Analysis of Self-Perceived Health Among Immigrants and the Canadian-born

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1. Introduction

Self-perceived health[1] (or self-rated health, or self-assessed health) is one of the most widely used health indicators (Deaton and Paxson, 1998; Adams et al., 2003; Contoyannis et al., 2004). It is based on a question like 'How would you describe your general health?' that lets people evaluate their health status on a scale ranging from poor to excellent. Some researchers have demonstrated the important role of self-perceived health in predicting mortality (Benyamini et al., 1999; Ferraro and Kelley-Moore, 2001; Ford et al., 2008). With the tremendous development of human society, numerous researchers have studied self-perceived health.

As one of the world's major immigrant-receiving countries, Canada attracts a large number of immigrants. A recent study predicts that the Canadian population will increase continuously due to the increasing number of immigrants in Canada (Hiebert, 2005). For instance, Statistics Canada estimates that in 2006 almost 20 percent of all Canadians were born abroad (Statistics Canada, 2009). Also, Statistic Canada notes that in 1988/1989, the total number of immigrants admitted to Canada was 177,632; by 2008/2009, the total number of immigrants had risen to 245,289. In other words, the number of immigrants admitted to Canada has increased by 67,657 from 1988/1989 to 2008/2009.[2] Moreover, in 2010, Canada admitted a huge number of immigrants, with over 280,600 new permanent residents start their brand new lives in the country (Citizenship and Immigration Canada, 2012).

Clearly immigration is an important part of Canada's population growth. Given the increasing proportion of immigrants in Canada, it is useful and necessary to focus on their

[1] In the rest of this paper, I will use the word "self-perceived health" instead of "self-rated health" or "self-assessed health".
[2] Statistics Canada, CANSIM table 051-0004.

health since they may encounter various difficulties in adjusting to a new environment and culture. Knowing the major determinants of immigrants' health in Canada can provide insight into how to improve the health of both male and female immigrants.

This study helps to address this issue by analyzing differences between immigrants' health and the health of those born in Canada. In addition, I investigate the "healthy immigrant effect," the phenomenon that recent immigrants to Canada tend to be healthier than native-born Canadians. Using self-perceived health as a measure of health and data from the 2010 Canadian Community Health Survey, I examine the health status of four different groups: male immigrants, female immigrants, Canadian-born males and Canadian-born females.

The rest of this paper is organized as follows: Section 2 reviews the literature on self-perceived health. Section 3 describes an ordered probit model of self-perceived health. Section 4 introduces the data and specifies the variables included in the model. Section 5 presents the empirical results from ordered probit regressions of self-perceived health. Specifically, I will do regressions with and without chronic health conditions included for the four different groups, because I want to examine the explanatory power of chronic health conditions in predicting self-perceived health. Then I will calculate the marginal effects of each explanatory variable on self-perceived health. The last section summarizes the results and conclusions.

2. Literature Review

Generally speaking, the literature on self-perceived health has focused on three fields: the

analysis of the determinants of self-perceived health; the comparison of self-perceived health in different groups, regions or countries; and the forecasting and improvement of future self-perceived health. Many of these previous studies use logistic regression models to analyze self-perceived health. The reminder of this literature review looks first at the determinants of self-perceived health, and then at the so-called "healthy immigrant" effect.

2.1 Determinants of the self-perceived health of immigrants

A large body of research has investigated the determinants of self-perceived health. Some studies have found that one socio-demographic factor, age, has a major influence on health status. For example, using data from the World Values Survey (1981–2005), Noymer and Lee (2012) found that age was closely associated with health status.

As age is an important factor related to health, many researchers around the world have focused their attention on specific age groups. For instance, using longitudinal data from the National Population Health Survey, one study compares the self-perceived health of younger (25-54) and older (55+) Canadian adults, and finds that a higher proportion of younger (25-54) Canadian adults report good or excellent health than older (55+) Canadian adults (Shooshtari, Menec, and Tate, 2007). A more recent study (Kulla, Ekman, Heikkila, and Sarvimaki, 2010) compared the self-perceived health of two groups of older immigrants (65 years or more) in Sweden, the Finland-Swedes and Finns, using data from a postal questionnaire.[3] They found that older Finland-Swede immigrants rate their health higher than older Finn immigrants

[3] Between 1945 and 1990, almost five hundred thousand Finns moved from Finland to Sweden and became immigrants. Finnish immigrants in Sweden actually include two ethnic groups, namely Finns and Finland-Swedes. Specifically, Finland-Swedes speak Swedish as their mother tongue in Sweden. Nowadays, Finnish immigrants are the largest group of immigrants in Sweden.

since Finland-Swede immigrants generally have a higher education level and are better integrated into Swedish culture.

On the other hand, using data from the Swedish Annual Level of Living Survey (1992–1999), Leao et al. (2009) found length of residence and age at migration to be significantly related to poor self-perceived health among first-generation immigrants in Sweden. The potential explanations for poor self-perceived health among these immigrants include employment status before and after immigration, lack of social supports, a lack of social networks, poor living conditions, limited language proficiency, discrimination, and failure to integrate into the host country.

Gender differences in self-perceived health have been shown to exist by numerous studies (e.g., Cott, Gignac, and Badley, 1999; Ahmad, Jafar, and Chaturvedi, 2005; Llacer et al., 2007; Martins and Reid, 2007; Peracchi and Rossetti, 2008; Ng, Pottie, and Spitzer, 2011; Demirchyan, Petrosyan, and Thompson, 2012). For example, using data from the Longitudinal Survey of Immigrants to Canada (LSIC), Ng, Pottie and Spitzer (2011) find that declines in self-perceived health among male immigrants in Canada are associated with being a refugee, being discriminated against frequently and living in Vancouver. However, the situation of female immigrants is different. The factors that are associated with a decline in their self-perceived health are older age, having difficulties in accessing health care and the lack of a friendly neighborhood environment. In addition, using data from a 2006 countrywide household health survey, Demirchyan et al. (2012) find that education levels are related to self-perceived health among males but not among females in Armenia. However, according to Arber and Cooper (1999), who use data from the British General Household

Survey (GHS), after controlling for socioeconomic factors such as income and occupation, the gender differences in self-perceived health decrease. Similarly, using data from a postal survey questionnaire in 2008, a study from Sweden suggests that if women were treated as fairly as men and had financial independence, gender gaps in self-perceived health would disappear (Molarius et al., 2011).

Acculturation has played an increasingly essential role in determining the self-perceived health of immigrants in recent studies. Acculturation is the ability of immigrants to acquire official languages, cultures, attitudes and customs of the host country (Lara, Gamboa, Kahramanian, Morales, and Bautista, 2005). Language fluency is a common proxy for acculturation (Abraido-Lanza et al., 2006). Using data from the Survey of Living Conditions in the Arctic (SLiCA), Eliassen et al. (2012) shows that acculturation significantly predicts poorer self-perceived health in Greenland. Furthermore, using data from the 2003 Detroit Arab American Study (DAAS), Abdulrahim and Baker (2009) conclude that language is a significant factor when modelling self-perceived health among the non-English speaking population.

Similarly, an individual's ability to master the official languages of the new country is related to self-perceived health among immigrants. According to Ng, Pottie and Spitzer (2011), persistently limited language proficiency during the first four years in Canada is associated with poorer self-perceived health among immigrants. Thus a limited ability to speak English or French among immigrants in Canada may result in poor health status. In addition, using the Longitudinal Survey of Immigrants to Canada (LSIC), Zhao, Xue, and Gilkinson (2010) find that proficiency in English is associated with better health.

Different ethnic groups of immigrants have their unique characteristics and cultures; thus members of the same ethnic group may share some similarities when rating their health. Many previous studies have examined the relationship between ethnicity and self-perceived health (e.g., Sundquist, 1995; Lindstrom, Sundquist and Ostergren, 2001; Wiking, Johansson, and Sundquist, 2004). For example, according to Kington and Nickens (2001), among older African Americans, a larger proportion of the population reports fair or poor health than among older Whites. In particular, using data from three sources (the 1990 Decennial Census, the 1994–1995 Project on Human Development in the Chicago Neighborhoods–Community Survey and the 1995, 1997, and 1999 Metropolitan Chicago Information Center–Metro Survey), Cagney, Browning and Wen (2005) show that African Americans are more likely to report poorer health status even after controlling for age and other individual-level characteristics. Similarly, using data from the San Luis Valley Diabetes Study, Shetterly et al. (1996) find that Hispanics rank their health more poorly than Caucasians. Moreover, using data from Statistics Sweden, Wiking, Johansson, and Sundquist (2004) find that immigrants from Poland, Turkey, and Iran report poorer health than Swedish-born individuals. Finally, Dunn and Dyck (2000), who use data from the National Population Health Survey (NPHS), report that immigrants to Canada from Asia are more likely to rate their health as poor than immigrants from Europe.

2.2 The healthy immigrant effect

Generally speaking, new immigrants report better health status than their native-born counterparts. This is a phenomenon called the "healthy immigrant effect" (HIE), which arises

when immigrants are on average healthier than the native-born (Antecol and Bedard, 2006). This effect has been observed in both physical health and mental health. Many previous studies have shown that the "healthy immigrant effect" exists in Canada and the United States (Ali, 2002; Pérez, 2002; Stephen et al., 1994).

Hyman (2001) concludes that, "In Canada, national health survey data show that recent immigrants, particularly from non-European countries, are in better health than their Canadian-born counterparts." It is a fact that people who are physically and mentally in the healthiest condition are more likely to be accepted as immigrants (MacDonald and Kennedy, 2004). Owing to this kind of selection, healthy individuals are more likely to migrate to another country than the unhealthy. Moreover, all potential immigrants to Canada are required to take a medical exam before being officially approved to be a permanent resident. Due to the required medical exam, new immigrants in Canada generally have better health status than their Canadian-born counterparts (Dunn and Dyck, 2000; Ali, 2002; Newbold and Danforth, 2003).

Usually, as new immigrants begin their lives in their new country, they encounter many challenges related to employment, culture, social status, emotion and so on. However, as the years pass, especially for immigrants who have been in the host country for more than 10 years, their health situation becomes different from that of new immigrants. Immigrants in a new society may start losing their initial health advantage over time (Dunn and Dyck, 2000; Ali, 2002; Agudelo-Suarez et al., 2009; Newbold, 2009; De Maio and Kemp, 2010). Some researchers find that the health status of immigrants declines to the same level as that of the Canadian-born population, or even becomes worse in specific cases (Chen et al., 1996; Ali,

2002; Dunn and Dyck, 2000; MacDonald and Kennedy, 2004). For example, using data from Statistics Canada's National Population Health Survey (NPHS) and applying a proportional hazards model, Ng et al. (2005) find that the self-perceived health of non-European immigrants in Canada declined over time as compared to the Canadian-born population. Similarly, Lou and Beaujot (2005) find that recent immigrants have a health advantage, but this advantage diminishes for long-term immigrants. What's more, they also found that the health status of long-term immigrants was similar to that of their Canadian-born counterparts. In addition, during the process of acculturation, immigrants who have adopted the Canadian lifestyle, including some unhealthy behaviors, may face negative effects on their health status (Gordon-Larsen et al., 2003; Beiser, 2005). Similar phenomena have also been observed in the United States. Lopez-Gonzalez et al. (2005) and Antecol and Bedard (2006) both find that immigrants' initial health advantage wanes with time, while Kaestner et al. (2009), using data from the National Health and Nutrition Examination Survey (1988–1994), find that long-term immigrants in the US tend to adopt unhealthy habits, such as smoking and drinking, and rate their health as poor because of language barriers or acculturation problems.

Gender variations have also been linked to the "healthy immigrant effect." According to Boyd and Grieco (2003), gender has a considerable effect on how immigrants get along with the new country and culture. Some researchers found that the reasons for immigration of males and females are different. (Curran et al., 2006; Donato, 2010). Using data from the Epidemiologic Study of the Elderly, a recent study by Hill et al. (2012) showed that the "healthy immigrant effect" tends to favor immigrant men rather than immigrant women.

Although the "healthy immigrant effect" declines over time, according to Dean and

Wilson (2010), most immigrants have positive attitudes towards their future health status and believe that their health will remain stable or improve as a result of life improvement in Canada.

Given the reality that immigrants to Canada are a growing proportion of the total population, it is essential to study their health status. Idler and Benyamini (1997) stated that "self-perceived health may capture the holistic health perception, including the physical, mental and social wellbeing using individual criteria." Numerous studies have focused on self-perceived health among immigrants in different countries. Following the literature, this paper also focuses on self-perceived health. For the purpose of examining immigrants' health status, the target populations of this paper are immigrants versus their Canadian-born counterparts. Because other studies have found gender differences to be important, I analyze male immigrants and female immigrants separately. In this paper, I investigate the impact of four types of factors on the self-perceived health of immigrants and the Canadian-born self-perceived health: socio-demographic factors, personal health behavior, personal psychological factors, and chronic health conditions. In addition, I examine the marginal effects of the above mentioned factors on each category of self-perceived health for immigrants and the Canadian-born by gender.

3. Econometric Model

It is well known that the traditional ordinary least squares (OLS) regression model is not suitable when the dependent variable is measured on an ordinal scale (Long, 1997). Generally speaking, due to the fact that many dependent variables in health economics are categorical

variables, it is common to apply nonlinear models. When an ordinal dependent variable has more than two outcomes, ordered probit and ordered logit models are the most widely used approach for analyzing the data (Zavoina and McKelvey, 1975). When the discrete dependent variable has a natural ordering, the ordered probit model is more appropriate than a multinomial choice model (Jones, 2007). Moreover, the method of maximum likelihood is widely used to estimate the parameters of ordered probit and logit models (Greene, 2007, 777). In this paper, since the dependent variable $sphgrp_i$ (self-perceived health) is an ordered multinomial variable, I adopt the ordered probit model.

An ordered probit model of self-perceived health is based on a continuous latent variable, $sphgrp_i^*$, which is unobserved and represents respondent i's own "true health status." Specifically, $sphgrp_i^*$ is assumed to be positively correlated with self-perceived health: the higher value of $sphgrp_i^*$, the more likely that respondent reports a higher category. The main idea is that there exist unknown thresholds values, such that the real line can be divided into various regions corresponding to the ordinal categories "poor", "fair", "good", "very good", and "excellent". Also, it is assumed that $sphgrp_i^*$ is a linear function of predictors and an error term that has a standard normal distribution (Jackman, 2000, 2). In other words,

$$sphgrp_i^* = X_i'\beta + \varepsilon_i \qquad (1)$$

where X_i' is a set of independent variables that explain self-perceived health, β is a vector of coefficients to be estimated, and ε_i is the error term with a standard normal distribution. Although $sphgrp_i^*$ is unobservable, we do observe the categorical variable $sphgrp_i$, which in this paper has five categories. The observable variable $sphgrp_i$ is related to as follows:

1. poor health: $sphgrp_i = 0$ if $sphgrp_i^* \leq \alpha_1$

2. fair health: $sphgrp_i = 1$ if $\alpha_1 < sphgrp_i^* \leq \alpha_2$

3. good health: $sphgrp_i = 2$ if $\alpha_2 < sphgrp_i^* \leq \alpha_3$

4. very good health: $sphgrp_i = 3$ if $\alpha_3 < sphgrp_i^* \leq \alpha_4$

5. excellent health: $sphgrp_i = 4$ if $sphgrp_i^* > \alpha_4$.

where α_j (j=1, …, 4) are the threshold values that classify the individual's health status into one of the five categories. In reality, each respondent has his or her unique feelings and opinions, and the specific characteristics of individual i depend on X_i' and other unobserved factors ε_i. In practice, individual i's response to the survey question is based on his or her own latent variable $sphgrp_i^*$, and the individual chooses the category that best reflects his or her own feelings (Greene, 2007, 832).

The probability that individual i reports a particular outcome $sphgrp_i = j$, j=0,…,4 is based on the difference between the probability of having a value of $sphgrp_i^*$ less than α_j and the probability of having a value of $sphgrp_i^*$ larger than α_{j-1}. With the assumption that ε_i is normally distributed across observations, the probabilities of each ordinal category are as follows:

$$\text{Prob}\,(sphgrp_i = 0 \mid X) = \Phi(\alpha_1 - X_i'\beta),$$

$$\text{Prob}\,(sphgrp_i = 1 \mid X) = \Phi(\alpha_2 - X_i'\beta) - \Phi(\alpha_1 - X_i'\beta),$$

$$\text{Prob}\,(sphgrp_i = 2 \mid X) = \Phi(\alpha_3 - X_i'\beta) - \Phi(\alpha_2 - X_i'\beta),$$

$$\text{Prob}\,(sphgrp_i = 3 \mid X) = \Phi(\alpha_4 - X_i'\beta) - \Phi(\alpha_3 - X_i'\beta),$$

$$\text{Prob}\,(sphgrp_i = 4 \mid X) = 1 - \Phi(\alpha_4 - X_i'\beta).$$

where $\Phi(\cdot)$ represents the standard normal cumulative distribution function. Note that the

values of α_j must have the property that $\alpha_1 < \alpha_2 < \alpha_3 < \alpha_4$.

The method of maximum likelihood is used estimate the parameters β and $\alpha_1,\ldots,\alpha_4$. The likelihood function is:

$$\mathcal{L} = \prod_{sphgrp_i=0} [\Phi(\alpha_1 - X_i'\beta)] \prod_{sphgrp_i=1} [\Phi(\alpha_2 - X_i'\beta) - \Phi(\alpha_1 - X_i'\beta)] \prod_{sphgrp_i=2} [\Phi(\alpha_3 - X_i'\beta) - \Phi(\alpha_2 - X_i'\beta)] \prod_{sphgrp_i=3} [\Phi(\alpha_4 - X_i'\beta) - \Phi(\alpha_3 - X_i'\beta)] \prod_{sphgrp_i=4} [1 - \Phi(\alpha_4 - X_i'\beta)]. \quad (2)$$

Taking logs one obtains the log-likelihood function:

$$\ln\mathcal{L} = \left(\sum_{sphgrp_i = 0}\right) \ln[\Phi(\alpha_1 - X_i'\beta)] + \left(\sum_{sphgrp_i = 1}\right) ln[\Phi(\alpha_2 - X_i'\beta) - \Phi(\alpha_1 - X_i'\beta)] + \left(\sum_{sphgrp_i = 2}\right) \ln[\Phi(\alpha_3 - X_i'\beta) - \Phi(\alpha_2 - X_i'\beta)] + \left(\sum_{sphgrp_i = 3}\right) \ln[\Phi(\alpha_4 - X_i'\beta) - \Phi(\alpha_3 - X_i'\beta)] + \left(\sum_{sphgrp_i = 4}\right) \ln[1 - \Phi(\alpha_4 - X_i'\beta)]. \quad (3)$$

In practice, it is more convenient to maximize the logarithmic form of the likelihood function.

In contrast to the standard linear regression model, it is more complicated to analyze the coefficients of an ordered probit model. Because the model is nonlinear, the marginal effects of the independent variables of ordered probit model are not equal to the values of coefficients (Greene, 2007, 832). In fact, many researchers focus on the study of marginal effects and use them to interpret the quantitative implications of results.

For a continuous explanatory variable, the marginal effect on Prob ($sphgrp_i = j$), j = 0,…,4, is just the derivative of Prob ($sphgrp_i = j$) with respect to that variable. For dummy explanatory variable, the marginal effect is the discrete change in Prob ($sphgrp_i = j$) when

the dummy explanatory variable changes from 0 to 1.[4] However, the sign of β does provide information about the relationship between the latent variable $sphgrp_i^*$ and the regressor. For example, if an estimated coefficient is positive, it is implies that an increase in the regressor will increase the probability of being in the category with the highest value $(sphgrp_i = 4)$.

In conclusion, the ordered probit model is suitable for ordered multinomial outcomes and I will apply it to examine the self-perceived health of immigrants and of their Canadian-born counterparts. The choice of variables included in the vector X_i will be discussed in the next section.

4. Data

This paper uses cross-sectional data from the public use file of the Canadian Community Health Survey (CCHS) 2010, the objective of which was to gather information related to Canada's health system. Data collection took place every two years before 2007. After 2007, a big change was made to the CCHS and data are now collected every year. The CCHS covers almost 98% of the Canadian population aged 12 and above who lived in one of 117 health regions. All provinces and territories are included. It collects data on general health and on a large variety of demographic and other characteristics of respondents. The 2010, sample consists of 62,909 respondents.

This study uses a subset of annual data from the 2010 CCHS.[5] All variables in the model were obtained from the CCHS. The source of all the variables retrieved is provided in the

[4] For further details on the ordered probit model and the calculations of marginal effects, see Jackman, 2000; Greene, 2007; Jones, 2007.

[5] Although the CCHS public use microdata file does include a weight variable, I did not use weights in empirical analysis.

Data Source section at the end of this paper.

Theoretically, the sample size in this paper ought to be 62,909, which includes all respondents. However, in practice some observations are lost due to missing values. The number of missing values for each question is different. Missing values can have a huge effect on the results of regression, so they are excluded from the data set used in this paper. As a result, the sample size decreases and the total effective sample size is 46,461 in this paper. In other words, 16,448 observations are excluded from data. Among the included respondents, the Canadian-born sample of 39,973 is fairly large, while the immigrant sample of 6,488 is relatively small. In the immigrant sample, there are 2,903 males and 3,585 females. In the Canadian-born sample, the numbers of males and females are 18,233 and 21,740 respectively.

4.1 Model variables

As already noted, the dependent variable of the model, $sphgrp_i$, is a categorical variable with five categories. $sphgrp_i$ represents the self-perceived health status for individual i measured in 2010, which is the dependent variable in this paper. The related survey question was "In general, would you say your health is excellent, very good, good, fair, or poor?" The responses were original coded as, 1 = excellent, 2 = very good, 3 = good, 4 = fair and 5 = poor. These five categories were in descending order. Generally speaking, it is convenient to generate a new categorical variable which named $sphgrp_i$ and code the answers in ascending order, ranging from poor to excellent.

Following the literature, I include as independent variables affecting self-perceived

health four types of factors. Firstly, among socio-demographic factors I include age, marital status, languages in which one can converse, highest level of education, total person income from all sources, employment status and length time in Canada since immigration. Secondly, personal health behavior factors include type of smoker, type of drinker, and a physical activity index. Thirdly, personal psychological factors include sense of belonging to the local community, satisfaction with life in general, and perceived life stress. Finally, in some models I also include chronic health conditions; in particular, anxiety disorder, asthma, high blood pressure, and migraine headaches. Specifically, I hypothesize that perceptions of health will be different for respondents who have a chronic health condition. Thus, I separately estimate immigrants and the Canadian-born's self-perceived health, by gender, with and without chronic health conditions included in order to determine how these conditions affect the results.

Two of the variables retrieved from the CCHS were used to allocate observations to subsamples rather than as explanatory variables. The first is sex_i, the gender variable. Males were coded as 1 and females were coded as 2. I prefer to generate a new categorical variable named $sexgrp_i$ and code it as 'male' if sex_i equals to 1. Otherwise, $sexgrp_i$ is labeled as 'female'. The second is imm_i, a variable that indicates if individual i is an immigrant. In CCHS 2010, immigrants were coded as 1 and non-immigrants were coded as 2. I generate a new dummy variable named $immgrp_i$, which equals to 1 if individual i was an immigrant. Otherwise, the value of $immgrp_i$ is 0. This variable is used to distinguish between immigrants and the Canadian-born.

Turning now to the socio-demographic variables included in the model, age_i is the age

of individual i in 2010. In this paper, I focus on persons whose ages were 15 years and older, so all individuals younger than 15 were excluded from the sample. The variable age_i had 15 categories ranging from 15 years to 80 years or more. I decided to group some ages together and reduce the number of categories to five instead of fifteen, and generated a new categorical variable named $agegrp_i$. The first category of $agegrp_i$ combines the first three groups of age_i together and labels them as 'age 15-24'. The second group has respondents ranging from 25 years to 39 years, so I label it 'age 25-39'. The third group is called 'age 40-54' and the fourth group is 'age 55-69' (the reference group). Finally, the last group is for people over 70. This group is labeled as 'age 70+'.

mar_i is the marital status for individual i in 2010. The related question in CCHS 2010 was "What is your marital status? Are you married, living common-law, widowed, separated, divorced, or single, never married?" I generated a new categorical variable named $margrp_i$ and classify the original four groups into three, which are in ascending order and labeled as 'never married', 'previously married' and 'married' respectively. Specifically, the group 'never married' consists of those for whom mar_i equals 4. Widowed, separated, and divorced individuals are grouped together as 'previously married', individuals for whom mar_i equals 3. If the value of mar_i is equal to 1 or 2, the individual is included in the category labeled 'married'.

lan_i indicates the language(s) in which individual i can converse. According to CCHS 2010, responses were labeled as follows: 1 = English (with or without language other than French), 2 = French (with or without language other than English), 3 = English and French (with or without other language), 4 = neither English nor French (other). I generated a new

categorical variable named $langrp_i$ and define four groups as follows: 'neither English nor French' if lan_i equals 4; 'English' if lan_i equals 1; 'French' if lan_i equals 2 and 'English and French' if lan_i equals 3. Each group is represented by a dummy variable in the empirical analysis.

edu_i is the highest education level for individual i in 2010. There are four categories, namely less than secondary school graduation, secondary school graduation (no post-secondary education), some post-secondary education and post-secondary degree/diploma, which they were coded as 1, 2, 3 and 4. Specifically, I generated a new categorical variable named $edugrp_i$. If edu_i equal 1, $edugrp_i$ is labeled as 'less than secondary'. The other three categories are labeled as 'secondary graduation', 'other post-secondary' and 'post-secondary graduation' when edu_i equals 2, 3 or 4 respectively. Again, each category is represented by a dummy variable in the ordered probit models.

inc_i is the individual's personal income from all sources in 2010. The six categories were defined as follows: 1 = no income, 2 = less than $20,000, 3 = $20,000 to $39,999, 4 = $40,000 to $59,999, 5 = $60,000 to $79,999 and 6 = $80,000 or more. In this paper, I generated a new categorical variable named $incgrp_i$ and then classify the six above-mentioned categories into four categories in ascending order. When $incgrp_i$ equals 1, it is labeled as 'no income'. The next group's label is 'less than $39,999' and corresponds to inc_i equal 2 or 3. The third category is labeled as '$40,000 to $79,999' and inc_i equals 4 or 5. The last category corresponds to inc_i equal to 6 and is labeled '$80,000 or more'.

emp_i is the employment status for individual i in 2010. Response to the question "Are

you an employee or self-employed?" were coded in such way that 1 = employee, 2 = self-employed and 6 = not applicable. Because CCHS provides limited information on labour market status, and many respondents were young, a large number of responses fall into the category named "not applicable." Specifically, I prefer to treat these responses as "not employed." Thus, I generated a new categorical variable named $empgrp_i$ and label it as 'employee' if emp_i equals to 1. If emp_i equal to 2, $empgrp_i$ is labeled as 'self-employed'. Finally, $empgrp_i$ is labeled 'not employed' when emp_i is not equal to 1 or 2.

lti_i represents the length of time that individual i has been in Canada since his or her immigration. According to CCHS 2010, if the time since immigration of individual i was less than 10 years, lti_i was coded as 1. If it was 10 years or more, it was coded as 2. For estimation purposes, I generated a new categorical variable named $ysmgrp_i$. When $ysmgrp_i$ equals 1, it is labeled '0 to 9 years'. For the case of long time immigration, $ysmgrp_i$ equals 2 and is labeled '10 or more years'. This variable was included only in the models for immigrants.

The first personal health behavior variable used in my analysis is tos_i, the specified smoking type of individual i. The CCHS 2010 used three categories to represent different types of smokers as follows: 1 = daily, 2 = occasionally and 3 = not at all. For estimation purposes, I generated a new categorical variable named $tosgrp_i$, which presents the smoking types in ascending order. Specifically, $tosgrp_i$ is labeled as 'not at all' if tos_i takes value of 3. The next group is called 'occasional smoker', which corresponds to tos_i equal to 2. The last group is labeled 'daily smoker' and corresponds to tos_i equal to 1.

tod_i is the drinking type of individual i in the last 12 months. There were three types of drinker: 1 = regular drinker, 2 = occasional drinker and 3 = did not drink in the last 12 months. Again, a new categorical variable is generated, named $todgrp_i$. Its categories are organized in ascending order and are labeled 'did not drink in the last 12 months', 'occasional drinker' and 'regular drinker' if tod_i takes the value of 3, 2 or 1 respectively.

pai_i is the CCHS variable that categorizes the physical activity of individual i. Responses were categorized as follows: 1 = active, 2 = moderately active and 3 = inactive. Since these responses were in descending order, I generated a new categorical variable named $paigrp_i$, which ranges from inactive to active. To be more specific, the three categories of $paigrp_i$ are labeled as 'inactive', 'moderately active' and 'active' correspondent to the descending values of pai_i.

The first personal psychological factor included in the model is sob_i, which represents the sense of belonging of individual i in 2010. The related question is "How would you describe your sense of belonging to your local community?" Answers were coded in descending order as follows: 1 = very strong, 2 = somewhat strong, 3 = somewhat weak and 4 = very weak. For this paper, I generated a new categorical variable named $sobgrp_i$. When sob_i takes values of 3 or 4, $sobgrp_i$ is assigned the value 1 and is labeled as 'weak'. On the contrary, if sob_i equals to 1 or 2, the value of $sobgrp_i$ is set equal to 2 and this category is labeled as 'strong'.

slg_i indicates the individual's satisfaction with life in general. Respondents rated their satisfaction with life as either 1 = very satisfied, 2 = satisfied, 3 = neither satisfied nor dissatisfied, 4 = dissatisfied or 5 = very dissatisfied. In order to have an ascending order of

satisfaction, I generated a new categorical variable named $slggrp_i$. Category 1 of $slggrp_i$ is called 'dissatisfied' and corresponds to slg_i equal to 4 or 5. If slg_i equals 3, $slggrp_i$ is labeled as 'neither satisfied nor dissatisfied'. The last category of $slggrp_i$ is labeled as 'satisfied' when slg_i takes value of 1 or 2.

pls_i is the perceived life stress for individual i in 2010. According to the question "Thinking about the amount of stress in your life, would you say that most days are: not at all stressful, not very stressful, a bit stressful, quite a bit stressful, or extremely stressful?", answers were classified into five categories. These five categories can be combined into three. Thus, I generated a new categorical variable named $plsgrp_i$ and labeled it in descending order from 'very stressful', to 'stressful' to 'not stressful'. Specifically, if pls_i equals 1, $plsgrp_i$ is labeled as 'not stressful'. $plsgrp_i$ is labeled as 'stressful' if pls_i equals 2 or 3. The highest value for $plsgrp_i$ is labeled as 'very stressful' corresponding to the last two values of pls_i.

The remaining four variables indicate the presence of certain chronic health conditions, and were not included in all the models estimated. anx_i indicates whether individual i had an anxiety disorder. Responses to the question "Do you have an anxiety disorder such as a phobia, obsessive-compulsive disorder or a panic disorder?" were classified into two categories. I prefer to generate a new categorical variable named $anxgrp_i$. If anx_i equals 2, $anxgrp_i$ is labeled as 'no'. For the case of a respondent who had an anxiety disorder, anx_i equals 1 and $anxgrp_i$ is labeled 'yes'.

ast_i is the variable that demonstrates if individual i had asthma. In response to the question "Do you have asthma?", answers were coded in such way that 1 = yes and 2 = no.

Similarly, I generated a new categorical variable named $astgrp_i$, which is labeled 'no' and 'yes' corresponding to value of 2 and 1 respectively for ast_i.

hbp_i is the variable that indicates if individual i had high blood pressure. The question was "Do you have high blood pressure?" and responses were coded as 1 = yes and 2 = no. I generated a new categorical variable named $hbpgrp_i$ and label it as 'no' if hbp_i equals 2. Otherwise, $hbpgrp_i$ is labeled as 'yes' whom hbp_i equals 1.

Finally, mih_i represents if individual i had migraine headaches. The related question was "Remember, we are interested in conditions diagnosed by a health professional. Do you have migraine headaches?" Responses were classified into two groups, namely 1 = yes and 2 = no. I generated a new categorical variable named $mihgrp_i$. If mih_i equals 2, $mihgrp_i$ is labeled as 'no'. Otherwise, $mihgrp_i$ is labeled as 'yes'.

In conclusion, all the variables included in the models are 0-1 dummy variables. A full summary of the definitions of all the categorical variables is provided in appendix Table A1. Table A2 in the appendix indicates the reference group for each categorical variable in the ordered probit models.

4.2 Descriptive statistics

Figure 1 shows the percentage reporting each level of self-perceived health for male immigrants and female immigrants in 2010. As we can see from the figure, over 23% of male immigrants reported excellent health as compared to 21% of female immigrants. In terms of reporting very good health status, female immigrants had a larger proportion than male immigrants. Male immigrants had a slightly higher proportion reporting good health.

However, female immigrants were more likely to report fair or poor health. Approximately 10% of female immigrants reported fair health and 4% of them reported poor health status.

The comparison between Canadian-born males and females in terms of their self-perceived health status is shown in Figure 2. Almost 20% of Canadian-born females reported excellent health as compared with 18.4% of Canadian-born males. Canadian-born females were slightly more likely to report very good or poor health. With respect to good health and fair health, Canadian-born males had relatively larger proportions.

Comparing Figure 1 and Figure 2, it can be seen that both male and female immigrants were more likely to report excellent health as compared with males and females born in Canada. With respect to very good health, Canadian-born males and females both had a larger proportion than those of male and female immigrants. Moreover, both male and female were less likely to report poor or good health. In contrast, considering of reporting fair health, both Canadian-born males and females had a slightly larger proportion.

Table 1 shows how the frequency distribution of the self-perceived health of immigrants varies across explanatory variables. First consider the socio-demographic factors. It can be seen that as immigrants' age increases, the percentage reporting poor or fair health status increases. At the same time, the percentage reporting very good or excellent health status decreased with age. Thus younger respondents were more likely to rate their health status as very good or excellent while the reverse was true for the elderly. In terms of marital status of immigrants, those previously married were more likely to report their health status as poor or fair with a proportions of 7.58% and 15.73% respectively, as compared to those never married or married. Immigrants with the ability to converse in both English and French had a

higher tendency to rate their health as excellent as compared with those unable to converse in either English or French. The levels of self-perceived health also varied with education and income; those with the highest education level or highest income level were less likely to report their health status as poor or fair compared with those with lower education or income. Over 6% of unemployed immigrants reported their health status as poor, compared to only 0.75% of those who were employees and 1.81% of those who were self-employed. As might be expected, long-term immigrants were less likely to report excellent or very good health as compared with those who had resided in Canada for less than 10 years.

Secondly, the personal health behaviors appear to be associated with perceived health status in the expected manner. Daily smokers were less likely to report excellent health as compared with those who did not smoke or who smoked occasionally. However, regular drinkers were more likely to report excellent health than occasional drinkers or who did not drink in the last 12 months. Overall, almost 30% of those who were physically active reported excellent health status compared with only 18% of those who were inactive.

Third, positive personal psychological factors were also related to excellent health status of immigrants. Over 23% of those with a strong sense of belonging to the local community reported excellent health, as compared with 17.88% of those with a weak sense of belonging to local community. More striking are the differences in each category of satisfaction with life, with almost 24% of those who were satisfied with their life reporting excellent health as compared with only 6% of those who were dissatisfied with life. Those with a very stressful life were more likely to rate their health status as poor or fair as compared with those who did not feel much stress. Finally, chronic health factors also appear to be correlated with

self-perceived health. As might be expected, chronic health factors were negatively related to health status. Specifically, over 22% of those without an anxiety disorder reported excellent health as compared to only 9.24% of those with an anxiety disorder. Similarly, those with asthma or high blood pressure were also found to be less likely to report excellent or good health. However, there was not much difference in reporting excellent self-perceived health between those with and without migraine headaches.

Table 2 shows the frequency distribution of self-perceived health by explanatory variable for the Canadian-born. The first panel of the table includes the socio-demographic factors. As shown in the table, the proportions reporting poor or fair health again increased with age. Specifically, respondents who were aged 25-39 had the largest proportion reporting excellent health, which was over 25%. Those who previously married were more likely to report poor or fair health compared with those who never married or were married. About 22% of those who never married or were married reported excellent health as compared with 13.92% of those who were previously married. As might be hypothesized, fluency in speaking both English and French was related to good health; over 22% of those who were able to converse in both English and French reported excellent health as compared to 13.95% of those who could not converse in either English or French. Regarding education and income, those with the highest level of education or income were more likely to report excellent health. Almost 7% of those unemployed reported poor health compared with only 0.91% of those who were employees and 1.08% of those who were self-employed.

Personal health behaviors are included in the second panel of Table 2. As was the case for immigrants, those who were regular drinkers were more likely to reported excellent or

very good health. In contrast, daily smokers were less likely to report excellent health. Over 28% of those who were physical active reported their health status as excellent, as compared with only 12.99% of those with inactive physical activity index.

The third panel of the table includes personal psychological factors. Respondents having a strong sense of belonging to the local community were more likely to rate their health as excellent or very good. More noticeable were the differences with respect to satisfaction with life: 20.29% of those who were satisfied with life reported excellent health as compared with only 3.83% of those who were dissatisfied with life. Over 7% of those with very stressful life reported poor health status as compared with only 2.25% of those who did not have a stressful life.

The last panel of Table 2 includes variables related to chronic illnesses. Chronic health factors were expected to be negatively associated with good health. It can be seen that almost 20% of those without an anxiety disorder reported excellent health as compared with only 6.86% of those with an anxiety disorder. Those without asthma, high blood pressure or migraine headaches were also more likely to report excellent health.

Comparing Table 1 and Table 2, it can be seen that immigrants who were aged 15-24 had the largest proportion reporting excellent health. However, among the Canadian-born those aged 25-39 had the largest proportion reporting excellent health. With respect to languages in which one can converse, the Canadian-born who cannot converse in either English or French had a larger proportion reporting poor health than immigrants who could not converse in either official language. Moreover, immigrants who had anxiety disorders were more likely to report poor health as compared to their Canadian-born counterparts with anxiety disorders.

5. Estimation Results

Table 3 to 6 contain parameter estimates of ordered probit models for the four different subsamples examined in this paper: male immigrants, female immigrants, males born in Canada, and females born in Canada. Although most of the discussion in this section focuses on the results for model 1, the table also contain parameters estimates for a second model that includes indicators of the presence of four chronic health conditions as explanatory variables.

5.1 Comparison of Models 1 and 2

As might be expected, chronic health factors are strongly associated with poor self-perceived health. The results in Table 3 indicate that chronic health factors have a negative and statistically significant relationship with the self-perceived health of male immigrants. Having a chronic illness (anxiety disorder; asthma; high blood pressure; migraine headaches) can have tremendous bad influence on health status. Comparing the results from Model 1 and Model 2, it is obvious that after adding chronic related factors, the coefficient values and significance levels of other predictors have both slightly changed. In particular, most of the coefficient values have slightly decreased. Since the changes with regard to other factors are not very large and the significance levels of each coefficient remain at almost the same level, we will focus on Model 1 when considering the role of the other explanatory variables.

For female immigrants, Table 4 presents the estimation results for the models with and without chronic health factors. As for male immigrants, having a chronic health condition is correlated with poor health status for female immigrants. However, the coefficient values for

Model 2 are close to those for Model 1. What's more, almost all the significance levels from Model 2 remain unchanged as compared with Model 1. These findings are similar to the results for male immigrants.

For their Canadian-born counterparts, the regression results for males and females are presented in Table 5 and Table 6 respectively. Again, the coefficient values and levels of significance for Canadian-born males and females both change slightly after adding chronic health factors to the model.

Therefore, adding chronic health factors to the ordered probit model does not result in significant changes among other predictors in reporting self-perceived health, which may be due to the fact that chronic health factors are somewhat inherently correlated with self-perceived health. In the following analysis, I mainly focus on the Model 1 estimates without chronic health factors and compare the results by gender.

5.2 Model 1 results for male and female immigrants

Model 1 is estimated separately for male immigrants and female immigrants. Although the coefficients of an ordered probit model are not equal to the marginal effects on the dependent variable, when the coefficient has a positive sign it reveals that a positive change in the independent variable increase the probability of ranking in the highest category of the outcome (Greene, 1997, 927).

For male immigrants, the Model 1 estimation results are reported in Table 3. In the category of socio-demographic factors, good health status is positive significantly associated with age (age 15-24; age 25-39; age 40-54), total personal income per year ($40,000 to

$79,999; $80,000 or more), employment status (employee; self-employed) and length time in Canada since immigration (0 to 9 years). Looking more closely at age, the younger are male immigrants, the higher the probability of reporting good health. Male immigrants aged 70 or more are not significantly different from the reference group. Moreover, the coefficient for immigrants who have resided in Canada less than 10 years is 0.339, which means that they have a higher probability of reporting good health as compared to longer-term immigrants (reference group). Thus, the results confirm that the "healthy immigrant effect" declines for longer-term male immigrants. However, better health status is significantly negatively related to marital status (previously married as compared to married), highest education level (less than secondary and other post-secondary as compared to post-secondary), but language skills are not significantly associated with better health for male immigrants.

As might be expected, healthy behaviors have a positive effect on perceived health status. I find that the physical activity index (moderately active; active) is positive and statistically significantly related to better health as compared to inactive male immigrants (reference group). Being a daily smoker is negatively significantly associated with better health. The coefficients of the categories of "did not drink" and "occasional drinker" are negative and significant also (-0.161 and -0.131, respectively), revealing that being a regular drinker (reference group) have a positive influence on health status for male immigrants. Turning now to personal psychological factors, better health status for male immigrants is negatively significantly related to a weak sense of belonging, satisfaction with life and perceived life stress (very stressful). However, having a life that is not stressful is found to be protective against poor self-perceived health among male immigrants.

For female immigrants, the Model 1 estimation results are presented in Table 4. With respect to socio-demographic factors, better health status is positively and significantly associated with age (age 15-24; age 25-39; age 40-54), language skills (English and French), total personal income per year ($40,000 to $79,999; $80,000 or more) and employment status (employee; self-employed). In particular, language skills (English and French) have emerged to be related to female immigrants' self-perceived health, but are not significantly related to the self-perceived health of male immigrants, as shown in Table 3. Moreover, female immigrants with other post-secondary education are found to have better self-perceived health; for male immigrants with this level of education the relationship is negative (Table 3 Model 1). The most interesting finding is that the "healthy immigrant effect" does not decline over time for female immigrants as it did for male immigrants, since the variable which represents 0 to 9 years length time in Canada does not have a statistically significant coefficient. In addition, marital status (previously married) loses its negative significance for female immigrants as compared with male immigrants. Another difference from Model 1 in Table 3 is that for male immigrants, being 70 or more is insignificantly associated with better health. In contrast, the coefficient of female immigrants with age 70 or more is -0.210 and is statistical significantly, implying that older female immigrants are less likely to report good health than those aged 55-69.

A striking finding is that certain variables of language are significantly related to the self-perceived health of female immigrants, while from Table 3 Model 1 we know that the category language variables are all insignificantly associated with better health for male immigrants. For example, female immigrants who can converse in English and French are

more likely to report better self-perceived health as compared to those who can only converse in English (reference group). Male immigrants who can converse in both English and French are no more likely to report better health than those who can converse only in English.

Theoretically, smoking is negatively related to self-perceived health. The results show that this is indeed the case, daily smoking is statistically significantly and negatively associated with better health with a coefficient of -0.199 for female immigrants. There is also evidence of a negative relationship between type of drinker (did not drink in the last 12 months; occasional drinker) and better self-perceived health among female immigrants. In contrast to the case for male immigrants, for being a regular drinker is not associated with worse health status for female immigrants. What's more, female immigrants who are moderately active are statistical significantly more likely to report better health. For the category of personal psychological factors, better health status is negatively significantly associated with sense of belonging (weak), satisfaction with life in general (dissatisfied; neither satisfied nor dissatisfied), and perceived life stress (very stressful) among female immigrants.

5.3 Model 1 results for males and females born in Canada

After analyzing immigrants' self-perceived health status, we turn to their Canadian-born counterparts. Table 5 presents estimation results for Canadian-born males. On the one hand, the estimates indicate that better health status is positively and significantly correlated with age (age 15-24; age 25-39; age 40-54), languages (French; English and French), total personal income per year (no income; $40,000 to $79,999; $80,000 or more) and employment

status (employee; self-employed). As for female immigrants, marital status (never married; previously married) is also negatively but insignificantly related to self-perceived health for Canadian-born males. In terms of languages, the coefficient of French become positively and statistically significantly associated with better health for Canadian-born males as compared to male and female immigrants respectively. Moreover, a striking result is that Canadian-born males with no income are significantly more likely to report better health as compared to those who have incomes below $39,999 per year (reference group).

On the other hand, certain socio-demographic factors are negatively correlated with better health status for Canadian-born males. For example, Canadian-born males who cannot converse in either English or French are more likely to report poor health since the coefficient of this variable has a negative sign. Compared to post-secondary graduates, who are the reference group, Canadian-born males with lower education levels are more likely to have poor health, especially for education levels less than secondary.

Turning to the category of personal health behaviors, it is obvious that being moderately active or active is positively and significantly correlated with better health status as compared with being inactive for Canadian-born males. Compared to Canadian-born males who did not smoke (reference group), being an occasional smoker or daily smoker results in worse health status. However, regular drinkers among Canadian-born males are more likely to report better health. It can also be seen that better self-perceived health is negative and significantly associated with sense of belonging (weak), satisfaction with life in general (dissatisfied; neither satisfied nor dissatisfied) and perceived life stress (very stressful). In particular, Canadian-born males who perceive life with no stress are more likely to report better health.

Estimation results for Canadian-born females are presented in Table 6. Considering first socio-demographic factors, we can see that certain variables are positively significantly correlated with better self-perceived health among Canadian-born females when compared to the reference individuals, namely age (age 15-24; age 25-39; age 40-54) compared to age 55-69, languages (French; English and French), total personal income per year (no income; $40,000 to $79,999; $80,000 or more) and employment status (employee; self-employed). Although Canadian-born males who cannot converse in English and French were more likely to report poor health, for female born in Canada the coefficient of the indicator for those who cannot converse in English or French is not significant, which means that lacking languages skills does not significantly affect Canadian-born females' health.

There is also evidence that better health is negatively and significantly correlated with marital status (never married and previously married are different from married) and highest education level (less than secondary; secondary graduation; other post-secondary) compared to the reference level, a post-secondary degree or diploma. In particular, marital status emerges as important for Canadian-born females, although marital status is insignificantly correlated with the self-perceived health of Canadian-born males (Table 5 Model 1). Moreover, for Canadian-born females the education level secondary graduation is significantly associated with poor health, while this is not the case for Canadian-born males.

Regarding the category of personal health behaviors, the pattern of significance of each variable is the same as that for Canadian-born males. Canadian-born females who are regular drinkers are more likely to report better health as compared to non-regular drinkers. As for personal psychological factors, for Canadian-born females' better health is found to be

negatively and significantly associated with sense of belonging (weak), satisfaction with life in general (dissatisfied; neither satisfied nor dissatisfied) and perceived life stress (very stressful), which are the same as for Canadian-born males.

Comparing results of immigrants and their Canadian-born counterparts, it can be seen that self-perceived health is positively and significantly associated with no income for the Canadian-born, but that there is no significant difference between immigrants with no income and incomes under $40,000. Another striking finding is that immigrants who can only converse in French were less likely to report better health. In contrast, better self-perceived health is positively and significantly related to being able to converse only in French for the Canadian-born.

5.4 Marginal effects for excellent self-perceived health

Table 7 presents the marginal effects on the probability of reporting excellent health for the different groups in the sample. The results in column (1), for male immigrants, show that if we hold other variables constant and the individual's age changes from 55-69 to 15-24, the probability of reporting excellent health will significantly increase by 17.77 percentage points. Regarding the marginal effects of each variable in column (1), age 15-24 has the largest marginal effects on the probability of reporting excellent health. The next two strongest marginal effects are for age 25-39 and self-employed, with values of 12.51 percentage points and 11.30 percentage points, respectively. The marginal effect of dissatisfaction with life is equal to -0.0917, which means that if we hold all other variables constant for a male immigrant, a change from satisfied to dissatisfied will lead to a decrease of 9.17 percentage

points in the probability of reporting excellent health as compared to the reference individual.

Column (2) of Table 7 reports the marginal effects for female immigrants. As for male immigrants, changes in age to 15-24 or 25-39 will increase by 18.20 percentage points and 13.26 percentage points respectively the probability of reporting excellent health compared to those aged 55-69 for female immigrants, when other factors are held constant. However, the marginal effect of being self-employed for female immigrants is not as large as that of male immigrants. Instead, a female immigrant who is active is 9.82 percentage points more likely to report excellent health when other factors are constant. Comparing columns (1) and (2), the marginal effect of being dissatisfied with life for female immigrants is equal to -0.1216, which is bigger than that of male immigrants.

The marginal effect of the variable length time in Canada since immigration is positive for both male and female immigrants. However, its value decreases from 0.0756 for males to 0.0174 and loses significance for female immigrants. When other variables are held constant, a female immigrant who has spent 0 to 9 years in Canada instead of more than 10 years will be only 1.74 percentage points more likely to report excellent health as compared to the reference individual. Thus, the results imply that the "healthy immigrant effect" does not weaken for females.

Regarding Canadian-born males, their marginal effects are presented in column (3). The largest and most significant marginal effect is for age 15-24, which is equal to 0.1078, closely followed by those for age 25-39 (0.0794) and an active physical activity index (0.0753). The variable that indicates dissatisfaction with life also has one of the largest negative marginal effects, equal to -0.0697.

For Canadian-born females, the group age 15-24 is no longer has with the largest positive marginal effect among all variables as was the case for the other subsamples. It is obvious that when other variables are held constant, a Canadian-born female who changes her physical activity index from inactive to active can dramatically increase her probability of reporting excellent health by 12.33 percentage points. The next most important variables are self-employed and income over $80,000 per year, with marginal effects of 10.10 percentage points and 9.79 percentage points respectively. A striking finding is that the variable reflecting dissatisfaction with life still has the largest marginal effect (-0.1172) which indicates that holding all else constant, who are dissatisfied with life are 11.72 percentage points less likely to report excellent health as compared to the reference individual who is satisfied with life.

In general, the younger the individual, the higher the probability of reporting excellent health. Specifically, the marginal effect of age 15-24 is larger for female immigrants than for the other three groups. Also, the marginal effect of being age 70 or more is positive for male immigrants as presented in column (1), but negative for the other three groups. This means that when other factors are unchanged, only male immigrants with aged 70 or more are more likely to report excellent health as compared to the reference individual. Under the same conditions, individuals in the other three groups are less likely to report excellent health. Moreover, the marginal effect of an inability to converse in English and French is significantly negative for female immigrants and Canadian-born males. In contrast, this marginal effect is positive but not statistically significant for male immigrants and Canadian-born females. In addition, when a female immigrant's education level decreases

from post-secondary to other-post secondary or secondary graduation with other factors held constant, it will not decrease the probability of reporting excellent health. However, under the same conditions, for the other three groups the sign of the marginal effect changes to negative. With regard to the marginal effect of being an occasional smoker, the values for male immigrants, Canadian-born males and Canadian-born females are negative. However, for female immigrants, this marginal effect has a positive sign, which implies that when other variables are constant, being an occasional smoker increases by 2.48 percentage points the probability reporting excellent health as compared with reference individual (although the effect is not statistically significant for this group).

5.5 Marginal effects for poor self-perceived health

Although the marginal effects of changes in explanatory variables on the probability of reporting very good, good, and fair health can be found in Table 8-10 respectively, detailed discussion of these marginal effects has be omitted. Instead, we turn now to the probability of reporting poor health. Marginal effects for this health outcome are presented in Table 11. First, the row of reference individual probabilities at the top of the table indicates that male immigrants are the most likely to report poor health. Although the marginal effects of changes in the explanatory variables on the probability of reporting very good, good, and fair health can be found in Tables 8-10 respectively, detailed discussion of these marginal effects has been omitted. Instead, I turn now to the probability of reporting poor health. Marginal effects for this health outcome are presented in Table 11. First, the row of reference individual probabilities at the top of the table indicates that male immigrants are the most likely to report

poor health. This finding is inconsistent with the "healthy immigrant effect." However, the reference group predicted probabilities in Table 7 show that both male and female immigrants were more likely to report excellent health as compared to their Canadian-born counterparts, a finding that is consistent with a "healthy immigrant effect." Thus my results with respect to the healthy immigrant effect are somewhat mixed. If a "healthy immigrant effect" exists, results discussed earlier indicate that it declines for longer-term male immigrants.

For all four groups, dissatisfaction with life has the largest marginal effect with a positive sign. No matter whether one is an immigrant or Canadian-born, being dissatisfied with life is correlated with poor health status. Moreover, the marginal effect of a weak sense of belonging is relatively large for male immigrants as compared with the other three groups. In addition, the marginal effects of daily smoking are slightly larger for Canadian-born than that for immigrants. This means that Canadian-born who smoke every day are more likely to report poor health as compared with immigrants.

With regard to languages, the ability to converse in French but not in English has different effects on immigrants and the Canadian-born. It can be seen that the marginal effect of conversing in French but not in English is positive but not significant for immigrants, whereas for the Canadian-born, the situation is the reverse.

6. Conclusion

Self-perceived health has been a widely used indicator in health research and a significant predictor of mortality (Mor, Wilcox, Rakowski, and Hiris, 1994; Benyamini and Idler, 1999). The basic goal of this paper is to examine the differences between immigrants

and the Canadian-born in reporting self-perceived health, using ordered probit models. Moreover, since gender differences have been shown to be significantly related to self-perceived health by many studies (e.g., Ahmad, Jafar, and Chaturvedi, 2005; Llacer et al., 2007; Peracchi and Rossetti, 2008; Ng, Pottie, and Spitzer, 2011), it is necessary to analyze self-perceived health by gender. In this paper, I estimated models of self-perceived health for four groups: male immigrants, female immigrants, Canadian-born males and Canadian-born females.

Some previous studies compared models for individuals with and without chronic diseases included in an attempt to determine the effect of chronic disease on reporting health status. Individuals with chronic illness were found to be more likely to report poor health than those without chronic illness (Cott, Gignac, and Badley, 1999). However, in this paper, I used chronic health conditions as independent variables. The results revealed that after adding chronic health factors to the model, there were no important changes with respect to other predictors of self-perceived health. Moreover, the significance level of each predictor remained almost unchanged. Therefore, I do not suggest using chronic health factors as explanatory variables for analyzing self-perceived health.

My findings show that three other categories of independent variables are closely associated with self-perceived health. Consistent with previous studies, age is significantly associated with health status, and poor self-perceived health is related to increasing age (Shooshtari, Menec, and Tate, 2007). However, this paper showed that elderly male immigrants in Canada were more likely to report good health instead of poor health. Compared to the other three groups, elderly male immigrants enjoyed relatively better health

status.

Many previous studies have focused on self-perceived health among married people and indicated that married people generally have better self-perceived health than non-married people (Goldman, 1993; Moore et al., 1997; Koo, Rie, and Park, 2004). This study revealed that for female immigrants and Canadian-born males, there was no significant relation between health and marital status. However, marital status was significantly correlated with Canadian-born females' health. Canadian-born females who were divorced may have dramatically worse health. Moreover, the ability to speak in French but not in English was significantly associated with poor health for both males and females. Higher levels of education and income were significantly associated with good health, a result that is consistent with many previous studies (Smith and Kington, 1997; Marmot, 2002). The current study found that as individuals become more educated or wealthy, they were more likely to report good health. Some studies have shown that unemployment was correlated with poor self-perceived health (Mathers and Schofield, 1998; McKee-Ryan et al., 2005). Our findings with respect to employment are consistent with previous studies and also revealed that self-employed status was more strongly associated with good health than employee status.

The literature has shown that "healthy immigrant effect" exists in certain countries, such as the US and Canada. My findings show that the "healthy immigrant effect" exists for both male immigrants and female immigrants, in that both are more likely to report excellent health than Canadian-born males and females. However, the results also show that male and female immigrants are more likely to report poor health, a finding that is not consistent with a

"healthy immigrant effect." These contradictory results suggest that further investigation of the "healthy immigrant effect" would be worthwhile.

Personal health behaviors are also important for analyzing self-perceived health and many studies have paid much attention to these variables (Cott, Gignac, and Badley, 1999; Perlman and Bobak, 2008; Demirchyan et al., 2012). Our findings are consistent with Cott, Gignac, and Badley (1999): regular drinkers are more likely to report good health than non-regular drinkers. Another consistent result was that smoking is generally related to poor health (Poikolainen, Vartianen, and Korhonen, 1996). Moreover, I included physical activity in the model and found that it was an important predictor of reporting excellent or good health, especially for Canadian-born females.

The most striking finding in this paper is the explanatory power of personal psychological factors in predicting self-perceived health, which is consistent with Siahpush, Spittal and Singh (2008) study. Our paper suggests that satisfaction with life is an essential predictor of excellent or good health, especially for female immigrants in Canada.

This paper did not include provincial dummy variables or metropolitan variables, which may have effect on self-perceived health. Thus, for future research, it would be interesting to look at provincial differences in the self-perceived health of immigrants.

In summary, our findings suggest that much more attention should be focused on female immigrants' life, since they are less likely to report better health, and this may due to problems related to culture, employment and so on. Moreover, because psychological factors play an important role in predicting self-perceived health, it is essential to popularize health education, especially for females since they have been found to be more sensitive to

psychological factors. Furthermore, as health is associated with personal health behaviors, it is desirable to promote health and increase physical activity among all groups in Canada, and reduce smoking.

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Appendix

Table A1. Categorical variable definitions

Variable	Variable definition
sphgrp	-0 if respondent report poor health -1 if respondent report fair health -2 if respondent report good health -3 if respondent report very good health -4 if respondent report excellent health
sexgrp	-1 if respondent is male -2 if respondent is female
immgrp	-0 if respondent is a Canadian -1 if respondent is an immigrant
1.Socio-demographic factors	
agegrp	-1 if respondent age 15-24 -2 if respondent age 25-39 -3 if respondent age 40-54 -4 if respondent age 55-69 -5 if respondent age 70 or more
margrp	-1 if respondent is never married -2 if respondent is previously married -3 if respondent is married
langrp	-1 if respondent converse in neither English nor French -2 if respondent converse in English -3 if respondent converse in French -4 if respondent converse in both English and French
edugrp	-1 if respondent has an education level less than secondary -2 if respondent has an education level of secondary graduation -3 if respondent has an education level of other post-secondary -4 if respondent has an education level of post-secondary graduation
incgrp	-1 if respondent has no income -2 if respondent has income less than $39,999 -3 if respondent has income between $40,000 and $79,999 -4 if respondent has income equal or larger than $80,000
empgrp	-1 if respondent is not employed -2 if respondent is employee -3 if respondent is self-employed
ysmgrp	-1 if respondent is an immigrant and has been in Canada $\leq$ 9 years -2 if respondent is an immigrant and has been in Canada $\geq$ 10 years
2.Personal health behaviors	
tosgrp	-1 if respondent do not smoke

	-2 if respondent is an occasional smoker -3 if respondent is a daily smoker
todgrp	-1 if respondent do not drink in the last 12 months -2 if respondent is an occasional drinker -3 if respondent is a regular drinker
paigrp	-1 if respondent has inactive physical activity index -2 if respondent has moderately active activity index -3 if respondent has active physical activity index
3.Personal psychological factors	
sobgrp	-1 if respondent has weak sense of belonging -2 if respondent has strong sense of belonging
slggrp	-1 if respondent is dissatisfied with life in general -2 if respondent is neither satisfied nor dissatisfied with life in general -3 if respondent is satisfied with life in general
plsgrp	-1 if respondent is very stressful -2 if respondent is stressful -3 if respondent is not stressful
4.Chronic health factors	
anxgrp	-1 if respondent do not has anxiety disorder -2 if respondent has anxiety disorder
astgrp	-1 if respondent do not has asthma -2 if respondent has asthma
hbpgrp	-1 if respondent do not has high blood pressure -2 if respondent has high blood pressure
mihgrp	-1 if respondent do not has migraine headaches -2 if respondent has migraine headaches

Source: Own research

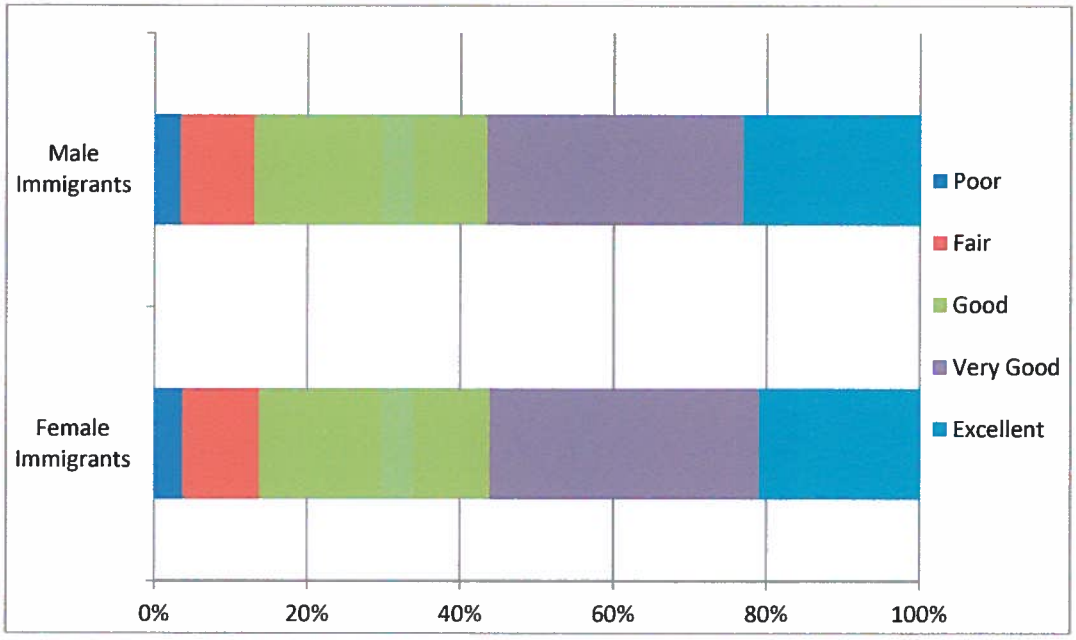
Table A2. Summary of reference group for each categorical variable

Group of categorical variables	**Reference group**
Age groups	Age 55-69
Marital status	Married
Languages	English
Highest education level	Post-secondary graduation
Income	Less than $39,999
Employment status	Not employed
Length time since immigration	10 or more years
Type of smoker	Not at all
Type of drinker	Regular drinker
Physical activity index	Inactive
Sense of belonging - local community	Strong
Satisfaction with life in general	Satisfied
Perceived life stress	Stressful
Anxiety disorder	No
Asthma	No
High blood pressure	No
Migraine headaches	No

Source: Own research

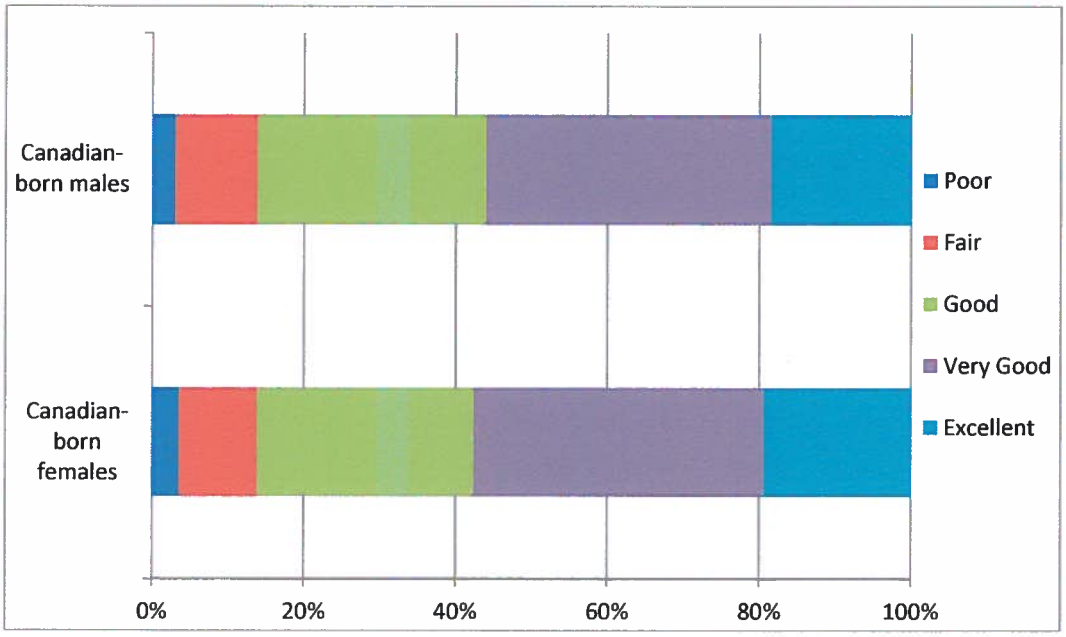
FIGURES AND TABLES

Figure 1. Comparison of self-perceived health status between male immigrants and female immigrants



Source: Author's calculations from CCHS 2010

Figure 2. Comparison of self-perceived health status between Canadian-born males and Canadian-born females



Source: Author's calculations from CCHS 2010

Table 1. Frequency distribution of self-perceived health by explanatory variable category, immigrants, 2010

	Poor %	Fair %	Good %	Very Good %	Excellent %	Total %
1.Socio-demographic factors						
Age groups:						
Age 15-24	0.24	3.16	21.17	42.82	32.60	100.00
Age 25-39	0.27	3.94	24.73	39.40	31.66	100.00
Age 40-54	2.05	8.01	28.70	37.05	24.18	100.00
Age 55-69	4.96	12.01	33.83	31.35	17.85	100.00
Age 70+	8.12	17.52	36.17	27.37	10.83	100.00
Marital status:						
Never married	1.51	7.03	27.25	37.85	26.36	100.00
Previously married	7.58	15.73	32.87	29.42	14.40	100.00
Married	2.74	8.53	30.22	35.17	23.34	100.00
Languages:						
Neither English nor French	4.23	17.31	36.15	27.69	14.62	100.00
English	3.72	9.97	30.48	34.26	21.57	100.00
French	2.79	10.61	40.78	25.14	20.67	100.00
English and French	2.89	6.95	25.56	38.61	25.99	100.00
Highest education level:						
Less than secondary	8.70	18.08	34.69	24.86	13.67	100.00
Secondary graduation	3.54	9.48	33.75	33.44	19.79	100.00
Other post-secondary	3.76	11.06	28.94	38.12	18.12	100.00
Post-secondary graduation	2.51	8.08	28.71	36.20	24.49	100.00
Total personal income per year:						
No income	2.03	7.77	34.12	32.43	23.65	100.00
Less than $39,999	4.93	12.37	32.02	31.29	19.39	100.00
$40,000 to $79,999	1.71	6.42	28.99	38.36	24.51	100.00
$80,000 or more	1.25	4.70	21.47	43.26	29.31	100.00
Employment status:						
Not employed	6.69	14.62	34.15	29.01	15.53	100.00
Employee	0.75	5.76	27.93	38.45	27.10	100.00
Self-employed	1.81	5.97	23.47	40.69	28.06	100.00
Length time in Canada since immigration:						
0 to 9 years	0.15	4.86	25.72	36.34	32.93	100.00
10 or more years	4.47	11.12	31.45	33.87	19.09	100.00

2.Personal health behaviors						
Type of smoker:						
Not at all	3.48	9.49	29.96	34.84	22.22	100.00
Occasional smoker	2.58	6.64	24.35	40.96	25.46	100.00
Daily smoker	4.87	14.03	35.30	27.92	17.87	100.00
Type of drinker :						
Did not drink in the last 12 months	5.70	12.85	31.34	29.26	20.84	100.00
Occasional drinker	5.55	10.84	32.44	32.87	18.30	100.00
Regular drinker	1.79	7.89	29.00	37.64	23.68	100.00
Physical activity index:						
Inactive	5.02	12.19	33.48	31.36	17.95	100.00
Moderately active	2.34	8.40	30.56	35.80	22.92	100.00
Active	1.71	6.13	22.87	39.62	29.66	100.00
3.Personal psychological factors						
Sense of belonging – local community:						
Weak	5.17	11.96	31.18	33.81	17.88	100.00
Strong	2.80	8.79	29.84	34.65	23.92	100.00
Satisfaction with life in general:						
Dissatisfied	31.50	27.00	25.00	10.50	6.00	100.00
Neither satisfied nor dissatisfied	13.45	27.31	34.87	15.13	9.24	100.00
Satisfied	1.82	7.83	30.09	36.77	23.49	100.00
Perceived life stress:						
Very stressful	6.95	13.29	30.32	30.69	18.75	100.00
Stressful	2.80	9.21	30.03	36.34	21.62	100.00
Not stressful	2.37	7.90	31.29	31.19	27.25	100.00
4.Chronic health factors						
Anxiety disorder:						
No	3.16	9.36	30.29	34.78	22.41	100.00
Yes	14.46	22.09	30.12	24.10	9.24	100.00
Asthma:						
No	3.20	9.52	29.95	34.65	22.68	100.00
Yes	10.08	15.26	35.97	29.70	8.99	100.00
High blood pressure:						
No	2.16	7.24	26.98	37.11	26.51	100.00
Yes	8.07	17.99	40.62	25.81	7.50	100.00
Migraine headaches:						
No	3.22	9.25	30.26	35.02	22.25	100.00
Yes	7.38	15.95	30.53	27.79	18.35	100.00

Source: Author's calculations using unweighted sample data.

Table 2. Frequency distribution of self-perceived health by explanatory variable category, Canadian-born, 2010

	Poor %	Fair %	Good %	Very Good %	Excellent %	Total %
1.Socio-demographic factors						
Age groups:						
Age 15-24	0.65	5.08	28.42	43.17	22.67	100.00
Age 25-39	1.06	5.16	24.82	43.91	25.05	100.00
Age 40-54	3.43	9.25	29.09	38.59	19.64	100.00
Age 55-69	4.92	13.41	30.75	34.66	16.27	100.00
Age 70+	5.67	19.30	34.44	30.03	10.55	100.00
Marital status:						
Never married	2.41	8.65	30.38	38.03	20.53	100.00
Previously married	5.96	16.94	32.22	30.96	13.92	100.00
Married	2.71	8.88	27.66	40.66	20.09	100.00
Languages:						
Neither English nor French	9.30	18.60	37.21	20.93	13.95	100.00
English	3.62	10.89	29.43	38.30	17.75	100.00
French	2.53	11.47	34.24	32.81	18.96	100.00
English and French	2.71	8.59	26.01	39.90	22.80	100.00
Highest education level:						
Less than secondary	6.73	18.91	34.48	28.62	11.26	100.00
Secondary graduation	2.93	9.58	30.77	38.69	18.03	100.00
Other post-secondary	3.45	9.41	30.29	40.04	16.81	100.00
Post-secondary graduation	2.19	7.94	26.90	40.76	22.21	100.00
Total personal income per year:						
No income	3.24	10.26	30.51	36.18	19.80	100.00
Less than $39,999	4.77	13.37	31.33	34.77	15.76	100.00
$40,000 to $79,999	1.37	6.88	27.26	42.49	22.00	100.00
$80,000 or more	0.58	4.58	23.42	43.62	27.79	100.00
Employment status:						
Not employed	6.74	16.78	31.57	31.10	13.81	100.00
Employee	0.91	6.08	27.99	43.20	21.82	100.00
Self-employed	1.08	6.55	26.55	40.08	25.73	100.00
2.Personal health behaviors						
Type of smoker:						
Not at all	2.65	9.54	27.71	39.38	20.73	100.00
Occasional smoker	2.66	7.99	30.22	40.19	18.95	100.00
Daily smoker	6.05	14.86	35.32	31.89	11.88	100.00

Type of drinker :						
Did not drink in the last 12 months	7.59	18.02	31.67	28.90	13.84	100.00
Occasional drinker	4.06	13.54	32.43	34.97	15.00	100.00
Regular drinker	1.95	7.65	27.85	41.22	21.33	100.00
Physical activity index:						
Inactive	5.38	14.72	32.84	34.07	12.99	100.00
Moderately active	1.80	7.96	28.64	41.53	20.06	100.00
Active	1.02	5.30	23.55	41.55	28.58	100.00
3.Personal psychological factors						
Sense of belonging – local community:						
Weak	5.04	12.46	31.30	34.69	16.51	100.00
Strong	2.50	9.58	28.38	39.49	20.05	100.00
Satisfaction with life in general:						
Dissatisfied	31.68	30.94	23.45	10.10	3.83	100.00
Neither satisfied nor dissatisfied	13.42	33.72	33.27	14.99	4.59	100.00
Satisfied	1.74	8.40	29.27	40.29	20.29	100.00
Perceived life stress:						
Very stressful	7.04	13.56	30.55	33.80	15.05	100.00
Stressful	2.34	9.65	29.08	39.82	19.12	100.00
Not stressful	2.25	9.92	28.52	35.20	24.12	100.00
4.Chronic health factors						
Anxiety disorder:						
No	2.74	9.66	28.99	38.87	19.73	100.00
Yes	11.74	22.96	34.10	24.35	6.86	100.00
Asthma:						
No	2.84	9.87	28.95	38.61	19.73	100.00
Yes	8.00	16.80	33.00	31.46	10.73	100.00
High blood pressure:						
No	2.28	7.68	26.77	40.72	22.55	100.00
Yes	6.81	20.03	37.90	28.62	6.64	100.00
Migraine headaches:						
No	2.88	9.97	29.10	38.48	19.56	100.00
Yes	7.06	15.13	31.16	33.36	13.29	100.00

Source: Author's calculations using unweighted sample data.

Table 3. Ordered Probit Regression Results of Association of Socio-demographic Factors, Personal Health Behaviors, Personal Psychological Factors and Chronic Health Factors With Self-Perceived Health Among Male Immigrants (n=2,903)

	(1) Model 1	(2) Model 2
Socio-demographic factors		
Age		
Age 15-24	0.677***	0.594***
	(6.15)	(5.33)
Age 25-39	0.514***	0.428***
	(7.31)	(5.97)
Age 40-54	0.278***	0.235***
	(4.57)	(3.81)
Age 55-69	Reference	Reference
Age 70 or more	0.0321	0.0307
	(0.50)	(0.47)
Marital status		
Never married	-0.0445	-0.0526
	(-0.70)	(-0.83)
Previously married	-0.102*	-0.0834
	(-1.77)	(-1.43)
Married	Reference	Reference
Languages		
Neither English nor French	0.132	0.115
	(1.13)	(0.99)
English	Reference	Reference
French	-0.156	-0.170
	(-1.23)	(-1.33)
English and French	0.0287	0.0302
	(0.51)	(0.54)
Highest education level		
Less than secondary	-0.198***	-0.178***
	(-2.98)	(-2.67)
Secondary graduation	-0.0201	-0.00422
	(-0.32)	(-0.07)
Other post-secondary	-0.193**	-0.205**
	(-2.26)	(-2.38)
Post-secondary graduation	Reference	Reference
Total personal income per year		
No income	0.0520	0.0142
	(0.38)	(0.10)
Less than $39,999	Reference	Reference
$40,000 to $79,999	0.0964**	0.0953*

	(1.97)	(1.94)
$80,000 or more	0.207***	0.201***
	(3.07)	(2.98)
Employment status		
Not employed	Reference	Reference
Employee	0.291***	0.276***
	(4.81)	(4.55)
Self-employed	0.473***	0.441***
	(6.60)	(6.12)
Length time in Canada since immigration		
0 to 9 years	0.339***	0.308***
	(5.72)	(5.17)
10 or more years	Reference	Reference
Personal health behaviors		
Type of smoker		
Not at all	Reference	Reference
Occasional smoker	-0.0401	-0.0617
	(-0.44)	(-0.68)
Daily smoker	-0.143**	-0.146**
	(-2.40)	(-2.44)
Type of drinker		
Did not drink in the last 12 months	-0.161***	-0.142***
	(-3.16)	(-2.77)
Occasional drinker	-0.131**	-0.115*
	(-2.12)	(-1.87)
Regular drinker	Reference	Reference
Physical activity index		
Inactive	Reference	Reference
Moderately active	0.119**	0.104**
	(2.36)	(2.05)
Active	0.328***	0.314***
	(6.56)	(6.26)
Personal psychological factors		
Sense of belonging – local community		
Weak	-0.197***	-0.192***
	(-4.59)	(-4.45)
Strong	Reference	Reference
Satisfaction with life in general		
Dissatisfied	-0.947***	-0.878***
	(-7.79)	(-7.15)

Neither satisfied nor dissatisfied	-0.723***	-0.709***
	(-9.21)	(-9.00)
Satisfied	Reference	Reference
Perceived life stress		
Very stressful	-0.171***	-0.148***
	(-3.14)	(-2.71)
Stressful	Reference	Reference
Not stressful	0.137**	0.128**
	(2.46)	(2.29)
Chronic health factors		
Anxiety disorder		
No		Reference
Yes		-0.417***
		(-3.36)
Asthma		
No		Reference
Yes		-0.472***
		(-4.79)
High blood pressure		
No		Reference
Yes		-0.337***
		(-6.55)
Migraine headaches		
No		Reference
Yes		-0.284***
		(-3.20)
cut1	-1.807***	-2.018***
_cons	(-21.45)	(-22.93)
cut2	-0.922***	-1.116***
_cons	(-12.56)	(-14.49)
cut3	0.230***	0.0562
_cons	(3.21)	(0.75)
cut4	1.250***	1.095***
_cons	(16.96)	(14.38)

t statistics in parentheses

Number of observation = 2,903

Model 1: Ordered probit regression without chronic health conditions for male immigrants.

LR chi2(29) = 780.79 Prob > chi2 = 0.0000 Pseudo R2 = 0.0955

Model 2: Ordered probit regression with chronic health conditions for male immigrants.

LR chi2(33) = 870.38 Prob > chi2 = 0.0000 Pseudo R2 = 0.1065

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4. Ordered Probit Regression Results of Association of Socio-demographic Factors, Personal Health Behaviors, Personal Psychological Factors and Chronic Health Factors With Self-Perceived Health Among Female Immigrants (n=3,585)

	(1) Model 1	(2) Model 2
Socio-demographic factors		
Age		
Age 15-24	0.635***	0.465***
	(6.23)	(4.49)
Age 25-39	0.490***	0.361***
	(8.24)	(5.85)
Age 40-54	0.243***	0.153***
	(4.39)	(2.70)
Age 55-69	Reference	Reference
Age 70 or more	-0.210***	-0.185***
	(-3.64)	(-3.16)
Marital status		
Never married	-0.0411	-0.0189
	(-0.72)	(-0.33)
Previously married	-0.0422	-0.0311
	(-0.90)	(-0.66)
Married	Reference	Reference
Languages		
Neither English nor French	-0.154*	-0.177**
	(-1.73)	(-1.98)
English	Reference	Reference
French	-0.0347	-0.0716
	(-0.32)	(-0.66)
English and French	0.118**	0.111**
	(2.14)	(2.01)
Highest education level		
Less than secondary	-0.182***	-0.145**
	(-3.08)	(-2.44)
Secondary graduation	0.0272	0.0290
	(0.52)	(0.56)
Other post-secondary	0.000373	0.0159
	(0.01)	(0.21)
Post-secondary graduation	Reference	Reference
Total personal income per year		
No income	0.0819	0.0550
	(0.99)	(0.66)
Less than $39,999	Reference	Reference
$40,000 to $79,999	0.117**	0.0940*

	(2.36)	(1.89)
$80,000 or more	0.228***	0.193**
	(2.76)	(2.32)
Employment status		
Not employed	Reference	Reference
Employee	0.224***	0.198***
	(4.47)	(3.93)
Self-employed	0.240***	0.175**
	(3.22)	(2.33)
Length time in Canada since immigration		
0 to 9 years	0.0787	0.0362
	(1.43)	(0.66)
10 or more years	Reference	Reference
Personal health behaviors		
Type of smoker		
Not at all	Reference	Reference
Occasional smoker	0.110	0.100
	(1.05)	(0.95)
Daily smoker	-0.199***	-0.178**
	(-2.83)	(-2.51)
Type of drinker		
Did not drink in the last 12 months	-0.212***	-0.208***
	(-4.80)	(-4.69)
Occasional drinker	-0.198***	-0.184***
	(-4.09)	(-3.79)
Regular drinker	Reference	Reference
Physical activity index		
Inactive	Reference	Reference
Moderately active	0.200***	0.191***
	(4.46)	(4.26)
Active	0.381***	0.355***
	(7.86)	(7.30)
Personal psychological factors		
Sense of belonging – local community		
Weak	-0.125***	-0.127***
	(-3.19)	(-3.23)
Strong	Reference	Reference
Satisfaction with life in general		
Dissatisfied	-1.248***	-1.168***
	(-11.12)	(-10.31)
Neither satisfied nor dissatisfied	-0.697***	-0.624***

	(-9.73)	(-8.64)
Satisfied	Reference	Reference
Perceived life stress		
Very stressful	-0.198***	-0.147***
	(-4.28)	(-3.13)
Stressful	Reference	Reference
Not stressful	0.376***	0.372***
	(6.92)	(6.82)
Chronic health factors		
Anxiety disorder		
No		Reference
Yes		-0.324***
		(-3.67)
Asthma		
No		Reference
Yes		-0.408***
		(-5.65)
High blood pressure		
No		Reference
Yes		-0.504***
		(-10.51)
Migraine headaches		
No		Reference
Yes		-0.258***
		(-4.50)
cut1	-1.987***	-2.325***
_cons	(-26.15)	(-28.62)
cut2	-1.097***	-1.398***
_cons	(-16.64)	(-19.87)
cut3	0.0355	-0.223***
_cons	(0.56)	(-3.35)
cut4	1.124***	0.895***
_cons	(17.23)	(13.18)

t statistics in parentheses

Number of observation = 3,585

Model 1: Ordered probit regression without chronic health conditions for female immigrants.

LR chi2(29) = 999.34 Prob > chi2 = 0.0000 Pseudo R2 = 0.0989

Model 2: Ordered probit regression with chronic health conditions for female immigrants.

LR chi2(33) = 1187.29 Prob > chi2 = 0.0000 Pseudo R2 = 0.1175

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5. Ordered Probit Regression Results of Association of Socio-demographic Factors, Personal Health Behaviors, Personal Psychological Factors and Chronic Health Factors With Self-Perceived Health Among Canadian-born males (n=18,233)

	(1) Model 1	(2) Model 2
Socio-demographic factors		
Age		
Age 15-24	0.533***	0.399***
	(15.39)	(11.28)
Age 25-39	0.420***	0.310***
	(16.30)	(11.68)
Age 40-54	0.168***	0.104***
	(7.07)	(4.31)
Age 55-69	Reference	Reference
Age 70 or more	-0.0264	-0.0209
	(-0.93)	(-0.73)
Marital status		
Never married	-0.0172	-0.0229
	(-0.79)	(-1.05)
Previously married	-0.0349	-0.0422*
	(-1.45)	(-1.75)
Married	Reference	Reference
Languages		
Neither English nor French	-0.495**	-0.582**
	(-2.07)	(-2.43)
English	Reference	Reference
French	0.0928***	0.0750***
	(3.47)	(2.79)
English and French	0.111***	0.111***
	(5.47)	(5.46)
Highest education level		
Less than secondary	-0.233***	-0.216***
	(-10.22)	(-9.45)
Secondary graduation	-0.0174	-0.0149
	(-0.76)	(-0.65)
Other post-secondary	-0.0668**	-0.0660**
	(-2.18)	(-2.15)
Post-secondary graduation	Reference	Reference
Total personal income per year		
No income	0.280***	0.257***
	(4.29)	(3.93)
Less than $39,999	Reference	Reference
$40,000 to $79,999	0.149***	0.135***

	(7.44)	(6.71)
$80,000 or more	0.282***	0.259***
	(10.55)	(9.63)
Employment status		
Not employed	Reference	Reference
Employee	0.267***	0.235***
	(11.67)	(10.24)
Self-employed	0.399***	0.347***
	(13.68)	(11.84)
Personal health behaviors		
Type of smoker		
Not at all	Reference	Reference
Occasional smoker	-0.174***	-0.188***
	(-4.78)	(-5.16)
Daily smoker	-0.239***	-0.252***
	(-11.65)	(-12.28)
Type of drinker		
Did not drink in the last 12 months	-0.141***	-0.127***
	(-5.98)	(-5.37)
Occasional drinker	-0.134***	-0.124***
	(-5.30)	(-4.88)
Regular drinker	Reference	Reference
Physical activity index		
Inactive	Reference	Reference
Moderately active	0.167***	0.158***
	(8.36)	(7.86)
Active	0.403***	0.383***
	(20.50)	(19.42)
Personal psychological factors		
Sense of belonging – local community		
Weak	-0.115***	-0.116***
	(-6.62)	(-6.69)
Strong	Reference	Reference
Satisfaction with life in general		
Dissatisfied	-1.085***	-1.026***
	(-22.35)	(-20.98)
Neither satisfied nor dissatisfied	-0.775***	-0.757***
	(-21.53)	(-20.93)
Satisfied	Reference	Reference
Perceived life stress		
Very stressful	-0.193***	-0.157***

	(-9.04)	(-7.28)
Stressful	Reference	Reference
Not stressful	0.262***	0.245***
	(11.06)	(10.30)
Chronic health factors		
Anxiety disorder		
No		Reference
Yes		-0.343***
		(-8.55)
Asthma		
No		Reference
Yes		-0.290***
		(-9.58)
High blood pressure		
No		Reference
Yes		-0.454***
		(-21.55)
Migraine headaches		
No		Reference
Yes		-0.213***
		(-6.28)
cut1	-1.855***	-2.152***
_cons	(-53.41)	(-58.36)
cut2	-0.848***	-1.118***
_cons	(-28.38)	(-35.16)
cut3	0.266***	0.0268
_cons	(9.14)	(0.87)
cut4	1.436***	1.220***
_cons	(47.43)	(38.74)

t statistics in parentheses

Number of observation = 18,233

Model 1: Ordered probit regression without chronic health conditions for Canadian-born males.

LR chi2(28) = 4634.32 Prob > chi2 = 0.0000 Pseudo R2 = 0.0916

Model 2: Ordered probit regression with chronic health conditions for Canadian-born males.

LR chi2(32) = 5351.32 Prob > chi2 = 0.0000 Pseudo R2 = 0.1058

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6. Ordered Probit Regression Results of Association of Socio-demographic Factors, Personal Health Behaviors, Personal Psychological Factors and Chronic Health Factors With Self-Perceived Health Among Canadian-born females (n=21,740)

	(1) Model 1	(2) Model 2
Socio-demographic factors		
Age		
Age 15-24	0.333***	0.191***
	(10.30)	(5.79)
Age 25-39	0.269***	0.162***
	(11.64)	(6.77)
Age 40-54	0.0789***	0.0185
	(3.52)	(0.81)
Age 55-69	Reference	Reference
Age 70 or more	-0.0411	-0.0230
	(-1.63)	(-0.90)
Marital status		
Never married	-0.111***	-0.104***
	(-5.23)	(-4.88)
Previously married	-0.0987***	-0.0872***
	(-5.02)	(-4.42)
Married	Reference	Reference
Languages		
Neither English nor French	0.0479	0.117
	(0.21)	(0.52)
English	Reference	Reference
French	0.105***	0.0971***
	(4.67)	(4.30)
English and French	0.0600***	0.0646***
	(3.16)	(3.39)
Highest education level		
Less than secondary	-0.252***	-0.224***
	(-11.37)	(-10.07)
Secondary graduation	-0.0494**	-0.0428**
	(-2.35)	(-2.02)
Other post-secondary	-0.139***	-0.128***
	(-4.93)	(-4.52)
Post-secondary graduation	Reference	Reference
Total personal income per year		
No income	0.151***	0.133***
	(3.68)	(3.22)
Less than $39,999	Reference	Reference
$40,000 to $79,999	0.181***	0.167***

	(9.38)	(8.63)
$80,000 or more	0.384***	0.358***
	(11.23)	(10.43)
Employment status		
Not employed	Reference	Reference
Employee	0.257***	0.221***
	(12.80)	(10.92)
Self-employed	0.394***	0.331***
	(12.07)	(10.07)
Personal health behaviors		
Type of smoker		
Not at all	Reference	Reference
Occasional smoker	-0.127***	-0.120***
	(-3.54)	(-3.32)
Daily smoker	-0.277***	-0.278***
	(-14.07)	(-13.99)
Type of drinker		
Did not drink in the last 12 months	-0.284***	-0.252***
	(-14.13)	(-12.48)
Occasional drinker	-0.175***	-0.148***
	(-9.35)	(-7.91)
Regular drinker	Reference	Reference
Physical activity index		
Inactive	Reference	Reference
Moderately active	0.273***	0.252***
	(15.25)	(13.99)
Active	0.466***	0.441***
	(24.48)	(23.01)
Personal psychological factors		
Sense of belonging – local community		
Weak	-0.138***	-0.130***
	(-8.56)	(-8.03)
Strong	Reference	Reference
Satisfaction with life in general		
Dissatisfied	-1.178***	-1.098***
	(-26.08)	(-24.07)
Neither satisfied nor dissatisfied	-0.739***	-0.678***
	(-22.60)	(-20.59)
Satisfied	Reference	Reference
Perceived life stress		
Very stressful	-0.265***	-0.207***

	(-14.31)	(-11.09)
Stressful	Reference	Reference
Not stressful	0.300***	0.273***
	(12.35)	(11.18)
Chronic health factors		
Anxiety disorder		
No		Reference
Yes		-0.402***
		(-14.44)
Asthma		
No		Reference
Yes		-0.346***
		(-14.35)
High blood pressure		
No		Reference
Yes		-0.484***
		(-24.61)
Migraine headaches		
No		Reference
Yes		-0.251***
		(-11.59)
cut1	-2.086***	-2.434***
_cons	(-67.49)	(-73.73)
cut2	-1.156***	-1.466***
_cons	(-43.23)	(-51.35)
cut3	-0.0651**	-0.331***
_cons	(-2.54)	(-12.27)
cut4	1.138***	0.909***
_cons	(43.23)	(33.19)

t statistics in parentheses

Number of observation = 21,740

Model 1: Ordered probit regression without chronic health conditions for Canadian-born females.

LR chi2(28) = 6254.12 Prob > chi2 = 0.0000 Pseudo R2 = 0.1031

Model 2: Ordered probit regression with chronic health conditions for Canadian-born females.

LR chi2(32) = 7517.84 Prob > chi2 = 0.0000 Pseudo R2 = 0.1239

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7. Comparison of marginal effects of reporting excellent self-perceived health among different observations

	(1) Male Immigrants	(2) Female Immigrants	(3) Canadian-born Males	(4) Canadian-born Females
Reference individual[1]	0.1057***	0.1305***	0.0755***	0.1275***
Social- demographic factors				
Age				
Age 15-24	0.1777***	0.1820***	0.1078***	0.0827***
Age 25-39	0.1251***	0.1326***	0.0794***	0.0649***
Age 40-54	0.0598***	0.0587***	0.0269***	0.0172***
Age 70 or more	0.0060	-0.0395***	-0.0037	-0.0084*
Marital status				
Never married	-0.0079	-0.0085	-0.0024	-0.0217***
Previously married	-0.0175*	-0.0087	-0.0048	-0.0194***
Languages				
Neither English nor French	0.0261	-0.0298*	-0.0488***	0.0103
French	-0.0258	-0.0072	0.0141***	0.0232***
English and French	0.0053	0.0267**	0.0170***	0.0129***
Highest education level				
Less than secondary	-0.0318***	-0.0347***	-0.0280***	-0.0452***
Secondary graduation	-0.0036	0.0058	-0.0024	-0.0100**
Other post-secondary	-0.0312**	0.00008	-0.0091**	-0.0268***
Total personal income per year				
No income	0.0098	0.0182	0.0484***	0.0343***
$40,000 to $79,999	0.0187*	0.0263**	0.0235***	0.0417***
$80,000 or more	0.0428***	0.0547**	0.0489***	0.0979***
Employment status				
Employee	0.0632***	0.0535***	0.0456***	0.0616***
Self-employed	0.1130***	0.0578***	0.0744***	0.1010***
Length time in Canada				
0 to 9 years	0.0756***	0.0174	-	-
Personal health behaviors				
Type of smoker				
Occasional smoker	-0.0071	0.0248	-0.0218***	-0.0246***
Daily smoker	-0.0238**	-0.0375***	-0.0285***	-0.0491***
Type of drinker				
Did not drink	-0.0265***	-0.0397***	-0.0181***	-0.0501***
Occasional drinker	-0.0220**	-0.0373***	-0.0173***	-0.0329***
Physical activity index				
Moderately active	0.0235**	0.0471***	0.0268***	0.0660***

Active	0.0726***	0.0982***	0.0753***	0.1233***
Personal psychological factors				
Sense of belonging–local community				
Weak	-0.0317***	-0.0247***	-0.0150***	-0.0266***
Satisfaction with life in general				
Dissatisfied	-0.0917***	-0.1216***	-0.0697***	-0.1172***
Neither satisfied nor dissatisfied	-0.0815***	-0.0961***	-0.0620***	-0.0973***
Perceived life stress				
Very stressful	-0.0280***	-0.0373***	-0.0239***	-0.0472***
Not stressful	0.0273**	0.0968***	0.0447***	0.0734***

[1] Reference individual of different groups of observations is based on following characteristics: age 55-69, married, can converse in English, post-secondary education level, income per year less than $39,999, not employed, length time in Canada equal to or more than 10 years (if immigrant), did not smoke, regular drink, inactive physical activity index, strong sense of belonging to local community, satisfied with life in general, perceived stressful life.

Number of observation for male immigrants = 2,903

Number of observation for female immigrants = 3,585

Number of observation for Canadian-born male = 18,233

Number of observation for Canadian-born female = 21,740

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8. Comparison of marginal effects of reporting very good self-perceived health among different observations

	(1) Male Immigrants	(2) Female Immigrants	(3) Canadian-born Males	(4) Canadian-born Females
Reference individual[1]	0.3035***	0.3553***	0.3194***	0.3984***
Social- demographic factors				
Age				
Age 15-24	0.0858***	0.0578***	0.1023***	0.0459***
Age 25-39	0.0775***	0.0569***	0.0868***	0.0401***
Age 40-54	0.0502***	0.0377***	0.0389***	0.0141***
Age 70 or more	0.0065	-0.0435***	-0.0064	-0.0080
Marital status				
Never married	-0.0093	-0.0079	-0.0042	-0.0226***
Previously married	-0.0217*	-0.0081	-0.0085	-0.0199***
Languages				
Neither English nor French	0.0258	-0.0311	-0.1229**	0.0088
French	-0.0335	-0.0066	0.0220***	0.0184***
English and French	0.0059	0.0203**	0.0261***	0.0109***
Highest education level				
Less than secondary	-0.0428***	-0.0372***	-0.0583***	-0.0547***
Secondary graduation	-0.0042	0.0050	-0.0042	-0.0097**
Other post-secondary	-0.0419**	0.00007	-0.0164**	-0.0287***
Total personal income per year				
No income	0.0105	0.0145	0.0622***	0.0254***
$40,000 to $79,999	0.0191**	0.0201**	0.0347***	0.0295***
$80,000 or more	0.0389***	0.0359***	0.0626***	0.0495***
Employment status				
Employee	0.0522***	0.0354***	0.0595***	0.0388***
Self-employed	0.0740***	0.0373***	0.0834***	0.0501***
Length time in Canada				
0 to 9 years	0.0589***	0.0140	-	-
Personal health behaviors				
Type of smoker				
Occasional smoker	-0.0084	0.0191	-0.0433***	-0.0260***
Daily smoker	-0.0306**	-0.0409***	-0.0597***	-0.0609***
Type of drinker				
Did not drink	-0.0345***	-0.0438***	-0.0350***	-0.0626***
Occasional drinker	-0.0279**	-0.0406***	-0.0333***	-0.0367***
Physical activity index				
Moderately active	0.0234**	0.0322***	0.0388***	0.0405***

Active	0.0573***	0.0511***	0.0840***	0.0532***
Personal psychological factors				
Sense of belonging–local community				
Weak	-0.0427***	-0.0249***	-0.0284***	-0.0284***
Satisfaction with life in general				
Dissatisfied	-0.1978***	-0.2645***	-0.2370***	-0.2759***
Neither satisfied nor dissatisfied	-0.1574***	-0.1577***	-0.1841***	-0.1785***
Perceived life stress				
Very stressful	-0.03681***	-0.0407***	-0.0482***	-0.0579***
Not stressful	0.0267**	0.0507***	0.0586***	0.0431***

[1] Reference individual of different groups of observations is based on following characteristics: age 55-69, married, can converse in English, post-secondary education level, income per year less than $39,999, not employed, length time in Canada equal to or more than 10 years (if immigrant), did not smoke, regular drink, inactive physical activity index, strong sense of belonging to local community, satisfied with life in general, perceived stressful life.

Number of observation for male immigrants = 2,903

Number of observation for female immigrants = 3,585

Number of observation for Canadian-born male = 18,233

Number of observation for Canadian-born female = 21,740

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9. Comparison of marginal effects of reporting good self-perceived health among different observations

	(1) Male Immigrants	(2) Female Immigrants	(3) Canadian-born Males	(4) Canadian-born Females
Reference individual[1]	0.4124***	0.3779***	0.4068***	0.3502***
Social- demographic factors				
Age				
Age 15-24	-0.1401***	-0.1452***	-0.0955***	-0.0731***
Age 25-39	-0.0998***	-0.1095***	-0.0703***	-0.0582***
Age 40-54	-0.0468***	-0.0502***	-0.0224***	-0.0159***
Age 70 or more	-0.0043	0.0316***	0.0027	0.0078*
Marital status				
Never married	0.0053	0.0072	0.0018	0.0201***
Previously married	0.0113*	0.0074	0.0035	0.0180***
Languages				
Neither English nor French	-0.0196	0.0244*	0.0080	-0.0095
French	0.0157	0.0061	-0.0113***	-0.0214***
English and French	-0.0038	-0.0229**	-0.0138***	-0.0120***
Highest education level				
Less than secondary	0.0184***	0.0281***	0.0152***	0.0408***
Secondary graduation	0.0025	-0.0050	0.0018	0.0093**
Other post-secondary	0.0182**	-0.00007	0.0064**	0.0247***
Total personal income per year				
No income	-0.0071	-0.0156	-0.0420***	-0.0314***
$40,000 to $79,999	-0.0138*	-0.0226**	-0.0194***	-0.0380***
$80,000 or more	-0.0329***	-0.0468**	-0.0424***	-0.0853***
Employment status				
Employee	-0.0496***	-0.0458***	-0.0394***	-0.0554***
Self-employed	-0.0902***	-0.0494***	-0.0658***	-0.0878***
Length time in Canada				
0 to 9 years	-0.0598***	-0.0149	-	-
Personal health behaviors				
Type of smoker				
Occasional smoker	0.0049	-0.0213	0.0132***	0.0228***
Daily smoker	0.0147**	0.0302***	0.0153***	0.0440***
Type of drinker				
Did not drink	0.0160***	0.0318***	0.0115***	0.0449***
Occasional drinker	0.0137**	0.0301***	0.0112***	0.0302***
Physical activity index				
Moderately active	-0.0175**	-0.0404***	-0.0223***	-0.0591***

Active	-0.0573***	-0.0827***	-0.0666***	-0.1050***
Personal psychological factors				
Sense of belonging–local community				
Weak	0.0184***	0.0204***	0.0099***	0.0245***
Satisfaction with life in general				
Dissatisfied	-0.0422	-0.0374	-0.0887***	0.0081
Neither satisfied nor dissatisfied	-0.0042	0.0457***	-0.0266***	0.0613***
Perceived life stress				
Very stressful	0.0168***	0.0301***	0.0140***	0.0425***
Not stressful	-0.0205**	-0.0815***	-0.0386***	-0.0653***

[1] Reference individual of different groups of observations is based on following characteristics: age 55-69, married, can converse in English, post-secondary education level, income per year less than $39,999, not employed, length time in Canada equal to or more than 10 years (if immigrant), did not smoke, regular drink, inactive physical activity index, strong sense of belonging to local community, satisfied with life in general, perceived stressful life.

Number of observation for male immigrants = 2,903

Number of observation for female immigrants = 3,585

Number of observation for Canadian-born male = 18,233

Number of observation for Canadian-born female = 21,740

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10. Comparison of marginal effects of reporting fair self-perceived health among different observations

	(1) Male Immigrants	(2) Female Immigrants	(3) Canadian-born Males	(4) Canadian-born Females
Reference individual[1]	0.1430***	0.1129***	0.1664***	0.1053***
Social- demographic factors				
Age				
Age 15-24	-0.0945***	-0.0756***	-0.0912***	-0.0448***
Age 25-39	-0.0775***	-0.0633***	-0.0755***	-0.0376***
Age 40-54	-0.0463***	-0.0356***	-0.0331***	-0.0121***
Age 70 or more	-0.0058	0.0370***	0.0055	0.0067
Marital status				
Never married	0.0082	0.0068	0.0036	0.0185***
Previously married	0.0192*	0.0070	0.0073	0.0164***
Languages				
Neither English nor French	-0.0232	0.0265*	0.1086**	-0.0075
French	0.0296	0.0057	-0.0187***	-0.0159***
English and French	-0.0052	-0.0183**	-0.0222***	-0.0093***
Highest education level				
Less than secondary	0.0378***	0.0317***	0.0504***	0.0442***
Secondary graduation	0.0037	-0.0044	0.0036	0.0080**
Other post-secondary	0.0370**	-0.00006	0.0140**	0.0235***
Total personal income per year				
No income	-0.0094	-0.0129	-0.0532***	-0.0224***
$40,000 to $79,999	-0.0172**	-0.0181**	-0.0295***	-0.0264***
$80,000 or more	-0.0354***	-0.0337***	-0.0535***	-0.0503***
Employment status				
Employee	-0.0484***	-0.0331***	-0.0508***	-0.0361***
Self-employed	-0.0728***	-0.0352***	-0.0723***	-0.0514***
Length time in Canada				
0 to 9 years	-0.0553***	-0.0124	-	-
Personal health behaviors				
Type of smoker				
Occasional smoker	0.0074	-0.0172	0.0373***	0.0214***
Daily smoker	0.0270**	0.0348***	0.0517***	0.0492***
Type of drinker				
Did not drink	0.0305***	0.0373**	0.0301***	0.0505***
Occasional drinker	0.0247**	0.0346***	0.0286***	0.0299***
Physical activity index				
Moderately active	-0.0211**	-0.0297***	-0.0330***	-0.0380***

Active	-0.0536***	-0.0521***	-0.0729***	-0.0583***
Personal psychological factors				
Sense of belonging–local community				
Weak	0.0377***	0.0214***	0.0244***	0.0232***
Satisfaction with life in general				
Dissatisfied	0.1723***	0.2172***	0.2065***	0.2214***
Neither satisfied nor dissatisfied	0.1392***	0.1331***	0.1644***	0.1440***
Perceived life stress				
Very stressful	0.0325***	0.0346***	0.0416***	0.0467***
Not stressful	-0.0241**	-0.0516***	-0.0500***	-0.0411***

[1] Reference individual of different groups of observations is based on following characteristics: age 55-69, married, can converse in English, post-secondary education level, income per year less than $39,999, not employed, length time in Canada equal to or more than 10 years (if immigrant), did not smoke, regular drink, inactive physical activity index, strong sense of belonging to local community, satisfied with life in general, perceived stressful life.

Number of observation for male immigrants = 2,903

Number of observation for female immigrants = 3,585

Number of observation for Canadian-born male = 18,233

Number of observation for Canadian-born female = 21,740

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11. Comparison of marginal effects of reporting poor self-perceived health among different observations

	(1) Male Immigrants	(2) Female Immigrants	(3) Canadian-born Males	(4) Canadian-born Females
Reference individual[1]	0.0354***	0.0234***	0.0318***	0.0185***
Social- demographic factors				
Age				
Age 15-24	-0.0289***	-0.0191***	-0.0233***	-0.0107***
Age 25-39	-0.0252***	-0.0168***	-0.0204***	-0.0092***
Age 40-54	-0.0168***	-0.0106***	-0.0103***	-0.0033***
Age 70 or more	-0.0024	0.0143***	0.0019	0.0019
Marital status				
Never married	0.0036	0.0024	0.0012	0.0057***
Previously married	0.0087	0.0024	0.0026	0.0050***
Languages				
Neither English nor French	-0.0091	0.0099	0.0551	-0.0021
French	0.0140	0.0020	-0.0061***	-0.0043***
English and French	-0.0022	-0.0058**	-0.0071***	-0.0026***
Highest education level				
Less than secondary	0.0184**	0.0121***	0.0206***	0.0148***
Secondary graduation	0.0016	-0.0015	0.0013	0.0024**
Other post-secondary	0.0179**	-0.00002	0.0051**	0.0073***
Total personal income per year				
No income	-0.0039	-0.0042	-0.0154***	-0.0059***
$40,000 to $79,999	-0.0069**	-0.0057**	-0.0093***	-0.0068***
$80,000 or more	-0.0134***	-0.0101***	-0.0155***	-0.0117***
Employment status				
Employee	-0.0174***	-0.0099***	-0.0149***	-0.0089***
Self-employed	-0.0241***	-0.0105***	-0.0197***	-0.0119***
Length time in Canada				
0 to 9 years	-0.0194***	-0.0040	-	-
Personal health behaviors				
Type of smoker				
Occasional smoker	0.0032	-0.0055	0.0146***	0.0066***
Daily smoker	0.0126**	0.0134**	0.0212***	0.0168***
Type of drinker				
Did not drink	0.0144***	0.0145***	0.0115***	0.0173***
Occasional drinker	0.0114*	0.0133***	0.0109***	0.0095***
Physical activity index				
Moderately active	-0.0083**	-0.0091***	-0.0102***	-0.0094***

Active	-0.0189***	-0.0145***	-0.0198***	-0.0131***
Personal psychological factors				
Sense of belonging–local community				
Weak	0.0183***	0.0078***	0.0091***	0.0072***
Satisfaction with life in general				
Dissatisfied	0.1593***	0.2064***	0.1888***	0.1636***
Neither satisfied nor dissatisfied	0.1038***	0.0750***	0.1083***	0.0706***
Perceived life stress				
Very stressful	0.0155***	0.0133***	0.0165***	0.0158***
Not stressful	-0.0094**	-0.0144***	-0.0147***	-0.0100***

[1] Reference individual of different groups of observations is based on following characteristics: age 55-69, married, can converse in English, post-secondary education level, income per year less than $39,999, not employed, length time in Canada equal to or more than 10 years (if immigrant), did not smoke, regular drink, inactive physical activity index, strong sense of belonging to local community, satisfied with life in general, perceived stressful life.

Number of observation for male immigrants = 2,903

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* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Data Source

Canadian Community Health Survey, 2010: Annual component
http://odesi1.scholarsportal.info/webview/