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The deterioration of health status among immigrants to Canada

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A growing body of literature suggests that immigrants to Canada experience deterioration in their health status after settling in the country. While selfselection processes and Canadian immigration policy ensure that, at the time of arrival, immigrants are healthier than the Canadian-born population, this health advantage does not persist over time. This study uses new data from the Longitudinal Survey of Immigrants to Canada (N = 7720) to examine how health transitions vary among immigrants. Logistic regression analyses indicate that visible minorities and immigrants who experienced discrimination or unfair treatment are most likely to experience a decline in self-reported health status. The results also confirm a clear inverse socioeconomic gradient with respect to increasing levels of feelings of sadness, depression and loneliness. These findings reflect important dimensions driving population health patterns in Canada, a country with a highly lauded health care system based on the principles of universality and comprehensiveness. Our findings suggest that discrimination and inequality partly drive the health transitions of immigrants. These factors, which largely operate outside of the formal health care system, need to be understood and addressed if health inequities are to be reduced.

Keywords: immigration; visible minority; discrimination; inequality; health

Introduction

The health of immigrants at the time of arrival is better than that of the Canadianborn population (Pérez 2002, Beiser 2005), due partly to a self-selection process and Canadian immigration policies (Laroche 2000, Oxman-Martinez *et al.* 2000, Hyman 2004). However, after settling in Canada, the health status of immigrants deteriorates. Studies have shown that immigration to Canada is associated with unhealthy levels of weight gain (McDonald and Kennedy 2005), increased likelihood of developing some chronic conditions (Pérez 2002) and increased rates of depression (Ali *et al.* 2004).

It is surprising that the health status of immigrants deteriorates after arrival to Canada in particular, a country with an advanced health care system based on principles of universality (all citizens and permanent residents are entitled to health coverage) and comprehensiveness (the system covers all 'medically necessary' services). Indeed, the health transition of immigrants may be a key signal of the importance of the social determinants of health, or factors outside of the formal

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health care system that influence patterns of morbidity and mortality throughout the lifecourse (Raphael 2004, Marmot and Wilkinson 2006). A better understanding of the social patterning behind the health transitions of immigrants would offer clues regarding how the social determinants of health operate in Canada.

Findings from cross-sectional studies

The mechanisms underlying the health transitions of immigrants are poorly understood, and little is known about the socioeconomic patterning of these changes. Indeed, we currently know little of the actual health transitions of individual immigrants; most of the existing literature has relied on cross-sectional data and is based on comparisons of recent versus long-term immigrants. Such is the case with studies analysing data from the Canadian Community Health Survey (CCHS). The CCHS began in 2000/2001 and is repeated every two years with a sample of approximately 130,000 people. Researchers have used the CCHS to compare the health status of immigrants and the Canadian-born population and have documented the so-called 'healthy immigrant' effect, wherein the health status of immigrants is initially better than that of the native-born population, but over time, this advantage is lost (Ali *et al.* 2004, Hyman 2004, Beiser 2005). Importantly, CCHS-based studies have also begun to identify exceptions – situations where the 'healthy immigrant' effect is not present. This is to be expected; there is tremendous heterogeneity among immigrants to Canada, and their experiences in the country do differ.

These limitations not withstanding, cross-sectional studies using CCHS data have yielded informative results. For example, Ali's (2002) analysis of the CCHS suggests that immigrants have lower rates of depression and alcohol dependence than the Canadian-born population. Consistent with the notion of a health transition of immigrants, the advantage diminishes as length of time residing in Canada increases. Similarly, Pérez (2002) observed a pattern of initial advantage that is lost over time in terms of chronic conditions in general, and heart disease (among men) and cancer (among women) in particular. However, no differences were observed with respect to diabetes or high-blood pressure, a finding that suggests that not all health conditions will reflect transition effects. McDonald and Kennedy (2004) pooled cross-sectional data from the CCHS and the National Population Health Survey (NPHS, the predecessor to the CCHS) in an analysis of health status and health service use. Using self-reported health status and the presence of chronic conditions as outcome measures, their study supports the notion of the healthy immigrant effect, with an initial advantage for immigrants that deteriorates with time in Canada.

Several studies have used the CCHS to compare the health of immigrants and the Canadian-born population in mid to later life. Newbold and Filice (2006) used the 2000/2001 CCHS to examine a variety of health measures (self-assessed health status, the Health Utilities Index, and presence and number of chronic conditions) for people aged 55 and older. They found no systematic differences between native-born and foreign-born Canadians in this age group, even after adjusting for demographic, socioeconomic and lifestyle factors. Gee *et al.* (2004) also analysed data from the 2000/2001 CCHS but focused on respondents aged 45 and older. Using an analytical framework similar to that used by Newbold and Filice (2006), they observed a healthy immigrant effect among mid-life immigrants (those aged 45–65), with an

initial advantage that is lost after 10 years in Canada. Among respondents aged 65 and over, recent immigrants appeared to have worse health than the native-born population, but socioeconomic and health behaviour factors accounted for much of that difference. Together, these studies suggest that health transitions may be of particular relevance to working-age immigrants.

These studies highlight the complexity underlying the health transitions of immigrants to Canada, with findings that are highly sensitive to operationalisation strategies (e.g., the health indicator that is used as the outcome measure, or the age groups studied). With some exceptions, the CCHS-based literature indicates substantial differences between the health of immigrants and the Canadian-born population. However, due to their reliance on cross-sectional data, these studies do not provide an analysis of the actual health transitions of immigrants. Indeed, whilst CCHS-based studies enable comparison of new versus long-term immigrants, the interpretation of observed differences may confound cohort and time effects (Beiser 2005). Immigration patterns have changed substantially in the recent history of the country, and it is difficult to infer a pattern by comparing the health status of recent immigrants with the health of immigrants who have been in the country for 20 or more years. Only with longitudinal data can actual health transitions be examined.

Findings from longitudinal studies

A few studies have been carried out with longitudinal data from the NPHS. Newbold (2005a,b) utilised data from NPHS waves 1994/1995–2000/2001 and found mixed or no support for a healthy immigrant effect using self-reported health status as the operational definition of health. In contrast, using proportional hazard modelling, Newbold (2006) found strong support for a healthy immigrant effect with chronic conditions. Arrival cohort was found to be a significant factor with more recent cohorts being less likely to have a chronic condition. Using similar methods and datasets as Newbold, Ng et al. (2005) found that immigrant health converges with that of native-born Canadians over time (a period less than 10 years). Ng's findings also begin to tease apart the heterogeneity of immigrant's experiences; immigrants of non-European origins were most likely to have a significant decrease in self-assessed health status. Deterioration of health status was also closely associated with low education and low household income. Longitudinal analyses such as these offer methodological properties particularly well-suited for the study of health transitions. However, the NPHS was not designed with an explicit focus on the immigrant population, and does not offer any data on the actual lived experience of immigrants.

The release of data from the Longitudinal Survey of Immigrants to Canada (LSIC) offers a unique opportunity to examine the social patterning of the health transitions of immigrants. We use LSIC data to examine three inter-related research questions: (1) To what extent do immigrants experience deterioration in their self-reported overall health and self-reported mental health? (2) What role do visible minority status and the experience of discrimination or unfair treatment play in negative transitions? and (3) Are health transitions patterned by socioeconomic or demographic factors? These questions build from the large body of literature on the healthy immigrant effect and from a number of recently published studies which have examined the pathogenic effects of racial discrimination in Canada (Noh *et al.* 2007) and the USA (Gee *et al.* 2006, Viruell-Fuentes 2007, Burgess *et al.* 2008). These

studies indicate that self-perceived discrimination is strongly related to poor health outcomes. Immigrant status adds further complexity to this issue by raising questions of cultural integration as well as social inequality.

Methods

The LSIC is a new longitudinal study recently completed by Statistics Canada and Citizenship and Immigration Canada (Chui 2003, Statistics Canada 2007). It has been used to examine post-migration settlement patterns (Hyndman *et al.* 2006, Newbold 2007), and is expected to inform policy makers and government agencies on a range of issues, including how people adapt to life in Canada. From the perspective of public health, LSIC data offer us the ability to analyse how the health of immigrants changes over time, and allows us to examine how health transitions are influenced by socioeconomic and social integration factors. This could potentially hold important implications for the medical sociological literature on health inequalities.

Over 12,000 immigrants took part in the LSIC (amounting to a 60% response rate based on the total number of eligible respondents). They represent a target population of approximately 250,000 persons aged 15 years or older who were admitted to Canada during the period 1 October 2000 and 30 September 2001. Data collection were carried out primarily via face-to-face interviews, with interviews conducted via the telephone if a face-to-face meeting could not be arranged. The LSIC included three waves of data collection: at six months (Wave 1), two years (Wave 2) and four years (Wave 3) after landing in Canada. Response rates for the follow-up waves were satisfactory, with 9320 Wave 1 respondents completing Wave 2 (78% response rate) and 7720 respondents completing all three waves. Whilst such attrition rates are common in longitudinal surveys (Magnusson and Bergman 1990), this raises the question of self-selection and possible bias. Schellenberg and Maheux (2007) suggest that despite the loss of some respondents during the course of the study, the LSIC remains representative of the original sample, particularly in weighted analyses (since the longitudinal weight accounts for non-reponse characteristics).

The survey was conducted in one of 15 languages, as chosen by the respondent. Along with data on health status and access to health care, the LSIC contains information on socioeconomic status, housing, language skills, values and social attitudes, and social capital (including membership in community organisations). Additional details on the survey's methodology and content are available elsewhere (Chui 2003, Newbold 2007, Statistics Canada 2007).

Dependent variables

Two series of logistic regression analysis are presented in this paper. The first reports on changes in overall self-reported health status and the second reports on changes in self-reported mental health. More specifically, self-reported health status was ascertained with the question 'In general, would you say your health is ... excellent, very good, good, fair, poor)'. This question is commonly used in medical sociology and social epidemiology, and has been found to be highly predictive of actual health status, including subsequent morbidity (Kennedy *et al.* 1998) and mortality (Idler and Benyamini 1997, Blakely *et al.* 2002). Although some researchers have raised questions regarding the validity (De Maio 2007) and reliability (Crossley and Kennedy 2002) of self-reported health status measures, they remain an important and useful part of the methodological toolbox for inequality researchers. Self-reported health status was measured in all three waves of the LSIC. The present analysis examines changes in response to this question between Waves 1 and 3. Our primary focus is on the deterioration of health status; as such, we derived a dichotomous variable with deterioration (for example, changing from excellent to good, or from very good to fair) being coded 1 and improvements or no change to health being coded 0. This allows us to contrast respondents who experienced some degree of worsening health status with those who did not.

Mental health data were collected with the question: 'Have you experienced any emotional problems? By emotional problems, I mean persistent feelings of sadness, depression, loneliness, etc.' and recorded as a yes or no response. In Wave 1, the question referred to the six months between data collection and the respondents' arrival in Canada. In Wave 2, the question referred to the period since the Wave 1 interview (approximately 18 months), and in Wave 3, the question referred to the preceding 12 months. From these data, we derived a dichotomous variable, where respondents who experienced a mental health problem in Wave 3 but had not experienced one in Wave 1 being coded 1 and respondents whose mental health remained constant being coded 0.

Independent variables

Along with standard demographic variables (sex, age and marital status), our analyses use information on visible minority status, the experience of discrimination in Canada and socioeconomic status. The definition of 'visible minority' status in Canada is controversial; indeed, the operationalisation of this complex and debated concept is fraught with methodological pitfalls (Mentzer 2002). The designation includes a wide range of heterogeneous groups; it aggregates groups whose experiences in Canada have historically differed and who currently hold different positions in the economic system, as gauged by average incomes (Mentzer 2002). The designation also confounds race, ethnicity and nationality.

The Canadian government defines visible minorities as 'persons, other than Aboriginal peoples, who are non-Caucasian in race or non-white in colour ... the visible minority population includes the following groups: Chinese, South Asian, Black, Filipino, Latin American, Southeast Asian, Arab, West Asian, Japanese, Korean and Pacific Islander' (Statistics Canada 2004). In the LSIC, visible minority status was determined through two questions replicated from the 2001 census. The first question asked respondents: 'To which ethnic or cultural groups do you belong?' This was an open-ended response, and interviewers were instructed to clarify that the question referred to the person's ethnic or cultural identity, or that of their ancestors, and not their citizenship. The second question asked respondents: 'Are you ...' and interviewers presented respondents with a response card with the following categories: (1) White; (2) Chinese; (3) South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.); (4) Black; (5) Filipino; (6) Latin American; (7) Southeast Asian (e.g., Cambodian, Indonesian, Laotian, Vietnamese, etc.); (8) Arab; (9) West Asian (e.g., Afghan, Iranian, etc.); (10) Japanese; (11) Korean; and (12) Other. This question is based on categories from the *Employment Equity Act* of 1995, which is enforced by the Canadian Human Rights Commission (Statistics Canada 2004).

The two questions – the first an open-ended response and the second a closeended response - were used by Statistics Canada to derive visible minority status. For this, the LSIC used the same coding procedure as the 2001 census, which attempted to overcome the important methodological difficulties associated with this complex concept by mixing information from the open and close-ended questions. For example, respondents who indicated 'Latin American' and 'White', or 'Arab' and 'White', were not counted as visible minorities. However, respondents who indicated 'Latin American', 'Arab' or 'West Asian' and a non-European open-ended response were included in the visible minority population. For example, respondents who indicated 'Latin American' and 'Peruvian' are counted as visible minorities. The advantage of this system is that it is flexible, enabling a variety of different analytic approaches. However, it is doubtful that any further refinements to question wording or data coding can overcome the ethnocentric basis of the underlying concept; visible minority status is clearly a difficult concept to define at an abstract or empirical level. Canadian researchers working on issues of health inequities – inequalities that are avoidable, unnecessary and unfair (Whitehead 1992) - are in the difficult position of having to rely on this operationalisation for data on what is a very important element of social division in the country.

Along with visible minority status, we incorporated a measure of discrimination as an independent variable. These data came from the third wave of the LSIC, which asked respondents: 'Have you experienced discrimination or been treated unfairly by others because of your ethnicity, culture, race or skin colour, language or accent, or religion?' Answers were recorded as yes or no.

Our analyses utilise two measures of socioeconomic status. The first measure is derived from the following Wave 1 question: 'How would you describe your financial situation? Would you say that you have more than enough money to meet your basic needs, that you have just enough, or not enough?' This measure is an important reflection of the financial situation of immigrants shortly after their arrival in the country, when their socioeconomic status is strongly shaped by the savings, which they bring with them. The second measure is derived from respondents' household income in Wave 3, with the income distribution analysed in quartiles. This measure reflects an immigrant family's success in obtaining and maintaining an income source. Both of the socioeconomic measures are important in our modelling; the first measure acts as a control for initial socioeconomic status and the second measure serves as an indicator of socioeconomic standing after settling in Canada.

The results are interpreted with odds ratios and 95% confidence intervals (Liao 1994). Logistic modelling began with a series of unadjusted models, with additional controls introduced in Models 2–4. The reference person for the fully adjusted model is a single (never married) white man aged 25–34 who reported having more than enough money in Wave 1, lived in a household in the upper income quintile in Wave 3, and who did not experience discrimination or unfair treatment during the course of the study. All of the models used bootstrap weights developed by Statistics Canada (Statistics Canada 2007). Analyses were conducted using Stata 10 at Statistics Canada's British Columbia Inter-University Research Data Centre.

Results

Table 1 presents descriptive statistics on the demographic and socioeconomic characteristics of LSIC participants. Following Statistics Canada policy, we have rounded sample sizes to the nearest 10th and present weighted results. The characteristics of the sample reflect contemporary Canadian immigration patterns – the majority of immigrants come from Asia (63.9%), followed by Europe (15.3%) and Africa (9.2%). A smaller number of immigrants originate from the Middle East, the Caribbean or Latin America. A large proportion (79.6%) of the sample is characterised as a visible minority. More than one-third (34.4%) of respondents indicated at Wave 1 that they did not have enough money to meet their basic needs. Only 9% indicated having more than enough money. More than a quarter of respondents indicated having experienced discrimination or unfair treatment at Waves 2 or 3.

Respondents experienced dramatic deterioration of health status. As shown in Table 2, whilst 43.0% of immigrants initially reported their health status as 'excellent' in Wave 1, this figure fell to 30.2% in Wave 2 and 23.0% in Wave 3. The percentage of respondents in the 'poor' and 'fair' categories increased. A deterioration of health status was also observed with respect to emotional/mental problems. In Wave 1, only 5.1% of respondents reported persistent feelings of sadness, depression or loneliness; by Wave 2, this figure had increased to 30.0% and remained close to this level in Wave 3.

Tables 3 and 4 present the results of logistic regression analysis. Table 3 examines changes in self-reported poor health status. The unadjusted models indicate that being a visible minority is associated with an increased likelihood of experiencing a decline in health status (odds ratio (OR) = 1.30, 95% confidence interval (CI) = 1.16-1.46). Having experienced discrimination is also associated with a decline in health status (OR = 1.19, 95% CI = 1.07-1.33). Socioeconomic indicators, either from Wave 1 (self-assessed financial situation) or from Wave 3 (household income quartile) are not significant predictors. Demographics show weak explanatory power, with only one age group (45–54 years of age) and one marital status (being married) having significant effects. Models 2–4 examine the robustness of the effects for being a visible minority and having experienced discrimination. Both factors hold statistical significance throughout the models, and their coefficients remain consistent.

The models in Table 4 examine changes in mental health. As was the case with general health status, the unadjusted models indicate that being a visible minority and experiencing discrimination are both strong predictors of deterioration of mental health (OR = 1.21, 95% CI = 1.05–1.38 and OR = 2.34, 95% CI = 2.08–2.64, respectively). Unlike the models in Table 3, the models in Table 4 indicate the presence of social gradients in terms of socioeconomic status, with income insecurity at Wave 1 and low income in Wave 3 both showing significant effects. Indeed, both socioeconomic indicators display gradient-like patterns. The likelihood of a deterioration in self-reported mental health status was highest among immigrants in the lowest income quartile (OR = 2.03, 95% CI = 1.72–2.39), followed by respondents in the medium low (OR = 1.53, 95% CI = 1.30–1.81) and medium high (OR = 1.30, 95% CI = 1.10–1.54) quartiles, in contrast to immigrants in the highest income quartile. In contrast to respondents who indicated having 'more than enough money' at the beginning of the study, those who indicated not having enough

	Ν	Weighted (%)
Demographics		
Sex		
Men	3820	49.5
Women	3900	50.5
Age		
15–24	1350	16.4
25–34	2880	39.7
35–44	2150	26.5
45–54	780	9.9
55–64	360	4.4
65 +	200	3.2
Marital status		
Married	5740	75.3
Common-law	80	0.9
Widow/er	160	2.1
Separated/divorced	140	1.7
Single	1600	20.0
Visible minority		
Yes	5870	79.6
No	1840	20.4
Region of birth		
North America	80	1.1
Europe	1460	15.3
Asia	4550	63.9
Middle East	300	3.9
Africa	790	9.2
Caribbean	210	3.1
Latin America	250	3.0
Australia and Oceania	60	0.5
Socioeconomic status		
Self-assessed financial situation at Wave 1		
More then enough money	670	9.0
Just enough money	4240	56.6
Not enough money	2750	34.4
Life in Canada		
Experience of discrimination or unfair treatment		
(Wave 2) Yes	2070	28.6
(Wave 3) Yes	2040	27.8
Total N	7720	

Table 1. Description of the sample (N rounded to the nearest 10th, and weighted percentage).

money (OR = 1.80, 95% CI = 1.44–2.26) and just enough money (OR = 1.43, 95% CI = 1.15–1.77) experienced a greater risk of reporting a new mental health problem in Wave 3. Women are particularly more likely to have experienced a deterioration

	Wave 1	Wave 2	Wave 3
'In general, would you say your health is'			
• Excellent	43.0	30.2	23.0
• Very good	35.4	40.1	37.2
• Good	18.6	24.3	31.8
• Fair	2.4	4.5	6.7
• Poor	0.6	0.9	1.4
'Have you experienced any emotional problems? By emotional problems, I mean persistent feelings of sadness, depression, loneliness'			
YesNo	5.1 94.9	30.0 70.0	28.6 71.4

Table 2. Health transitions of immigrants to Canada (data refer to weighted percentages).

(OR = 1.53, 95% CI = 1.37-1.71). Other demographic variables do not have much explanatory power at the unadjusted stage. In this case, the adjusted models explain away the predictive power of being a visible minority (see Models 2–4, Table 4). The experience of discrimination, socioeconomic status and sex hold their statistical significance throughout the models and their coefficients are stable.

Discussion

Our findings support the notion that the health of immigrants to Canada deteriorates after arrival in the country and highlight the significant social patterning that exists within these health transitions. Participants in this study reported a substantial worsening of self-reported health status, with the percentage of respondents indicating that their health was 'excellent' declining from 43.0% (Wave 1) to 30.2% (Wave 2) to 23.0% (Wave 3). A similar deterioration was observed with respect to emotional/mental problems, with only 5.1% of respondents reporting persistent feelings of sadness, depression or loneliness in Wave 1, but 30.0 and 28.6% reporting these feelings in Waves 2 and 3, respectively. Our logistic regression analyses indicate that visible minorities and immigrants who experienced discrimination or unfair treatment are most likely to experience a decline in selfreported health status and that a clear inverse socioeconomic gradient exists with respect to increasing levels of self-reported mental health problems. Women are most likely to experience an increase in persistent feelings of sadness, depression and loneliness as length of time residing in Canada increases. Importantly, visible minority status remains statistically significant as a predictor of deterioration in selfrated health after controlling for experience of discrimination as well as socioeconomic and demographic factors.

These results contribute to the existing knowledge base on the health transitions of immigrants to Canada. Until now, the literature on the healthy immigrant effect has been dominated by studies analysing cross-sectional datasets. Whilst such studies are informative, interpretation of their findings is problematic and can confound time and cohort effects (Beiser 2005). Only with longitudinal analyses like this one,

	M (una	odel 1 .djusted)	М	odel 2	М	odel 3	Ν	lodel 4
-	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Visible minority								
Yes	1.30	(1.16-1.46)	1.28	(1.14 - 1.44)	1.26	(1.12 - 1.43)	1.25	(1.10 - 1.41)
No	1.00	-	1.00	-	1.00	-	1.00	-
Experienced discrimination (Wave 3)								
No	1.00	_	1.00	_	1.00	_	1.00	_
Yes	1.19	(1.07 - 1.33)	1.17	(1.05 - 1.31)	1.17	(1.04 - 1.31)	1.17	(1.04 - 1.31)
Socioeconomic status		. ,				. ,		. ,
Self-assessed financial situation (Wave 1)								
More then enough money	1.00	_			1.00	_	1.00	_
Just enough money	1.07	(0.89 - 1.28)			1.04	(0.86 - 1.25)	1.04	(0.86 - 1.25)
Not enough money	1.05	(0.88 - 1.26)			1.01	(0.84–1.23)	1.01	(0.83–1.22)
Household income (quartile) at Wave 3								
High	1.00	_			1.00	_	1.00	_
Medium high	1.00	(0.87 - 1.16)			0.97	(0.84 - 1.13)	0.98	(0.85 - 1.14)
Medium low	1.02	(0.88 - 1.17)			0.97	(0.84 - 1.12)	0.97	(0.84 - 1.13)
Low	1.10	(0.95 - 1.28)			1.06	(0.91 - 1.23)	1.08	(0.93 - 1.26)
Demographics								
Sex								
Men	1.00	_					1.00	_
Women	1.09	(0.99–1.20)					1.11	(1.00-1.22)
Age								
15–24	0.90	(0.78 - 1.04)					1.00	(0.84 - 1.19)
25–34	1.00	_					1.00	
35–44	1.08	(0.96–1.21)					1.06	(0.93–1.20)

Table 3. Predictors of deterioration in general self-reported health.

Table 3 (Continued)								
	M (una	Model 1 (unadjusted)		Model 2		odel 3	Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
45–54	1.24	(1.04–1.47)					1.23	(1.03–1.47)
55–64	0.99	(0.78 - 1.26)					1.01	(0.78 - 1.30)
65+	1.06	(0.78 - 1.44)					1.25	(0.87 - 1.80)
Marital status								
Married	1.31	(1.16–1.47)					1.27	(1.08 - 1.49)
Common-law	0.78	(0.46 - 1.31)					0.89	(0.51 - 1.53)
Widow/er	0.89	(0.62 - 1.29)					0.76	(0.48 - 1.21)
Separated/divorced	0.96	(0.64 - 1.43)					0.89	(0.58–1.36)
Single	1.00	_					1.00	-
N	753	8–7716	7	708	7	490		7489

Table 4. Predictors of deterioration in self-reported mental head	Table 4.	eterioration in self-reported mer	tal health.
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	Mo (una	odel 1 djusted)	N	Iodel 2	Ν	Iodel 3	1	Model 4
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Visible minority								
Yes	1.21	(1.05 - 1.38)	1.10	(0.96 - 1.26)	1.00	(0.87 - 1.15)	0.98	(0.85 - 1.13)
No	1.00	_	1.00	_	1.00	_	1.00	_
Experienced discrimination (Wave 3)								
No	1.00	_	1.00	_	1.00	_	1.00	_
Yes	2.34	(2.08 - 2.64)	2.33	(2.07–2.63)	2.29	(2.02–2.59)	2.33	(2.05-2.64)
Socioeconomic status								
Self-assessed financial situation								
More then enough money	1.00	_			1.00	_	1.00	_
Just enough money	1.43	(1.15–1.77)			1.28	(1.02 - 1.61)	1.29	(1.02 - 1.62)
Not enough money	1.80	(1.44–2.26)			1.45	(1.14–1.83)	1.49	(1.18–1.88)
Household income (quartile) at Wave 3								
High	1.00	_			1.00	_	1.00	_
Medium high	1.30	(1.10–1.54)			1.21	(1.02 - 1.44)	1.22	(1.02 - 1.45)
Medium low	1.53	(1.30–1.81)			1.40	(1.18–1.66)	1.40	(1.17 - 1.67)
Low	2.03	(1.72–2.39)			1.81	(1.52-2.14)	1.83	(1.54 - 2.18)
Demographics								
Sex								
Men	1.00	_					1.00	_
Women	1.53	(1.37–1.71)					1.62	(1.44–1.82)
Age								
15–24	0.86	(0.73 - 1.01)					0.94	(0.77 - 1.15)
25–34	1.00	_					1.00	_
35–44	0.90	(0.79 - 1.04)					0.87	(0.75 - 1.00)
45–54	1.01	(0.84 - 1.22)					1.05	(0.86 - 1.29)

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Table 4 (Continued)

	Mc (unac	Model 1 (unadjusted)		Model 2		Model 3		Model 4
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
55–64	0.55	(0.41-0.76)					0.65	(0.46–0.91)
65 +	0.69	(0.47–1.00)					0.86	(0.54–1.35)
Marital status								
Married	1.14	(0.99 - 1.30)					1.15	(0.96 - 1.38)
Common-law	0.78	(0.43 - 1.42)					0.98	(0.54 - 1.81)
Widow/er	0.78	(0.50 - 1.21)					0.92	(0.53 - 1.59)
Separated/divorced	1.04	(0.67 - 1.63)					0.89	(0.54 - 1.45)
Single	1.00	-					1.00	-
N	7535	5–7712	7	704	,	7487		7486

we can actually analyse the health transition of individual immigrants. LSIC data give us a detailed picture of the lived experience of individual immigrants to Canada. This is invaluable to our understanding of how Canadian society affects the health status of its newest members. At the same time, our results shed light into factors that may also influence the health of immigrants in other countries. Indeed, our findings support recently published results from a qualitative study in the USA that point towards discrimination as an important pathway through which the health of immigrants and their descendants erodes (Viruell-Fuentes 2007).

There are three important limitations to our study. The first is our reliance on selfreported measures of health. Whilst self-reported measures are commonly used in the literature on health inequalities, we know little of how immigrants' expectations of their health changes after settling in Canada. It could be that part of the adaptation process involves developing new thresholds for what constitutes health and illness; this would imply that instead of deterioration in health, our main results may be reflective of increasing expectations that may be associated with life in Canada. Indeed, the sociological literature emphasises the social nature of self-reported health status, with individuals judging their health in comparison to complex reference groups (Johansson 1991, Samson 1999). However, little is known about this phenomenon among immigrant groups. At the same time, immigrant women may be more likely than immigrant men to identify and disclose health problems. Future studies employing qualitative methods and an interpretivist epistemology may be able to ascertain the extent to which this biases self-report measures of health status in immigrant populations. A second limitation arises from our use of visible minority as an explanatory variable. Future analyses need to 'unpack' this contested term and examine differences amongst immigrant groups using other analytical concepts, perhaps via interaction terms with country of birth. However, due to the data protection regulations used by Statistics Canada, which are rightfully concerned with inadvertent disclosure of the identity of survey respondents, it may be difficult to do so (particularly if the analysis uses a regional level of analysis; in that case, sample sizes may be too small to meet the disclosure requirements of Statistics Canada). The third limitation reflects a weakness of the LSIC's methodological design: a four-year followup may not be long enough for health transitions to fully emerge. A longer follow-up period would have been preferable, but of course, such designs are much more expensive and difficult to carry out.

Overall, the LSIC offers myriad opportunities for analysis of how immigrants adapt to life in Canada and how their health changes during their first four years in the country. Future research in this area could build on the present study in various ways. A sub-national analysis could examine how health transitions vary in different parts of the country, for example, by comparing the health transitions in francophone Quebec and the rest of the country. A multilevel analysis (Diez-Roux 2002, Browne and Rasbash 2004, Goldstein 2007) could differentiate the importance of compositional effects and contextual effects. Such an analysis could be integrated into the substantial literatures on social capital (Pearce and Davey Smith 2004, Szreter and Woodcock 2004, Kim *et al.* 2006) and income inequality (Lynch *et al.* 2004, Wilkinson and Pickett 2006). Indeed, analysis of the health effects of social capital within immigrant communities may be able to contribute in important ways to disentangling the effects of bridging versus bonding social capital (Kim *et al.* 2006). Future research could also investigate not only factors associated with an

immigrant's new community, but also distress they may feel about family and life in their country of origin. Both are likely sources of chronic stress and can be expected to influence patterns of health status.

A better understanding of why the health of immigrants deteriorates after coming to Canada, along with an analysis of its underlying social patterning, will offer important indications of the forces driving population health in the country. As social determinants of health research suggests, our health is not merely produced by access to health care, but also by the social conditions in which we live (Marmot and Wilkinson 2006, Raphael *et al.* 2006). This is further supported by analyses of the LSIC that suggest the vast majority of respondents report few problems accessing health care services (Schellenberg and Maheux 2007); in other words, deterioration in health status is not necessarily produced by a lack of health care services. The results of this study attest to the roles of discrimination and inequality as drivers of health inequities. It is not enough to have a publicly funded health care system based on the principles of universality and comprehensiveness. If Canada is to be successful in maximising the health of its population and reducing avoidable, unnecessary and unfair patterns of morbidity and mortality, these root causes of illness need to be acknowledged and addressed.

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