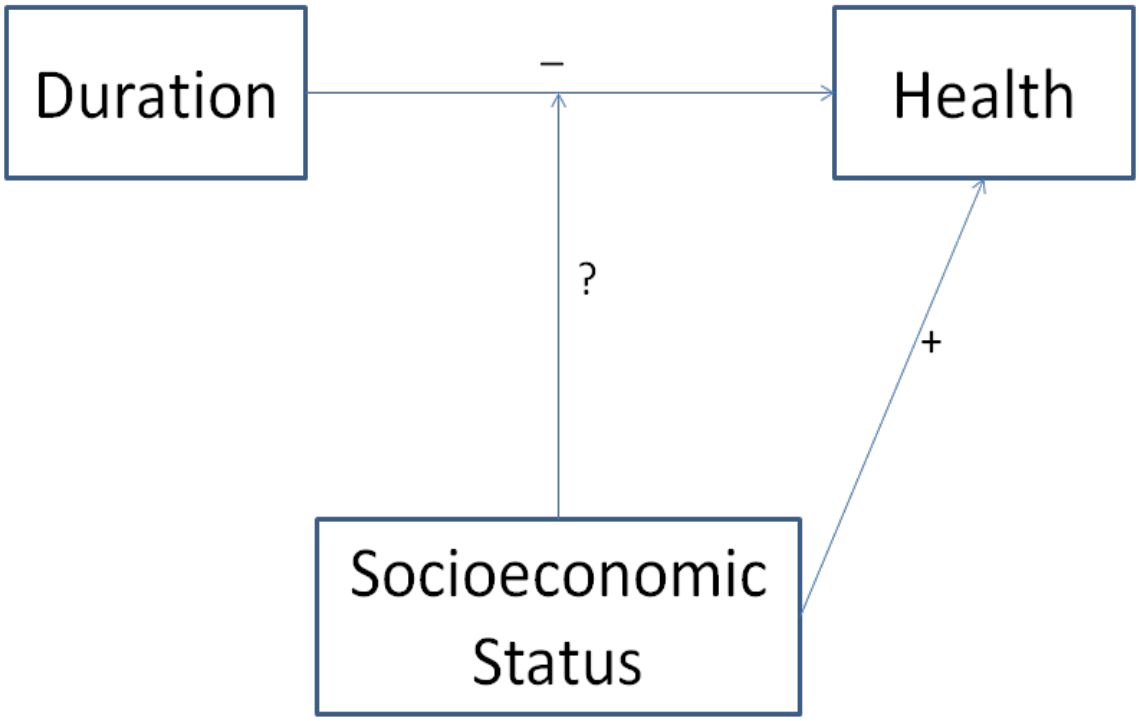


Figure 2.1: Socioeconomic Status, Acculturation Forces and Immigrant Health

Figure 2.2: Theoretical Model: Duration, Socioeconomic Status and Immigrant Health



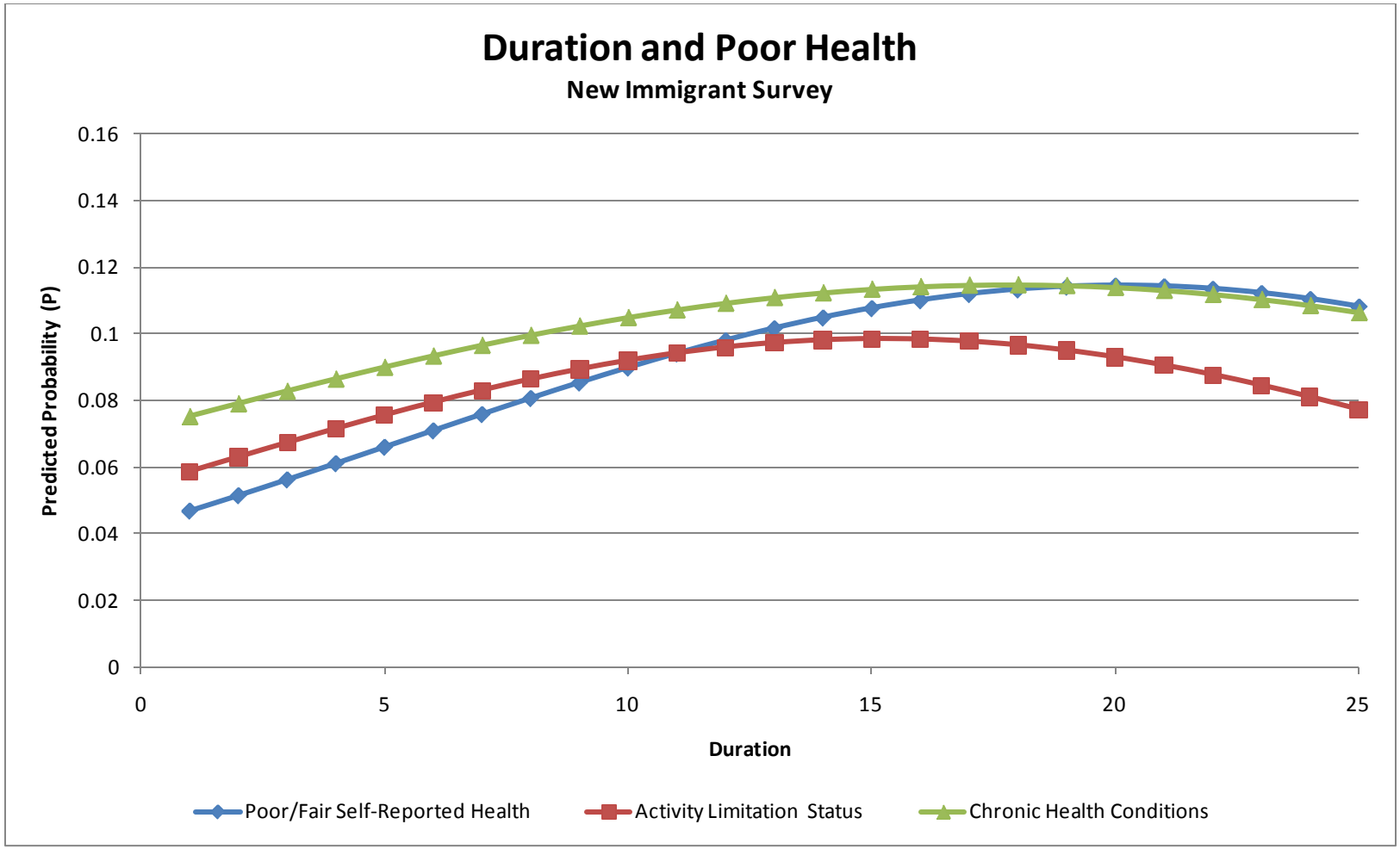


Figure 5.1: Predicted Probability of Poor/Fair Self-Reported Health, Activity Limitation and Chronic Health Conditions for U.S. Adult Immigrants by Duration of Residence, NIS 2003

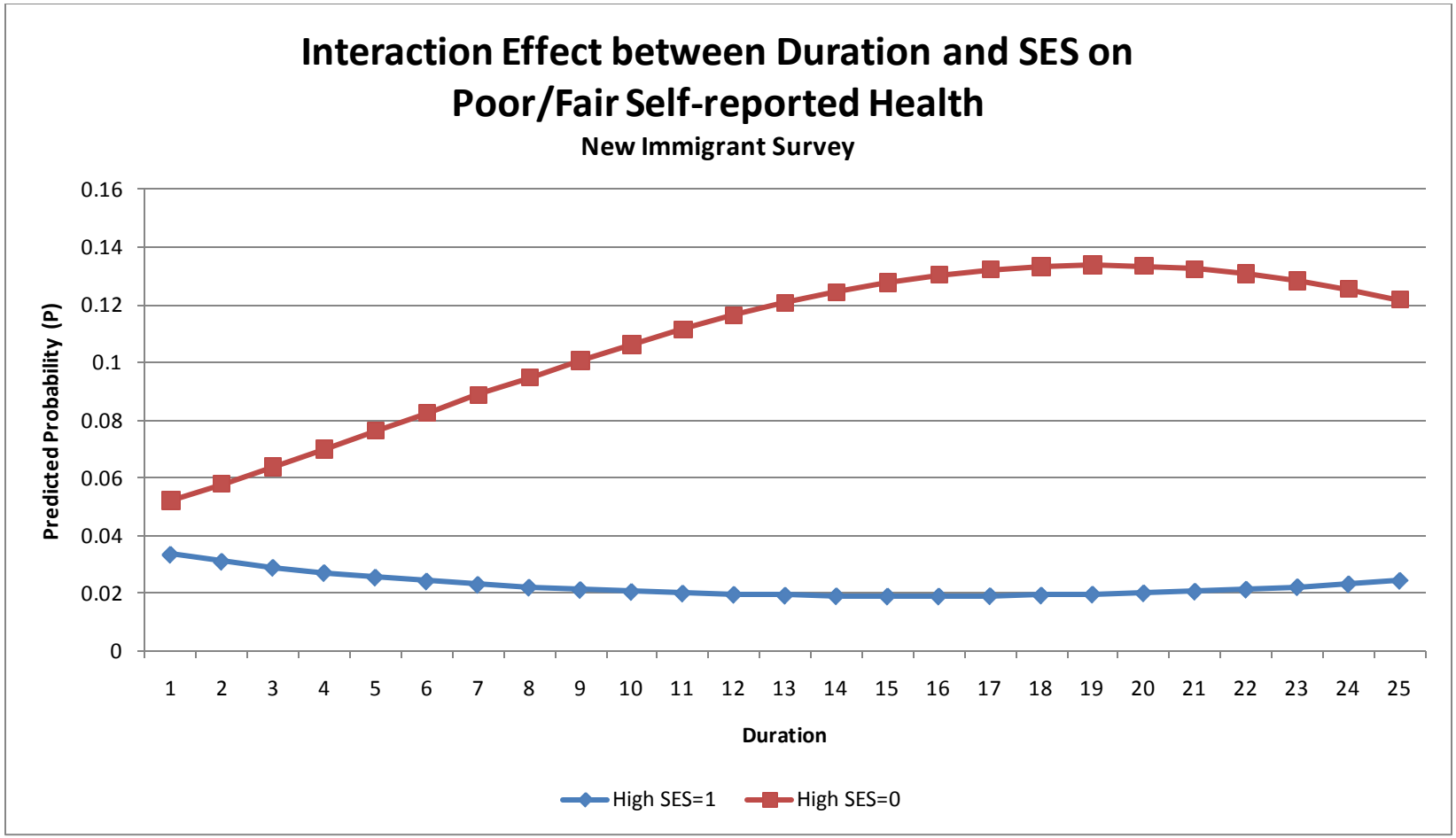


Figure 5.2 Predicted Probability of Poor/Fair Self-Reported Health for U.S. Adult Immigrants by Duration of Residence, NIS 2003

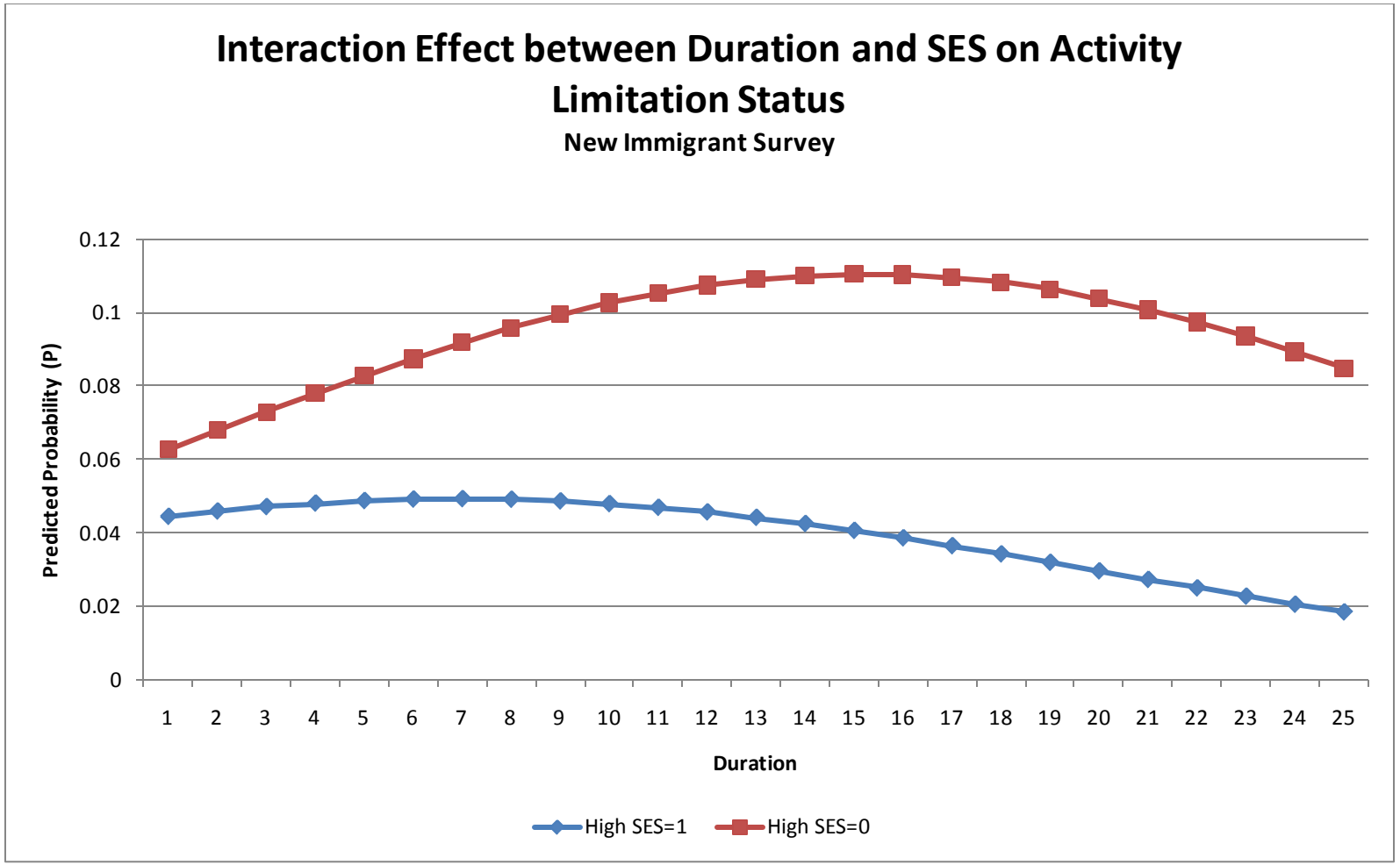


Figure 5.3 Predicted Probability of Activity Limitation Status for U.S. Adult Immigrants by Duration of Residence, NIS 2003

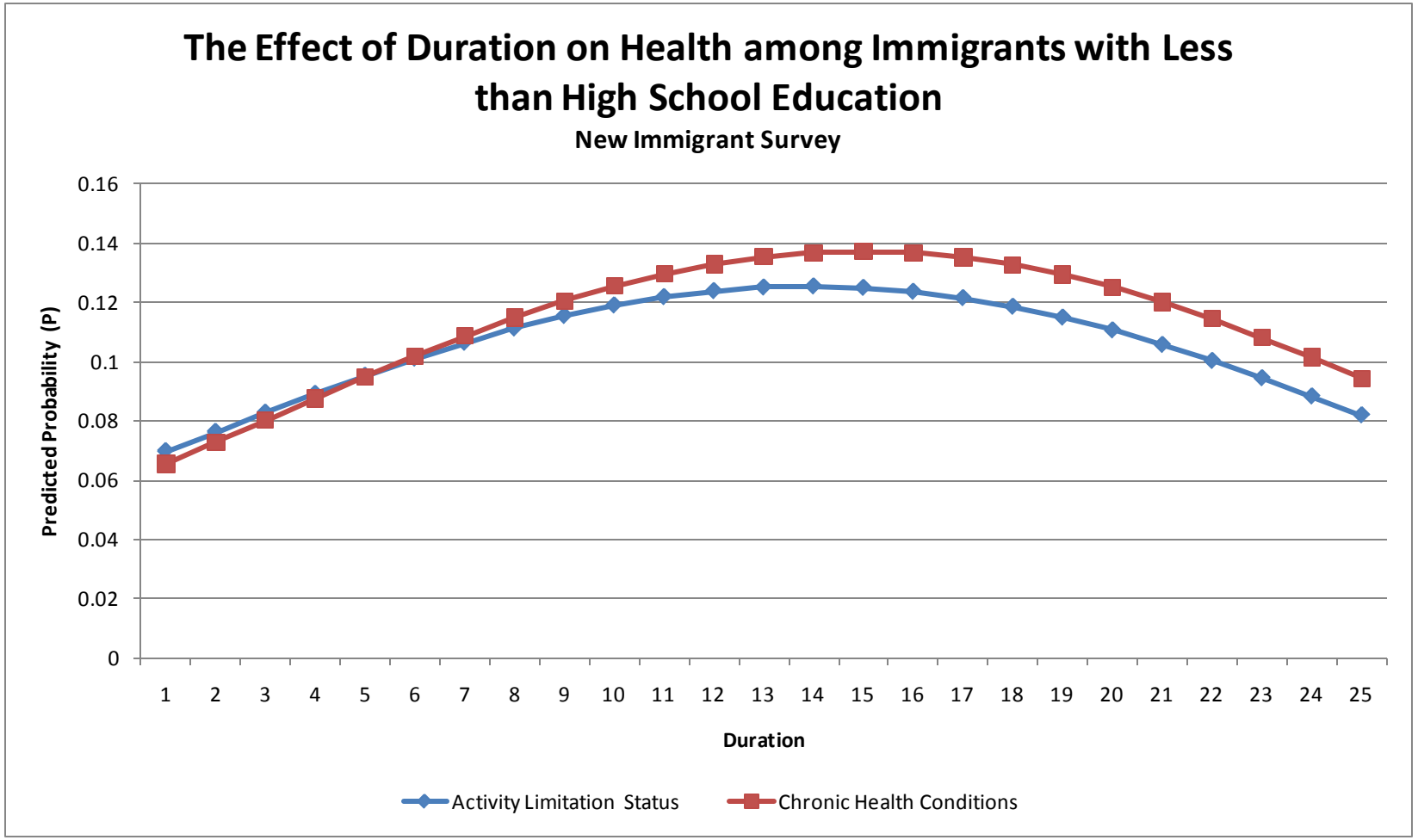


Figure 5.4 Predicted Probabilities of Activity Limitation Status and Chronic Health Conditions for U.S. Adult Immigrants with Less than High School Education, NIS 2003

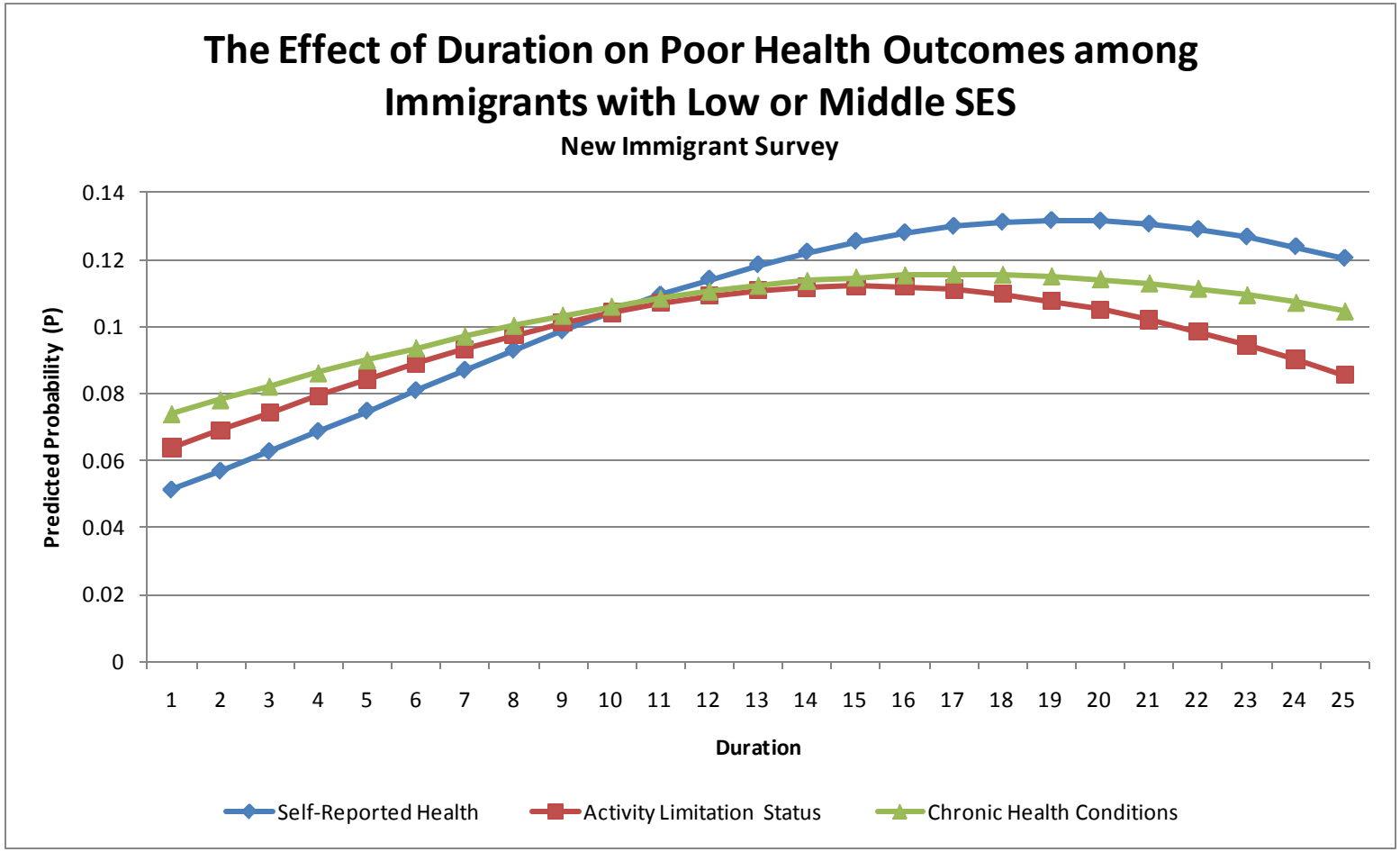


Figure 5.5 Predicted Probabilities of Poor Health Outcomes for U.S. Adult Immigrants with Low or Middle SES, NIS 2003

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