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**The Health Behaviors of Immigrants and
Native-Born People in Canada**

James Ted McDonald

SEDAP Research Paper No. 144

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The Health Behaviors of Immigrants and Native-born People in Canada

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Abstract: This paper analyzes the incidence of participation in various activities generally expected to have an impact on current and future physical health. Attention is focused on the incidence of these activities among immigrant and minority groups compared to native-born white Canadians. Immigrants generally exhibit significantly lower rates of alcohol consumption, binge drinking, and daily smoking but also lower participation in vigorous physical activity and consumption of fruit and vegetables. Differences are particularly pronounced for immigrants from Asia and Africa, and this is true for both men and women. For most immigrant men, alcohol consumption and smoking both increase with years in Canada, *ceteris paribus*, and in the case of immigrants from Europe and the USA, reach native-born white levels after between 10-20 years in Canada. For other immigrant men, the incidence of alcohol consumption remains low even for long-term residents of Canada. Interestingly, there is no significant change with years-since-migration in any of the health behaviors for immigrant women. Canadian born members of visible minorities also display significantly lower rates of alcohol consumption, smoking and (for women) vigorous physical activity than native-born whites, although these rates were still higher than for immigrants from Asia and Africa. Finally, native-born white lifestyle choices are found to exert a significant positive influence on the behaviors of immigrants and native-born minorities who are residents of the same province.

Résumé: Cet article analyse la fréquence de la participation à des activités dont on peut attendre des répercussions sur la santé physique présente et future. Nous concentrons notre attention sur l'incidence de ces activités sur les immigrants et les minorités ethniques et les comparons aux Canadiens de naissance de race blanche. On constate en général chez les immigrants des consommations régulières ou excessives d'alcool, et des consommations de cigarettes sensiblement plus faibles, mais aussi une moindre participation aux exercices physiques intenses ainsi qu'une plus faible consommation de fruits et légumes. Ces différences sont particulièrement prononcées parmi les immigrants originaires de l'Asie et d'Afrique, aussi bien pour les hommes que pour les femmes. Pour la majorité des hommes immigrants, la consommation d'alcool et le tabagisme augmentent avec le nombre d'années passées au Canada *ceteris paribus*, et les immigrants en provenance de l'Europe et des Etats-Unis arrivent à des niveaux de consommation comparables aux Canadiens de naissance de race blanche après 10 à 20 ans de résidence au Canada. Pour les autres groupes d'hommes immigrants, la fréquence de la consommation d'alcool demeure faible même parmi les résidents Canadiens de longue date. Étonnement, on observe que le nombre d'années passées au Canada n'engendre aucun changement significatif du comportement lié à la santé des immigrantes. Les Canadiens de naissance membres d'une minorité visible montrent également des taux de consommation d'alcool et de tabagisme, et (pour les femmes) de participation à des exercices physiques intenses sensiblement inférieurs à ceux observés chez les Canadiens de naissance de race blanche, bien que ces taux demeurent toujours plus élevés que ceux observés pour les immigrants originaires de l'Asie et d'Afrique. Finalement, nous observons que les choix du mode de vie des Canadiens de naissance de race blanche exercent une influence significativement positive sur les comportements liés à la santé des immigrants et des membres d'une minorité ethnique résidant dans la même province.

JEL Classification: I1, J0

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1. Introduction

It is now generally accepted that new immigrants to Canada and other developed countries such as Australia and the USA enjoy significant health advantages relative to comparable native-born populations in these countries. The health ‘gap’ enjoyed by recent immigrants is present even though a majority of these immigrants come from developing countries where mortality and morbidity indicators are worse than in Canada. The gap is also not explained by differences in observable socio-economic factors such as education and income. Equally notable is the finding that the health gap narrows significantly with additional years in the new country, suggesting that immigrants’ health is deteriorating over time relative to their native-born peers. This pattern in health outcomes experienced by immigrants to Canada and other countries – an initial health gap followed by a worsening of health and convergence towards native-born levels – has come to be known as the ‘healthy immigrant effect’ (HIE).¹

A range of possible explanations for the HIE have been suggested in the literature. The initial health gap has been attributed to healthier behaviors of new immigrants prior to migration, to health screening by immigration officers, and to immigrant self-selection whereby the healthiest and wealthiest individuals are the people most likely to migrate. Similarly, the decline in health with years in Canada has been attributed to persistent barriers to access of health services, improved use of diagnostic services, environmental factors, and the adoption of native-born behaviors relevant to health. However, there has

¹ For Canada, see Perez, 2002, Newbold and Danforth, 2003, Deri, 2004, and McDonald and Kennedy, 2004. Biddle, Kennedy and McDonald (2005) and Kennedy and McDonald (2005) document a healthy immigrant effect for immigrants to Australia, while Antecol and Bedard (2005) and Jasso et.al. (2004) do so for immigrants to the US. The evidence for the HIE is not unanimous however, and has been found to be sensitive to how physical health is measured. McDonald and Kennedy (2004) and Newbold (2005) find mixed evidence for the HIE in terms of self-assessed health status and the probability that an individual rates his or her health as ‘fair’ or ‘poor’.

been relatively little formal research that has investigated what actually underpins the healthy immigrant effect.

Understanding the factors that give rise to the HIE is an issue of great interest and importance for policymakers and health practitioners. The health of a country's immigrants figures prominently in the direct costs borne by the citizens of that country through public funding of the health system. Just as importantly, an immigrant's health will substantially affect the process through which he or she adjusts to the labour market and contributes to the economy of the new country of residence. Further, the determination of factors that contribute to good health at migration and the subsequent deterioration of immigrant health over time can yield valuable lessons about how the health and well-being of all of the recipient country's residents could be improved.

The objective of this paper is to provide new insights into some of the factors that might underpin the apparent deterioration in immigrants' physical health with years in Canada on arrival in their new country and over time, by documenting and analyzing the incidence of a range of behaviors that are strongly associated with current and future health. These measures span a range of personal choices, including regular alcohol consumption, binge drinking, daily smoking, physical activity, and fruit and vegetable consumption. The extent to which immigrant health behaviors display similar patterns to health outcomes with additional years in Canada will provide some evidence about the validity of the acculturation hypothesis as an explanation for the healthy immigrant effect. That is, if health behaviors converge to native-born levels with additional years in

Canada, it seems reasonable to think that it is changing personal behaviors that are contributing to changes in health outcomes.²

2. Literature Review

An often-cited explanation for the healthy immigrant effect relates to the adoption of destination-country habits and lifestyles that are associated with poor health. Favorable habits and behaviors in the home country prior to migration, such as physically active lifestyles and diets low in fat, lead to new immigrants who are relatively healthier than the average person in the recipient country. Thus, immigrants from developing countries who migrate to a developed country such as Canada enjoy ‘the best of both worlds’ (Powles, 1990, Khlat and Darmon, 2003) – both the favorable habits of their country of origin and the efficiency of the health care system in the host country.

This theory also leads to an explanation for why the health advantage is lost with years in the host country. With the influence of the majority native-born lifestyle, immigrants gradually adopt ‘Western’ habits and lifestyle in terms of activity levels, diet, and consumption of alcohol and tobacco - a process referred to as acculturation. There is a large body of literature on acculturation and health outcomes among immigrants and minority groups (see early work by Marmot and Syme, 1976, and more recent surveys by Beiser *et.al.*, 1997, and Salant and Lauderdale, 2003).³

² A companion paper (McDonald and Kennedy, 2005) examines the incidence of overweight and obesity among immigrant and native-born Canadians. These measures are intermediate outcomes in the underlying relationship between current health behaviors and future health outcomes since they will reflect in part past and current choices about diet and physical activity.

³ The maintenance of beneficial health behaviors after migration to another country is often cited as an explanation for the persistence of better health among some minority groups. This includes the so-called ‘Hispanic paradox’ - when compared to non-Hispanic Whites, Hispanics in the US are found to have lower all-cause mortality rates although they are also poorer and less educated. Khlat and Darmon (2003) cite similar results for Mediterranean immigrants to France and Germany.

One outcome in some of the research on the healthy immigrant effect is that the inclusion of variables reflecting health behaviors as explanatory variables does not appear to have a large effect on the magnitude of the initial health gap or on the convergence in health to native born levels (for Canada, see e.g., Perez, 2002 and Ng et.al, 2005). The implication is that to the extent immigrants' health behavior is changing with years in the new country, these changes are not driving the convergence in health outcomes. However, there is an obvious endogeneity problem in that contemporaneous health behaviors and health outcomes are likely to be jointly determined, and may even reflect reverse causality – if for example, poor health forces changes in health behaviors such as quitting smoking or losing weight. Further, changes in health behaviors are more likely to impact on future health outcomes than current health outcomes (though there are some exceptions, for example, the relatively rapid impact of excess weight on the incidence of hypertension).

While significant differences in health behaviors across immigrant and ethnic groups in Canada have been noted elsewhere (e.g., Millar, 1992, Chen et.al., 1996, Perez, 2002, Maclean et.al., 2004, Ng. et.al., 2005), evidence of convergence in these health behaviors to native-born levels is limited.⁴ Two recent studies published by Statistics Canada (Perez 2002, Ng et.al., 2005) note only mixed evidence of convergence in health behaviors for smoking, inactivity, and excess weight. However, Perez's paper relies on only a single cross section of data, so that years since migration (denoted YSM) effects cannot be identified separately from arrival period unobserved effects. Ng et.al.'s paper

⁴ There is also a body of literature that examines the health behaviors of particular immigrant groups within specific Canadian communities. For example, Palacios and Sheps (1992) study health behaviors among the Hispanic community living in Vancouver and find that the female Hispanic community has lower rates of alcohol use and tobacco use than the Canadian population. Li and Rosenblood (1994) analyze the drinking behavior of Chinese college students, and find that the number of Caucasian friends a Chinese student has exerts a significant effect on drinking behavior.

estimates transition models using the longitudinal component of the National Population Health Survey (NPHS) but the small sample size for some immigrant groups limits the range of specifications that can be estimated. Some support for the acculturation hypothesis in Canada is found by McDonald and Kennedy (2005a). They use pooled NPHS and Canadian Community Health Survey (CCHS) cross-sectional data and find that the probability of being overweight or (for women) obese is lower for most new immigrants than for comparable native-born Canadians, but increases gradually with additional years in Canada.

For the US, Antecol and Bedard (2005) analyze pooled cross-sectional data from the National Health Interview Surveys (NHIS) and find that the incidence of overweight and obesity among recent immigrants converges slowly to native-born levels. Singh and Siahpush (2002) also analyze pooled data from the NHIS and find that recent immigrants' incidence of smoking and obesity are both significantly lower than for comparable native-born people but increase with the length of residence in the US. Other authors attempt to capture the extent of acculturation more directly and find greater acculturation significantly increases the incidence of certain health behaviors. For example, Landrine et al (1994) analyze a sample of 4375 US adolescents and measure the degree of acculturation among Hispanics according to whether English is the usual language spoken at home. They find that acculturated Hispanics show smoking rates similar to those of whites, while less acculturated Hispanics show significantly lower smoking rates that are similar to those of blacks and Asians.

3. Empirical Methodology

The basic approach used here follows McDonald and Kennedy (2004, 2005), who use the ‘population health’ perspective that defines the major determinants of health status to be cultural, social and economic factors rather than medical care inputs and utilization *per se* (Frank, 1995, Dunn and Dyck, 2000). Each dependent variable is expressed as a function of a set of demographic and socio-economic variables including age, education level, marital status, presence of young and school-aged children, an indicator for home ownership, type of dwelling, plus an indicator for receipt of dividend and interest income.⁵ Also included are a set of provincial indicator variables, and indicator variables for whether the individual resides in a Census Metropolitan Area (CMA) or in a rural area.

Immigrant characteristics are measured by a set of three YSM indicator variables, for 1-10 years in Canada, 11-20 years in Canada, and 21+ years in Canada. It is important to note that the composition of immigrant inflows to Canada has changed markedly over time, particularly in terms of region of origin and visa category. Since it is changes in health behaviors with years in Canada that are of most interest, it is important to ensure that these compositional changes do not give rise to misleading inferences about changes in the health behaviors of particular immigrant groups with years in Canada. To this end, two sets of indicator variables are also included in the regression equations: 1) controls for region of origin (US, UK and Ireland, Oceania, Western Europe, Southern Europe, Eastern Europe, Russia, Western Asia/Middle East, Africa, South Asia, East Asia, Southeast Asia, Central America and South America); and 2) controls for year of arrival

⁵ Housing and income category variables as well as education variables are included as proxies for socio-economic status. Current personal income is available in the data but as noted by Etner (1996) and others, it is likely to be an endogenous determinant of health outcomes and health behaviors.

in Canada (five-year arrival cohorts from 1951-55 to 1996-2000 inclusive plus an indicator for immigrants arriving between 2001 and 2003).

In order to allow for additional flexibility in the econometric specification, the YSM terms are allowed to vary by broad region of origin through their interaction with indicator variables for immigrants from English-speaking countries (UK and Ireland, USA, Australia and NZ) – hereafter denoted ESB, non-English speaking European countries – hereafter denoted NESB-Europe, and non-English speaking non-European countries – hereafter denoted NESB-other. Thus, changes in health behaviors with years in Canada are allowed to vary by broad ethnic/language background.

A wide variety of consistently defined measures of health behaviors are available in the NPHS and CCHS data. The following set of five measures are intended to capture a range of health behaviors that together provide some sense of the extent to which a particular individual is engaging in a healthy lifestyle.⁶ These measures are 1) is the person a weekly drinker, 2) has the person binged on alcohol in the last month (defined to be consumption of five or more drinks in one sitting), 3) is the person a daily smoker, 4) has the person engaged in vigorous physical activity in the last week, and 5) does the person typically consume 5 or more servings of fruit and vegetables per day. Each is defined as a binary variable, and estimation is via Logit.

The data used in the paper are drawn from the 1996 wave of the NPHS and the 2000-01 and 2002-03 waves of the Canadian Community Health Survey (CCHS). The NPHS and CCHS are both population-based surveys that are very comparable in terms of survey design and collection (although the NPHS collects information on people of all

⁶ The links between good health and occasional alcohol consumption somewhat ambiguous. Later in the paper, an alternative measure for alcohol consumption is considered that is more clearly associated with negative health effects is whether the individual exceeds the standard set by Health Canada for moderate alcohol consumption, namely 2 drinks per day for men and 1 drink per day for women.

ages, while the CCHS is limited to people aged 12 years or older). Definitions of survey questions and response categories are also almost identical between the surveys.⁷ The sample is restricted to adults aged 20 to 65 inclusive. Age effects are captured through a simple quadratic in age, although the robustness of the results are evaluated using a range of more flexible specifications for age.

One extension to the primary analysis arises from the fact that health behaviors vary significantly across Canada's provinces, even after controlling for differences in socio-economic and demographic characteristics. Differences across provinces can arise for many reasons not controlled for in the regressions – urban infrastructure (availability of alcohol, fresh food, proximity of walking trails), price differences, weather and geographical amenities, as well as provincial public policy (for example, regulation of the sale and consumption of alcohol and tobacco, and the direct promotion of healthier lifestyles through bans on the consumption of soft drinks in schools). As well, cultural differences across Canada's provinces in terms of attitudes to health and lifestyle may be reflected in observed differences. While the health behaviors of immigrants to Canada should reflect the same province-specific factors with regard to urbanization, infrastructure and public policy, it seems logical to think that if there is a process of acculturation occurring, the behavioral choices of immigrants could also be affected by the cultural differences in the majority native-born population *across* provinces.

To test the influence of majority health behavior on minority and immigrant choices, additional variables are included in the regressions that measure the incidence of the relevant health behavior of the gender-specific white native-born population in each

⁷ See McDonald and Kennedy (2004) for further discussion of the comparability of these two data surveys.

Canadian province.⁸ These variables are set equal to zero for white native-born Canadians. The province indicator variables in the main specification will control for the presence of region-specific factors (such as those mentioned above) that affect the health behaviors of all residents. However, to the extent that these factors impact on minority groups and immigrants differently, additional interactions of the province indicator variables and the indicator variables for visible minority status and for immigrant status (ESB, NESB-Europe, NESB-other are also included. Thus it is changes over time in the incidence of health behaviors of the majority population that allow the impact of majority health behaviors on minorities and immigrants to be identified.⁹

4. Results

Table 1a gives the incidence of the various health behaviors for male subpopulations defined by immigrant status and visible minority status. From the top row of Table 1a, 56.3% of Canadian-born white men drink alcohol weekly, while 29.4% have drunk five or more drinks in one sitting (bingeing) at least once in the past month. As well, 28.6% of native-born white men smoke daily, 34.1% have engaged in at least 15 minutes of vigorous exercise once or more in the past week, and 28.9% typically consume five or more servings of fruit and vegetables daily. Native-born men who are a visible minority on average lead healthier lifestyles: they consume less alcohol and tobacco, and are more active and have more balanced diets.¹⁰

⁸ For sample size considerations, the Canadian provinces are aggregated into six regions: Atlantic, Quebec, Ontario, Prairies, Alberta and BC.

⁹ Also included are a set of interaction terms of the province indicators with indicators for survey year. These are included to control for the effects of province-specific changes over time (such as a change in tobacco legislation) that would affect *all* residents of the province.

¹⁰ Since the incidence of overweight and obesity is analyzed in detail in McDonald and Kennedy, 2005a, the incidence of these conditions is not discussed here. However, it is useful to note that the main results

In the lower part of the table, it can clearly be seen that there are substantial differences between immigrants and native-born men, and among immigrants from different regions of origin. ESB immigrants are more likely than native-born white men to be weekly drinkers and are less likely to be binge drinkers or daily smokers. Non-European NESB immigrants are much less likely to drink alcohol, to binge drink, and to smoke daily, while European NESB immigrants are about as likely as white native-born men to drink and smoke but are less likely to be physically active and more likely to consume the recommended amount of fruit and vegetables. The incidence of these health behaviors also varies by years since migration, although there are relatively few instances of a clear pattern of convergence with YSM to native-born levels. ESB immigrants show an upward trend in smoking incidence and NESB-other immigrants show an upward trend in the incidence of drinking weekly but in neither case does the relevant figure come close to the comparable figure for native-born men, even for immigrants resident in Canada more than 20 years. Other health behaviors show little change with YSM – for example, the incidence of binge drinking among NESB-other men remains below 10% and the rate of daily smoking remains below 17%.

Comparable results are presented for women in Table 1b. Compared to men, women are less likely to drink, to binge, and to smoke, and are more likely to be physically active and to eat 5+ fruit and vegetables. Among women, non-ESB immigrants and visible minority groups are generally less likely than Canadian born white women to drink alcohol, to binge, and to smoke, while ESB immigrants are more likely to drink, less likely to smoke, and more likely to be physically active. As with

are generally consistent with what is reported here: specifically, most visible minority and immigrant groups have significantly lower rates of excess weight.

immigrant men, there is little consistent evidence of convergence with years in Canada. NESB immigrants display modest increases in weekly alcohol consumption with YSM but non-Europeans still have significantly lower rates even after more than 20 years in Canada. Smoking incidence increases with YSM for both ESB and NESB-other immigrants but in neither case comes close to levels for native-born white women.¹¹

Of course, these proportions are not adjusted for differences in demographic and socio-economic characteristics that are important determinants of health behaviors. As well, the decomposition by YSM does not control for changes in the composition of the immigrant inflows to Canada over time. The latter point in particular may obscure convergence patterns with YSM.

Regression results for the key variables of interest – the YSM terms - are presented in log-odds form for men in Table 2a and for women in Table 2b. Log-odds ratios are interpreted as the ratio of the odds of a person with a particular characteristic engaging in the behavior to the odds of a person without the particular characteristic engaging in the behavior. Thus, a log-odds ratio greater than 1 means that the other things equal, a Canadian-born visible minority male is only 48.8% as likely as a Canadian-born white male (the default group) to drink alcohol weekly. The YSM terms for 1-10 years in Canada and 11-20 years in Canada are relative to the default group - those individuals in Canada for more than 20 years - as captured by the terms for the overall immigrant groups (ESB, NESB-Europe, and NESB-other). Thus, the YSM terms reflect the extent to which health behaviors for recently arrived immigrant groups change with years since

¹¹ The incidence of daily drinking that exceeds Health Canada guidelines is low for all Canadian residents. For men (women), it ranges from less than 1% (< 0.5%) for recent NESB-other immigrants to 7.1% (3.9%) for native-born whites. For immigrants from all three broad regions, incidence increases modestly with years in Canada but only achieves native-born levels for ESB immigrants.

migration, while the latter variables reflect long-term differences in the health behaviors of immigrants in Canada for at least 21 years relative to comparable native-born Canadians.

For men, both groups of NESB immigrants show significant increases with YSM in the incidence of weekly alcohol consumption and binge drinking, while all three immigrant groups show significant increases with YSM in the incidence of daily smoking. For European immigrants, there is convergence to native-born levels, indicated by log-odds ratios for the long-term immigrants that are not significantly different from one. This is also true for ESB immigrants and smoking, although for alcohol consumption there are no significant differences between any ESB immigrants and the native-born. For NESB-other immigrants, although there is convergence towards native-born levels in the incidence of weekly and binge drinking, the incidence of these activities is still markedly below those of comparable native-born men even after more than 20 years in Canada. For vigorous physical activity, all of the immigrant groups have significantly lower rates of activity than native-born men, and there is no evidence of any changes with YSM. For fruit and vegetable consumption, there is a lot of variation in the estimated log-odds ratios but no significant differences relative to the native-born. Finally, it is also notable that for native-born members of a visible minority, rates of alcohol consumption and smoking are all significantly lower than for native-born white men, but there are no differences in activity or fruit/vegetable consumption.

For women, the main result is that unlike the case for men, there is no evidence of convergence to native-born levels with YSM for any activity for any group of immigrants. In fact, for NESB-Europeans there are no significant differences in any

measure of health behavior between immigrants and native-born women. For NESB-other immigrants, rates of alcohol consumption, smoking, physical activity and fruit/vegetable consumption are all consistently lower than for native-born women and while the patterns in the YSM terms for weekly drinking and daily smoking show increasing incidence with YSM, these changes are not statistically significant. The extremely low rates of alcohol and tobacco consumption, even for immigrant women in Canada 21 years or more, are striking. Interestingly, a similar pattern is found for native-born women who are members of a visible minority – for each measure of health behaviors, the incidence is markedly lower than for comparable native-born white women (though they are still higher than for NESB-other immigrants).¹²

Results for socio-economic and demographic variables are largely as expected. Tables 3a and 3b present abbreviated results that indicate which variables are significant determinants of health behaviors and the direction of effect. Education is an important determinant, with more educated people more likely to drink weekly, to be active and to eat fruit/vegetables but less likely to binge drink or smoke. As well, receipt of dividend income has similar effects. Marriage and the presence of children reduce the incidence of alcohol consumption and smoking, while being widowed, separated or divorced increases the incidence of binge drinking for men and smoking for both genders. Residing in a census metropolitan area is associated with more weekly drinking and physical activity, but less smoking.

¹² For daily consumption that exceeds Health Canada guidelines, both visible minority native-born men and women and NESB-other immigrants have significantly lower incidence compared to native-born whites. Longer term male immigrants from Europe and ESB countries are more likely than native-born whites to exceed the guidelines. In contrast to other results, there is no evidence of significant changes with YSM for any group of immigrants.

The final set of control variables from the main regressions illustrate the presence of significant provincial variation for men and women, even after controlling for demographic and socio-economic differences, residence in a CMA, other urban, or rural area, and the presence of immigrants and visible minorities. Tables 4a and 4b present log-odds ratios by province, for men and women respectively. (Due to sample size limitations, the Atlantic provinces are grouped together into 'Atlantic', and Manitoba and Saskatchewan are grouped together into 'Prairies'. In each case, the base group is Ontario. For men, Quebec residents are more likely to drink weekly but less likely to binge drink, but the opposite is true for residents of Atlantic Canada and the Prairies. Atlantic and Prairie residents are also significantly less likely to be physically active and to consume fruit/vegetables. Residents of BC are less likely to smoke but more likely to be active and to consume fruit/vegetables. Similar patterns are found for women, although women from Quebec are more likely to be daily smokers.

The significant variation in health behaviors across provinces that is present after controlling for socio-economic and demographic variables raises the question about the possible influence that the health behaviors of the native-born residents of particular provinces exert on the health behaviors of the immigrants in those provinces.¹³ Though not reported, each specification begins with the provincial majority health behavior measure interacted with indicators for native-born visible minority groups and the three main groups of immigrants identified earlier: ESB, NESB-Europe and NESB-other. Thus, separate effects of majority white health behaviors on minority and immigrant health are allowed for each group. It is important to note that these results are obtained in

¹³ In McDonald and Kennedy (2005a), attention focused on the influence that obesity rates among individuals of particular ethnic minority groups had on individuals that belonged to the same minority groups, a related but distinct concept.

regression specifications that also allow for provincial fixed effects for visible minority groups and the various groups of immigrants as well as for the majority white population.

Table 5 reports selected results for these provincial health behavior measures after narrowing the flexible specification to a more parsimonious one. For both men and women, the results indicate significant and positive effects on the incidence of weekly drinking and binge drinking among immigrants and visible minority groups. There are also significant results for the incidence of vigorous exercise but only for ESB and NESB-Europe men. To illustrate the interpretation of the log-odds ratios reported, consider the result of 1.028 for binge drinking among men. The implication of this result is that a one percentage point increase in the provincial average incidence of binge drinking among majority white men is associated with a 2.8% increase in the incidence of binge drinking among visible minority and immigrant men. Assuming an incidence of binge drinking of 20% for these groups implies around a 0.6 percentage point increase in the incidence of binge drinking (2.8% of 20%). Overall, the results suggest that even after controlling for unobserved factors that affect the health behaviors of all provincial residents in general, and immigrant and minority residents in particular, health behaviors of the majority white population themselves also affect some immigrants' and minority groups' choices about the consumption of alcohol, binge drinking in particular.

5. Discussion

This paper has identified significant differences between immigrants and native-born Canadians in lifestyle choices that have important implications for current and

future health. Specifically, a number of immigrant groups exhibit significantly lower rates of alcohol consumption, binge drinking, and daily smoking but also lower participation in vigorous physical activity and consumption of fruit and vegetables. Differences are particularly pronounced for NESB immigrants from outside of Europe, and this is true for both men and women. For most immigrant men, alcohol consumption and smoking both increase with years in Canada, *ceteris paribus*, and in the case of ESB and NESB-Europe immigrants, reach native-born white levels after between 10-20 years in Canada. For NESB-other immigrant men, the incidence of alcohol consumption remains low even for long-term residents of Canada. Interestingly, there is no significant change with years-since-migration in any of the health behaviors for immigrant women. What is also notable is that Canadian born members of visible minorities also display significantly lower rates of alcohol consumption, smoking and (for women) vigorous physical activity than native-born whites, although these rates were still higher than long-term resident NESB-other immigrants. Evidence is also found that native-born white lifestyle choices exert a significant influence on the behaviors of immigrants and native-born minorities who are residents of the same province.

These results are important for two reasons. First, in terms of determining what underpins the healthy immigrant effect, the results provide some evidence that health behaviors converge over time to comparable native-born levels. The clearest evidence is for the incidence of daily smoking among immigrant men, which shows convergence to native-born rates of smoking after 20 years in Canada. Increased smoking may well underpin at least part of the worsening physical health with years in Canada exhibited by immigrant men (e.g., in terms of specific chronic conditions that respond fairly quickly to changes in smoking behavior, such as higher blood pressure and bronchitis and

emphysema). For women, changes in smoking incidence or alcohol consumption appear to contribute little to the explanation for the worsening health with years in Canada, although another explanation may well relate to the consistently lower rates of vigorous physical activity and consumption of fruit and vegetables that characterize immigrant women from NESB regions outside of Europe. The fact that there is evidence of acculturation in these health behaviors for immigrant men might arise perhaps because of fewer contacts with native-born counterparts – say because of lower labour force participation rates and more young children at home. In any event, it is an interesting avenue for future research.

Second, the results indicate that the health behaviors of immigrants and minority groups are sensitive to the health behaviors of white native-born men and women, at least with regard to alcohol consumption, and this gives additional support that a process of acculturation does occur. However, the persistent differences in the health behaviors among some immigrants and visible minority groups suggests that maintenance of ethnic or home-country attitudes and beliefs persists in some dimensions even if the individual has been in Canada for many years or was born in Canada. This is also supported by the analysis of immigrant and visible minority overweight and obesity in McDonald and Kennedy (2005), who find slow rates of change with years in Canada, and persistently lower rates of excess weight for some immigrant groups even after many years in Canada.

Finally, there is much discussion in the literature about the possibility that a lack of acculturation with regard to the development of English language skills, Canadian-specific human capital, or labour market contacts outside of ethnic enclaves may inhibit

the labour market adjustment of immigrants and result in higher rates of unemployment, lower earnings and greater reliance on social assistance. One implication of the paper is that the process of social adjustment is multi-faceted and complex, and the effects of inhibited acculturation are not necessarily all bad. While maintaining home country mores, beliefs and networks may inhibit labour market adjustment, there may well be positive benefits as well, in terms of lifestyle choices that are associated with better current and future health.

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Table 1a: Proportion of Adult men aged 20-65 engaging in specific activities, by years since migration and broad region of origin

	Weekly drinker	Binge drank (5+ drinks in one sitting) last month	Daily smoker	Vigorous physical activity last month	Usually eats 5+ fruit/veg per day
Native-born					
White	0.563	0.294	0.286	0.341	0.289
Visible minority	0.409	0.242	0.195	0.504	0.295
Immigrants					
ESB					
YSM 1-10 yrs	0.615	0.288	0.143	0.380	0.307
YSM 11-20 yrs	0.623	0.219	0.178	0.432	0.334
YSM 21+ yrs	0.615	0.239	0.186	0.365	0.332

NESB –Europe					
YSM 1-10 yrs	0.499	0.179	0.280	0.306	0.407
YSM 11-20 yrs	0.606	0.257	0.258	0.251	0.425
YSM 21+ yrs	0.594	0.162	0.227	0.274	0.376

NESB – Other					
YSM 1-10 yrs	0.233	0.078	0.168	0.306	0.294
YSM 11-20 yrs	0.289	0.098	0.167	0.341	0.307
YSM 21+ yrs	0.353	0.092	0.161	0.344	0.331

Table 1b: Proportion of Adult women aged 20-65 engaging in specific activities, by years since migration and broad region of origin

	Weekly drinker	Binge drank (5+ drinks in one sitting) last month	Daily smoker	Vigorous physical activity last month	Usually eats 5+ fruit/veg per day
Native-born					
White	0.345	0.106	0.252	0.348	0.436
Visible minority	0.245	0.085	0.137	0.415	0.398
Immigrants					
ESB					
YSM 1-10 yrs	0.432	0.112	0.131	0.407	0.426
YSM 11-20 yrs	0.376	0.088	0.181	0.390	0.471
YSM 21+ yrs	0.414	0.058	0.195	0.392	0.485

NESB –Europe					
YSM 1-10 yrs	0.278	0.038	0.189	0.317	0.515
YSM 11-20 yrs	0.309	0.045	0.175	0.379	0.467
YSM 21+ yrs	0.330	0.037	0.158	0.302	0.504

NESB – Other					
YSM 1-10 yrs	0.065	0.013	0.034	0.264	0.377
YSM 11-20 yrs	0.095	0.022	0.046	0.277	0.412
YSM 21+ yrs	0.146	0.020	0.073	0.324	0.420

Table 2a: Log-odds ratios for Adult men aged 20-65 engaging in specific activities: impact of years since migration by broad region of origin

	Weekly drinker	Binge drank (5+ drinks in one sitting) last month	Daily smoker	Vigorous physical activity last month	Usually eats 5+ fruit/veg per day
Native-born					
White	1.000 ---	1.000 ---	1.000 ---	1.000 ---	1.000 ---
Visible minority	0.488*** (-7.38)	0.547*** (-5.77)	0.734*** (-2.92)	1.047 (.48)	0.863 (-1.35)
ESB					
YSM 1-10 yrs	0.906 (-.36)	0.874 (-.40)	0.290*** (-3.25)	1.061 (.21)	0.732 (-.93)
YSM 11-20 yrs	1.121 (.54)	0.664 (-1.61)	0.603* (-1.89)	1.508* (1.88)	0.705 (-1.11)
All ESB	1.128 (.66)	1.115 (.52)	1.210 (.80)	0.652** (-2.12)	1.158 (.62)
NESB – Europe					
YSM 1-10 yrs	0.763 (-1.05)	0.605 (-1.49)	0.489** (-2.19)	0.891 (-.42)	0.704 (-1.05)
YSM 11-20 yrs	1.261 (1.04)	1.215 (.73)	0.614 (-1.53)	0.948 (-.23)	0.941 (-.21)
All NESB – Europe	1.115 (.55)	1.133 (.54)	1.400 (1.28)	0.604** (-2.24)	1.401 (1.33)
NESB – Other					
YSM 1-10 yrs	0.575** (-2.48)	0.600* (-1.77)	0.351*** (-3.66)	1.043 (.18)	0.736 (-1.03)
YSM 11-20 yrs	0.797 (-1.28)	0.801 (-.99)	0.523*** (-2.76)	1.228 (1.07)	0.731 (-1.23)
All NESB – Other	0.281*** (-6.70)	0.269*** (-5.70)	1.026 (.66)	0.502*** (-3.68)	0.657 (-.95)

- denotes significantly different from 1.000 at the 10% level, ** at the 5% level and *** at the 1% level.

Note: Shading indicates that the two YSM terms are significantly different from the all-immigrant indicator for the immigrants from the relevant region of origin. In other words, shading implies significant changes in the incidence of the particular health behavior with additional years in Canada, ceteris paribus.

Table 2b: Log-odds ratios for Adult women aged 20-65 engaging in specific activities: impact of years since migration by broad region of origin

	Weekly drinker	Binge drank (5+ drinks in one sitting) last month	Daily smoker	Vigorous physical activity last month	Usually eats 5+ fruit/veg per day
Native-born					
White	1.000	1.000	1.000	1.000	1.000
Visible minority	0.548*** (-4.69)	0.394*** (-5.47)	0.564*** (-4.26)	0.783** (-2.39)	0.843 (-1.17)
ESB					
YSM 1-10 yrs	1.682 (1.56)	3.977** (2.27)	0.909 (-.23)	1.128 (.47)	1.215 (.63)
YSM 11-20 yrs	1.143 (.58)	1.991* (1.76)	1.378 (1.08)	1.038 (.18)	1.184 (.65)
All ESB	0.913 (-.41)	0.509 (-1.61)	0.520** (-2.06)	0.807 (-1.17)	0.871 (-.66)
NESB – Europe					
YSM 1-10 yrs	1.098 (.26)	1.753 (.81)	1.730 (1.35)	0.940 (-.23)	1.393 (1.08)
YSM 11-20 yrs	1.116 (.40)	1.288 (.57)	1.516 (1.23)	1.231 (.85)	1.052 (.19)
All NESB – Europe	0.977 (-.10)	0.676 (-.90)	0.616 (-1.41)	0.818 (-.99)	0.995 (-.02)
NESB – Other					
YSM 1-10 yrs	0.699 (-1.13)	1.059 (.09)	0.519 (-1.61)	0.926 (-.34)	1.551 (1.65)
YSM 11-20 yrs	0.820 (-.71)	1.238 (.34)	0.820 (-.48)	0.899 (-.55)	1.411 (1.53)
All NESB – Other	0.153*** (-7.44)	0.111*** (-3.73)	0.152*** (-5.12)	0.563*** (-2.85)	0.446*** (-3.18)

- denotes significantly different from 1.000 at the 10% level, ** at the 5% level and *** at the 1% level.

Note: in no case are the YSM terms jointly significantly different from zero, implying that the incidence of each health behavior do not change significantly with additional years in Canada.

Table 3a: Summary of direction of effect for other explanatory variables: Men

	Weekly drinker	Binge drank (5+ drinks in one sitting) last month	Daily smoker	Vigorous physical activity last month	Usually eats 5+ fruit/veg per day
Age		-	+	-	-
Education					
Less than high school	-		+	-	-
Post-secondary-no degree			-		+
Bachelor's degree	+	-	-	+	+
Higher degree	+	-	-	+	+
Marital Status and kids					
Married	+	-	-	-	
WSD	+	+	+		-
Kids aged 5 or less	-	-		-	
Kids aged 12 or less	-	-	-	+	+
Language at home					
French	+			+	+
Other Language	-	-			+
Assets					
Received dividend income	+		-	+	+
Home ownership					
Population size of residence					
CMA	+		-	+	
Rural				-	

“+” indicates that the specific control variable significantly increases the incidence of the particular activity (at the 5% level), while “-” indicates that the variable significantly decreases the incidence of the particular activity (at the 5% level).

Note: the default group against which the effects of these variables are measured is as follows: a high school educated person who is single, no kids under age 13, speaks English at home, lives in a rental house in an urban area outside of a CMA.

Table 3b: Summary of direction of effect for other explanatory variables: Women

	Weekly drinker	Binge drank (5+ drinks in one sitting) last month	Daily smoker	Vigorous physical activity last month	Usually eats 5+ fruit/veg per day
Age	+		+	-	-
Education					
Less than high school	-		+	-	-
Post-secondary-no degree	+	-	-	+	+
Bachelor's degree	+	-	-	+	+
Higher degree	+	-	-	+	+
Marital Status and kids					
Married		-	-	-	+
WSD			+	-	
Kids aged 5 or less	-	-		-	+
Kids aged 12 or less	-	-	-	+	+
Language at home					
French	+	-	-	+	+
Other Language	-	-	-	+	+
Assets					
Received dividend income	+	-	-	+	
Home ownership					
Population size of residence					
CMA	+		-	+	
Rural	-	-		-	

“+” indicates that the specific control variable significantly increases the incidence of the particular activity (at the 5% level), while “-” indicates that the variable significantly decreases the incidence of the particular activity (at the 5% level).

Note: the default group against which the effects of these variables are measured is as follows: a high school educated person who is single, no kids under age 13, speaks English at home, lives in a rental house in an urban area outside of a CMA.

Table 4a: Log-odds ratios by Canadian Region – Men (Ontario base group)

	Weekly drinker	Binge drank (5+ drinks in one sitting) last month	Daily smoker	Vigorous physical activity last month	Usually eats 5+ fruit/veg per day
Atlantic Canada	0.648 ^{***}	1.314 ^{***}	1.030	0.747 ^{***}	0.748 ^{***}
Quebec	1.134 ^{***}	0.899 ^{***}	1.040	0.731 ^{***}	1.001
Ontario	1.000	1.000	1.000	1.000	1.000
Prairies	0.771 ^{***}	1.071 [*]	0.892 ^{***}	0.802 ^{***}	0.696 ^{***}
Alberta	0.880 ^{***}	0.978	0.981	0.983	0.776 ^{***}
BC	0.954	0.957	0.793 ^{***}	1.324 ^{***}	1.115 ^{***}

* denotes significantly different from 1.000 at the 10% level, ** at the 5% level and *** at the 1% level.

Table 4b: Log-odds statistics by Canadian Region – Women (Ontario base group)

	Weekly drinker	Binge drank (5+ drinks in one sitting) last month	Daily smoker	Vigorous physical activity last month	Usually eats 5+ fruit/veg per day
Atlantic Canada	0.562 ^{***}	1.152 ^{***}	0.986	0.765 ^{***}	0.723 ^{***}
Quebec	1.158 ^{***}	0.920	1.282 ^{***}	0.716 ^{***}	1.085 ^{**}
Ontario	1.000	1.000	1.000	1.000	1.000
Prairies	0.794 ^{***}	1.185 ^{***}	1.006	0.951	0.806 ^{***}
Alberta	0.814 ^{***}	1.005	1.003	1.121 ^{***}	0.915 ^{**}
BC	1.184 ^{***}	1.092	0.724 ^{***}	1.255 ^{***}	1.116 ^{***}

* denotes significantly different from 1.000 at the 10% level, ** at the 5% level and *** at the 1% level.

Table 5: Log-odds results for the effect of province-specific white Canadian health behaviors on the health behaviors of immigrants and visible minority groups

	Weekly drinker	Binge drank (5+ drinks in one sitting) last month	Daily smoker	Vigorous physical activity last month	Usually eats 5+ fruit/veg per day
Men					
Cdn-born visible minority	1.032** (1.98)	1.028** (2.32)			
ESB		1.028** (2.32)		1.034** (2.25)	
NESB – Europe		1.028** (2.32)	0.952* (-1.81)	1.034** (2.25)	
NESB - Other	1.032** (1.98)	1.028** (2.32)			
Women					
Cdn-born visible minority		1.100*** (3.45)			
ESB					
NESB – Europe	1.037** (2.22)	1.100*** (3.45)			
NESB - Other	1.037** (2.22)	1.100*** (3.45)			

* denotes significantly different from 1.000 at the 10% level, ** at the 5% level and *** at the 1% level.

Note: reported log-odds ratios are restricted to be constant across certain groups because such restrictions could not be rejected against more flexible alternative specifications that allowed for separate effects for each minority and immigrant group.

Appendix

The YSM results reported in the paper are obtained from regressions that also include a detailed set of immigrant controls for region of birth and year of arrival in Canada. To give some sense of the importance of these factors, Tables A1 and A2 report log-odds ratios for the region of birth controls. In each case, the estimate is relative to the base region of origin for each broad immigrant group – particular ESB regions are measured against the default group of immigrants from the UK, NESB-Europe regions are measured against immigrants from Western Europe, and NESB-other regions are measured against immigrants from East Asia (mainly China). In general, the tables show that within these broad immigrant groups, there is still significant variation by region of origin. For example, immigrants from the Americas (excluding the US) are more likely to drink, to be active, and to consume fruit/vegetables, but are less likely to smoke when compared to East Asians. Immigrants from Southeast Asia and Africa are less likely to smoke but are more likely to be active and to consume fruit/vegetables. Americans are less likely than British immigrants to drink and are also more likely to be active and to consume fruit/vegetables.¹⁴

¹⁴ Though not reported here, the results show the presence of significant arrival cohort effects for immigrant men in terms of smoking incidence, with more recent arrivals more likely to smoke, *ceteris paribus*. In contrast, cohort effects for immigrant women show that it is the earlier arrivals that are more likely to smoke. There are also cohort effects for activity, with earlier arrivals of both genders significantly more likely to be physically active than more recent arrivals.

Table A1: Log-odds ratios for region of birth: Immigrant Men

	Weekly drinker	Binge drank (5+ drinks in one sitting) last month	Daily smoker	Vigorous physical activity last month	Usually eats 5+ fruit/veg per day
ESB					
UK and Ireland	1.000	1.000	1.000	1.000	1.000
USA	0.667***	0.712**	0.940	1.057	1.691***
Australia/NZ	1.282	1.281	0.837	2.697***	2.525***
NESB – Europe					
Western Europe	1.000	1.000	1.000	1.000	1.000
Eastern Europe	0.737**	0.736	0.946	0.988	1.147
Southern Europe	1.035	0.509***	0.877	0.799	1.218
Russia	0.451***	0.639	0.899	1.642*	2.411***
NESB - Other					
East Asia	1.000	1.000	1.000	1.000	1.000
Middle East/Western Asia	1.483**	1.446	1.139	1.091	1.535***
South-east Asia	1.015	1.397*	1.011	1.325**	1.439**
Southern Asia	1.163	0.825	0.343***	1.162	1.789***
Africa	1.028	0.769	0.540**	1.394**	1.866***
Central America/Caribbean	1.933***	1.611***	0.507***	2.168***	2.006***
South America	2.334***	2.279***	0.589**	1.937***	2.115***

* denotes significantly different from 1.000 at the 10% level, ** at the 5% level and *** at the 1% level.

Note: Log-odds are relative to the relevant base group region of origin indicated; thus, log-odds ratios that are significantly different from zero indicate that there are significant differences in the incidence of health behaviors within the broad region of origin (ESB, NESB-Europe, and NESB-other)

Table A2: Log-odds ratios for region of birth: Immigrant Women

	Weekly drinker	Binge drank (5+ drinks in one sitting) last month	Daily smoker	Vigorous physical activity last month	Usually eats 5+ fruit/veg per day
ESB					
UK and Ireland	1.000	1.000	1.000	1.000	1.000
USA	0.649***	0.611**	1.076	0.959	1.025
Australia/NZ	0.946	0.648	2.252	1.595	1.497
NESB - Europe					
Western Europe	1.000	1.000	1.000	1.000	1.000
Eastern Europe	0.537***	0.565*	1.103	0.896	1.245
Southern Europe	0.656***	0.319***	0.411***	0.636***	0.961
Russia	0.615*	0.095***	0.269***	0.744	1.240
NESB - Other					
East Asia	1.000	1.000	1.000	1.000	1.000
Middle East/Western Asia	2.127***	2.739*	3.652***	0.983	1.643***
South-east Asia	0.935	1.226	0.965	0.941	1.397***
Southern Asia	0.735	0.319**	0.432**	0.570***	1.368*
Africa	0.883	0.785	1.044	1.269	1.265
Central America/Caribbean	1.424**	0.943	0.450	1.170	1.416***
South America	2.263***	1.367	1.484	1.216	1.956***

* denotes significantly different from 1.000 at the 10% level, ** at the 5% level and *** at the 1% level.

Note: Log-odds are relative to the relevant base group region of origin indicated; thus, log-odds ratios that are significantly different from zero indicate that there are significant differences in the incidence of health behaviors within the broad region of origin (ESB, NESB-Europe, and NESB-other)

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