Western University
Scholarship@Western

MA Research Paper | Sociology Department

August 2015

The Immigrant Health Advantage in Canada: Lessened by Six Health Determinants

Sasha Koba

Follow this and additional works at: https://ir.lib.uwo.ca/sociology_masrp

 Part of the Sociology Commons

Recommended Citation
Koba, Sasha, "The Immigrant Health Advantage in Canada: Lessened by Six Health Determinants" (2015). *MA Research Paper*. 5.
https://ir.lib.uwo.ca/sociology_masrp/5

This Dissertation/Thesis is brought to you for free and open access by the Sociology Department at Scholarship@Western. It has been accepted for inclusion in MA Research Paper by an authorized administrator of Scholarship@Western. For more information, please contact tadam@uwo.ca, wlswadmin@uwo.ca.

THE IMMIGRANT HEALTH ADVANTAGE IN CANADA: LESSENED BY SIX HEALTH DETERMINANTS

by

Sasha Koba

A research paper accepted in partial fulfilment of the
requirements for the degree of
Master of Arts

Department of Sociology
The University of Western Ontario
London, Ontario, Canada

Supervisor: Dr. Rachel Margolis

2015

Abstract

The existence of a healthy immigrant effect in which immigrants initially have a health advantage over the native-born is well established. As immigrants spend time in their host country, they adopt health behaviours and subsequently lose their health advantage. However, the causes of the decline in immigrants' health as their time in Canada increases are not known. I examine the effect of six health determinants on immigrants' deteriorating health in Canada. I also explore if there are gender differences in the deterioration of immigrants' health. Additionally, I consider the possible association between immigrants' length of time in Canada, their age and health deterioration. I find that six health behaviours account for some deterioration of immigrants' health in Canada. I find evidence suggesting no gender differences in deterioration of immigrants' health in Canada. Moreover, results indicate that there is a correlation between immigrants' age, length of time in Canada, and health.

Keywords: healthy immigrant effect, health, Canada, immigration

Introduction

Immigrants in Canada have better health than the Canadian-born population at the time of their arrival. However, as their time in Canada increases, their health deteriorates relative to native-born. This immigrant health advantage is also referred to as the "healthy immigrant effect" and has been documented in Europe (Bollini & Siem, 1995), the United States (Singh & Siahpush, 2002; Jasso et al, 2004; Antecol & Bedard, 2006; and Cunningham, Ruben, & Narayan, 2008), Australia (Biddle, Kennedy, & McDonald, 2006), and Canada (Perez, 2002; Newbold & Danforth, 2003; Deri, 2005; McDonald & Kennedy, 2004; Beiser, 2005; Ng et al, 2005; and Wu & Schimmele, 2005). However, the factors that contribute to the deteriorating health of immigrants are not clear and have not been explored in the Canadian context. Moreover, the rate at which immigrants' health deteriorates is not known. Gender differences in the deterioration of health, and gender differences in the pace at which immigrant health deteriorates have also not been explored. The association between age at time of immigration and deteriorating health has not been considered. First, I will explore the deterioration of immigrants' health over time relative to native-born, and which factors contribute to this phenomenon. Second, I will explore gender differences in the deterioration of immigrants' health. Third, I will explore what effect age and time spent in Canada have on the deterioration of immigrants' health. These factors are important to consider in the Canadian context because Canada depends on immigrants for economic growth. Better understanding immigrant health will allow Canada to maximize the economic contribution of immigrants over the course of their stay in Canada and to improve overall population health.

Literature Review

It is well established that immigrants who come to Canada are healthier than the Canadian-born population at the time of their arrival (Ng, 2011, McDonald & Kennedy, 2004; DesMeules et al., 2003; Ali et al., 2013; Newbold & Danford, 2003). Recent immigrants also have higher healthy life expectancy (Chen et al., 1996, Manuel & Schultz, 2004) and lower mortality rates than the Canadian-born population (DesMeules, 2003). There are differences in the health of immigrants in Canada by sending region or nativity (Ng, 2011; Chen et al., 1996; Veenstra, 2009), however, the health of recent immigrants is better than that of those born in Canada, regardless of country of origin (Wang & Hu, 2013). Furthermore, there are differences in healthy life expectancy for immigrant men and immigrant women (Wolfson, 1996; Belanger et al., 2002; Kobayashi & Prus, 2012; Deri, 2004). Nevertheless, as immigrants' time spent in Canada increases, they are likely to adopt Canadian habits that lead to poorer health such as poor diet, smoking, and drinking (Shields & Shooshtari, 2001). Immigrant health deteriorates over time in Canada until it is at the same level as that of the Canadian-born population (McDonald & Kennedy, 2004). Furthermore, the Canadian-born population is less likely to experience deteriorating health than immigrants (Newbold, 2005). However, the rate at which immigrants' health deteriorates after migration is not known. The degree to which the adoption of health behaviours in Canada affects the health of immigrants is also not known. Furthermore, there may be gender differences in the deterioration of immigrant health.

The "healthy immigrant effect" is an important phenomenon in the Canadian context for two reasons. First, Canada has a large number of immigrants; therefore

immigrant health is a good measure of the health of Canadians and an indicator of the strain on and adequacy of the health care system. According to the 2011 Canadian Census, 20.6% of the Canadian population was foreign-born, with 1,162,900 foreign-born people immigrating to Canada between 2006 and 2011. Therefore, it is important to understand why immigrant health decreases after arrival to Canada. Health behaviours that contribute to negative health outcomes for immigrants could also have negative effects on the health of the Canadian-born population. Second, the health of Canadian immigrants is a determinant of the benefit of a large-scale immigration policy that is oriented towards the economic success of Canada. Immigrants in Canada are expected to contribute to economic growth, but are only able to do so if they remain healthy in Canada. Therefore, it is important for immigrants to remain healthy after migration in order for the economically oriented Canadian immigration policy to be most effective.

Four Reasons for the Superior Health of Immigrants

There are four primary explanations for the superior health of immigrants and the resulting health gap between immigrants and the Canadian-born population: 1) selection based on health prior to admittance to Canada, 2) immigrants' healthy behaviours prior to or at the time of migration 3) immigrants' financial resources prior to migrating and 4) the salmon-bias hypothesis.

Despite considerable literature outlining the existence of the healthy immigrant effect, we do not know what contributes to the deterioration of the superior health of recent immigrants as time spent in Canada increases. Furthermore, it is unclear as how to minimize the deterioration of immigrants' health as the time they spend in Canada increases. Although the approximate time the health gap takes to narrow is known to be

over ten years (McDonald & Kennedy, 2004; Popkin & Udry, 1998), it is unclear at what rate health deteriorates, or what impact age at the time of immigration has on the deterioration of immigrant health.

Insight into relevant Canadian health determinants may be found in the U.S. literature. The U.S. healthy immigrant paradox is a similar phenomenon to the healthy immigrant effect in Canada, where U.S. immigrants have better health than the U.S.-born population (Markides & Coreil, 1986; Sorlie, et al., 1993). The healthy immigrant paradox literature suggests that diet and health behaviours could be crucial to differences in health of immigrants and the U.S-born population. Hispanics are the largest immigrant group in the U.S. and have healthier diets and lower rates of smoking than the U.S.-born population (Rumbaut, et al., 2006). Hispanic immigrants in the U.S. experience deteriorating health as a result of overweight related behaviours such as adoption of an American diet (Gordon-Larson et al, 2003; Antecol & Bedard, 2006), lack of exercise, alcohol consumption, and smoking (Abraido-Lanza, et al., 2005). Furthermore, second and third generation immigrants experience a significant increase in obesity relative to their parents, suggesting that the deterioration of the health of immigrants continues as time in the U.S. increases (Popkin & Udry, 1998).

Similar to Canada, both male and female immigrants in the U.S. have higher life expectancy than the U.S.-born population (Singh & Miller, 2003). In addition, Singh and Miller (2003) establish that immigrants in the U.S. have lower mortality from lung, colorectal, breast, prostate and esophageal cancer, cardiovascular disease, cirrhosis, diabetes, respiratory diseases, HIV/AIDS, and suicide. These findings suggest that despite experiencing U.S. determinants of health, immigrants maintain their health

advantage over the U.S.-born population. Low smoking rates of Hispanic immigrants have been shown to contribute to the difference in mortality rates between Hispanics and non-Hispanic whites (Blue & Fenelon, 2011).

First, Citizenship and Immigration Canada policy screens potential immigrants for health prior to admittance (Beiser, 2005). As a result, immigrants in most cases are required to have good health prior to entry to Canada (Kennedy et al., 2006). Furthermore, immigrants are often selected based on their future contributions as high-skilled workers in the Canadian labour market through Canada's point system. High skilled, highly educated immigrants have better health in their country of origin as a result of high socioeconomic status, and subsequent resource availability. Therefore, the most advantaged and healthy applicants are overrepresented as Canadian immigrants. These criteria in Canada's immigration policy contribute to a health gap between recent immigrants and the Canadian-born population.

Second, immigrants may have healthier behaviours than the Canadian-born population, which contribute to their superior health at the time of immigration to Canada (Kennedy et al., 2006; Subedi & Rosenberg, 2014). However, as immigrants' time spent in Canada increases, health may decrease as a result of exposure to Canadian health determinants and uptake of negative health behaviours. Recent immigrants from higher socioeconomic positions in their sending country could maintain better health behaviours and lifestyle choices. However, poor health behaviours tend to be concentrated in lower socioeconomic groups (Lynch et al., 1997). Nevertheless, immigrants in Canada have superior health relative to the Canadian-born population, regardless of socioeconomic background.

Third, Canada's immigration policy targets those with high human capital, language proficiency, higher education, work experience, and relatively high levels of wealth. Individuals who are wealthy typically have better health (Kennedy et al., 2006). Moreover, the characteristics preferred by the Canadian point system are associated with better health because healthier people typically have better skills (Jasso et al., 2004). Canadian immigration policy prefers highly educated immigrants, who are able to contribute to the Canadian high skilled labour market (Kennedy et al., 2006). Those who are wealthy and well educated tend to have better health than those who are not (Chen, et al., 1996). Citizenship and Immigration Canada requires that immigrant applicants pay a number of fees prior to migrating to Canada, which advantages those who are wealthy. Those who are able to emigrate are often individuals with high socioeconomic status who therefore have the resources to leave their country of origin. Canada's immigration policy disproportionately favours immigrants who are wealthy, well-educated, and high-skilled, thus contributing to the healthy immigrant effect.

Fourth, the salmon bias is a possible explanation for the Hispanic health paradox that could also be present in Canada. The selective return of less-healthy Hispanics in the U.S. to their country of birth causes mortality rates at older ages to appear lower than they are (Hummer et al., 2004; Elo & Preston, 1997; Sorie et al., 1993). Hispanics in the U.S. also return to their country of origin after retiring or being temporarily employed in the U.S. Although the salmon bias has been shown to have an impact on the Hispanic mortality advantage, it is not a primary explanation (Turra & Elo, 2008). Although there is no evidence for a similar effect in the Canadian context, it is possible that immigrants

in Canada engage in return migration when their health deteriorates, or during times of unemployment, causing the appearance of a lasting health advantage.

It is important to determine the causes of the deteriorating health of recent immigrants in Canada for two reasons. First, although it is documented that immigrants have better health than the Canadian-born population, the factors that contribute to the convergence of immigrant and Canadian-born levels of health are not clear. By exploring some of the reasons for the worsening health of recent immigrants, we can better understand the health of the immigrants and the Canadian-born population. Second, by understanding some of the factors that negatively impact the health of recent immigrants, we will better understand the reasons for the superior health of immigrants at the time of their arrival in Canada, and be able to improve the health of the Canadian population.

Contributions

The acculturation hypothesis suggests that as immigrants spend time in Canada, they adopt Canadian norms, values, and beliefs and assimilate into Canadian society (Dean & Wilson, 2010; Subedi & Rosenberg, 2014). Assimilation is the end result of the process that takes multiple generations and ends with immigrants being fully incorporated into the host country and adopting behaviours and norms. Upon immigrating to Canada, immigrants are exposed to Canadian life and health determinants, which causes the difference in health between recent immigrants and the Canadian-born population to decrease. The impact of specific Canadian health behaviours on the health of immigrants is not known. This paper will explore the impact of a series of Canadian health behaviours on immigrants' health, and evaluate the contribution of smoking history, frequency of binge drinking, body mass index, diet, stress and level of physical

activity to the deteriorating health of immigrants. Gender differences in immigrant health deterioration will also be examined to determine if there are gender differences in the assimilation process. Finally, the importance of immigrants' health at the time of migration will be explored to determine if there are differences in health deterioration associated with length of time spent in immigrants' sending country.

Research Questions and Hypotheses

1) I examine which health behaviours contribute to the decline of the superior health of immigrants relative to the Canadian-born population as time in Canada increases. I measure the impact of 1) smoking history, 2) frequency of binge drinking, 3) Canadian diet, 4) physical activity, 5) body mass index, and 6) stress on immigrants' health after the time of migration. Furthermore, I explore the individual effect of each of these health determinants to determine which contribute most to the deterioration of immigrant health. I hypothesize that these six health behaviours explain some of the decline in immigrants' health as their time in Canada increases.

2) Second, I explore whether there are gender differences in the decreasing health of immigrants as their time in Canada increases. It is possible that immigrant men and women engage in and adopt different behaviours while in Canada, and as a result, their health trajectories change as time spent in Canada increases. Furthermore, immigrant men and women may have different levels of health at the time of immigration as a result of behaviours and life-style in their sending country. This could contribute to different health gaps for men and women, which could lead to different amounts of time until the gaps in health decrease. I hypothesize that there are gender differences in the decline of immigrants' health as their time in Canada increases.

3) Third, this paper explores the impact that age at time of immigration has on the deterioration of immigrants' health as time in Canada increases. The more time individuals spend in their country of origin prior to immigration, the more they experience that country's determinants of health. The higher the age at time of immigration, the less time they have to experience Canadian determinants of health (Deri, 2004; Gee et al., 2004). Therefore, there could be differences in the health of immigrants based on age of arrival in Canada. As a result of these factors, both the size of the health gap between immigrants and the Canadian-born population, as well as the time it takes for the gap to disappear could be affected. I hypothesize that middle aged long-term immigrants will have lower odds of reporting good health relative to middle aged recent immigrants. Additionally, it is likely that regardless of time spent in Canada, younger immigrants will have relatively greater odds of reporting good health, while older immigrants have lower odds.

Data and Methods

This study uses the public use version of the 2012 Canadian Community Health Survey (CCHS). The CCHS is a cross-sectional survey collected by Statistics Canada that includes information related to overall health, health care utilization and health determinants for the Canadian population. The CCHS is representative of the Canadian population ages 12 and older. The CCHS is suitable for this project because it provides in-depth information pertaining to the health and health behaviours of both the Canadian-born population as well as those born outside of Canada, in all provinces.

Analytic sample

There are 61,707 total respondents for the 2012 Canadian Community Health

Survey. Of the 61,707 respondents, 50,983 were born in Canada, 8,578 were born elsewhere. Respondents who did not respond to questions about their health were also removed from the sample (N = 126). Those who did not specify their length of time in Canada as Canadian-born, fewer than 10 years, or 10 years or more, were also removed (N = 2,020). The total analytic sample used in first part of the analysis is 59,561.

My second and third research questions only consider the health of immigrants. All respondents who were born in Canada were excluded from this sample (N = 50,983). Immigrant respondents who did not specify their length of time in Canada were also removed (N = 2,020). Respondents who did not respond to questions about their health were also removed from the sample (N = 126). The analytic sample for these models is 8,578.

Dependent Variable: Self-Rated Health

Self-rated health refers to respondents' perception of their overall health status including incipient disease, disease severity, aspects of positive health status, and physiological, psychological, social and mental functions. Health means not only the absence of disease or injury, but also physical, mental, and social well-being. The question "In general, would you say your health is…?" is used to collect data for self-rated health and is originally coded as "excellent," "very good," "good," "fair," or "poor." I recode self-rated health into a dichotomous variable as either 1) good health (includes excellent, very good, and good) or 2) poor health (includes fair, and poor).

Independent Variables: Sociodemographics

Demographic characteristics (age, sex, nativity, education, income, length of time in Canada) are used to examine what explains the health gap between immigrant and

Canadian-born populations. Sex is coded as male or female. To answer my first two research questions, I recode age into categories: 12 to19, 20 to 29, 30 to 39, 40 to 49, 50 to 59, 60 to 69, 70 to 79, and 80 years or more. To answer my third question I recode age into three categories: younger (12 to 34), middle aged (35-64), and older (65 and older). Educational attainment is measured as the respondents' highest level of education: less than secondary school graduation, secondary school graduation (including high school equivalency), some post-secondary, and post-secondary graduation. Total personal income from all sources is used as a measure of income because it takes into account all forms of income including: wages and salaries, income from self-employment, government assistance, investments, retirement savings, child support and alimony, and scholarships. Total personal income from all sources is coded into categories: less than $20,000, $20,000 to $39,999, $40,000 to $59,999, $60,000 to $79,999, and $80,000 or more. Length of time in Canada is used to distinguish between recent immigrants, coded as zero to nine years since time of immigration, and long-term immigrants, coded as ten years or more since time of immigration. The distinction between recent and long-term immigrants is important because these groups have different levels of health and have experienced Canadian health behaviours differently. However, I am limited by the public use CCHS, which does not provide ideal detailed information regarding immigrants' time in Canada beyond these two categories.

Health Determinants

Body mass index (BMI) is used as an indicator of respondents' weight because it provides an adequate measure of healthy weight at specific ages for men and women of varying heights. I recode BMI as underweight (less than 18.5), normal (18.5 to 25),

overweight (25 to 30), and obese (more than 30). Lack of physical activity in Canada contributes to weight gain and negative health outcomes. I recode leisure physical activity is coded as: active, moderately active, and inactive. Frequency of binge drinking is measured as having 5 or more alcoholic beverages on one occasion. Self-rated stress is used as a measure of respondents' overall levels of stress. The question "Thinking about the amount of stress in your life, would you say that most days are…?" is asked, and is coded as: not at all stressful, not very stressful, a bit stressful, quite a bit stressful, and extremely stressful. I recode self-rated stress into three categories: 1) not at all stressed (not at all stressful, not very stressful), 2) not very stressed (not very stressful, a bit stressful), and 3) very stressed (quite a bit stressful, extremely stressful). Type of smoker is coded as: daily, occasional, always occasional, former daily, former occasional, or never smoked. Former smoking habits are important to include in this study to fully understand the impact smoking has on health (Leffondré et. al, 2002). To consider the impact of both former and current smoking habits, I recode type of smoker into three categories: 1) never, 2) former smoker (former daily and former occasional), 3) current smoker (occasional and always occasional). Frequency of having 5 or more drinks on one occasion in the past 12 months is coded as: never, less than once a month, once a month, 2 to 3 times a month, once a week, more than once a week. I recode binge drinking into four categories: 1) never, 2) rarely (less than once a month) 3) occasionally (once a month or 2 to 3 times a month) and 4) frequently (once a week or more than once a week). Healthy diet is measured by daily consumption of fruits and vegetables. Total daily consumption of fruits and vegetables is coded as: 1) less than 5 per day, 2) 5-10 per day, 3) more than 10 per day.

Method

I use logistic regression to estimate the impact of BMI, leisure physical activity, stress, type of smoker, frequency of binge drinking, and diet on the deterioration of immigrants' health after migration. The first set of models includes time spent in Canada, sociodemographic characteristics and determinants of health: BMI, leisure physical activity, stress, type of smoker, frequency of binge drinking, and diet. All health behaviours are initially included together, and then individually in the following models. Gender, age, household income, and level of education are included as sociodemographic characteristics.

$$ln\left(\frac{\pi}{1-\pi}\right) = a + \beta 1_{TIC} + \beta 2_{G} + \beta 3_{A} + \beta 4_{BMI} + \beta 5_{PA} + \beta 6_{S} + \beta 7_{TS} + \beta 8_{BD} + \beta 9_{D} + \beta 10_{ED} + \beta 11_{I} + e$$

The second set of models includes immigrants' time spent in Canada and gender to test differences between male and female immigrants' health deterioration as time in Canada increases. An interaction term between time in Canada and gender is also included in this set of models. The six health determinants and sociodemographics are also included together in all models.

$$ln\left(\frac{\pi}{1-\pi}\right) = a + \beta 1_{G} * \beta 2_{TIC} + \beta 3_{G} + \beta 4_{TIC} + \beta 5_{A} + \beta 6_{BMI} + \beta 7_{PA} + \beta 8_{S} + \beta 9_{TS} + \beta 10_{BD} + \beta 11_{D} + \beta 12_{ED} + \beta 13_{I} + e$$

The third set of models includes immigrants' time spent in Canada and their age to explore the association between age at migration and the deterioration of the health of immigrants. An interaction term between time in Canada and age is also included in these models. The six health determinants and sociodemographics are included as control

variables in these models.

$$ln\left(\frac{\pi}{1-\pi}\right) = a + \beta 1_A * \beta 2_{TIC} + \beta 3_A + \beta 4_{TIC} + \beta 5_G + \beta 6_{BMI} + \beta 7_{PA} + \beta 8_S + \beta 9_{TS} + \beta 10_{BD} + \beta 11_D + \beta 12_{ED} + \beta 13_I + e$$

I also calculate the predicted probabilities of being in good health for three age categories (younger, middle aged, older) and immigrants' length of time in Canada.

Limitations of Data

First, the public use version of the Canadian Community Health Survey (2012) does not categorize those not born in Canada by country of birth. The health of immigrants varies by country of origin. Measuring the health of all immigrants without distinguishing between sending countries could impact results. Second, self-rated health could be somewhat problematic for comparisons across groups. Reports of health, or good health, could vary based on cultural norms regarding levels of health, which could make comparisons between the Canadian-born population and immigrants difficult. Furthermore, health is relative, thus reports of self-rated health could differ based on socioeconomic background, which further complicates comparisons.

In the section of the analysis regarding immigrants' age at time of migration and length of time in Canada, the younger age category includes those aged 12 to 19 due to sample size restrictions (N = 490). This is not ideal because children are typically in good health, and have different health related behaviours than those aged 20 to 34.

Results

Table 1 shows sample characteristics (percentages) by nativity for the total analytic sample. Approximately 45% of both Canadian-born and immigrant respondents

are male, while 55% are female. Approximately 14 % of both Canadian-born and immigrant respondents reported being in poor health. 19 % of immigrants reported being in Canada for 9 or fewer years, 75% reported being in Canada for 10 years or more, and the remaining 6% did not specify their length of time in Canada. Recent immigrants account for less than 3 % of the total sample of those living in Canada, while long-term immigrants represent 11 %.

The modal age category for both Canadian-born and immigrant respondents is 60-69 years of age. A larger proportion of immigrants are older than 70 years (24%), relative to Canadian-born (18%). Conversely, a smaller proportion of immigrants are under 30 years of age compared to the Canadian-born population. A larger proportion of immigrants has completed post-secondary education relative to the Canadian-born population (61% and 51% respectively). A smaller proportion of immigrants has a household income of $80,000 or more per year compared to the Canadian-born population (29% and 35% respectively). Furthermore, foreign-born and native-born differ in health determinants: BMI, leisure physical activity, type of smoker, frequency of binge drinking, and daily consumption of fruits and vegetables. However, there is no difference in stress levels between these two groups. These differences are important to note because they show key sociodemographic differences between immigrants and the Canadian-born population. These differences in sociodemographics and health behaviours could contribute to differing health outcomes for immigrants and the Canadian-born population.

Table 2 shows bivariate and multivariate odds ratios from logistic regression models predicting self-rated good health. Bivariate relationships in Table 2 show that

there are differences in the odds of reporting good health by nativity and length of time in Canada. In addition, Table 2 shows associations between health behaviours and the odds of reporting good health. Recent immigrants have nearly three times the odds of reporting good health than the Canadian-born population ($p < 0.001$). Conversely, long-term immigrants are nearly 25% ($p < 0.001$) less likely than those born in Canada to report good health. Furthermore, health behaviours are associated with the likelihood of reporting good health. Results also show that BMI, leisure physical activity, stress, type of smoker, binge drinking, and daily consumption of fruits and vegetables have statistically significant associations with the odds of reporting being in good health.

Bivariate models in Table 2 show a trend of decreasing odds of reporting being in good health as age increases, when compared to those aged 12-19. Conversely, these models show a trend of greater odds of reporting being in good health with increased household income relative to those who earn less than $20,000 per year. Those who earn over $80,000 per year have nearly seven times greater odds of reporting being in good health than those who earn less than $20,000 per year.

Finally, bivariate models in Table 2 show that those who complete secondary school have 66% greater odds of reporting good health relative to those who have less than secondary school completed. Furthermore, those who have completed some post secondary education have roughly 60% greater odds of reporting good health than those who did not complete secondary school. Those who have completed post-secondary education have two times greater odds of reporting good health than those with less than secondary education completed. These initial relationships suggest that multivariate

models are needed to explore the associations between nativity, length of time in Canada, health behaviours and self-rated health in more detail.

Multivariate logistic regression is used to answer my first research question, which considers the contribution of six health behaviours to the decline of immigrants' health relative to the Canadian-born population as time in Canada increases. I hypothesize that BMI, physical activity, stress, smoking history, frequency of binge drinking, and daily consumption of fruits and vegetables explain some of the deterioration of immigrants' health as they spend time in Canada. Model 1a, shown in Table 2, includes immigrants' time in Canada, gender, age, BMI, leisure physical activity, stress, type of smoker, frequency of binge drinking, and daily consumption of fruits and vegetables. Consistent with existing literature, immigrants' length of time in Canada is associated with differences in likelihood of reporting good health. Results show that recent immigrants have 65% ($p < 0.001$) higher odds of reporting good health than those born in Canada. However, there are no statistically significant differences in the odds of reporting being in good health between long-term immigrants and the Canadian-born population.

Furthermore, those who are either underweight or obese have roughly 50% ($p > 0.001$) lower odds of reporting being in good health than those who have normal weight. In addition, those who are overweight have 8% ($p < 0.05$) lower odds of reporting being in good health relative to those with normal weight. Relative to those who are active, those who are moderately active have approximately 30% ($p < 0.001$) lower odds of reporting being in good health, while those who are inactive have approximately 60% ($p < 0.001$) lower odds. Those who are not very stressed have 34% ($p < 0.001$) lower odds

of reporting good health than those who are not at all stressed. Furthermore, those who are very stressed have nearly 75% ($p < 0.001$) lower odds of reporting good health than those who are not at all stressed. Relative to individuals who reported never smoking, those who are current smokers have 57% ($p < 0.001$) lower odds of reporting being in good health. Moreover, those who are former smokers have 22% ($p < 0.001$) lower odds of reporting being in good health relative those who have never smoked. Individuals who reported rarely binge drinking have nearly 30% ($p < 0.001$) greater odds of reporting being in good health than those who reported never binge drinking. Additionally, those who reported occasional binge drinking have 36% ($p < 0.001$) greater odds of reporting being in good health than those who never binge drink. However, there are no statistically significant differences in the odds of reporting being in good health between those who reported frequently binge drinking and those who reported never binge drinking. Relative to those who reported consuming fewer than five fruits or vegetables per day, those who consumed five to ten have nearly 20% ($p < 0.001$) greater odds of reporting being in good health. However, there are no statistically significant differences in the odds of reporting good health between those who consume more than ten fruits and vegetables per day, and those who consume fewer than five.

Logistic regression in Model 1b shows that when holding health behaviours and sociodemographics constant, recent immigrants' odds of reporting being in good health increase to 81% ($p < 0.001$) relative to the Canadian-born population. Furthermore, long-term immigrants' odds of reporting good health become statistically significant net of education and household income, with long-term immigrants having 10% ($p < 0.01$) lower odds than the Canadian-born population of reporting good health. These findings

suggest that long-term immigrants' health could continue to decrease below the level of the Canadian-born.

When taking into account both level of education and household income in Model 1b, results for BMI, leisure physical activity, stress, type of smoker, binge drinking, and total fruits and vegetables remain fairly similar to Model 1a. Relative to those who did not complete secondary school, those who completed secondary school have nearly 30% ($p < 0.001$) greater odds of reporting good health, while those who completed post-secondary education have nearly 40% ($p < 0.001$) greater odds. Those who completed some post-secondary education do not have statistically significant different odds of reporting good health than those who did not completed secondary school. Results from Model 1b also show a trend of increasing odds of reporting good health as income increases. These findings support my hypothesis that the six included health determinants account for some of immigrants' deteriorating health as they stay in Canada.

To understand the deteriorating health of Canadian immigrants, I test which health behaviours are more important in explaining the difference in health for immigrants. Logistic regression results presented in Table 3 show the odds of recent and long-term immigrants reporting good health when taking health behaviours into account individually. Consistent with results from Table 2, all models in Table 3 show that recent immigrants are more likely than the Canadian-born population to report being in good health. Despite recent immigrants being more likely to report being in good health consistently, there are differences between models.

Model 2a includes immigrants' time in Canada, as well as gender, age, education, and household income. Recent immigrants have 85% ($p < 0.001$) greater odds of

reporting being in good health relative those who are born in Canada. Furthermore, there is no statistically significant difference in the odds of reporting good health between long-term immigrants and those born in Canada when health behaviours are not included in the model. Model 2b shows that when taking BMI into account, recent immigrants have 78% ($p < 0.001$) greater odds of reporting being in good health than those born in Canada. In addition, long-term immigrants have 9% ($p < 0.01$) lower odds of reporting good health relative to the Canadian-born population. Model 2c shows that when adding leisure physical activity to the model, recent immigrants have more than two times ($p < 0.001$) greater odds of reporting being in good health than those born in Canada. Model 2d shows that when taking stress into account, recent immigrants have 80% ($p < 0.001$) greater odds of reporting being in good health than those born in Canada. Model 2e includes type of smoker and shows that relative the Canadian-born population, recent immigrants have 62% ($p < 0.001$) greater odds of reporting being in good health. Additionally, long-term immigrants have 11% ($p < 0.001$) lower odds of reporting being in good health than the Canadian-born population. Results from Model 2f show that when frequency of binge drinking is included, recent immigrants have more than twice ($p < 0.001$) the odds of reporting being in good health. Model 2g includes total daily fruit and vegetable consumption and shows that recent immigrants have 86% ($p < 0.001$) greater odds of reporting being in good health than the Canadian-born population.

Smoking history explains more of the difference of recent immigrants' odds of reporting good health than the other tested health behaviours. Moreover, when taking type of smoker into account, the difference in odds of reporting good health between long-term immigrants and native-born becomes significant. BMI also accounts for more

of the difference in odds of reporting being in good health between recent immigrants and those born in Canada, than other tested health behaviours. Similar to smoking history, when BMI is included in the model, the difference in odds of reporting being in good health between long-term immigrants and those born in Canada become statistically significant. This finding suggests that smoking history and BMI contribute to long-term immigrants' deteriorating health to below Canadian levels.

The next section of the analysis addresses gender differences in the narrowing of the health gap between the Canadian-born population and immigrants in Canada. I hypothesize that there could be gender differences in the deterioration of immigrants' health. To address this question, the sample is further restricted to only the immigrant population (N = 8,578). Results of logistic regression models presented in Table 4 show odds ratios for self-rated health of immigrants by gender, age, and health behaviours. Model 3a includes immigrants' time in Canada and gender, and shows that there are no statistically significant gender differences in the odds of reporting good health. Model 3b includes an interaction term between gender and immigrants' time in Canada. There are no statistically significant gender differences in the main effects or in the interaction term in the odds of immigrants reporting being in good health.

Model 3c includes age, BMI, leisure physical activity, stress, type of smoker, frequency of binge drinking, and total daily consumption of fruits and vegetables. Logistic regression again shows that there are no statistically significant gender differences in immigrants' odds of reporting being in good health when taking age and these health behaviours into account. Furthermore, the interaction term between gender

and immigrants' time in Canada is not statistically significant further suggesting that there are no gender differences in immigrants' odds of reporting good health.

In addition to gender, immigrants' time in Canada, age and health behaviours, Model 3d includes level of education and household income. Results from Model 3d show that there are no statistically significant gender differences in immigrants' odds of reporting being in good health. The interaction term between gender and time in Canada is also not statistically significant. The findings from Table 4 suggest that there are no gender differences in the odds of immigrants' reporting being in good health. The lack of gender differences in reporting good health among both recent and long-term immigrants is consistent with the acculturation hypothesis that suggests a convergence of immigrant and Canadian-born health behaviours and existing literature regarding assimilation. These findings provide support for a consistent decline in health for men and women as immigrants' time in Canada increases.

The final question of the analysis considers immigrants' age, length of time in Canada, and odds of reporting being in good health. Existing literature indicates that long-term immigrants in Canada have lower odds of reporting good health relative to recent immigrants. Furthermore, previous studies show that good health is negatively correlated to increasing age. Therefore, I hypothesize that long-term middle aged immigrants will have lower odds of reporting good health than recent middle aged immigrants. In addition, it is likely that regardless of length of time in Canada, younger immigrants will have relatively greater odds of reporting good health, while older immigrants will have relatively lower odds. Table 5 presents results from logistic regression models of self-rated health of immigrants by age, length of time in Canada, an

interaction term between age and length of time in Canada, and health behaviours. These results are also based on the subsample consisting only of immigrants (N = 8,578).

In all models, older immigrants have approximately 85% ($p < 0.001$) lower odds of reporting being in good health than younger immigrants. Model 4a includes immigrants' time in Canada and age in categories. Long-term immigrants have nearly 45% ($p < 0.001$) lower odds of reporting being in good health than recent immigrants. Middle aged immigrants have approximately 60% ($p < 0.001$) lower odds of reporting being in good health than younger immigrants. Model 4b includes an interaction term between immigrants' length of time in Canada and their age. Model 4c includes gender, BMI, leisure physical activity, stress, type of smoker, frequency of binge drinking, and total daily consumption of fruits and vegetables. In addition to variables included in Model 4c, Model 4d includes education and household income. Models 4b, 4c, and 4d show that those who are middle aged do not have statistically significant differences in odds of reporting being in good health relative to younger immigrants. Results from these models also show that middle aged immigrants who are also long-term immigrants have roughly 70% ($p < 0.001$) lower odds of reporting being in good health relative to younger recent immigrants.

Table 6 shows predicted probabilities of reporting good health for immigrants by length of time in Canada and age while holding all other variables at their means. Younger recent immigrants and younger long-term immigrants have predicted probabilities of approximately 95% ($p < 0.001$) of reporting being in good health. Older recent immigrants and older long-term immigrants have predicted probabilities of roughly 80% ($p < 0.001$) of reporting being in good health. Similar to younger

immigrants, middle aged recent immigrants have a predicted probability of reporting being in good health of 95% ($p < 0.001$). However, middle aged long-term immigrants have a predicted probability of 86% ($p < 0.001$) of reporting being in good health. These findings indicate that regardless of length of time in Canada, younger immigrants have the highest odds of reporting good health while older immigrants have the lowest. Furthermore, results show that middle aged immigrants experience the sharpest decline in the odds of reporting good health as time in Canada increases.

Discussion

Recent immigrants are more likely to report being in good health than the Canadian-born population, while long-term immigrants are less likely to report having good health than the Canadian-born population. These findings provide support for the existence of a healthy immigrant effect in Canada. Results showing a recent health advantage paired with the similar odds of reporting good health between long-term immigrants and native-born provide support for the acculturation hypothesis. Initially immigrants are more likely to report being in good health, however, as their time in Canada increases, the odds of reporting good health resemble those of the Canadian-born population. Results also provide some evidence that long-term immigrants could have worse health than the Canadian-born population. These findings are also consistent with the acculturation hypothesis, and could contribute to differences in immigrants' odds of reporting good health as time in Canada increases.

I find support for the existence of a healthy immigrant effect in Canada as outlined by Perez (2002,) Newbold and Danforth (2003,) Deri, (2005,) McDonald and Kennedy (2004,) Beiser (2005,) Ng et al (2005,) and Wu and Schimmele (2005). When

taking BMI, physical activity, stress, smoking history, frequency of binge drinking, and daily consumption of fruits and vegetables into account, recent immigrants still consistently have greater odds of reporting good health than the native-born, but they explain some of the difference. Additionally, findings show that smoking history, BMI, and stress are most important in explaining the decline in recent immigrants' odds of reporting being in good health until they resemble those of the native-born. Furthermore, smoking history and BMI explain the decline of recent immigrants' odds of reporting being in good health until they are lower than those of the native-born. Leisure physical activity, frequency of binge drinking, and daily consumption of fruits and vegetables are less important in explaining the decline in immigrant health. These findings provide support for my first hypothesis that the six tested health behaviours contribute to immigrants' deteriorating health as their time in Canada increases.

I also find support for the acculturation hypothesis when taking these six health behaviours and sociodemographics into consideration. Unlike some U.S. literature (Blue & Fenelon, 2011), results suggest that immigrants in Canada do not retain a health advantage over the native-born. Findings show that long-term immigrants' odds of reporting being in good health are lower than the native-born in some cases. However, I also find results indicating that long-term immigrants have no different odds of reporting being in good health than the native-born. These mixed results indicate that despite an initial health advantage, immigrants are not healthier than the native-born ten years after migration, and could in fact be less healthy. Additionally, findings indicate consistency in assimilation between genders. Findings show that when taking health behaviours and

sociodemographics into account, there are no gender differences in immigrants' odds of reporting being in good health as their time in Canada increases.

Younger immigrants consistently have higher odds of reporting good health while older immigrants have lower odds. Furthermore, middle aged long-term immigrants have lower odds of reporting good health than middle aged recent immigrants. These findings support my hypothesis that middle aged long-term immigrants have lower odds of reporting good health, and experience the sharpest decline in odds of reporting good health as time in Canada increases.

Limitations and Future Directions

Nativity data are limited in the public use CCHS, therefore potentially important findings regarding the decline in immigrant health by sending country could be missed. It is established that immigrants' health varies by sending country (Ng, 2011; Chen et al., 1996; Veenstra, 2009), therefore exploring the effect of health behaviours in Canada by nativity is an important next step. Additionally, exploration of other relevant health behaviours of immigrants in Canada is needed to further understand the deteriorating health of immigrants after migration. Understanding which health behaviours cause long-term immigrants' health to decline below that of the native-born are particularly important for improving overall population health in Canada.

Collapsing age groups of immigrants into three categories to address the final section of my analysis is due to small sample size. In particular, categories for older ages of recent immigrants, and younger ages of long-term immigrants are especially small. Ideally, age categories would remain consistent for all sections of the analysis.

Data outlining immigrants' length of time in Canada are limited in the public use CCHS. More precise categories of these data would facilitate better understanding of long-term immigrants' health as they spend more time in Canada. Moreover, understanding recent immigrants' declining health as they become long-term immigrants would be an additional benefit. In addition to first generation immigrants, second and third generation Canadians could differ from the Canadian-born population in their health behaviours, as some U.S. literature shows (Popkin & Udry, 1998). Exploration of health behaviours of second and third generation immigrants in Canada is needed to fully understand the assimilation process and the health of both immigrants and the native-born. It is also important to understand if immigrants and their children have a lasting health advantage over the Canadian-born population, despite the adoption of Canadian health behaviours.

Longitudinal data regarding the health of native and foreign-born in Canada would be beneficial for exploring long-term changes in the health of immigrants in Canada. Although cross sectional data are useful for understanding some changes in immigrants' health, longitudinal data are ideal for researching health transitions over time.

Conclusion

The results of this study provide support for a healthy immigrant effect in Canada in which immigrants have an initial health advantage over the native-born that decreases over time. BMI, leisure physical activity, stress, smoking history, binge drinking, and daily consumption of fruits and vegetables explain some of the decrease in immigrant health as immigrants spend time in Canada. Moreover, smoking history and BMI

contribute to long-term immigrants' health deteriorating to below that of the native-born. Overall Canadian population health can be improved by understanding what causes immigrants' initial health advantage to decline. As the population of immigrants in Canada continues to grow and age, it is imperative to minimize strain on the health care system and maximize the economic efficiency of Canada's immigration policy.

Table 1. Sample characteristics by nativity (percentages), CCHS, 2012

	Nativity			
	Canadian-born (N=50,744)	Immigrant (N=9,150)	Total (N= 59,894)	T-test
Self-Rated Health				0.072
Fair, poor	13.54	14.14	13.76	
Excellent, very good, good	86.28	85.58	86.04	
Missing	0.17	0.27	0.20	
Time in Canada				0.000
Recent	—	18.94	2.81	
Long-term	—	75.05	11.13	
Missing	—	6.01	86.06	
Gender				0.198
Male	44.61	45.26	44.73	
Female	55.39	54.74	55.27	
Age				0.000
12-19	11.80	6.28	10.80	
20-29	11.78	9.55	11.34	
30-39	11.74	12.96	11.93	
40-49	11.57	13.54	11.88	
50-59	17.58	13.96	16.99	
60-69	18.00	19.97	18.32	
70-79	11.17	14.56	11.78	
Over 80	6.37	9.18	6.95	
Body Mass Index				0.000
Underweight	1.81	2.46	1.93	
Normal weight	34.85	41.45	35.96	
Overweight	29.68	31.23	29.92	
Obese	19.51	13.67	18.54	
Leisure physical activity index				0.000
Active	28.59	26.11	28.13	
Moderately active	24.65	23.04	24.34	
Inactive	44.56	47.63	45.15	
Stress				0.499
Not at all	13.39	16.40	13.96	
Not very	66.34	62.91	65.64	
Very	19.72	19.58	19.70	
Type of Smoker				0.000
Never	36.44	50.55	38.40	
Former	21.06	11.99	19.58	
Current	42.20	37.09	41.25	
Binge Drinking				0.000
Never	39.11	46.91	39.79	
Rarely	25.77	14.67	23.67	
Occasionally	8.68	3.52	7.76	
Frequently	2.56	1.23	2.33	
Total daily fruits and vegetables				0.000
<5 per day	55.13	51.86	54.55	
5-10 per day	33.79	35.41	33.88	
>10 per day	3.38	3.08	3.31	
Education				0.000
Less than Secondary	25.24	18.27	23.56	

Secondary School Grad	17.71	15.62	16.94	
Some Post-Secondary	5.03	3.88	4.74	
Post-Secondary Grad	50.88	60.67	51.08	
Household Income				0.018
< $20,000	10.80	11.08	11.17	
$20,000-$39,999	20.60	24.63	22.05	
$40,000-$59,999	18.75	20.67	18.90	
$60,000-$79,999	14.84	14.36	14.51	
$80,000 or more	34.92	29.10	33.27	

Source: Statistics Canada, Canadian Community Health Survey, 2012.

Table 2. Logistic Regression Predicting Good Self-Rated Health of Canadian-born and Immigrant populations, CCHS, 2012

N=59,561	Bivariate	Multivariate	
		Model 1a	Model 1b
Time in Canada (Canadian-born)			
Recent	2.998***	1.654***	1.813***
Long-term	0.776***	0.935	0.894**
Gender (Female)			
Male	0.980	0.871***	0.780***
Age (12-19 years)			
20-29 years	0.706***	0.740***	0.698***
30-39 years	0.705***	0.855	0.714***
40-49 years	0.411***	0.558***	0.482***
50-59 years	0.255***	0.348***	0.320***
60-69 years	0.222***	0.265***	0.286***
70-79 years	0.160***	0.180***	0.232***
80 or more years	0.113***	0.134***	0.187***
BMI 18+ years (normal)			
Underweight	0.460***	0.513***	0.558***
Overweight	0.820***	0.918*	0.902**
Obese	0.440***	0.497***	0.505***
Leisure physical activity index (active)			
Moderately active	0.604***	0.714***	0.708***
Inactive	0.273***	0.413***	0.432***
Stress (not at all)			
Not very	0.948	0.656***	0.617***
Very	0.453***	0.277***	0.256***
Type of smoker (never)			
Current	0.474***	0.430***	0.526***
Former	0.636***	0.780***	0.793***
Binge drinking (never)			
Rarely	1.714***	1.278***	1.226***
Occasionally	1.746***	1.356***	1.335***
Frequently	0.831*	0.871	0.902
Total daily fruits and vegetables (< 5 per day)			
5-10 per day	1.437***	1.180***	1.097**
> 10 per day	1.651***	1.054	0.973
Education (less than secondary school)			
Completed secondary school	1.663***		1.281***
Some post secondary	1.591***		1.008
Completed post secondary	2.052***		1.379***
Household income (no income or less than $20,000			
$20,000 to $39,999	1.706***		1.612***
$40,000 to $59,999	2.967***		2.335***
$60,000 to $79,999	4.315***		2.907***
$80,000	6.990***		3.933***

Source: Statistics Canada, Canadian Community Health Survey, 2012

*P < .05 **P < .01 ***P < .001, Reference category in parenthesis, odds ratios presented in table

Table 3c. Logistic Regression Showing Odds Ratios of Self-Rated Good Health of Canadian-born and Immigrants, CCHS, 2012

N=59,561					Multivariate		
	Model 2a	Model 2b	Model 2c	Model 2d	Model 2e	Model 2f	Model 2g
Time in Canada (Canadian-born)							
Recent	1.855***	1.782***	2.058***	1.805***	1.623***	2.134***	1.858***
Long-term	0.937	0.911*	0.943	0.944	0.887***	0.975	0.938
BMI 18+ years (normal)							
Underweight		0.460***					
Overweight		0.913**					
Obese		0.472***					
Pseudo R^2		0.1205					
Leisure physical activity index (active)							
Moderately active			0.678***				
Inactive			0.363***				
Pseudo R^2			0.1338				
Stress (not at all)							
Not very				0.606***			
Very				0.233***			
Pseudo R^2				0.1323			
Type of smoker (never)							
Current					0.557***		
Former					0.860***		
Pseudo R^2					0.1101		
Binge drinking (never)							
Rarely						1.133***	
Occasionally						1.207**	
Frequently						0.750***	
Pseudo R^2						0.1114	
Total daily fruits and vegetables (< 5 per day)							
5-10 per day							1.301***
> 10 per day							1.231*
Pseudo R^2							0.1100

Source: Statistics Canada, Canadian Community Health Survey, 2012

*p<.05 **p<.01 ***p<.001, Reference category in parenthesis

* Note: gender, age, education, and household income are included in all models, but are not shown.

Table 4. Odds Ratios Self-Rated Health of Immigrants in Canada by Gender, Age, and Health Behaviours, CCHS, 2012

N=8,578

	Model 3a	Model 3b	Model 3c	Model 3d
Time in Canada (Recent)				
Long-term	0.259***	0.275***	0.724	0.672*
Gender (Female)				
Male	0.997	1.129	0.950	0.897
Interaction				
Male*Long-Term		0.874	0.891	0.834
Age (12-19 years)				
20-29 years			0.697	0.573
30-39 years			0.782	0.568
40-49 years			0.502*	0.368**
50-59 years			0.257***	0.207***
60-69 years			0.183***	0.166***
70-79 years			0.104***	0.111***
80 or more years			0.082***	0.097***
BMI 18+ years (normal)				
Underweight			0.719	0.758
Overweight			0.905	0.912
Obese			0.519***	0.538***
Leisure physical activity index (active)				
Moderately active			0.716**	0.712**
Inactive			0.432***	0.450***
Stress (not at all)				
Not very			0.660***	0.628***
Very			0.265***	0.252***
Type of smoker (never)				
Current			0.665***	0.744**
Former			0.955	0.932
Binge drinking (never)				
Rarely			1.366*	1.319*
Occasionally			1.191	1.230
Frequently			0.457**	0.467**
Total daily fruits and vegetables (< 5 per day)				
5-10 per day			1.177*	1.138
> 10 per day			0.882	0.838
Education (less than secondary school)				
Completed secondary school				1.409**
Some post secondary				0.698*
Completed post secondary				1.500***
Household income (no income or less than $20,000				
$20,000 to $39,999				1.483***
$40,000 to $59,999				1.934***
$60,000 to $79,999				3.242***
$80,000				3.082***

Source: Statistics Canada, Canadian Community Health Survey, 2012

*p<.05 **p<.01 ***p<.001, Reference category in parenthesis

Table 5. Odds Ratios Self-Rated Health of Immigrants in Canada by Age, Length of Time in Canada, and Health Behaviours, CCHS, 2012

N=8,578

	Model 4a	Model 4b	Model 4c	Model 4d
Time in Canada (Recent)				
Long-term	0.554***	1.099	1.057	0.922
Age (Younger)				
Middle Aged	0.394***	0.839	0.932	0.819
Older	0.167***	0.128***	0.147***	0.154***
Interactions				
Middle aged*Long-term		0.316***	0.310***	0.326***
Older*Long-term		0.927	0.748	0.934
Gender (Female)				
Male			0.875	0.771***
BMI+ years (normal)				
Underweight			0.677	0.720
Overweight			0.896	0.903
Obese			0.515***	0.540***
Leisure physical activity index (active)				
Moderately active			0.708**	0.702**
Inactive			0.415***	0.436***
Stress (not at all)				
Not very			0.691***	0.647***
Very			0.286***	0.264***
Type of smoker (never)				
Current			0.637***	0.723**
Former			0.882	0.871
Binge drinking (never)				
Rarely			1.475**	1.399*
Occasionally			1.291	1.307
Frequently			0.456***	0.469**
Total daily fruits and vegetables (< 5 per day)				
5-10 per day			1.146	1.117
> 10 per day			0.888	0.839
Education (less than secondary school)				
Completed secondary school				1.403**
Some post secondary				0.710
Completed post secondary				1.548***
Household income (no income or less than $20,000				
$20,000 to $39,999				1.532***
$40,000 to $59,999				2.016***
$60,000 to $79,999				3.467***
$80,000				3.375***

Source: Statistics Canada, Canadian Community Health Survey, 2012

*p<.05 **p<.01 ***p<.001, Reference category in parenthesis

Table 6. Predicted Probabilities of Immigrants Reporting Good Health by Age Category and Length of Time in Canada, CCHS, 2012

N=8,578	
Younger*Recent	0.958***
Younger*Long-term	0.953***
Middle Aged*Recent	0.948***
Middle Aged*Long-term	0.862***
Older*Recent	0.802***
Older*Long-term	0.780***

Source: Statistics Canada, Canadian Community Health Survey, 2012

*p<.05 **p<.01 ***p<.001

References

Abraido-Lanza, A. F., Chao, M. T., & Florez, K. R. (2005). Do healthy behaviors decline with greater acculturation?: Implications for the Latino mortality paradox. *Social Science & Medicine*, *61*(6), 1243-1255.

Ali, J. S., McDermott, S., & Gravel, R. G. (2003). Recent research on immigrant health from statistics Canada's population surveys. *Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique*, 95(3), I9-13.

Antecol, H., & Bedard, K. (2006). Unhealthy assimilation: why do immigrants converge to American health status levels?. *Demography*, *43*(2), 337-360.

Beiser, M. (2005). The health of immigrants and refugees in Canada. *Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique*, S30-S44.

Belanger, A., Martel, L., Berthelot, J. M., & Wilkins, R. (2002). Gender differences in disability-free life expectancy for selected risk factors and chronic conditions in Canada. *Journal of Women & Aging*, 14(1-2), 61-83.

Biddle, N., S. Kennedy and J.T. McDonald (2006) 'Health assimilation patterns among Australian immigrants', *The Economic Record*.

Blue, L., & Fenelon, A. (2011). Explaining low mortality among US immigrants relative to native-born Americans: the role of smoking. *International Journal of Epidemiology*, *40*(3), 786-793.

Bollini, P., & Siem, H. (1995). No real progress towards equity: health of migrants and ethnic minorities on the eve of the year 2000. *Social Science & Medicine,* 41(6), 819-828.

Chen, J., Wilkins, R., & Ng, E. (1996). Health expectancy by immigrant status, 1986 and 1991. *Health Reports*-Statistics Canada, 8, 29-38.

Cunningham, S. A., Ruben, J. D., & Narayan, K. M. V. (2008). Health of foreign-born people in the United States: a review. *Health & Place,* 14(4), 623-635.

Dean, J. A., & Wilson, K. (2010). "My health has improved because I always have everything I need here . . .": A qualitative exploration of health improvement and decline among immigrants. *Social Science & Medicine*, 70(8), 1219-1228.

Deri, C. (2003) 'Social Networks and Health Service Utilization in Canada', *Journal of Health Economics*, 24(6), 1076-1107

DesMeules, M., Gold, J., Kazanjian, A., Manuel, D., Payne, J., Vissandée, B., ... & Mao, Y. (2003). New approaches to immigrant health assessment. *Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique*, 95(3), I22-6.

Elo, I. T., & Preston, S. H. (1997). Racial and Ethnic Differences in Mortality at Older Ages. *Racial and Ethnic Differences in the Health of Older Americans*, 10-42.

Gee, E. M. T., Kobayashi, K. M., & Prus, S. G. (2004). Examining the healthy immigrant effect in mid-to later life: findings from the Canadian Community Health Survey. *Canadian Journal on Aging/La Revue Canadienne du Vieillissement*, 23(5), S55-S63.

Gordon-Larsen, P., Harris, K. M., Ward, D. S., & Popkin, B. M. (2003). Acculturation and overweight-related behaviors among Hispanic immigrants to the US: the National Longitudinal Study of Adolescent Health. *Social Science & Medicine*, 57(11), 2023-2034.

Hummer, R. A., Benjamins, M. R., & Rogers, R. G. (2004). Racial and Ethnic Disparities in Health and Mortality Among the US Elderly Population. *Critical Perspectives on Racial and Ethnic Differences in Health in Late Life*, 53-94.

Jasso, G., D. Massey, M. Rosenzweig, and J. Smith (2004) 'Immigrant Health – Selectivity and Acculturation', Chapter 7 in Anderson, Bulatao and Cohen (eds) *Critical Perspectives on Racial and Ethnic Differences in Health in Late Life*, Committee on Population, National Research Council, Washington DC: The National Academies Press.

Kennedy S, McDonald J T, Biddle N. (2006) The Healthy Immigrant Effect and Immigrant Selection: Evidence From Four Countries. *Social and Economic Dimensions of an Aging Population Research Papers* No. 164.

Kobayashi, K. M., & Prus, S. G. (2012). Examining the gender, ethnicity, and age dimensions of the healthy immigrant effect: Factors in the development of equitable health policy. *International Journal of Equity Health*, 11(1), 8.

Leffondré, K., Abrahamowicz, M., Siemiatycki, J., & Rachet, B. (2002). Modeling smoking history: a comparison of different approaches. *American Journal of Epidemiology*, *156*(9), 813-823.

Manuel, D. G., & Schultz, S. E. (2004). Health-related quality of life and health-adjusted life expectancy of people with diabetes in Ontario, Canada, 1996–1997. *Diabetes Care*, 27(2), 407-414.

Markides, K. S., & Coreil, J. (1986). The health of Hispanics in the southwestern United States: an epidemiologic paradox. *Public Health Reports*, *101*(3), 253.

McDonald, J. T., & Kennedy, S. (2004). Insights into the 'healthy immigrant effect': health status and health service use of immigrants to Canada. *Social Science & Medicine*, 59(8), 1613-1627.

Newbold, K. B. (2005). Self-rated health within the Canadian immigrant population: risk and the healthy immigrant effect. *Social Science & Medicine*, 60(6), 1359 1370.

Newbold, K. B., & Danforth, J. (2003). Health status and Canada's immigrant population. *Social Science & Medicine*, *57*(10), 1981-1995.

Ng, E. (2011). The healthy immigrant effect and mortality rates. *Health Reports*, 22(4), 25

Ng, E., R. Wilkins, F. Gendron and J-M. Berthelot (2005) 'Dynamics of Immigrants' Health in Canada: Evidence from the National Population Health Survey', Statistics Canada, Catalogue 82-618.

Perez, C. (2002) 'Health Status and Health Behaviour Among Immigrants' *Health Reports* (Supplement) volume 13.

Popkin, B. M., & Udry, J. R. (1998). Adolescent obesity increases significantly in second and third generation US immigrants: the National Longitudinal Study of Adolescent Health. *The Journal of Nutrition*, 128(4), 701-706.

Rumbaut, R. G., Escarce, J., & Morales, L. (2006). The health status and health behaviors of Hispanics. *Hispanics and the Future of America*, 362-409.

Shields, M., & Shooshtari, S. (2001). Determinants of self-perceived health. *Health Reports*, *13*(1), 35-52.

Singh, G. K., & Miller, B. A. (2003). Health, life expectancy, and mortality patterns among immigrant populations in the United States. *Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique*, 95(3), I14-21.

Singh, G. and M. Siahpush (2002) 'Ethnic-Immigrant Differentials in Health Behaviors, Morbidity,and Cause-Specific Mortality in the United States: An Analysis of Two National Data Bases', *Human Biology*, 74(1), 83–109.

Sorlie, P. D., Backlund, E., Johnson, N. J., & Rogot, E. (1993). Mortality by Hispanic status in the United States. *Jama,* No. *270*(20), 2464-2468.

Subedi, R. r., & Rosenberg, M. W. (2014). Determinants of the variations in self-reported health status among recent and more established immigrants in Canada. *Social Science & Medicine*, 115103-110.

Turra, C. M., & Elo, I. T. (2008). The impact of salmon bias on the Hispanic mortality advantage: New evidence from social security data. *Population Research and Policy Review*, *27*(5), 515-530.

Veenstra, G. (2009). Racialized identity and health in Canada: Results from a nationally representative survey. *Social Science & Medicine*, 69(4), 538-542.

Wang, L. l., & Hu, W. (2013). Immigrant health, place effect and regional disparities in Canada. *Social Science & Medicine*, 988-17

Wolfson, M. C. (1996). Health-adjusted life expectancy. *Health Reports*-Statistics Canada, 8, 41-45.

Wu, Z. and C. Schimmele (2005) 'Racial/Ethnic Variation in Functional and Self-Reported Health', *American Journal of Public Health*, 95(4), 710-716.