



Canadian Studies in Population

Official Journal of the Canadian Population Society

Vol. 44, No. 1-2 (Spring/Summer) 2017

Demographic Research: Selected papers from the
Federation of Canadian Demographers 2015 Conference

Special Issue sponsored by Strategic Research and Statistics Directorate, INAC

Guest Editor Gustave Goldmann

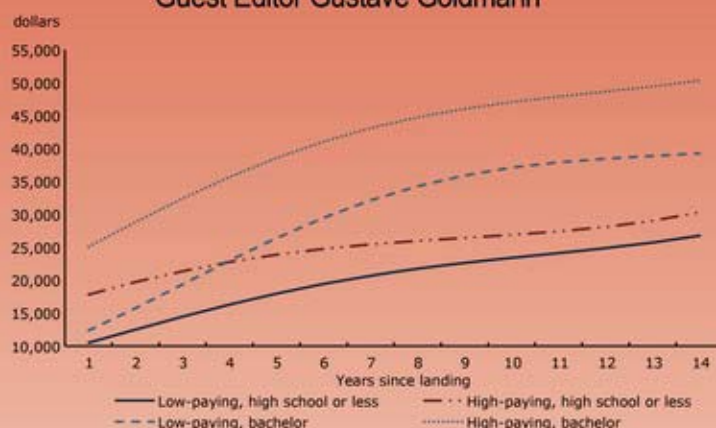


Figure 5. Estimated earnings growth pattern by educational level, men.
W. Ci and F. Hou. Immigrants' initial firm allocation and earnings growth.



A publication of the Population Research Laboratory, University of Alberta

Canadian Studies in Population

Official Journal of the
Canadian Population Society

Editor

Frank Trovato, University of Alberta

Journal Manager

Ksenia Maryniak, University of Alberta

Special Issue

**Demographic Research:
Selected papers from the Federation of
Canadian Demographers 2015 Conference**

Guest Editor

Gustave Goldmann, University of Ottawa

Vol. 44, No. 1–2 (Spring/Summer) 2017

Population Research Laboratory, University of Alberta

© 2017 by the Canadian Population Society and the Population
Research Laboratory, University of Alberta, Edmonton
All rights reserved. Published 2017

ISSN 0380-1489

Frank Trovato, Editor

Ksenia Maryniak, Journal Manager

Canadian Studies in Population (CSP) is indexed in the *Web of Science*, the largest and most comprehensive citation index available. All articles published in CSP since 2009 are indexed and abstracted in the Social Sciences Citation Index, Journal Citation Reports/Social Sciences Edition, and in Current Contents/Social and Behavioral Sciences.

CSP is hosted online by the University of Alberta Libraries at journals.library.ualberta.ca/csp, with links posted on the CPS website at www.canpopsoc.ca/publications/journal.

Canadian Studies in Population was founded by Dr. P. Krishnan, Professor Emeritus at the University of Alberta, and is published with the support of the Canadian Population Society and the Population Research Laboratory, Department of Sociology, University of Alberta.

Funding for *Canadian Studies in Population* is provided by the Social Sciences and Humanities Research Council of Canada (SSHRC).

Contents

iv–vi	Guest Editor’s Introduction <i>Gustave Goldmann</i>
1–15	Gender inequality in the family setting <i>Roderick Beanjot, Jianye Lin, and Zenaida Ravanera</i>
16–27	Non-residential fatherhood in Canada <i>Lisa Strohschein</i>
28–41	Changing BMI scores among Canadian Indigenous and non-Indigenous children, youth, and young adults: Untangling age, period, and cohort effects <i>Piotr Wilk, Alana Maltby, and Martin Cooke</i>
42–58	Immigrants’ initial firm allocation and earnings growth <i>Wen Ci and Feng Hou</i>
59–76	Individual and community-level determinants of retention of Anglophone and Francophone immigrants across Canada <i>Michael Haan, Jake Arbuckle, and Elena Prokopenko</i>
77–99	The moderating effect of sociodemographic factors on the predictive power of self-rated health for mortality in Canada <i>James Falconer and Amélie Quesnel-Vallée</i>
100	Book reviews

Guest Editor's Introduction

Demographic Research: Selected papers from the Federation of Canadian Demographers 2015 Conference

Gustave Goldmann
University of Ottawa

In 2015, the Federation of Canadian Demographers (FCD) held a conference in Ottawa on the theme “Revisiting Demographic Challenges in the 21st Century—Population Dynamics, Demographic Methods, and Public Policy.” The organizers’ intention was to revisit some of the dominant ideas expressed at an earlier FCD conference, “Demographic Challenges of the 21st Century.” Indeed, important social demographic changes evolved over the 10-year span between these two conferences: Canadian society witnessed the continuing urbanization of Canada’s Indigenous Peoples; fertility rates stayed low, at sub-replacement levels; family structures became increasingly more complex; continued ageing of the population led to an increasingly older labour force, as well as changes in health policies; changes in immigration patterns has resulted in the social fabric becoming increasingly diverse along ethnic, racial, religious, and linguistic lines; and cancellation of the long-form census in 2011 (recently reinstated for the 2016 Census) prompted researchers to explore new data sources in order to supplement available census data.

It was noted in the call for papers for the FCD 2015 Conference that although some of the challenges raised during the 2005 conference had been addressed, new challenges had since presented themselves, and a substantial number of challenges still remained to be explored. Consequently, the FCD’s Scientific Committee¹ prepared a program that reflected the demographic challenges that we faced in the 2015, and offered an excellent platform to expand demographic research in Canada.

It was agreed early in the planning process for the 2015 FCD conference that a selection of the papers would be published in two journal special issues—*Canadian Studies in Population* for the presentations given in English and *Cahiers québécois de démographie* for the presentations given in French. The six papers presented in this issue of *CSP* offer an excellent cross-section of the research presented at the conference. The themes addressed encompass the retention of immigrants across Canada; the relationship between sociodemographic factors, self-rated health and mortality; immigrant employment and earnings; measures of obesity among Canadian Indigenous and non-Indigenous children, youth, and young adults; non-residential fatherhood; and gender inequality in the family setting.

In the leading paper, Beaujot and colleagues offer an important analysis and discussion of the respective gender roles and responsibilities within a family unit.² They observe that although gender inequalities with respect to paid and unpaid work have diminished, the presence of young children still results in observable inequalities. They recognize the impact of lone parenthood on the children, and suggest that current policy must adapt to help these children to overcome the inherent disadvantages that they face due to the family structure. They propose that discussions on social policy should take into consideration the modernization of families and the concept of co-parenting.

This discussion is taken a step further in Strohschein’s article on non-residential fatherhood in Canada. Strohschein analyzed the 2012 Canadian Longitudinal and International Survey of Adults (LISA) to examine

1. The members of the scientific committee were Rosemary Bender (chair), Lisa Kaida, Thomas LeGrand, Lisa Strohschein, and Hélène Vézina.

2. This article is reprinted, with permission, from the Oxford University Press book *Social Inequality in Canada: Dimensions of Disadvantage*.

the impact of characteristics such as age, marital status, education, income, and region of residence on the likelihood of non-residential fatherhood. *Non-residential fatherhood* is a natural outcome of co-parenting, and it has become a topic of increasing interest to social scientists. Strohschein highlights some of the conceptual challenges that must be addressed when analyzing this important outcome of changing family structures. Her work demonstrates the limitations as to how far analysis can progress with the first cycle of data, and highlights the importance of working with robust longitudinal data on the subject. Importantly, her article provides directions that should be considered in the study of non-residential fatherhood. Chief among these is the need to measure the proportion of time that fathers spend in the same residence as their children.

A great deal of demographic and health research has been conducted on the growing incidence and the health consequences of obesity in the population. Wilk and his colleagues begin their article with an overview of the existing literature on the subject. Obesity has been linked to cardiovascular diseases, cancers, and diabetes, among other ailments. In fact, as proposed by Olshansky et al. (2005) in their article appearing in *New England Journal of Medicine*, rising levels of obesity may possibly lead to a decline in life-expectancy in the United States. Wilk and associates raise the prospect of the possible adverse effects of obesity among Canadian Indigenous children, youth, and young adults. They focus on important methodological issues concerning measurement of the effects of age, birth-cohort, and period on obesity. They examine repeated waves of the Canadian Community Health Survey (from 2001 to 2008) in order to conduct a hierarchical age-period-cohort analysis of the Indigenous and non-Indigenous population between the ages of 12 and 40 years. Their findings show that *overweight and obesity* remains an issue that cannot be explained by either period or birth-cohort effects for Indigenous peoples living off-reserve. They conclude that the Indigenous population is at greater risk for obesity-related co-morbidities, and also that nationwide initiatives must be undertaken to promote a healthy lifestyle for these population groups.

In another area, immigration and its role in the growth and development of Canadian society has been the subject of numerous books and articles (Beaujot 2005; Boyd and Vickers 2000; Ley and Hiebert 2001). Other studies examine the link between immigration and economic growth (Morley 2006). Ci and Hou focus more narrowly on the economic opportunities of immigrants, once they have arrived in Canada. They employ data from four administrative sources that have been linked together to form the Canadian Employer-Employee Dynamics Database, study the factors associated with initial employment of immigrants, and examine the earnings growth trajectories for these immigrants. The firms are classified into three categories: low-paying, low- to medium-paying, and high-paying. A great deal of work to develop administrative data sources for analytical purposes has been undertaken by national statistical agencies, and this article demonstrates the analytical power of these data to study demographic phenomena. The authors demonstrate that the initial employment for immigrants is a strong indicator of their longer-term earnings trajectories. Furthermore, the returns to education were significantly higher for those employed in high-paying firms.

Continuing with the theme of immigration, Haan and colleagues examine the factors that contribute to the retention of immigrants across Canada. This project is another example of the value of administrative data in analyzing demographic phenomena in Canada. The authors use the Longitudinal Immigration Database and harmonized Census data files to examine the differences between official language minority communities in Quebec and outside Quebec with respect to retention of immigrants. Language is an important demographic feature of a society, and it is a defining feature of Canadian society (Goldmann and Lachapelle 2011; Goldmann et al. 2011; Trovato 2015). Haan and colleagues combine the demographic and political importance of language by focusing their analysis on the role of official language minority communities in the retention of immigrants, using Cox proportional hazard models to analyze the risk factors associated with migration out of a province. They consider the type of community (with respect to official language designation) as one of the explanatory variables, and they distinguish between English- and French-speaking immigrants. They observe that the risk of immigrants migrating out of the province of landing diminishes with age, and that it is influenced by the immigration class under which they were admitted. They also observe that the patterns differ based on the language classification of the immigrants and on the province of settlement. Significant differences in risks of migration exist among immigrants landing in Quebec and in the rest of Canada. This work clearly demonstrates the importance of considering language in analyzing migratory flows in Canada, and also the power of administrative data in demographic analysis.

The final article in this Special Issue addresses an important methodological question in social epidemiology—the predictive power of self-rated health on mortality. Falconer and Quesnel-Vallée test the moderating effect of demographic and human capital characteristics on self-rated health to predict mortality. They examine longitudinal data from the National Population Health Survey over 9 cycles from 1994 to 2010 to complete their analysis. As mentioned by the authors, this study adds a Canadian context to the existing literature on the topic. Self-rated health is often reported on a 5-point Likert scale, ranging from poor to excellent. This scale is often either dichotomized (“poor” versus the remaining 4 categories) or simplified into three categories in demographic and epidemiological studies. Falconer and Quesnel-Vallée effectively dichotomize the scale by focusing primarily on self-reported “poor” health. They hypothesize that the predictive power of self-rated health will increase with proximity to death. This thesis is supported by their empirical analysis. They also show that there is a positive correlation between self-rated health and the SES of the respondent. Their research reinforces the power of longitudinal data in demographic analyses, and situates Canada firmly in the social epidemiological literature on the impact and value of self-reported health in demographic analyses.

The papers published in this issue of *Canadian Studies in Population* (and in the upcoming volume of *Cahiers québécois de démographie*) provide strong evidence that the goals of the FCD 2015 Conference were achieved. The papers address the demographic implications of changing family structures and changing gender roles. They also address some of the economic challenges faced by immigrants, and the impact of language on internal geographic mobility. A number of the papers demonstrate innovative uses of existing and new data sources. Questions of the health of various population groups, most notably the Indigenous Peoples of Canada, and the use of health indicators in demographic methods are addressed. Although much more research is clearly needed concerning Canadian population dynamics, demographic methods, and public policy, this special issue of *Canadian Studies in Population* presents substantial progress in addressing certain important aspects of the broader theme.

As most readers of this Special Issue of the *CSP* journal will appreciate, its content is the result of significant contributions by many people and organizations. First, the success of the conference is due to important contribution made by the School of Sociological and Anthropological Studies and the Faculty of Social Sciences of the University of Ottawa, Statistics Canada and the Program and Organising Committees. The publication of this collection of selected papers on demographic research was made possible, in part, by the generous support of Indigenous and Northern Affairs Canada. I would also like to acknowledge the collaboration of Laurent Martel, my co-chair on the FCD 2015 Conference Organizing Committee. Finally, I would like to acknowledge the overwhelmingly excellent contribution of Frank Trovato and his staff in producing this outstanding Special Issue of *Canadian Studies in Population*.

References

- Beaujot, R.P. 2005. *Population Change in Canada*. 2nd rev. edn. Don Mills, ON: Oxford University Press.
- Boyd, M., and M. Vickers. 2000. 100 years of immigration in Canada (includes related articles and statistics). *Canadian Social Trends* 58:2.
- Goldmann, G., and R. Lachapelle. 2011. Language and demography, in *The Changing Canadian Population*, edited by E. Fong and B. Edmonston. Montreal: McGill–Queen’s University Press, p. 347–66.
- Goldmann, G., A. Sweetman, and C. Warman. 2011. The Portability of New Immigrants’ Human Capital: Language, Education, and Occupational Matching. IDEAS Working Paper Series RePEc:qed:wpaper:1271. repec.org: Research Papers in Economics.
- Ley, D., and D. Hiebert. 2001. Immigration policy as population policy. *Canadian Geographer / Le Géographe canadien* 45(1):120–25. doi:10.1111/j.1541-0064.2001.tb01175.x
- Morley, B. 2006. Causality between economic growth and immigration: An ARDL bounds testing approach. *Economics Letters* 90(1):72–76. doi:10.1016/j.econlet.2005.07.008
- Trovato, F. 2015. *Canada’s Population in a Global Context : An Introduction to Social Demography*. 2nd rev. edn. Don Mills, ON: Oxford University Press.

Gender inequality in the family setting

Roderic Beaujot¹

Jianye Liu

Zenaida Ravanera

Abstract

Now that human capital increases the propensity to be in union for both men and women, the gender differences in the patterns of entry and exit from relationships have decreased. However, there are still strong gender differences in living with children, with women at younger ages and women not in couples being more likely than men to be living with children. Women are more likely to be lone parents while men are more likely to be living as part of a couple. While the employment rate of women in unions is no longer suppressed if they are living with children, their average work hours remain lower, while men have the highest employment rate and highest average work hours if they are living with children. For both men and women, parents do more unpaid work than persons without children though parenthood increases women's more than men's unpaid work. In the context of diverse and less stable families, a more equal division of both earning and caring activities would benefit gender equality.

Keywords: gender, unions, children, earning, caring.

Résumé

Maintenant que le capital humain augmente la propension à être en union pour les hommes et les femmes, les différences entre les sexes dans les modèles d'entrée et de sortie de relations ont diminué. Cependant, il y a encore de fortes différences entre les sexes dans la propension à vivre avec les enfants : les plus jeunes femmes et les femmes qui ne sont pas en couple sont plus susceptibles que les hommes de vivre avec les enfants. Les femmes sont plus susceptibles d'être des parents seuls alors que les hommes sont plus susceptibles de vivre dans le cadre d'un couple. Alors que le taux d'emploi des femmes en union n'est plus réduit si elles vivent avec des enfants, leurs heures moyennes de travail restent inférieure, tandis que les hommes ont le taux d'emploi et les heures moyennes de travail les plus élevés si ils vivent avec des enfants. Pour les hommes et les femmes, les parents font plus de travail non-payé que les personnes sans enfants, mais la parentalité augmente plus le travail non-payé des femmes que des hommes. Dans le contexte des familles diverses et moins stables, une répartition plus égale dans la division des activités d'emploi et de soins serait bénéfique pour l'égalité des sexes.

Mots-clés : genre, unions, enfants, emploi, soins.

Introduction

Families are arenas for sharing and caring, but they are also arenas of power relations. Both love and exploitation can occur in families. The balance of these dynamics depends considerably on socio-economic dimensions that give rise to differential access to resources on the basis of gender and age. It also depends on the extent to which people can enter and exit from relationships. The potential for exploitation is much higher if some members control decisions about the formation or dissolution of the family, and if there is limited alternative support for those who remove themselves from their family setting.

1. In Grabb, Edward; Reitz, Jeffrey; Hwang, Monica; *Social Inequality in Canada: Dimensions of Disadvantage*, 6/e, © Oxford University Press Canada 2016. Reprinted by permission of the publisher. The authors are also thankful to Ed Grabb for his thoughtful guidance and editorial work, and to the Social Science and Humanities Research Council for the support of our project on "Vulnerable families and individuals: Risk and resilience over the adult life course".

We first consider change and diversity across the various types of families. We then assess gender differences in the entry and exit from relationships and gender differences in living with children. Because gender issues in families are most apparent in the central activities of earning a living and caring for each other, we also look at gender inequalities in the division of paid and unpaid work. The concluding section addresses certain policy questions associated with gender inequality in family settings.

Family diversity

Families have become increasingly diverse. In the “Leave it to Beaver” era of the 1950s there was one predominant family model: the heterosexual nuclear family with a traditional division of labour. Recent census reports reveal the diversity across family types today. In the 2011 census, families with two married parents and children at home represented only 31.9 per cent of families, while 7.3 per cent were cohabiting couples with children, and 16.3 per cent were lone-parent families (Statcan 2012). Therefore, almost half (44.5 per cent) of families did not include children at home. Among couple families with children at home, 12.6 per cent were stepfamilies (Statcan 2012: 11). Stepfamilies were also more likely to involve cohabitation rather than marriage: among families with children, common-law couples comprised 14.0 per cent of intact families but 50.1 per cent of stepfamilies. Same-sex couples comprised 0.8 per cent of all families.

These trends towards greater diversity across families have been linked to weakening norms against divorce, premarital sex, cohabitation, voluntary childlessness, and same-sex relationships. The trends are also linked to the gender revolution and the growing importance of individual autonomy for both women and men.

Value change has promoted individual rights, along with less regulation of the private lives of individuals by the larger community (Dagenais 2008). There is a heightened sense that both women and men should make their own choices about relationships and child-bearing. Diversity is valued in living arrangements and in family forms. While most people do not live in same-sex relationships themselves, the majority support the right to equal treatment for gay and lesbian relationships and marriages.

A key change has been greater flexibility in the entry and exit from relationships, as represented by cohabitation and divorce. Cohabitation first changed premarital relationships, but also changed post-marital relationships; cohabitation effectively changed marriage itself, by introducing less rigid understandings of unions. Common-law couples represented 6.3 per cent of all couples in 1981, but this number had risen to 19.9 per cent by 2011. In recent times, as well, evidence indicates that more than one-third of marriages end in divorce within the first 25 years (Milan 2013: 14).

Besides the greater flexibility in entry and exit from relationships, we have seen a delay in family formation. The mean age at first marriage was 23 for women and 25 for men in 1961–71, but by 2008 it had risen to age 29 for women and 31 for men (Kerr and Beaujot 2016). In 1965, 30.8 per cent of first-time brides were under 20 years of age, compared to 3.5 per cent in 2000. Of more significance, the age at women’s first giving birth increased from a mean of 23.6 years in 1961 to 28.5 in 2011.

The family transitions associated with home leaving and union formation have involved not only a delay, but also more fluidity through less defined transitions and variability from case to case. The trajectories have diverged from the traditionally preferred pathway of finishing schooling, leaving the parental home, entering the labour force, and then getting married (Ravanera et al. 2006; Ravanera and Rajulton 2006).

Educational attainment has increased, leading to a later completion of education and later entry into full-time employment, which has also occurred because of insecurities in the labour market (Beaujot 2006). Since both men and women need to position themselves in relation to the labour market, Oppenheimer (1988) speaks of a “career entry theory” of marriage timing. To make the most profitable match, prospective partners need to know how each will be positioned for earning income. Two incomes have become important for maintaining stable middle-class standing (Coltrane 1998). Consequently, the completion of education and higher income prospects have come to be positively related to women’s probability of getting married, a pattern that has always been the case for men (Ravanera and Rajulton 2007; Sweeney 2002).

Family diversity can be found in the variety of living arrangements evident today: alone or in a family; married or cohabiting; two parents or a lone parent; opposite-sex or same-sex; couples with children or without;

and intact families or stepfamilies. Diversity is also evident in how earning and caring responsibilities are shared: single breadwinner versus dual earners; and a traditional gender division of work and care versus a more equal division by gender. Because of significant cultural and political changes, many Canadians now celebrate this diversity, because it means more family options beyond the once-predominant heterosexual couple with children and a traditional gender division of labour.

Another important indicator of change is that Statistics Canada decided not to publish the vital statistics of marriage after 2008. Of course, divorce statistics do not include separations of relationships that were not official marriages, or persons who are separated but not divorced. Consequently, Statistics Canada data on families generally do not differentiate married and cohabiting unions. In this chapter, we do the same: our tables combine married and cohabiting families.

Gender differences in the entry and exit from relationships

While sharing a common culture, ethnicity, or religion was once the dominant factor in union formation, education now plays a much more important role. Potential mates often socialize in similar educational settings, and persons with similar educational assets are more likely to enter into marital unions.

Since 1970, there has been an increase in educational homogamy, i.e., in people marrying others with a similar level of education. Hou and Myles (2008) found that this increase was more about changing patterns of mate selection than about the growing similarity in educational attainments of men and women. Among men with a university degree, 67 per cent were married to women with a university degree in 2006, compared to only 38 per cent in 1981 (Martin and Hou 2010: 71). These results reflect what can be called assortative mating, in which people form relationships with others having a similar level of education, leading to an accentuation of the differences across couples.

Selectivity in union formation

In their analysis of the propensity to marry in the United States, Goldscheider and Waite (1986) found that, before 1980, stable employment increased the likelihood of marriage for men but not for women. In that period, women apparently were more likely to use a higher personal income to “buy out of marriage,” because higher income gave women greater options outside of marriage and so reduced their relative preference for marriage. These patterns would change in the 1980s, as economic prospects became positively related to marriage for both men and women (Pew Research Center 2010; Sweeney 2002). In a comparison of the propensity to marry by level of education in 25 European countries, Kalmijn (2013) found that more highly educated women were less likely to be married in countries with traditional gender roles, but more likely to be married in countries with relatively egalitarian gender roles.

Such findings suggest that socio-economic characteristics have long been important for men’s marriageability, but that this pattern now applies to women as well. In Canada, as well, Ravanera and Rajulton (2007) analyzed data for 1993–8 to show that increased education is the main factor in the postponement of marriage, and that greater economic assets increase the propensity to marry for both men and women.

Selectivity into union dissolution

Using Swedish data for 1970–99, Kennedy and Thomson (2010) determined that educational differences in family instability were small in the 1970s, but then increased due to the rising union disruption among less-educated parents. Sweden now conforms to the patterns in other countries in showing socio-economic differences in family stability, with more separations for those with lower socio-economic status. Using longitudinal data from Canada over the period 2002–7, Bohnert (2011) also found evidence of these patterns: employment difficulties were associated with increases in the relative risks of union dissolution, while home ownership had the opposite effect.

In a study of multi-partner fertility among Norwegian men born between 1955 and 1984, Lappegard and her colleagues (2009) showed that men’s education and income are positively related to the likelihood of having a first birth, and also to the probability of a second birth with the same partner, while men with lower education are more likely to have a subsequent birth with a new partner. That is, men with lower status are less likely to retain a stable partnership.

Proportions living in couples by gender, education, and age

For people over age 30, the evidence on the proportion living as couples confirms that those with more education are more likely to be in union. For instance, at ages 40–4, 83.6 per cent of men with a university degree are part of a couple, compared to 71.4 per cent of men without a university degree (Table 1). For women of the same ages, the differences are smaller but in the same direction, with 78.5 per cent of those with university degrees living in couples, compared to 71.1 per cent of those without a university degree. For people in their twenties, those with no university degree are more likely to be living in couples. That is, those who complete their education sooner are also more likely to cohabit or marry sooner. More generally, within given cohorts, later marriage is associated with higher socio-economic status (Ravanera and Rajulton 2006; Ravanera et al. 1998, 2006). The patterns at ages over 30 imply that higher human capital increases the propensity to union formation, and higher education also increases the likelihood to remain in union or to form a subsequent union.

Table 1. Percent living in couples, for population aged 15+, by gender, education, and age, Canada, 2011

	Male			Female		
	Total	No university degree	University or higher	Total	No university degree	University or higher
15+	60.4	56.8	71.9	57.5	54.4	66.0
15–19	0.4	0.4	1.7	1.6	1.7	1.3
20–24	11.2	11.6	8.7	21.1	22.3	17.4
25–29	40.8	42.3	37.3	54.2	55.8	51.9
30–34	64.3	62.7	67.7	69.9	67.9	72.7
35–39	74.4	71.8	79.6	74.3	71.1	79.0
40–44	75.3	71.4	83.6	73.8	71.1	78.5
45–49	74.0	71.0	82.1	72.5	71.2	75.7
50–54	74.9	72.8	81.4	72.5	72.0	73.8
55–59	76.4	74.7	81.5	70.5	70.6	70.3
60–64	78.8	77.3	82.8	68.4	68.4	68.5
65–69	79.9	78.8	83.2	64.8	64.4	66.3
70–74	79.8	78.8	83.3	58.0	58.1	58.0
75–79	77.6	76.6	81.9	46.0	45.7	48.3
80–84	72.3	71.2	78.1	33.0	32.2	40.7
85+	60.2	58.8	66.8	16.1	15.7	21.2

Source: 2011 NHS micro-file (data are weighted).

Note: (1) Persons living in couples are persons who are married or common-law, as defined by “marital status” and “common-law status”; (2) Total number of cases aged 15+ is 762,879 and there are 34,807 (4.6 per cent) missing cases.

Table 1 also confirms that union formation typically occurs earlier for women: for instance, at ages 25–9, 54.2 per cent of women are married or cohabitating, compared to 40.8 per cent of men. However, the opposite occurs at ages over 40, where a higher proportion of men than women are in union. While there are increased gender similarities in the formation and dissolution of unions, men are advantaged by later entry into relationships and by the higher propensity to be in union at ages 40 and above.

Parenting and gender inequalities

The median age at birth of the first child has increased for both women and men, but the median age remains four years older for men than women (Ravanera and Hoffman 2012: 29). There are also important gender differences in the proportions living with children. Table 2 shows that in 2011, at ages 20–64, 38.6 per cent of men compared to 43.7 per cent of women were living with children. For persons living in couples, at each age group from 20–4 to 40–4, women were more likely than men to be living with children, and the opposite occurred at ages 45–9 to 60–4, where the men were more likely to be living with children. The contrasts

Table 2. Percent living with children, for (1) married spouses or common-law partners, and (2) others, for population aged 20–64, by gender and age, Canada, 2011

	Male			Female		
	Total	Persons in couples	Persons not in couples	Total	Persons in couples	Persons not in couples
20–64	38.6	58.1	5.9	43.7	55.5	23.0
20–24	3.2	26.2	0.5	10.5	33.3	4.6
25–29	16.9	40.6	1.4	32.2	48.7	13.9
30–34	42.8	65.9	3.7	59.8	73.4	30.3
35–39	61.1	80.4	8.9	74.1	84.7	45.1
40–44	65.4	83.2	14.2	75.4	84.6	51.1
45–49	61.3	78.1	15.4	65.8	73.6	46.1
50–54	49.2	61.9	12.9	43.7	49.2	30.0
55–59	28.3	34.8	7.7	18.8	20.6	14.7
60–64	12.2	14.5	4.2	5.0	5.3	4.3

Source: 2011 NHS micro-file (data are weighted).

Note: (1) Children are defined as persons under 25 who are living with at least one parent; (2) Persons in couples are married spouses or common-law partners. Persons not in couples are all other people aged 20–64; (3) Total number of cases aged between 20 and 64 is 552,577 and there are 3,526 (0.6%) missing cases.

are greater for persons not living in couples, where, up to ages 55–9, women were considerably more likely to be living with children. At ages 30–54, over 30 per cent of women not in couples were living with children. For men not in couples, the highest proportions living with children were at ages 40–54, with about 13–15 per cent living with children.

These patterns of parenting by age indicate that women are more likely than men to be living with children. The gender differences are especially noteworthy at younger ages, and especially for people who are not in couples. While parenting brings various life satisfactions, parenting also competes with other activities. In particular, there are trade-offs between investing in reproduction and investing in one's own productive abilities. Later entry into relationships, and especially later child-bearing, makes young people more able to handle the trade-offs. In contrast, persons who make transitions early can be relatively disadvantaged. Based on census data from 2006, Ravanera and Hoffman (2012: 31) found that at ages 20–39, fathers had less education than non-fathers, but the opposite applied at ages 40–64 where fathers had more education than non-fathers.

In a study of men born between 1926 and 1975 and women born between 1922 and 1980, based on the 2001 Canadian General Social Survey, Ravanera and colleagues (Ravanera and Rajulton 2007; Ravanera et al. 2006) found that men and women with high social status were more likely to have delayed their entry into parenthood, having first completed post-secondary education. In contrast, men and women with low social status were more likely to become parents at a younger age, often without first completing post-secondary education or having a period of regular full-time work.

Since women typically carry more of the parenting burden, these socio-economic differences in the timing of parenthood affect women more than men. Only at older ages (45+ for men living in union, and 60+ for men not in union) are men more likely to be living with children. By these ages, there is less difficulty in handling the trade-offs between investing in production and investing in reproduction.

Earnings inequality across family types

Diversity can mean differential risks and inequality across families and individuals. In 1980, the average employment earnings of married mothers were highest when husbands had intermediate earnings; however, by the 1990–2000 period, employment earnings of married mothers were higher when husbands were in the higher earnings categories (Myles 2010: 69). Similarly, Gaudet and her colleagues (2011) found that the proportion of women working within two years of a first birth was highest for women whose husbands earned the highest incomes.

Especially important is the contrast between two-earner couples, on the one hand, and breadwinner and lone-parent families, on the other hand. For instance, among couples without children, those with one full-time, full-year worker had only 55.5 per cent of the median earnings of those with two full-time, full-year workers in 2005 (Statcan 2008). For couples with children, those with one earner had only 54.9 per cent of the income of those with two earners. As measured by Statistics Canada's low-income cut-off (LICO), after taxes and transfers, the 2011 poverty rate was 5.1 per cent for two-parent families with children, compared to 21.2 per cent for female lone-parent families and 12.4 per cent for male lone-parent families (Statcan 2013). The low-income rates are also high for non-elderly persons who are "unattached," that is, either living alone or not in a family setting. The poverty rates for the non-elderly unattached are 29.9 per cent for men and 36.0 per cent for women. In contrast, the poverty rates are below 3 per cent for couples with two earners and for elderly couples. Among one-earner couples, there are much higher rates of poverty when children are present (Beaujot et al. 2014).

It is important to observe the significant decline in the low-income proportion among people in lone-parent families over time, from 49.3 per cent in 1996 to 19.7 per cent in 2011 (Statcan 2013). However, the disadvantages of lone-parent families remain significant, at almost four times the rate for two-parent families with children. Further analyses indicate that older female lone parents made significant income gains over the period 1980–2000. This may be partly because they have fewer and older children, they have increased their education, and they are working longer hours (Myles et al. 2007; see also Richards 2010). At the same time, the income gains for married female parents are even stronger, especially through increases in hours worked.

The income situation of younger lone parents did not improve over the period 1980–2000. Lone parenthood is a significant risk factor for women who marry early. For instance, among women under age 25, the proportion with children is highest for the formerly married, as opposed to women who are currently married, cohabiting, or single (Ravanera and Beaujot 2010).

Compared to intact families with children, stepfamilies are more likely to have both parents in paid employment and also working full-time (Vézina 2012). However, stepfamilies are more likely to be financially stressed, with 18 per cent being "unable to meet a financial obligation at least once in the previous year," compared to 11 per cent for intact families and 31 per cent for lone parents. The complex nature of financial obligations, within and beyond the immediate family, contributes to this greater financial stress in stepfamilies and lone-parent families.

Some of the gender inequality that we see in families derives from the relative disadvantage of women compared to men in a given family arrangement. The 2011 low-income rate is higher for female (21.2 per cent) than for male (12.4 per cent) lone parents; for female (36.0 per cent) than for male (29.9 per cent) unattached non-elderly; and for female (16.1 per cent) than for male (12.2 per cent) unattached elderly (Beaujot et al. 2014). Gender inequality also stems in part from the higher probability of women being lone parents, while men are more likely to be living as part of a couple.

Families, earnings, and gender inequality

Although inequality persists, employment and earnings have been moving in a converging direction by gender. For instance, women's labour force participation rate increased from 22.9 per cent in 1951 to 62.3 per cent in 2011, while men's rate declined from 84.1 per cent to 71.5 per cent in the same period (Beaujot et al. 2014). Another example of this converging trend concerns income changes for men and women among couples with children; the median income for husbands declined by 5 per cent between 1980 and 2005 but increased for wives by more than 500 per cent (Statcan 2008: 26). For all couples, wives were earning more than husbands in only 10 per cent of couples in 1976, compared to 30 per cent in 2008 (Statcan 2011).

While there has been movement in a converging direction, important differences remain. At ages 20–64, 78.8 per cent of men and 64.1 per cent of women were employed in 2011 (Table 3). For those working, the mean hours worked were 42.5 for men and 35.2 for women.

Table 3 further differentiates employment rates and mean work hours, both by marital status (married/cohabiting vs other) and by parental status (not living with children vs living with children). There is less evidence of the traditional pattern, in which men's labour force involvement is higher and women's lower, when they are married with children. Nonetheless, men still have the highest employment rate when they are married

Table 3. Employment rate, hours worked at all jobs in a week, and % with low income status, by gender, marital and parental status, persons aged 20–64, Canada, 2011

		Male			Female		
		Employment rate	Mean work hours	% with low income	Employment rate	Mean work hours	% with low income
Mar/Coh	Total	86.4	43.9	7.0	66.2	35.2	6.8
	No Child	78.1	42.6	6.7	66.3	35.8	6.2
	Child(ren)	91.0	44.6	7.2	66.1	34.8	7.4
Other	Total	61.9	39.1	19.3	59.5	35.2	22.0
	No Child	60.7	38.9	23.6	56.4	34.5	25.7
	Child(ren)	77.6	42.0	8.7	68.1	37.2	16.9
Total	Total	78.8	42.5	11.5	64.1	35.2	12.2
	No Child	68.7	40.6	15.0	61.6	35.2	14.3
	Child(ren)	90.4	44.4	7.5	66.4	35.2	10.1

Note: For “Percent with low income”, (1) Number of missing cases is 2,283 or 0.3% of total sample size;

(2) The definition of low income status is based on After Tax Low Income Cut-offs (LICO-AT).

Sources: (1) “Employment rate” and “Mean work hours” are based on 2011 GSS (data are weighted);

(2) “Percent with low income are based on 2011 NHS micro-file (data are weighted).

or cohabiting with children at home. However, women’s employment rate is no longer suppressed when they are living with children. For married or cohabiting women, the employment rates are the same for those living with and without children at home (66.1 per cent versus 66.3 per cent). For women who are not in relationships, employment rates are higher if they are living with children, as is the case for men. In terms of average hours worked, men’s hours are highest if there are children at home, especially if they are married or cohabiting. Married/cohabiting women have slightly higher average work hours if they have no children, while women who are not in relationships have the highest hours if they have children.

Thus, for both men and women, employment rates are higher for those in relationships. For men, and for women not in relationships, the employment rate and the hours worked are higher when they have children. For women in relationships, the employment rates are the same when comparing those with and without children.

Table 3 also shows economic differences, as measured by the proportions of men and women who are in poverty (below the LICO). For the 20–64 age group, the poverty rate is 11.5 per cent for men and 12.2 per cent for women. The poverty rates are lowest and the gender differences are small for persons who are married or cohabiting, with 7.0 per cent of men and 6.8 per cent of women below the LICO. For persons not in relationships, the rates are much higher: 19.3 per cent for men and 22.0 per cent for women. It can also be seen that the poverty rates are highest for those not in union and not living with children: 23.6 per cent for men and 25.7 per cent for women. Nonetheless, the rates are also high for women with children but not in union, at 16.9 per cent compared to 8.7 per cent for men.

Therefore, except for women who are living with children and not in union, the gender differences in poverty rates are not large across marital and parental statuses. On the whole, men are advantaged by being more likely to be in union, while women are disadvantaged by being more likely to be not in union but living with children.

Families, caring, and gender inequality

It is especially in caring activities that family status differentiates men and women (Beaujot 2000). However, there has been some change, with men doing more housework and child care than in the past (Doucet 2006; Ranson 2010).

For this section, we rely on time-use surveys that measure each person’s activities over a 24-hour day. Time use provides a means of gauging both earning and caring activities on the basis of the same metric (see Marshall 2006, 2011, 2012; Milan et al. 2011; Turcotte 2007). The activities that take place over a 24-hour day can be grouped into four categories: (1) paid work (including commuting to and from work, and education), (2) unpaid work (including housework, household maintenance, child care, elder care, and volunteer work), (3) personal care (including eating and sleeping), and (4) leisure or free time (including active and passive leisure).

The tables presented here use the categories of paid work and unpaid work, which together can be seen as productive activities, in contrast to the down time associated with personal care and leisure. In the period 1986–2010, women’s paid work hours increased and men’s unpaid hours increased (Beaujot et al. 2014). In 1986, women’s paid work plus education represented 58.9 per cent of men’s time in these activities, compared to 74.0 per cent in 2010. For unpaid work, men’s time in 1986 represented 46.3 per cent of women’s time, compared to 65.9 per cent in 2010. Therefore, for the whole population, men’s unpaid work time represented less than half of women’s unpaid work time in 1986, compared to two-thirds in 2010.

Based on time-use surveys in 1986, 1992, 1998, and 2005, Marshall (2006) used the title of “Converging gender roles” to describe the trends in paid and unpaid work. Marshall (2011) showed this convergence by comparing the division of work across three generations: late baby boomers (born 1957–66), Generation X (1969–78), and Generation Y (1981–90). She found increasing gender similarity in the involvement in paid work and housework from the earlier to the later generation. For young adults (ages 20–29) in dual-earner couples, she found increased sharing of economic and domestic responsibilities over generations, as women increased their hours of paid work and men increased their share of household work. However, even for the younger generations, the presence of dependent children reduced the woman’s contribution to the couple’s total paid work time, and increased her relative time in housework.

When paid work and unpaid work are added, the average total productive activity of men and women is found to be very similar in each of the survey years. For instance, in 2010, for ages 15–64, the average total productive hours per day (paid plus unpaid) were 8.4 hours for men and 8.8 hours for women (Table 4). For both men and women, and at each of the age groups shown, the total productive hours increase as we move from those not in relationships with no children, to those in relationships without children, to those in relationships with children.

The younger married or cohabiting parents have rather complementary patterns of time use: men did an average of 6.5 hours of paid work and 4.0 hours of unpaid work, while women did an average of 6.5 hours of unpaid work and 3.7 hours of paid work, with average total hours of 10.5 for men and 10.2 for women (Table 4). At ages 45–64, the average hours of unpaid work increased for the four marital and parental categories shown: unmarried with no children, married no children, married parents, and lone parents.¹ The lone parents, both women and men, have the longest hours of unpaid work. At ages 15–44, the increase occurs only over the first three marital/parental categories, with both male and female lone parents having less unpaid work than married parents of the same gender.

Table 4. Average daily hours in paid work and unpaid work, for population 15-64, by gender, age, marital and parental status, Canada, 2010

	Men				Women			
	Total	Paid	Unpaid	N	Total	Paid	Unpaid	N
15–44 years old								
Unmarried no children	6.9	5.4	1.4	1,152	7.7	5.8	1.9	1,044
Married no children	9.2	6.8	2.4	377	9.0	5.6	3.4	449
Married parents	10.5	6.5	4.0	968	10.2	3.7	6.5	1,317
Lone parents	10.0	6.4	3.7	56	10.3	4.5	5.8	107
45–64 years old								
Unmarried no children	7.1	4.3	2.8	755	8.0	4.1	3.9	1,105
Married no children	8.0	4.8	3.2	1,347	8.1	3.7	4.5	1,729
Married parents	9.7	6.5	3.2	478	9.5	4.3	5.1	390
Lone parents	8.7	4.6	4.1	51	9.5	3.9	5.6	125
Total	8.4	5.7	2.7	5,184	8.8	4.5	4.3	6,542

Source: 2010 GSS (data are weighted).

Note: Married includes cohabiting.

The converging trend in gender roles is also seen through the increased number of dual-earner couples between 1986 and 2005 (Marshall 2006). In 2005, among dual-earner couples, husbands put in 54 per cent of the total time that couples spent at jobs, and wives did 62 per cent of the time that couples spent on housework. Marshall (2006) observes that “children widen the gap” and “education narrows it.” In dual-earner couples, the

division of labour becomes more equal as wives have higher incomes. For couples with the wife's income at \$100,000+, the division was equal, with each partner spending some 6.5 hours per day on paid work and 1.5 hours on housework.

Table 5 presents figures on time use in productive activities by employment status, for men and women. It is noteworthy that the average total productive hours are again very similar, at 9.3 hours for men and 9.4 hours for women, for the total age group 25–54. As average paid hours are reduced over the categories of full-time, part-time, and not employed, the average unpaid hours increase over these same categories, for both men and women. Nonetheless, for both men and women, the average total hours are lowest for those who are not employed and highest for those working full-time. For men, the average hours of child care are quite similar over these categories of employment; for women, however, the average hours of child care increase from those working full-time, to part-time, to not employed. Thus, among persons working full-time the average hours of child care are lowest, and are most similar for men and women.

Table 5. Average daily hours of paid work and unpaid work, ages 25–54, by gender and labor force status, Canada, 2010

	Male					Female				
	Paid work	Child care	Other Unpaid	All unpaid	Total paid and unpaid	Paid work	Child care	Other Unpaid	All unpaid	Total paid and unpaid
Total	6.2	0.6	2.4	3.0	9.3	4.5	1.2	3.7	4.9	9.4
Full-time	7.0	0.6	2.3	2.9	9.9	5.9	0.8	3.2	4.1	10.0
Part-time	4.2	0.6	2.7	3.3	7.5	3.5	1.6	4.0	5.6	9.1
Not employed	2.6	0.7	3.0	3.7	6.3	1.5	2.0	4.7	6.8	8.3

Source: 2010 GSS (data are weighted).

Another way of measuring the variability in earning and caring is at the couple level. By comparing spouses, we can determine whether a given person does more, the same amount, or less of both paid work and unpaid work (Table 6). For couples where neither is a full-time student and neither is retired, we have combined the patterns into five models for the division of paid and unpaid work.² The most predominant model is complementary traditional, where the man does more paid work and the woman does more unpaid work; however, this model's proportion has declined over time, from 43.5 per cent of persons in couples in 1992 to 33.4 per cent in 2010. The female double burden, in which women do more unpaid work and at least as much paid work compared to men, has remained rather constant over time, involving some 26 to 27 per cent of couples. The shared-role model, in which women and men do about the same amount of unpaid work, has increased, from 22.6 per cent of couples in 1992 to 28.8 per cent in 2010. The male double burden, in which men do more unpaid work and at least as much paid work compared to women, has increased over time, from 5.8 per cent to 8.8 per cent. The complementary gender-reversed model is the least common, but it has increased from 1.7 per cent to 3.2 per cent of couples during the period 1992–2010.

Table 6. Distribution of couples by models of division of work, Canada, 1992–2010

Models of Division of Work (%)	Persons in couples			
	1992	1998	2005	2010
Complementary-traditional	43.5	39.1	32.9	33.4
Complementary-gender-reversed	1.7	2.7	3.0	3.2
Women's double burden	26.5	26.8	26.8	25.9
Men's double burden	5.8	7.6	10.7	8.8
Shared roles	22.6	23.8	26.5	28.8

Sources: Beaujot et al. 2013, Table 6 (based on 1992, 1998, 2005 and 2010 General Social Surveys).

Other analyses indicate that the models in which women do more unpaid work (complementary traditional or women's double burden) are more common when there are young children present, while the models in

which men do a more equal share of unpaid work are more likely when women have more education and other resources (Ravanera et al. 2009). Other analyses using these models of the division of work indicate that, in 2005 and 2010, average household incomes are highest in the shared-roles model, intermediate in the models involving the double burden, and lowest in the complementary-roles model (Beaujot et al. 2014). Thus, contrary to the theory that shared roles are an inefficient approach to the division of paid and unpaid work, couples in the shared-roles model have the highest average incomes.

Discussion

The greater variability and fluidity in family transitions and family patterns have brought considerable diversity in the families and family experiences of individual children, women, and men. This has been celebrated as evidence of less rigidity and more pluralism in family forms, but has also brought other forms of inequality in the earning and caring ability of families. It is noteworthy that, among families with children, 27.2 per cent are lone-parent and 12.6 per cent are step-parent families.

Some family trends have moved in the direction of reduced gender inequalities, especially a greater sharing of paid work, and towards men's greater participation in unpaid work. However, the differences remain large, and the inequalities are accentuated by the presence of young children.

Across family types, those with the highest poverty rates involve people who are unattached to families, and also lone-parent families. A significant portion of gender inequality in family settings derives from the higher likelihood of women being lone parents. Until age 50, women are more likely than men to be living with children, while men over age 40 are more likely to be living in a couple.

The patterns for entering marital or cohabiting unions have become more similar for women and men, with socio-economic status positively related to union formation for both men and women. There is also higher union dissolution among those with lower socio-economic status. The delays in union formation and parenthood have also benefited both men and women, who profit from a longer period of human capital accumulation. This also implies that those who form unions early, and especially those who have children early, are more likely to be disadvantaged. These patterns of early union and early parenthood affect women more than men.

In the context of diverse and less stable families, what directions should social policy take? In our view, equality across gender would especially benefit from the promotion of a model of gender equity in the division of both earning and caring. As a report for the United Nations Economic Commission for Europe proposes: “transforming gender norms is vital to the success of family policies” (United Nations 2013: 11). In particular, the two-income model should be promoted at the expense of the breadwinner model.

In the past, family policy followed the breadwinner model, with an emphasis on men's family wage and associated pension and health benefits, along with widowhood and orphanhood provisions in the case of the premature death of breadwinners. That is, the focus of family policy was on dealing with the loss of a breadwinner and supporting the elderly who were beyond working age. The challenge of current policy is to accommodate children who receive lower parental investments; young lone parents who have difficulty coping with both the earning and caring functions; the disadvantages faced by couples where neither has secure employment; and the difficulties of unattached persons at older labour force ages who have limited employment potential.

As we move towards a two-income model, we should discuss putting aside widowhood benefits, tax deductions for dependent spouses, and pension-splitting. Similarly, while income-splitting for taxation purposes promotes more equality across two-parent families with children, it provides no benefit to lone-parent families. These provisions, based on a breadwinner model, can promote dependency, especially for women. If the aim is to reduce inequality across all families and not just across two-parent families, then policies should take the form of the Child Tax Credit, the Working Income Tax Credit, and the Guaranteed Income Supplement, where the strongest transfers occur for those who have the lowest incomes.

Across family types, lone parents are especially disadvantaged. The widowhood and orphanhood provisions are clearly inadequate when the death of the breadwinner is infrequently the reason for lone parenthood. The policies promoting the employment of the lone parent are important, as are the child tax benefits and child-care

subsidies tailored to families with lower income. There is also an “equivalent to spouse tax credit” that, for tax purposes, counts the first child of a lone-parent family as equivalent to a dependent spouse. We would propose that tax deductions for dependent spouses should be abolished and replaced, for all families, with a tax deduction for the first dependent child. That would leave room for an alternative like that used in Norway, such as doubling the child tax benefit for the first child of a lone-parent family.

We should promote a more egalitarian type of family that includes greater common ground between women and men in family activities. Just as policy has promoted the de-gendering of earning, we would argue for approaches that increase equal opportunity through the de-gendering of child care (Beaujot 2002). We should discuss the types of social policy that would further modernize the family in the direction of co-providing and co-parenting. Key questions here include parental leave and child care. Parental leave supports the continuing earning roles of parents, and public support for child care reduces the costs for working parents. The Quebec model for parental leave, including greater flexibility and a dedicated leave for fathers, has promoted the greater participation of men in parental leave (Beaujot et al. 2013). At the same time, the higher Quebec support for child care has promoted women’s earning activities.

Notes

1. As elsewhere in the chapter, the married category includes cohabiting, while the unmarried category is neither married nor cohabiting.
2. These models are based on questions regarding time use in the previous week for the respondent and the respondent’s spouse. Combining the paid and unpaid work hours for the couple, we first divided both the paid and unpaid work hours of respondent and spouse into three categories: respondent does more (over 60 per cent of the total), respondent does less (under 40 per cent of the total), and they do the same (40–60 per cent of the total). From the nine models in terms of a given partner doing more, the same, or less of both paid and unpaid work, we derived the five models as specified in Table 6. The 2010 questionnaire used categories rather than the exact number of hours for spouse’s time use over the week. Using the respondents of given sexes and presence of children, we established point estimates from these categories.

References

- Beaujot, R. 2000. *Earning and Caring in Canadian Families*. Peterborough, ON: Broadview Press.
- . 2002. Earning and caring: Demographic change and policy implications. *Canadian Studies in Population* 29:195–225.
- . 2006. Delayed life transitions: Trends and implications, in *Canada’s Changing Families: Implications for Individuals and Society*, edited by K. McQuillan and Z. Ravanera. Toronto: University of Toronto Press, p. 105–32.
- Beaujot, R., C. Du, and Z. Ravanera. 2013. Family policies in Quebec and the rest of Canada: Implications for fertility, child care, women’s paid work and child development indicators. *Canadian Public Policy* 39(2):221–39.
- , J. Liu, and Z. Ravanera. 2014. Family diversity and inequality: The Canadian case. Population Change and Life-course Cluster Discussion Paper 1, 1. <http://ir.lib.uwo.ca/pclc/vol1/iss1/7/>
- Bohnert, N. 2011. Examining the determinants of union dissolution among married and common-law unions in Canada. *Canadian Studies in Population* 38(3–4):93–104.
- Coltrane, S. 1998. *Gender and Families*. Thousand Oaks, CA: Pine Forge Press.
- Dagenais, D. 2008. *The (Un)making of the Modern Family*. Vancouver: University of British Columbia Press.
- Doucet, A. 2006. *Do Men Mother? Fathering, Care, and Domestic Responsibilities*. Toronto: University of Toronto Press.
- Gaudet, S., M. Cooke, and J. Jacob. 2011. Working after childbirth: A life-course transition analysis of Canadian women from the 1970s to the 2000s. *Canadian Review of Sociology* 48(2):153–80.

- Goldscheider, F., and L.J. Waite. 1986. Sex differences in the entry into marriage. *American Journal of Sociology* 92(1):91–109.
- Hou, F., and J. Myles. 2008. The changing role of education in the marriage market: Assortative marriage in Canada and the United States since the 1970s. *Canadian Journal of Sociology* 33(2):337–66.
- Kalmijn, M. 2013. The educational gradient in marriage: A comparison of 25 European countries. *Demography* 50(4):1499–1520.
- Kennedy, S., and E. Thomson. 2010. Children's experiences of family disruption in Sweden: Differentials by parent education over three decades. *Demographic Research* 23(17):479–508.
- Kerr, D., and R. Beaujot. 2016. *Population Change in Canada*. 3rd edn. Toronto: Oxford University Press.
- Lappegard, T., M. Ronsen, and K. Skrede. 2009. Socioeconomic Differentials in Multi-partner Fertility Among Fathers. Paper presented at the International Population Conference of the International Union for the Scientific Study of Population, Marrakesh, 27 Sept.–2 Oct.
- Marshall, K. 2006. Converging gender roles. *Perspectives on Labour and Income* 18(3):7–19.
- . 2011. Generational change in paid and unpaid work. *Canadian Social Trends* 92:13–24.
- . 2012. Paid and unpaid work over three generations. *Perspectives on Labour and Income* 24(1):5–17.
- Martin, L., and F. Hou. 2010. Sharing their lives: Women, marital trends, and education. *Canadian Social Trends* 90:70–4.
- Milan, A. 2013. Marital status overview, 2011. *Report on the Demographic Situation in Canada*. Cat. 91-209-X. Ottawa: Statistics Canada.
- Milan, A., L-A. Keown, and C. Robles Urquijo. 2011. *Families, Living Arrangements and Unpaid Work*. Cat. 89-503-X. Ottawa: Statistics Canada.
- Myles, J. 2010. The inequality surge. *Inroads: The Canadian Journal of Opinion* 26:66–73.
- Myles, J., F. Hou, G. Picot, and K. Myers. 2007. Employment and earnings among lone mothers during the 1980s and 1990s. *Canadian Public Policy* 33(2):147–72.
- Oppenheimer, V. 1988. A theory of marriage timing. *American Journal of Sociology* 94(3):563–91.
- Pew Research Center. 2010. *The Decline of Marriage and Rise of New Families*. A Social & Demographic Trends Report. Washington: Pew Research Center.
- Ranson, G. 2010. *Against the Grain: Couples, Gender, and the Reframing of Parenting*. Toronto: University of Toronto Press.
- Ravanera, Z.R., and R. Beaujot. 2010. Childlessness and socio-economic characteristics: What does the Canadian 2006 General Social Survey tell us?" Paper presented at the meetings of the Canadian Sociological Association, Montreal, June.
- Ravanera, Z.R., R. Beaujot, and J. Liu. 2009. Models of earning and caring: Determinants of the division of work. *Canadian Review of Sociology* 46(4):319–37.
- Ravanera, Z.R., T.K. Burch, and F. Rajulton. 2006. Men's life course trajectories: Exploring the differences by cohort and social class. *Social Biology* 53(3–4):120–39.
- Ravanera, Z.R., and J. Hoffman. 2012. Canadian fathers: Demographic and socio-economic profiles from census and national surveys, in *Father Involvement in Canada: Diversity, Renewal, and Transformation*, edited by J. Ball and K. Daly. Vancouver: University of British Columbia Press, p. 26–49.
- Ravanera, Z.R., and F. Rajulton. 2006. Social status polarization in the timing and trajectories to motherhood. *Canadian Studies in Population* 33(2):179–207.
- . 2007. Changes in economic status and timing of marriage of young Canadians. *Canadian Studies in Population* 34(1):49–67.

- Ravanera, Z.R., F. Rajulton, and T. Burch. 1998. Early life transitions of Canadian women: A cohort analysis of timing sequences, and variations. *European Journal of Population* 14:179–204.
- Richards, J. 2010. Reducing lone parent poverty. C.D. Howe Institute Commentary No. 305. <http://www.cdhowe.org>.
- Statcan (Statistics Canada). 2008. *Earnings and Incomes of Canadians over the Past Quarter Century: 2006 Census*. Cat. 97-563-X. Ottawa: Statistics Canada.
- . 2011. *Women in Canada*. Ottawa: Statistics Canada.
- . 2012. *Portrait of Families and Living Arrangements in Canada: Families, Households and Marital Status, 2011 Census of Population*. Cat. 98-312-X2011001. Ottawa: Statistics Canada.
- . 2013. *CANSIM Table 202-0804*. Ottawa: Statistics Canada.
- Sweeney, M. 2002. Two decades of family change: The shifting economic foundations of marriage. *American Sociological Review* 67:132–47.
- Turcotte, M. 2007. Time spent with family during a typical workday, 1986 to 2005. *Canadian Social Trends* 83:2–11.
- United Nations. 2013. *Report of the UNECE Regional Conference on ICPD beyond 2014: Enabling Choices: Population Priorities for the 21st Century*. ECE/AC.27/2013/2. United Nations: Economic and Social Council, Economic Commission for Europe.
- Vézina, M. 2012. *2011 General Social Survey: Overview of Families in Canada—Being a Parent in a Stepfamily: A Profile*. Cat. 89-650-X—No. 002. Ottawa: Statistics Canada.

Nonresidential fatherhood in Canada

Lisa Strohschein¹

Abstract

The purpose of this study was to shed light on nonresidential fatherhood in Canada. Data come from the 2012 LISA. Analysis was restricted to fathers who had children under the age of 19 (N=3,592); approximately 17.4 per cent were nonresidential fathers. Logistic regression models indicated that outside a marital union, low educational attainment and low income were associated with increased odds of being a nonresidential father. Teen parenthood was not a statistically significant predictor. I discuss the implications of these findings as well as the need for measures that better capture variability in the living arrangements of fathers and their children.

Keywords: family complexity; Canada; nonresidential fatherhood; living arrangements; children.

Résumé

Le but de cette étude est d'éclairer le phénomène de paternité non résidentielle au Canada. Les données proviennent du sondage LISA 2012. L'analyse est limitée aux pères ayant des enfants de moins de 19 ans (N=3 592). Environ 17,4% sont des pères non-résidentiels. Les modèles de régression logistique indiquent qu'étant hors d'une union maritale, d'avoir un faible niveau de scolarité, et de faible revenu est associé à une probabilité élevée d'être un père non-résidentiel. Être un parent adolescent n'est pas un prédicteur statistiquement significatif. Je discute des implications de ces résultats ainsi que de la nécessité de mesures qui permettent de mieux saisir la variabilité des modes de vie des pères et de leurs enfants.

Mots-clés : complexité familiale; Canada; paternité non résidentielle; des modes de vie; les enfants.

Introduction

Families, in Canada and elsewhere, are more diverse and fluid today than they were a generation or two ago. The normativity of heterosexual marriage has given way to a plethora of alternative arrangements, including cohabitation, same-sex relationships (married or cohabiting), and even living-apart-together partnerships. In addition, people have acquired a merry-go-round approach to intimacy (Cherlin 2009). Specifically, loosening the social constraints on union formation and dissolution has empowered individuals to step in and out of intimate relationships with relative ease. Together, these patterns have increased the likelihood that adults and children will inhabit a wide variety of family forms throughout their lifetime.

Keeping pace with these transformations in family life and evaluating the consequences of these trends are now central issues in family research. Recently, demographers have adopted the term *family complexity* to organize their understanding of the ways in which families are changing. Family complexity refers to the different ways in which marriage and legal ties, living arrangements, fertility, and parenting are no longer coterminous factors in the makeup of families (Carlson and Meyer 2014). Because there are numerous possibilities for unlinking these factors from one another, family complexity is perhaps best understood by contrasting it with the *traditional family* form. In a traditional family, co-residence coincides with marriage, the union is lifelong, and all children are born and raised within the marital union. Although family complexity cannot be considered an entirely new

1. Associate Professor, Associate Chair Undergraduate Program, 6-13 HM Tory Building, Department of Sociology, University of Alberta; email: lisa.strohschein@ualberta.ca

phenomenon, this concept has become useful for illustrating the scope of change in contemporary families and providing a framework for theorizing about its consequences.

Given that there are few studies on family complexity in the Canadian context, there is a critical need to document these patterns in this country. This is an enormous task that lies beyond the scope of a single project. For this reason, the current study considers *nonresidential fatherhood* as one aspect of family complexity. Nonresidential fatherhood exemplifies family complexity to the extent that parenthood can be de-coupled from living arrangements, with children occupying a different residence from their fathers.

Importantly, nonresidential fathers experience all of the challenges associated with belonging to a complex family. Complex families are of concern because resources, roles, and responsibilities are diffused across multiple households (Berger and Bzostek 2014; Fomby et al. 2016; Furstenberg 2014). Money, time, and attention are finite resources that parents expend on their children. Nonresidential fathers must allocate what they have across multiple households, and their children necessarily compete for a smaller share of available parental resources (Carlson and Berger 2013; Tach et al. 2014). Moreover, families function best when roles and responsibilities are clear and unambiguous. Parental roles and responsibilities can become murky when either or both adults have a marital history that encompasses a succession of previous partners with whom they have produced children (Brown and Manning 2009). In such instances, there may be confusion and even profound disagreement about who is family and who is obligated to perform tasks or provide help (Cherlin and Seltzer 2014; Nock 2000). For example, co-residential stepfathers and nonresidential biological fathers may hold divergent views about disciplining children, or they might both defer such tasks to the co-residential biological mother. When the boundaries of acceptable behaviour shift depending on the parental figure, children are left to try make sense of the variable responses their behaviour elicits.

As such, researchers and policymakers have considerable interest in understanding nonresidential fatherhood from the perspective of family complexity. Simply stated, identifying where and with whom children live is critical for understanding how children are being parented on a daily basis, the type of support they receive from their parents, and how these relate to their development and well-being (Waller and Jones 2014). In the next section, I evaluate how nonresidential fatherhood is measured and review what is currently known about nonresidential fatherhood in Canada and elsewhere.

Nonresidential fatherhood

Scholarly interest in fatherhood has grown exponentially over the past few decades (Greene and Biddlecom 2000; Lamb 2010). Its emergence as a field of research can be traced to an ongoing gender revolution that has been unfolding over the last half-century. This period witnessed the end of specialization, where men were the breadwinners and women took care of domestic chores and raised children. Instead, the roles of men and women have gradually become more similar (though not fully so), with both sexes balancing the demands of paid employment and home life (Altintas and Sullivan 2016). Growing levels of paternal involvement in childrearing prompted social scientists to pioneer new avenues of research that evaluate how fathers matter with respect to child well-being and family functioning.

The trend toward increased paternal involvement, however, is not universal. In particular, researchers have discovered diverging experiences of fatherhood, with an upswing in both paternal involvement and paternal absence (Juby and LeBourdais 1998; Livingston and Parker 2011). The growing presence of women in the labour market in the past half-century paved the way for men's increased involvement in family life, including spending more time with their children (Goldscheider et al. 2015). At the same time, sharp climbs in rates of *union dissolution* and *non-marital childbearing* have weakened the links between fathers and their children, by increasing the chances that fathers and children will live apart from one another. When they do not share the same residence, fathers may struggle to remain involved in the lives of their children (Carlson and McLanahan 2004). Their difficulties are amplified if nonresidential fathers enter into new unions with competing obligations (Manning et al. 2003; McGene and King 2012; Tach et al. 2010).

It is fair to say that research on nonresidential fatherhood is at a preliminary stage in most countries. Because of this, researchers have yet to achieve consensus on how nonresidential fatherhood should be measured. There is unevenness, for example, in what constitutes a *dependent child*, with researchers employing different criteria and imposing different age limits. In the U.K., where the rate of nonresidential fatherhood is estimated to be 16.7 per cent (Poole et al. 2016), dependent children are restricted to those under the age of 16. In Australia, the age of dependent children is limited to those under the age of 18, but the prevalence of nonresidential fatherhood is also far lower, at approximately 8.4 per cent (Australian Bureau of Statistics 2006). Why they are far lower in Australia than in other jurisdictions has yet to be determined. One difference, however, is that Australian researchers exclude adopted children from their calculations, whereas other countries do not. Conversely, the United States, with the highest reported prevalence of nonresidential fatherhood at 26.9 per cent (Jones and Mosher 2013; Livingston and Parker 2011), includes both biological and adopted children, but defines dependent children as under the age of 19. Clearly, inconsistencies in the measurement of nonresidential fatherhood pose challenges for researchers, who seek rigorous comparisons across different countries.

Another measurement problem in this emerging field of research stems from the crude categorization of nonresidential fatherhood. Despite wide variability in living arrangements among contemporary families, researchers continue to employ binary categories. It is clear that such dichotomization has not been guided by thoughtful debate about the threshold at which a father's time spent living apart from their child meets the criteria for identification as a nonresidential father. Also, discussion is absent as to whether two categories sufficiently capture the contemporary experience of nonresidential fatherhood.

Instead, researchers seem to have taken their cue from the divorce literature. Rising divorce rates in the 1980s spurred initial interest in nonresidential fatherhood, as separation agreements almost always awarded sole custody of children to the mother. In that context, nonresidential fatherhood made sense as a binary category. Today, this approach is much less compelling. Not only has there been a dramatic shift toward shared living arrangements, with an increasing number of divorced fathers living with their children at least some of the time, but divorce is no longer the only entry point into nonresidential fatherhood. Because so many of the assumptions underlying nonresidential fatherhood no longer apply straightforwardly, a critical reassessment of its measurement is both timely and warranted.

In American studies to date, fathers must live apart from one or more of their children on a full-time basis in order to be considered nonresidential (Jones and Mosher 2013; Livingston and Parker 2011). Fathers who share a residence with one or more children on a part-time basis, even if it is just once a month, are identified as residential fathers. In the U.K., Poole and colleagues (2016) constructed their variable from a single question that asked fathers whether they had a child under the age of 16 living elsewhere. Not only do such approaches oversimplify the living arrangements of fathers and their children, they may fail to capture meaningful distinctions.

Canadian researchers have also relied on a binary distinction but have differentiated between fathers who lived on a full-time basis with all of their children versus fathers who had any other kind of living arrangement with their children (Beaupré et al. 2010). Analyzing data from the 2006 General Social Survey, Beaupré and colleagues reported that 19.4 per cent of fathers had one or more biological or adopted children under the age of 19 whose living arrangements deviated from full-time residence in their father's household, i.e., were living elsewhere either on a full- or part-time basis. By imposing a different threshold, Beaupré and her colleagues made visible a subset of fathers who would otherwise have been treated as residential fathers. Why is this important? The simple answer is that it may be a mistake to treat fathers who live part of the time with at least one of their children as if they are in the same category as fathers who live with all of their children on a full-time basis.

This becomes apparent if one recognizes that fathers who live on a part-time basis with one or more children share many of the same challenges as nonresidential fathers. For instance, a father who lives with his child only some of the time must distribute his time, attention, and finances across multiple households in ways that a father who has all of his children living with him on a full-time basis does not. Moreover, fathers whose children live with them only some of the time are just as likely as nonresidential fathers to experience the contradictions and ambiguities in roles and responsibilities that characterize complex families.

In the current study, I imposed a threshold that treats fathers who live less than half the time with one or more children in the same way as fathers who do not share a residence at all with one or more children. Formally stated, *nonresidential fatherhood* was defined as a father who lives less than half of the time, or not at all, with one or more biological or adopted children under the age of 19. This threshold is more conservative than the one used by Beaupré and her colleagues, as their cutoff distinguished between fathers who lived with all of their children on a full-time basis from fathers who had any other kind of living arrangement. Unfortunately, it was not possible, given the constraints of the survey data used in this study, to experiment with a range of different thresholds or to create multiple categories. While this approach has its own limitations, including greater difficulty comparing these findings with prior work, the use of a unique threshold in this study is intended to raise awareness of alternative ways of assessing nonresidential fatherhood, and to stimulate future discussion about improving its measurement.

In addition to estimating the prevalence of nonresidential fatherhood in Canada, this study highlights the shortcomings of an *address-based approach* to family. *Complex families*, by their very nature, transcend the confines of a single residence. Because of this, family complexity can be made to disappear when researchers focus on the relationships of household members *within* the household, but neglect to ask about relationships *beyond* the household. One way in which complex families become invisible is through routine measures that identify intact households. An *intact household* is one in which a couple are the biological or adopted parents of all children in the household. Unless additional questions are asked about family members living elsewhere, researchers cannot accurately identify all instances of family complexity. By demonstrating that a sizeable percentage of intact households actually contains nonresidential fathers, this study provides further support for the argument that family demographers must move beyond an address-based approach to family.

A final goal was to establish whether the known correlates of nonresidential fatherhood in other studies could also be observed in the Canadian population. Complex families are often drawn from disadvantaged segments of the population (McLanahan 2009; Tach 2015). This appears to be true for nonresidential fathers as well. The research suggests that nonresidential fathers have, on average, less education and report lower income than fathers who reside with their children (Carlson et al. 2017; Dermott 2016; Jones and Mosher 2013; Livingston and Parker 2011). Nonresidential fathers also tend to be younger on average and less likely to be living with a partner than residential fathers (Kiernan 2006; Poole et al. 2016). Others have found that men who became fathers in their teenage years were less likely to share a residence with their offspring than men who became fathers at a later age (Mollborn and Lovegrove 2011). In the current study, these associations were tested at the bivariate level, but also entered in a logistic regression model to evaluate the relative contribution of these variables, adjusted for one another.

Methods

Sample

Data come from the 2012 Canadian Longitudinal and International Survey of Adults (LISA), the first wave of a longitudinal survey conducted by Statistics Canada (Statcan 2014). The sample was derived through a stratified multi-stage, multi-phase design. The target population was all Canadians living in the ten provinces, excluding residents of institutions, members of the Canadian Armed Forces living in military camps, and people living on Indian reserves. These exclusions represent approximately 2 per cent of the Canadian population. Interviews were conducted with all household residents aged 15 and older; children aged 0 to 14 will be interviewed in subsequent waves once they reach the age of 15. The overall response rate was 71.8 per cent. When weighted, the sample is representative of the adult Canadian population over the age of 15.

The original sample consisted of 32,133 respondents residing in 11,458 households. To address the research questions of this study, the sample was reduced to males who were between the ages of 18 and 65 and who identified themselves as parents of children under the age of 19. This produced a final sample of 3,592 fathers.

Measures

Nonresidential fatherhood was derived by taking into account fathers' responses to a series of questions regarding how many children they have and the ages of their oldest and youngest child, and comparing this information to the household roster, which contained the number, ages, and nature of the relationship for each household member to every other household member. Decisions about the inclusion of children who were not full-time residents of the household were made by the interviewer. Children who lived less than half of the time in the household were treated as nonresidential, whereas children who lived more than half of the time in the household were treated as residential. Children who spent exactly half of their time in the household were included only if they were present on the day of interview. Problematically, the response to the question about the proportion of time a child lived in the household was not included as a variable in the final dataset, and thus could only be inferred from their presence on the household roster. This variable will be made available beginning in the third wave of LISA (Andrew Heisz, personal communication 2015). Nonresidential fatherhood was coded '1' if fathers had any biological or adopted children aged 18 and younger living less than half of the time, or not at all, in the father's household, and coded '0' if fathers had all of their biological and adopted children aged 18 and younger living with him at least half of the time. There is obvious fuzziness as to the placement of fathers whose children lived exactly half the time with them, a limitation that I return to in a later section.

Independent variables included known correlates of nonresidential fatherhood. Current age was coded into a four-level categorical variable. Dummy variables were constructed for fathers aged 35 to 44, 45 to 54, and 55 to 65, with 18 to 34 acting as the omitted reference category. Marital status was a categorical variable that differentiated between fathers who were married; cohabiting; formerly married (separated, divorced, or widowed); or single and never married at the time of the survey. Dummy variables were created for each marital status, with married as the omitted reference category in the regression model. Father education is a dichotomous variable that compares fathers who have attained a postsecondary degree or diploma (coded '1') with fathers who have not completed a postsecondary degree or diploma (coded '0'). Preliminary analysis with additional categories for paternal education suggested that a simple distinction between fathers who had and had not completed a postsecondary degree provided the best fit. The father's 2011 total income before taxes, reported in dollars, comes from the linked tax records. Overall, 94.8 per cent of all respondents participating in the 2012 LISA were successfully matched to their tax records. Data were missing for a small percentage of respondents who denied permission to link to their tax records as well as instances where permission was granted, but a match could not be made (Hemeon 2016). In the regression model, father's income was recoded into units of ten thousand dollars. 'Teen parent' was a dummy variable that assessed whether the respondent fathered their first child as a teenager (coded '1' if first birth was before age 20, and '0' otherwise). 'Intact household' evaluated whether all children in the household were the biological or adopted parents of the respondent and his partner or spouse (coded '1' if intact household and '0' otherwise). Dummy variables for 'region of residence' distinguished between fathers living in eastern provinces, Québec, Ontario, the prairie provinces and British Columbia. In regression models, Ontario was the omitted reference category.

Analysis

The dependent variable was dichotomous, therefore logistic regression was used to determine correlates of nonresidential fatherhood. In a logistic regression model, regression coefficients are interpreted as the log of the odds of an event before and after a one-unit change in an explanatory variable, with all other terms held constant. Normalized sampling weights were applied to all analyses to adjust for nonresponse and differential selection probabilities in a complex survey design.

Results

Nonresidential fathers accounted for 17.4 per cent of all Canadian fathers with dependent children under the age of 19. Table 1 compares characteristics of residential fathers and nonresidential fathers. Nonresidential fathers were slightly overrepresented among younger men and under-represented among older respondents.

Table 1. Sample characteristics of residential and nonresidential fathers in Canada, 2012 LISA (N=3,592)

	Residential father	Nonresidential father
Age		
18–34	22.1	24.0
35–44	40.6	34.9
45–54	31.3	37.3
55–65	6.0	3.7
		$\chi^2 = 15.37^{**}$
Marital status		
Married	78.0	30.3
Common law	18.1	21.2
Separated, divorced or widowed	2.0	32.0
Single, never married	1.9	16.5
		$\chi^2 = 1,065.14^{***}$
Completed postsecondary education	33.7	17.3
		$\chi^2 = 64.49^{***}$
Income	64,671.81 (47,235.00)	52,371.46 (44,323.65)
		F = 35.59^{***}
Teen parent	29.8	37.3
		$\chi^2 = 13.61^{***}$
Intact household	85.8	13.7
		$\chi^2 = 1,364.60^{***}$
Region		
Eastern provinces	6.1	7.4
Québec	24.6	26.5
Ontario	40.2	35.6
Prairie provinces	16.5	20.4
British Columbia	12.6	10.1
		$\chi^2 = 12.16^*$
N (%)	2,968 (82.6%)	624 (17.4%)

Note: Statistics are reported as means (SD) and proportions.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Residential fathers were far more likely to be married than were nonresidential fathers (78.0 versus 30.3 per cent). Conversely, residential fathers were less likely to be ‘formerly married’ or ‘single, never married’ compared to nonresidential fathers. Differences between married and formerly married fathers were particularly pronounced. Nearly all married fathers were residential (92.4 per cent); in contrast, the majority of formerly married fathers (77.2 per cent) were nonresidential.

Nonresidential fathers were also more socioeconomically disadvantaged than residential fathers, with fewer having obtained a postsecondary degree or diploma, and reporting a lower pre-tax income relative to residential fathers. Becoming a parent as a teenager was slightly more common for nonresidential fathers than it was for residential fathers (37.3 versus 29.8 per cent). The majority of residential fathers resided in intact households, where both adults were the biological or adopted parents of all children living in the household. Nonetheless, almost one in seven (13.7 per cent) nonresidential fathers also met the criteria for living in an intact household. Regional differences in the proportion of nonresidential fathers were marginally significant, with nonresidential fathers disproportionately represented in the prairie provinces.

Table 2 presents the results of a logistic regression model estimating the correlates of nonresidential fatherhood in Canada, adjusted for one another. The odds of being a nonresidential father were lower for those aged 55 to 65 relative to those aged 18 to 34, adjusting for other terms in the model. The odds of being a nonresidential father were significantly lower for those who had achieved a postsecondary degree or diploma relative to those with less education. Higher pre-tax income in 2011 was associated with a lowered risk of being a nonresidential father. Relative to married fathers, the odds of being a nonresidential father were significantly higher for

Table 2. Logistic regression model, correlates of nonresidential fatherhood, 2012 LISA (N=3,592)

	b	(s.e.)	Odds ratio
Age (ref=18–34)			
35–44	0.08	(0.14)	1.08
45–54	0.24	(0.15)	1.27
55–65	–0.71	(0.30)	0.49*
Marital status (ref=married)			
Common law	1.22	(0.14)	3.39***
Separated, divorced or widowed	3.77	(0.17)	43.38***
Single, never married	3.14	(0.20)	23.10***
Completed postsecondary education	–0.29	(0.13)	0.75*
Income	–0.03	(0.01)	0.97*
Teen parent	–0.09	(0.12)	0.91
Region (ref=Ontario)			
Eastern provinces	0.29	(0.22)	1.34
Québec	–0.26	(0.14)	0.77
Prairie provinces	0.51	(0.15)	1.67***
British Columbia	–0.16	(0.19)	0.85

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

those who were cohabiting, formerly married (separated, divorced, or widowed), or single and never married. Once adjusted for other terms in the model, being a teen parent was not statistically significant correlates of nonresidential fatherhood. Relative to fathers residing in Ontario, the odds of being a nonresidential father are significantly higher among fathers living in the prairie provinces.

Discussion

In the past, complex family forms accounted for a fraction of the population. Over the course of the past few decades, however, family complexity has become much more ordinary. Because families bear primary responsibility for the care and socialization of children, researchers have wondered whether family complexity poses a risk to child well-being, interferes with the transmission of cultural, economic and social resources to the next generation, or has unanticipated implications for society as whole. The purpose of the current study was to analyze data from the first wave of the LISA household panel survey, in order to shed light on nonresidential fatherhood as one dimension of family complexity in Canada.

In the current study, the criteria for nonresidential fatherhood were met when a father had any biological or adopted children under the age of 19 who lived less than half of the time, or not at all, in his household. As discussed earlier, this threshold was determined by the constraints of the data, and thus is a weakness of this study. At the same time, this threshold presented an opportunity to think about nonresidential fatherhood in a different way. I first compare current findings with prior research as a way of highlighting existing problems in measurement, before discussing how researchers might better conceptualize nonresidential fatherhood in future research.

Results indicated that 17.4 per cent of Canadian fathers met the criteria for nonresidential fatherhood. This estimate places Canada in the middle of pack—far below the 26.9 per cent reported in the U.S. but well above the rate of 8.4 per cent reported in Australia. Nonetheless, because the measurement of nonresidential fatherhood varies across countries, comparisons must be made cautiously.

One shared feature of this study with previous American and Canadian research is that *dependent children* were consistently defined as being under the age of 19. Elsewhere, researchers have selected a smaller age range for identifying dependent children, capped at those under age 16 (United Kingdom) or under age 18 (Australia). Whether these age variations have an effect on observed estimates has not been investigated to date, but there is at least one reason to be concerned about selecting older children. Namely, choosing a higher age limit could

potentially inflate rates of nonresidential fatherhood by inappropriately including fathers of older children who have left home to attend a postsecondary institution. None of the studies that comprise children under the age of 19, including the current study, have attempted, or even have the necessary information, to exclude from their estimates fathers whose children have moved away to attend a postsecondary institution in another location. As such, researchers should be aware of the implications of including older children. Ultimately, social scientists must pursue methods that result in more accurate estimates of nonresidential fatherhood.

As noted earlier, U.S. and Canadian studies have imposed a different threshold when evaluating the proportion of time that fathers share a residence with their children. The U.S. employed the most stringent definition, by treating fathers who live on a part-time basis with one or more children as residential fathers. Even so, the prevalence of nonresidential fatherhood was far higher in the United States than in Canada (26.9 versus 17.4 per cent). This large gap suggests that nonresidential fatherhood is a more dominant force in the lives of American families than it is in Canadian families. This also raises questions about the extent to which estimates would need to be upwardly revised should American researchers begin to count fathers who share their residence with one or more children on a part-time basis as nonresidential fathers.

Estimates in the current study were somewhat comparable to prior Canadian research, with slight variation in the threshold at which fathers were considered nonresidential. Beaupré and her colleagues (2010) distinguished between fathers who lived on a full-time basis with all their children and those fathers who had a separate residence from one or more children on a full- or part-time basis. Thus, when fathers lived with one or more children less than half the time, the current study and the study by Beaupré and colleagues similarly treated these fathers as nonresidential. Once co-residence exceeded the 50 per cent threshold, the current study treated these fathers as co-residential, whereas Beaupré and her colleagues did not. Not surprisingly then, the estimates reported by Beaupré and her colleagues are slightly higher than what was obtained in the current study (19.4 versus 17.4 per cent).

Despite differences from prior work in how nonresidential fatherhood was measured, the findings of current study offer some important insights. First, this study reveals how an address-based approach can be blind to instances of family complexity. In most large-scale surveys, scholars have too narrowly focused on family relationships within a selected household. In doing so, they overlook questions that make it possible to identify family members who reside elsewhere. When such information is available, hidden complexity comes into view. Such was the case in the current study, where approximately one in seven (13.7 per cent) nonresidential fathers met the criteria for living in an intact household. In other words, the father and his partner were the biological or adopted parents of all children in the household, but he was also father to at least one child under the age of 19 living elsewhere on a part- or full-time basis. As such, the findings of the current study reinforce the notion that relying solely on an address-based approach can undermine the conclusions that researchers make about families.

This hidden form of family complexity also raises questions about how such fathers are treated by the institutions they come into contact with, and whether their unique needs are being recognized. Income taxes, eligibility for social programs, and the level of claimable benefits are often determined by the configuration of the household. The absence of clear guidelines for complex families, including how to count children who divide their time across multiple households, perpetuates existing tensions and competing interests in policies and programs (Carlson and Meyer 2014). Policymakers are under increasing pressure to ensure their programs have their intended effect and do not unfairly treat those who belong to a complex family. Formulating appropriate responses in the policy arena depends on making complex families visible, lending urgency to the task of systematically investigating how families are changing in the Canadian population.

Second, in assessing the social and demographic correlates of nonresidential fatherhood in Canada, the results of this study correspond with what researchers have discovered elsewhere. In particular, the current study found that nonresidential fathers had attained lower levels of education, reported less income, and were more likely to be outside a marital union than were co-residential fathers. Similar associations have been reported in the U.S. (Carlson et al. 2017; Jones and Mosher 2013; Livingston and Parker 2011) and in the U.K. (Dermott 2016; Kiernan 2006; Poole et al. 2016). This is the first study, however, to detect these associations in the Canadian population. That these disadvantages were more common among nonresidential fathers in Canada, even

though the definition of nonresidential fatherhood was different from what has been used elsewhere, gives credence to the argument that nonresidential fathers and their families constitute a vulnerable segment of the population. These findings also suggest variation in nonresidential fatherhood across Canada. The prairie provinces accounted for disproportionately more nonresidential fathers across the country than elsewhere. Given that the 2012 LISA survey took place during a boom in the oil industry, with many fathers commuting from distant provinces to work in the oilfields of Alberta and Saskatchewan, this finding was not entirely unexpected. Whether this association holds in the more recent environment of low oil prices is an open question, but can and should be investigated in subsequent waves of the LISA survey.

Finally, the results of this study highlight the need to refine existing measures of nonresidential fatherhood. At issue is achieving consensus on how to categorize household members who simultaneously occupy multiple residences. Up until now, researchers studying nonresidential fatherhood have largely avoided taking up this issue. Nonetheless, the pitfalls of assigning children to a single household are becoming apparent. For example, one study in France found that half of the children categorized as living with their fathers were, in fact, dividing their time between the households of their estranged parents (Toulemon and Pennec 2010). As this article has made clear, some researchers would have classified these fathers as nonresidential fathers, whereas others would have categorized them as residential fathers. Resolving these discrepancies in measurement must command greater attention in future research.

Viewing this issue from the perspective of family complexity, I have posited that fathers who live on a part-time basis with one or more dependent children should not be treated in the same way as fathers who live with all of their children on a full-time basis. To the extent that part-time fathers must allocate resources across multiple households and navigate ambiguity in their roles and responsibilities, their experiences may more closely resemble those of a complex family. Whether this classification is appropriate could not be determined in the present study, but bears careful investigation and verification in empirical research in the future. Importantly, researchers should not be bound to dichotomous measures of nonresidential fatherhood, but strive instead for measures that meaningfully capture the wide variability that exists in the actual living arrangements of fathers and their children.

Of course, this task is not possible without high quality data. As such, the current study joins with a growing chorus of researchers advocating for a new generation of surveys that are sensitive to the myriad ways in which families exhibit complexity (Manning 2015; Tach 2015; Waller and Jones 2014). This means that survey researchers must be willing to move beyond address-based approaches and plumb more deeply into what it means to hold membership in multiple households simultaneously. There can be no doubt that the need to address this data gap is likely to become more pressing as the twenty-first century unfolds.

Limitations and future directions

One limitation of population-based surveys that rely on men providing information about their children is that the prevalence of nonresidential fatherhood may be undercounted. First, not all men are willing to acknowledge (and some may even be unaware of) all the children they have fathered. Second, by design, population-based surveys exclude men living in institutions, thereby overlooking one way that fathers come to live apart from their children. Research in the United States, for example, suggests that more than half of incarcerated men are the parents of minor children (Glaze and Maruschak 2008). To better estimate its true prevalence, researchers should consider other methods for assessing nonresidential fatherhood in the population. This might involve taking the child as the unit of analysis and probing resident adults for further information when the biological father is absent. Alternatively, researchers might obtain the perspectives of different household members, which are known to vary widely in terms of identifying who is seen as family (Carlson and Meyer 2014; Waller and Jones 2014).

The most serious shortcoming of the current study is that data constraints precluded knowing the proportion of time fathers shared the same residence as their children. Instead, the proportion of time spent in the same household had to be inferred from a child's presence on the household roster. Misclassifying nonresidential fathers was most likely to occur in instances when fathers shared a residence with one or more children

precisely half of the time, because assignment to the category of nonresidential father was made on the basis of whether the child was present on the day of interview. While this information will become available from the third wave of the LISA survey onward, its absence on the current dataset made it impossible to test different thresholds or move beyond binary categories in deriving a measure of nonresidential fatherhood.

One potential future advantage of the LISA is that it is a longitudinal household panel survey. All household members in the first wave maintain their status as longitudinal respondents, and will be re-interviewed on a biennial basis, regardless of where they live. Consequently, this research design will help social scientists to obtain a more dynamic picture of family living arrangements. In particular, researchers will have the opportunity to better understand pathways in and out of nonresidential fatherhood. Identifying the routes that lead fathers to live apart from their children is important, because they could potentially signal different ways in which fathers interact with or allocate resources to their children. Fathers who live apart from their children following divorce are likely to have very different experiences than are fathers who have never shared a residence with their biological children, as occurs when fathers have only maintained a romantic relationship with the mother of his children (Tach and Edin 2011), and be different yet again from fathers who do not reside with their children because they are incarcerated. Similarly, longitudinal research can also shine light on the fluidity of contemporary families, by revealing whether children who are living apart from their fathers at one point in time ever come to share a residence with their fathers at a later date. Finally, longitudinal research may also address the thorny problem of selection. If men with few resources and low personal skills are more likely to experience nonresidential fatherhood, and men who are more advantaged and have high personal skills are less likely to experience nonresidential fatherhood, researchers cannot easily disentangle the consequences of family complexity with its antecedents (Furstenberg 2014).

Conclusion

Family complexity is slowly becoming a fixture of Canadian society, yet few studies have documented its scope, let alone assessed its consequences. Family complexity challenges basic assumptions about the roles, obligations, and resource-sharing functions of the family unit. As the living arrangements of fathers and their children become ever more diverse, researchers must strive to capture these variations in their measures. Importantly, existing discrepancies in the measurement of nonresidential fatherhood must be resolved; otherwise, researchers will be hampered in their ability to conduct comparative analyses or to advance knowledge. The current study offers modest suggestions for moving this field of research forward, but makes clear that further work, both in Canada and elsewhere, will be needed to better understand nonresidential fatherhood and how it is reshaping family life in the twenty-first century.

Acknowledgments

Funding for this research comes from a SSHRC Insight grant (435-2014-0268). The research and analysis are based on data from Statistics Canada, but the opinions expressed do not represent the views of Statistics Canada. Earlier versions of this paper were presented at the 2015 PAA meetings in San Diego and the 2015 FCD Conference in Ottawa.

References

- Altintas, E., and O. Sullivan. 2016. Fifty years of change updated: Cross-national gender convergence in housework. *Demographic Research* 35:455–70.
- Australian Bureau of Statistics. 2006. *Australian Social Trends, 2006*. <http://www.abs.gov.au/AUSSTATS/abs@.nsf/7d12b0f6763c78caca257061001cc588/5a3e269e290eb5b1ca2571b0001032d8!OpenDocument> (retrieved October 2016)
- Beaupré, P., H. Dryburgh, and M. Wendt. 2010. Making fathers ‘count’. *Canadian Social Trends* 90:26–34.

- Berger, L.M., and S.H. Bzostek. 2014. Young adults' roles as partners and parents in the context of family complexity. *Annals of the American Academy of Political and Social Science* 654:87–109.
- Brown, S., and W.D. Manning. 2009. Family boundary ambiguity and the measurement of family structure: The significance of cohabitation. *Demography* 46:85–101.
- Carlson, M.J., and L.M. Berger. 2013. What kids get from parents: Packages of parental involvement across complex family forms. *Children and Youth Services Review* 87(2):213–49.
- Carlson, M.J., and S.S. McLanahan. 2004. Early father involvement in fragile families, in *Conceptualizing and Measuring Father Involvement*, edited by R. Day and M. Lamb. Mahwah, NJ: Lawrence Erlbaum Associates, p. 241–71.
- Carlson, M.J., and D.R. Meyer. 2014. Family complexity: Setting the context. *Annals of the American Academy of Political and Social Science* 654:6–11.
- Carlson, M.J., A.G. VanOrman, and K.J. Turner. 2017. Fathers' investment of time and money across residential contexts. *Journal of Marriage and Family* 79(Feb):10–23. (DOI:10.1111/jomf.12324)
- Cherlin, A.J. 2009. *The Marriage-Go-Round: The State of Marriage and the American Family Today*. New York: Knopf.
- Cherlin, A.J., and J.A. Seltzer. 2014. Family complexity, the family safety net, and public policy. *Annals of the American Academy of Political and Social Science* 654:12–30.
- Dermott, E. 2016. Non-resident fathers in the UK: Living standards and social support. *Journal of Poverty and Social Justice* 24(2):113–25.
- Fomby, P., J.A. Goode, and S. Mollborn. 2016. Family complexity, siblings, and children's aggressive behavior at school entry. *Demography* 53(1):1–26.
- Furstenberg, F.F., Jr. 2014. Fifty years of family change: From consensus to complexity. *Annals of the American Academy of Political and Social Science* 654:87–109.
- Glaze, L.E., and L.M. Maruschak. 2008. *Parents in Prison and Their Minor Children*. Washington, DC: Bureau of Justice Statistics. Available at <http://www.bjs.gov/index.cfm?ty=pbdetail&iid=823>
- Goldscheider, F., E. Bernhardt, and T. Lappegård. 2015. The gender revolution: A framework for understanding changing family and demographic behavior. *Population and Development Review* 41(2):207–39.
- Greene, M.E., and A.E. Biddlecom. 2000. Absent and problematic men: Demographic accounts of male reproductive roles. *Population and Development Review* 26(1):81–115.
- Hemeon, J. 2016. Historical data linkage quality: The longitudinal and international study of adults, and tax records on labour and income. Cat. 89-648-X. Ottawa: Statistics Canada.
- Jones, J., and W.D. Mosher. 2013. Fathers' involvement with their children: United States, 2006–2010. *National Health Statistics Reports* 71:1–21.
- Juby, H., and C. LeBourdais. 1998. The changing context of fatherhood in Canada: A life course analysis. *Population Studies*, 52(2):163–75.
- Kiernan, K. 2006. Non-residential fatherhood and child involvement: Evidence from the Millennium Cohort Study. *Journal of Social Policy* 35(4):651–69.
- Lamb, M.E. 2010. *The Role of the Father in Child Development*. New York: Wiley.
- Livingston, G., and K. Parker. 2011. *A Tale of Two Fathers: More Are Active, but More Are Absent*. Washington, DC: Pew Research Center.
- Manning, W.D. 2015. Family formation processes: Assessing the need for a new nationally representative household panel survey in the United States. *Journal of Economic and Social Measurement* 40:171–93.
- Manning, W.D., S.D. Stewart, and P.J. Smock. 2003. The complexity of fathers' parenting responsibilities and involvement with nonresident children. *Journal of Family Issues* 24(5):645–67.

- McGene, J., and V. King. 2012. Implications of new marriages and children for coparenting in nonresident father families. *Journal of Family Issues* 33(12):1619–41.
- McLanahan, S. 2009. Fragile families and the reproduction of poverty. *Annals of the American Academy of Political and Social Science* 621:111–31.
- Mollborn, S., and P.J. Lovegrove. 2011. How teenage fathers matter for children: Evidence From the ECLS-B. *Journal of Family Issues* 32(1):3–30.
- Nock, S.L. 2000. The divorce of marriage and parenthood. *Journal of Marriage Therapy* 22:245–63.
- Poole, E., S. Speight, M. O'Brien, S. Connolly, and M. Aldrich. 2016. Who are non-resident fathers? A British sociodemographic profile. *Journal of Social Policy* 45(2):223–50.
- Statcan. 2014. *Longitudinal and International Study of Adults, 2012: User Guide*. Ottawa: Statistics Canada.
- Tach, L. 2015. Social mobility in an era of family instability and complexity. *The Annals of the American Academy of Political Science* 657:83–96. (DOI: 10.1177/0002716214547854)
- Tach, L., and K. Edin. 2011. The relationship contexts of young disadvantaged men. *The Annals of the American Academy of Political Science* 635:76–94. (DOI: 10.1177/0002716210393680)
- Tach, L., K. Edin, H. Harvey, and B. Bryan. 2014. The family-go-round: Family complexity and father involvement from a father's perspective. *Annals of the American Academy of Political and Social Science* 654:169–84.
- Tach, L., R. Mincy, and K. Edin. 2010. Parenting as a 'package deal': Relationships, fertility, and nonresident father involvement among unmarried parents. *Demography* 47:181–204.
- Toulemon, L., and S. Pennec. 2010. Multi-residence in France and Australia: Why count them? What is at stake? Double counting and actual family situations. *Demographic Research* 23(1):1–40.
- Waller, M.R., and M.R. Jones. 2014. Who is the residential parent? Understanding discrepancies in unmarried parents' reports. *Journal of Marriage and Family* 76:73–93.

Changing BMI scores among Canadian Indigenous and non-Indigenous children, youth and young adults: Untangling age, period, and cohort effects

Piotr Wilk¹
Alana Maltby
Martin Cooke

Abstract

The objective of this study was to examine age, period, and cohort effects on BMI among Indigenous and non-Indigenous populations, using repeated cross-sectional survey data from the CCHS (2001 to 2014). Cross-classified random-effects two level models were used to estimate fixed effects for age and its quadratic term (Level 1), and also estimate random effects for time periods and birth cohorts (Level 2), while controlling for the effects of Level 1 control variables: sex, model of interview, and response by proxy. Overall, the results support the hypothesis that age and period effects are primarily responsible for the current obesity epidemic.

Keywords: age-period-cohort analysis; BMI; CCHS; Canada; obesity.

Résumé

L'objectif de cette étude était d'examiner les effets de l'âge, de la période et de la cohorte sur l'IMC chez les populations autochtones et non autochtones, en utilisant des données d'enquêtes transversales répétées de l'ESCC (2001 à 2014). On a utilisé des modèles à deux niveaux à effets aléatoires croisés pour estimer les effets fixes pour l'âge et son terme quadratique (niveau 1), et également estimer les effets aléatoires pour les périodes et les cohortes de naissance (niveau 2), tout en contrôlant les effets du niveau 1 Variables de contrôle: sexe, modèle d'interview et réponse par procuration. Dans l'ensemble, les résultats confirment l'hypothèse selon laquelle les effets de l'âge et de la période sont les principaux responsables de l'épidémie actuelle d'obésité.

Mots-clés : analyse de l'âge, de la période et de la cohorte; l'IMC; l'ESCC; Canada; obésité.

Introduction

Overweight and obesity is a critical public health issue worldwide, and is associated with the prevalence of co-morbidities such as type 2 diabetes, cancer, and cardiovascular diseases (Guh et al. 2009). Between 1980 and 2013, the combined global rates of overweight and obesity among children rose 47.1 per cent, and 27.5 per cent for adults (Ng et al. 2014). In total, from 1980 to 2013, the number of individuals with overweight and obesity has risen from 857 million to 2.1 billion (Ng et al. 2014). Within Canada, approximately one-third of 5- to 17-year-olds are overweight or obese; 19.8 and 11.7 per cent, respectively (Roberts et al. 2012). Among Canadians 18 years and older, 33.6 per cent could be classified as overweight and 18.3 per cent as obese (Twells et al. 2014). It has been estimated that by 2019, approximately 55 per cent of Canadians will be overweight or obese (Twells et al. 2014). These trends are worrisome given that the prevalence and severity of obesity has been found to negatively impact population life expectancy in the United States (Olshansky et al. 2005). Olshansky and colleagues highlight that the rise of obesity rates among children in particular may worsen this effect, with the result that life expectancy might

1. Piotr Wilk (corresponding author), Department of Epidemiology & Biostatistics and Paediatrics, Western University, Room K201, Kresge Building, 1151 Richmond Street, London ON, Canada N6A 5C1, email: piotr.wilk@schulich.uwo.ca; Alana Maltby, Department of Epidemiology & Biostatistics and Paediatrics, Western University, London ON; and Martin Cooke, School of Public Health and Healthy Systems, University of Waterloo, Waterloo ON.

decrease for recently born cohorts (Olshansky et al. 2005). If this pervasive and difficult public health problem is not addressed, further population health consequences and impacts on mortality are likely (Preston 2005).

In Canada, obesity rates among Indigenous populations are particularly concerning, as they tend to be significantly higher than those among non-Indigenous Canadians (Ng et al. 2012). Given that obesity-related comorbidities, such as type 2 diabetes, are also high in this population (Amed et al. 2010), it is important to reduce the rates of overweight and obesity to prevent further chronic disease.

Indigenous populations in Canada are young and growing; 28 per cent of the Indigenous population is aged 14 and under, compared to 16.5 per cent of the total Canadian population, and about 7 per cent of all children in Canada are Indigenous (Statcan 2013). An important but often neglected fact is that the majority of Indigenous people in Canada, nearly 60 per cent in 2006, live outside of discrete Indigenous communities such as First Nations reserves, Inuit communities, and Métis settlements (Statcan 2013). Moreover, much of the recent growth in Indigenous populations, and therefore in the number of Indigenous children and youth, has occurred in cities and other off-reserve areas. Understanding the trends and dynamics of the health of these off-reserve Indigenous populations should therefore be a priority for researchers (Young 2003).

Overweight and obesity are associated with a variety of physical, emotional, and social consequences. Among children, they are a strong risk factor for the early onset of type 2 diabetes (Amed et al. 2010) and significantly increases the risk of obesity in adulthood (Srinivasan et al. 1996), with attendant implications for dyslipidemia, hypertension, and certain types of cancers (Bhaskaran et al. 2014; Srinivasan et al. 1996). They are also associated with osteoarthritis as well as other adverse health outcomes (Dietz 1998a, 1998b; Janssen et al. 2005; Lawlor and Leon 2005; Maffei and Tataru 2001). Psycho-social effects are also important. Children who are overweight can develop negative self-image and low self-esteem, with implications for older ages (Strauss 2000).

Taking into account that childhood overweight and obesity may continue into adulthood (Telama et al. 2005) and can have short- and long-term health consequences, it is critical to understand better how weight status changes across the life course. As well, understanding these age-related trends means considering whether or not they have changed across time periods, and for different birth cohorts.

This requires separating the effects of age, period, and cohort on the problem, using what has been known as *age-period-cohort analysis* (APC). *Age effects*, in this case, refer to the developmental changes that occur (biologically or socially) throughout the life course (Reither et al. 2009; Yang and Land 2008). *Period effects* refer to variations between calendar years, which may impact all age groups and birth cohorts simultaneously. This includes the broad effects of social changes or historical effects (Yang and Land 2008). Lastly, birth cohorts are defined as groups of people who experience historical or social events at the same age (Reither et al. 2009; Yang and Land 2008). As described by Keyes et al. (2010), a *cohort effect* can be understood as a period effect that is differentially experienced through age-specific exposure to changing or new environmental causes.

Hierarchical age-period-cohort analysis (HAPC) is a promising methodology that has been used to examine the independent effects of age, time period, and birth cohort for the prevalence of various health outcomes while overcoming some of the constraints of traditional APC methods (Yang and Land 2006). A notable problem with APC analysis is with model identification occurring from the mathematical linear dependency between age, period, and cohort [calendar year = birth year + age] (Yang and Land 2008). To address this issue, Yang and Land (2006, 2013) have proposed a HAPC approach, which allows for separate estimates of age, period, and cohort effects. Unlike the traditional APC method, the HAPC framework considers period and cohort effects to be “contextual,” while age is entered as an individual-level variable in a hierarchical model (Yang and Land 2013). Using a mixed-effect model is an appropriate alternative to the linear model as it does not assume fixed age, period, or cohort effects that are additive (Yang and Land 2013), thereby removing the identification problem.

Previous studies have employed a HAPC framework to explore trends in overweight and obesity (Fu and Land 2015; Reither et al. 2009; Yang and Land 2013). The results of these studies indicate that trends in age typically show a lower average body mass index (BMI) scores amongst younger people that steadily increases with age, followed by a decrease in older adult ages (Jiang et al. 2013). Secular changes in diet and levels of physical activity across time (period effects) are generally thought to be the root of the current obesity epidemics (An and Xiang 2016; Reither et al. 2009). However, analyses of data in the United States (Reither et al. 2009; Robinson et al. 2013), China (Fu and Land 2015; Jaacks et al. 2013), Japan (Yamakita et al. 2014), and Australia

(Allman-Farinelli et al. 2008) have found unique effects of birth cohort membership as well. Rapid social and environmental changes over recent decades have meant that succeeding birth cohorts have grown up in decidedly different social, technological, and physical environments. These changed environments affect not only their behaviours in terms of their diets and physical activity, but also their expectations and preferences with regard to lifestyles, social activity, and other factors that indirectly affect the risk of overweight and obesity (Reither et al. 2009).

It is not surprising that given the current obesogenic environment, more recent birth cohorts are more at risk for overweight and obesity compared to past cohorts (Reither et al. 2009). These effects might be even stronger among cohorts of Indigenous peoples, who are not only at higher risk of overweight and obesity, but also might have experienced even more rapid social change than the non-Indigenous Canadian population. Thus, understanding the reasons for changing trends in weight status requires careful attention to the three unique effects of age, period, and cohort.

To our knowledge, assessment of age, period, and cohort effects has not been carried out in a Canadian context since 2009 (Ng et al. 2012), and therefore needs to be updated to continue to monitor trends in weight status among Canadians, and among Indigenous populations in particular. Using data from the longitudinal National Population Health Survey (NPHS), Ng and colleagues examined BMI trajectories among Indigenous ($n=311$) and non-Indigenous Canadians ($n=10,967$) living off-reserve between 1994 and 2009 (Ng et al. 2012). Respondents were divided into five birth cohorts (1940s, 50s, 60s, 70s, and 80s) and linear growth curve models were estimated. That analysis found that Indigenous Canadians had experienced a greater average BMI increase between 1994 and 2009 than did non-Indigenous Canadians, and that Indigenous people born in the 1960s and 70s had even higher BMI scores, rising more quickly than those born before or after (Ng et al. 2012). The authors speculate that the faster BMI increase among those born in the 1960s and 70s may be a result of birth cohort membership, and that this generation of Indigenous people could have experienced substantial cultural and social shifts that negatively influenced their health status (Ng et al. 2012). On the other hand, the result could also be due to differences that are age-related and specific to the Indigenous Canadians.

As Ng, Corey et al.'s (2012) study used NPHS data, only off-reserve First Nations, Inuit, and Métis populations in the ten provinces were included. Additionally, as the data were longitudinal, the study was limited to cohorts born before the 1980s and a relatively high rate of attrition, observed at the latest periods of data collection ($n=1,408$ in 1994/95 to $n=971$ in 2008/09), limited the generalizability of the results. The present study hopes to address some of these limitations by using cross-sectional data from repeated waves of the Canadian Community Health Survey (CCHS), which provide a much larger sample of Indigenous respondents and are not affected by attrition. Additionally, although the CCHS also does not sample on-reserve populations, it does include populations from the three Canadian territories (which have majority Indigenous populations). Finally, using HAPC analysis may offer a different analytical framework to address research questions involving assessment of the independent effects of age, period, and cohort. Taking into account that most of the current Canadian survey data containing information on Indigenous peoples are cross-sections, there is a need to develop methodological techniques that will enable us to assess changing behaviours and patterns of health outcomes among various populations over time.

The objective of this study was therefore to conduct an analysis of age, period, and cohort effects on weight status among Indigenous and non-Indigenous children, youth, and young adults, using repeated cross-sectional survey data from the CCHS from 2001 to 2014.

Methods

Study populations

The CCHS is a repeated cross-sectional survey that began in 2000/01 and is primarily used for health surveillance and population health research (Statcan 2016).² The survey includes those 12 years and older living within the ten provinces and three territories of Canada. Seven cycles of the CCHS were used: 2001, 2003, 2005, 2007/08,

2. The data for this paper were provided by Statistics Canada through the Research Data Centres program. The analyses and interpretation are the authors' alone.

2009/10, 2011/12, and 2013/14.³ For the purpose of this study, a sample of respondents between 12 and 40 years old was selected. Within this sample, we identified a group of 20,247 (6.93 per cent) respondents who self-identified as belonging to one of three Indigenous identity groups in Canada (approximately 58.7 per cent First Nations, 11.5 per cent Inuit, and 29.7 per cent Métis) and a group of non-Indigenous respondents (N=291,883; 93.07 per cent). These two samples excluded respondents who indicated that they were pregnant at the time of the interview.

Measurement instruments

As direct measures of body fatness were not available in the CCHS, BMI was used to assess weight status. BMI was calculated using self-reported height and weight values from the CCHS [$\text{BMI} = \text{weight}(\text{kg}) / \text{height}^2(\text{m})$]. Although weight tends to be underreported and height to be overreported (Connor Gorber et al. 2007), it is assumed that this bias is consistent across time periods, birth cohorts, and age groups. In order to make our results more comparable to those of Ng and colleagues (2012), we decided to use BMI as the outcome variable, as opposed to overweight and obesity rates, which were used in other HAPC studies (Allman-Farinelli et al. 2008; Reither et al. 2009). The initial screening of BMI scores suggested that a small number of respondents had extremely high scores. To prevent these values from disproportionately affecting the result of the analysis, we removed any respondents with BMI scores greater than 80.

Age and a quadratic function of age were included in the models as individual-level focal variables. The quadratic term was added, as the BMI trajectory between age 12 and 40 is expected to follow a non-linear trend (Jaacks et al. 2013). Age was centered at the group mean, and divided by 10 to increase interpretability. Respondent-level control variables included in the analysis were sex, mode of interview, and an indicator whether survey responses had been given by a proxy. Interaction effects between sex and age variables were included as it is expected that BMI changes across the life course would differ between males and females (Allman-Farinelli et al. 2008). Mode of interview (e.g., in person or by telephone) was included as a control, as differences in the proportion of respondents interviewed by each mode across survey cycles might affect the distribution of reporting bias for the outcome variable (St-Pierre and Béland 2004). Interviews conducted by proxy may also be subject to bias.

Based on the year when data for each of the seven cycles of the CCHS were collected, we identified seven time periods: 2001, 2003, 2005, 2007/08, 2009/10, 2011/12, and 2013/14. To examine the effects of birth cohort on weight status, we constructed ten three-year synthetic birth cohorts: 1966–68, 1969–71, 1972–74, 1975–77, 1978–80, 1981–83, 1984–86, 1987–89, 1990–92, and 1993–95. Membership in each cohort was identified based on respondents' age at the time of survey and the year of the CCHS data collection. For instance, the 1981–83 cohort consists of respondents who were 18–20 years old in the 2001 cycle of the CCHS, 22–24 years old in the 2005 cycle of the CCHS, 26–29 years old in the 2009/10 cycle of the CCHS, and 30–33 years old in the 2013/14 cycle of the CCHS. These ten birth cohorts allowed us to examine time trends in BMI scores from 2001 to 2014, and to explore differences in these trends between the cohorts at ages 12 to 40.

Statistical analyses

Means for the BMI scores were derived in order to describe the time trends in weight status by age, time period, and birth cohort. Cross-classified random-effect two-level models were used to estimate fixed effects for age and its quadratic term (Level 1), and also to estimate random effects for time periods and birth cohorts (Level 2), while controlling for the effects of Level 1 control variables: sex, model of interview, and response by proxy. Separate statistics were computed for Indigenous and non-Indigenous respondents. In the CCHS, each respondent was assigned a cross-sectional sampling weight that represented his or her contribution to the total population. This weight took into account the CCHS multi-stage sampling design, and was adjusted to be calibrated with population projections of age and sex strata within each province; these sampling weights were also adjusted for survey non-response (Statcan 2016). Sampling weights were normalized to reflect the actual num-

3. Before 2007, the CCHS data were collected every two years, over a one-year period. In 2007 and later cycles, data were collected annually, with adjacent years combined by Statistics Canada to provide comparable sample sizes to the 2005 and earlier cycles.

bers of respondents participating in each cycle of the CCHS. Bootstrap weights were not used in this study, as they are not available for models with random effects. SAS 9.4 was used for all analyses (SAS Institute Inc. 2013).

Results

Descriptive statistics

Table 1 presents the means and proportions for the variables used in the analysis. The mean values for BMI across all age groups, time periods, and birth cohorts were 25.55 for Indigenous and 24.27 for non-Indigenous populations. Within the Indigenous population, 47.73 per cent were classified as overweight and 20.09 per cent as obese, compared to 37.28 and 11.90 per cent, respectively, among the non-Indigenous population. The average age was 25.18 for Indigenous people and 25.77 for non-Indigenous people.

Table 1. Means and proportions for non-Indigenous and Indigenous populations

	non-Indigenous	Indigenous
Weight status		
BMI (kg/m ²)	24.27	25.55
Overweight	37.28	47.73
Obese	11.90	20.09
Age (yrs.)	25.77	25.18
Sex: male	51.51	49.64
Interview mode: in person	39.63	44.79
Interview by proxy	2.75	2.92

The mean values for BMI scores for all ten birth cohorts across the seven time periods are depicted in Table 2, separately for Indigenous and non-Indigenous respondents. The trends shown in Table 2 appear to

Table 2. Mean BMI for non-Indigenous and Indigenous populations by birth cohort and time period (kg/m²)

Time periods			Time periods					
Birth cohort	2001	2003	2005	2007/08	2009/10	2011/12	2013/14	Average
Non-Indigenous								
1966–68	25.36	25.46	25.62	25.98	27.03			25.60
1969–71	25.12	25.52	25.60	25.89	25.95	26.68		25.65
1972–74	24.91	25.31	25.64	25.75	25.91	26.65	26.88	25.70
1975–77	24.07	24.74	25.08	25.63	25.78	26.74	26.88	25.39
1978–80	23.34	24.28	24.62	25.19	25.33	25.79	26.57	24.82
1981–83	22.70	23.49	23.81	24.59	25.09	25.55	26.42	24.29
1984–86	21.48	22.32	23.24	23.91	24.52	25.09	25.67	23.51
1987–89	20.16	21.11	22.11	23.25	23.71	24.55	24.83	22.70
1990–92		19.83	20.60	21.85	22.87	23.70	24.49	22.29
1993–95			19.31	20.21	21.36	22.52	23.16	21.66
Average	23.51	23.82	23.99	24.30	24.56	25.06	25.49	24.27
Indigenous								
1966–68	27.30	28.29	28.64	26.93	27.71			27.88
1969–71	26.96	26.84	27.48	27.12	27.97	26.37		27.19
1972–74	26.72	27.68	26.67	27.79	27.96	28.49	29.42	27.72
1975–77	26.21	26.78	27.92	26.68	28.98	27.41	29.54	27.64
1978–80	24.39	27.02	25.94	26.02	26.42	27.74	27.45	26.48
1981–83	23.51	25.07	24.84	25.46	26.70	26.57	27.19	25.70
1984–86	22.12	23.61	24.93	24.80	25.84	26.64	26.93	25.02
1987–89	20.60	21.79	22.78	23.02	24.91	25.12	26.82	23.68
1990–92		20.94	22.00	22.79	23.31	24.52	25.01	23.33
1993–95			20.47	20.82	22.30	23.27	24.96	22.63
Average	24.77	25.39	25.36	24.78	25.70	26.15	26.84	25.55

be very linear for the non-Indigenous group; at each time period, BMI increases for each successive cohort. Among the Indigenous group, there are some deviations from the expected linear trends. For example, within the Indigenous cohort born in 1975–77, BMI is higher during the 2005 time period but decreases in 2007/08, followed by another increase in 2009/10. For both groups, more recently born cohorts have lower BMI than earlier-born cohorts.

HAPC Analysis – BMI changes between ages 12 and 40

Table 3 presents the results from the HAPC analysis, separately for Indigenous and non-Indigenous Canadians. In both populations, age ($p < 0.0001$) and sex ($p < 0.0001$) were found to have statistically significant effects. Interaction effects between sex and a quadratic function of age were also statistically significant in the two populations ($p < 0.0012$ and $p < 0.0001$), although the interaction effect involving the linear age variable was significant only in the non-Indigenous population ($p < 0.0001$).

Figure 1 presents the BMI changes between ages 12 and 40 for Indigenous and non-Indigenous respondents, and by sex. On average, the BMI scores were higher for Indigenous than for non-Indigenous Canadians, although 12-year-old Indigenous girls and boys had very similar BMI compared to non-Indigenous girls and boys of the same age. Between the ages of 12 and 40, Indigenous males' BMI increased at a faster rate compared to Indigenous females; however, overall increases in average BMI for Indigenous males (7.73) and females (7.50) were comparable and higher than for non-Indigenous males and females. Non-Indigenous females (4.98), in particular, experienced a noticeably smaller increase in average BMI than any other group, including non-Indigenous males (5.96). These findings suggest that Indigenous and non-Indigenous females and males experience different patterns of change in BMI as they age.

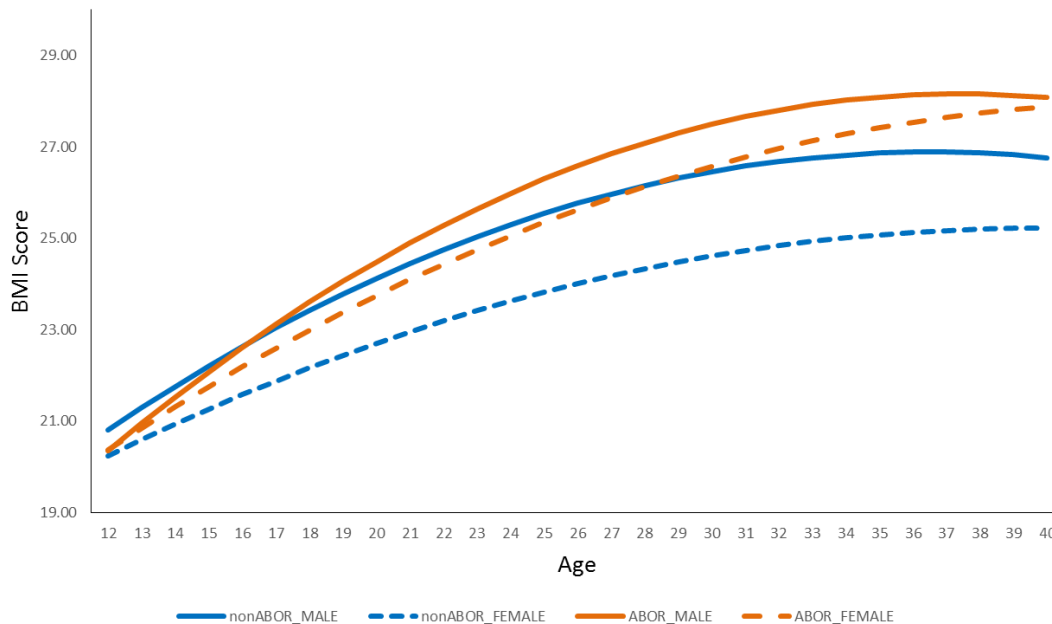


Figure 1. BMI changes between ages 12 and 40 for Indigenous and non-Indigenous males and females.

HAPC analysis period and cohort effects on BMI from 2001 to 2014

Level 2 variances for period and cohort effects were both found to be statistically significant only for the non-Indigenous group. The results indicate that after controlling for age and other covariates, across-cohort variance in the non-Indigenous population was 0.021 ($p < 0.05$), and across-period variance was 0.096 ($p < 0.05$). However, most of the variance in BMI scores was still due to individual-level differences (21.312; $p < 0.0001$).

Significant effects for specific time periods were found for both Indigenous and non-Indigenous groups, despite the lack of statistically significant effects in the overall level 2 variances in the Indigenous group. In this

Table 3. Estimates from HAPC models for non-Indigenous and Indigenous populations, 2001–14

Effect	non-Indigenous				Indigenous			
	Estimate	Std error	<i>t</i> -value	<i>p</i> value	Estimate	Std error	<i>t</i> -value	<i>p</i> value
Fixed effects								
Intercept	23.852	0.128	186.75	<0.0001	25.560	0.168	152.42	<0.0001
Age	1.885	0.047	39.71	<0.0001	2.715	0.112	24.35	<0.0001
Age ²	–0.654	0.025	–26.11	<0.0001	–0.763	0.106	–7.21	<0.0001
Sex								
Male	1.730	0.026	66.46	<0.0001	0.954	0.112	8.52	<0.0001
Female	Reference							
Age × Sex	0.408	0.023	17.45	<0.0001	0.101	0.102	0.99	0.3237
Age ² × Sex	–0.358	0.032	–11.29	<0.0001	–0.444	0.137	–3.25	0.0012
Interview mode								
In person	0.081	0.019	4.37	<0.0001	0.153	0.079	1.95	0.0507
By phone	Reference							
Response by proxy								
Yes	–0.128	0.066	–1.93	0.0535	0.156	0.291	0.54	0.5924
No	Reference							
Random effects								
Period								
2001	–0.333	0.123	–2.71	0.007	–0.186	0.162	–1.14	0.253
2003	–0.216	0.121	–1.79	0.073	0.303	0.152	2.00	0.046
2005	–0.201	0.120	–1.68	0.093	0.063	0.146	0.43	0.664
2007/08	–0.081	0.119	–0.68	0.499	–0.495	0.142	–3.49	0.001
2009/10	–0.018	0.120	–0.15	0.882	0.046	0.145	0.32	0.751
2011/12	0.333	0.122	2.74	0.006	–0.070	0.151	–0.47	0.641
2013/14	0.515	0.124	4.17	<0.0001	0.338	0.157	2.16	0.031
Birth cohorts								
1966–68	–0.168	0.080	–2.10	0.035	0.009	0.179	0.05	0.960
1969–71	–0.076	0.070	–1.09	0.278	–0.359	0.158	–2.27	0.023
1972–74	0.073	0.062	1.18	0.238	0.139	0.145	0.96	0.338
1975–77	0.083	0.056	1.49	0.137	0.397	0.136	2.92	0.004
1978–80	0.040	0.053	0.75	0.452	–0.085	0.130	–0.66	0.512
1981–83	0.131	0.053	2.49	0.013	–0.173	0.130	–1.33	0.184
1984–86	0.119	0.056	2.13	0.033	0.117	0.131	0.89	0.372
1987–89	0.072	0.062	1.17	0.243	–0.155	0.138	–1.13	0.260
1990–92	0.008	0.070	0.11	0.914	0.020	0.150	0.13	0.896
1993–95	–0.281	0.081	–3.47	0.001	0.091	0.169	0.54	0.590
Variances								
Period	0.096	0.057	1.70	0.044	0.093	0.059	1.57	0.058
Cohort	0.021	0.011	1.93	0.027	0.061	0.038	1.60	0.054
Residual	21.318	0.059	362.36	<0.0001	29.073	0.299	97.26	<0.0001
Fit statistics								
–2 Res Log Likelihood		1673215			130280			
AIC		1673221			130286			
AICC		1673221			130286			
BIC		1673221			130286			

group, significant period effects were found for years 2003, 2007/08, and 2013/14, with all *p*-values < 0.05, suggesting that average BMI for these periods differs from overall average BMI across all periods (reference value). For the non-Indigenous population, statistically significant effects were found for years 2001, 2011/12, and 2013/14, with all *p*-values < 0.01. Statistically significant birth cohort effects were also found for both populations. For Indigenous people born in 1969–71 and 1975–77, cohort effects were statistically significant (*p* < 0.05), whereas non-Indigenous 1966–68, 1981–83, 1984–86, and 1993–95 cohorts had higher BMI scores than the overall average BMI across all cohorts.

To examine the effects of time period on weight status, we displayed the estimates from the HAPC models (with confidence intervals) at seven different time periods: 2001, 2003, 2005, 2007/08, 2009/10, 2011/12, and 2013/14. Figure 2A presents the results for Indigenous and Figure 2B for non-Indigenous populations. These results indicate that the period-specific BMI scores for non-Indigenous group followed a steady linear trend, increasing from 2001 to 2009/10 then increasing at an accelerated rate from 2009/10 to 2013/14. For non-Indigenous people, only the specific effects for 2003, 2007/08, and 2013/14 demonstrated statistically significant differences in BMI scores from the average BMI score. However, as is clearly visible in Figure 2A, the pattern of period-specific effects is not the same for the Indigenous population; no clear trend for the overall period effects can be identified, and the results are more difficult to interpret.

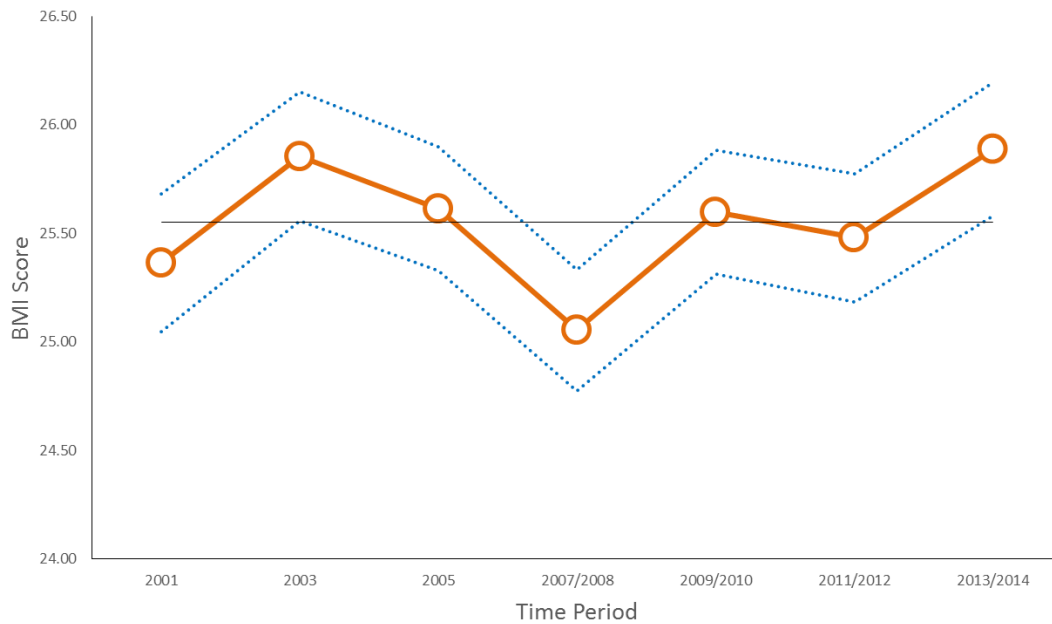


Figure 2A. The effects of time period on weight status for the Indigenous population.

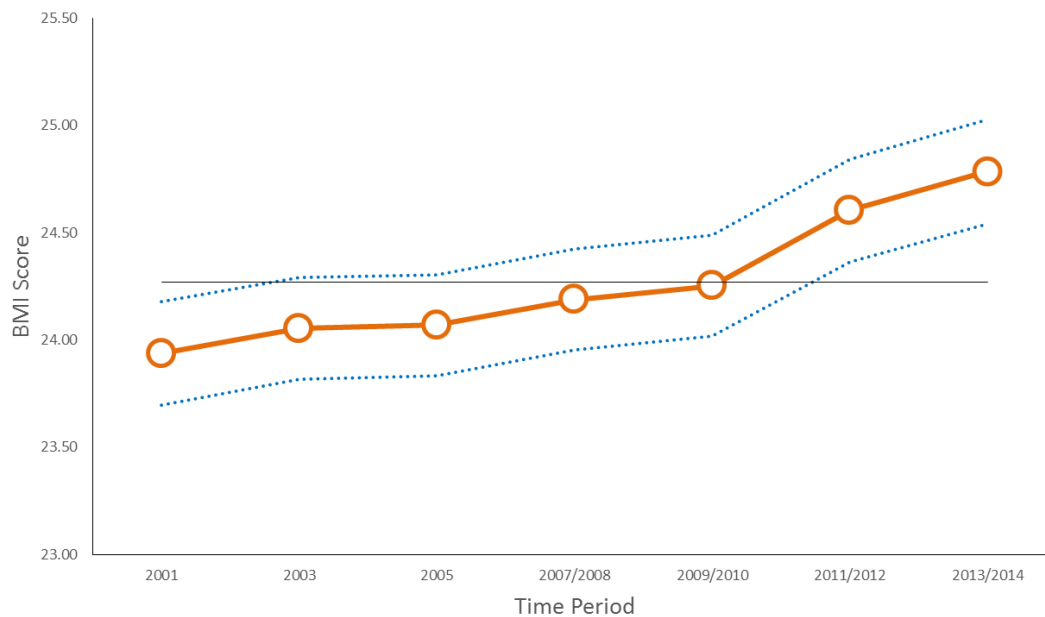


Figure 2B. The effects of time period on weight status for the non-Indigenous population.

To illustrate the estimated effects of birth cohort on weight status, we displayed the results from the HAPC analysis in Figures 3A and 3B for the birth cohorts 1966–68, 1969–71, 1972–74, 1975–77, 1978–80, 1981–83, 1984–86, 1987–89, 1990–92, and 1993–95. Figure 3A presents the results for Indigenous and Figure 3B for non-Indigenous populations. There is no clear pattern for specific birth cohort effects for the Indigenous population. Two of these cohorts (1969–71 and 1975–77) had average BMI scores that were statistically different from the overall BMI score. For the non-Indigenous population, the specific cohort effects for the oldest cohort (1966–68), two middle cohorts (1981–83 and 1984–86), and the youngest cohort (1993–95) were statistically significant. Figure 3B demonstrates an inverted U-shaped trend, with those in the earliest cohorts having lower BMI compared to the middle cohorts, who had higher BMI. The youngest cohorts, those born between 1993 and 1995, also were estimated to have lower BMI than the middle cohorts, controlling for age and period.

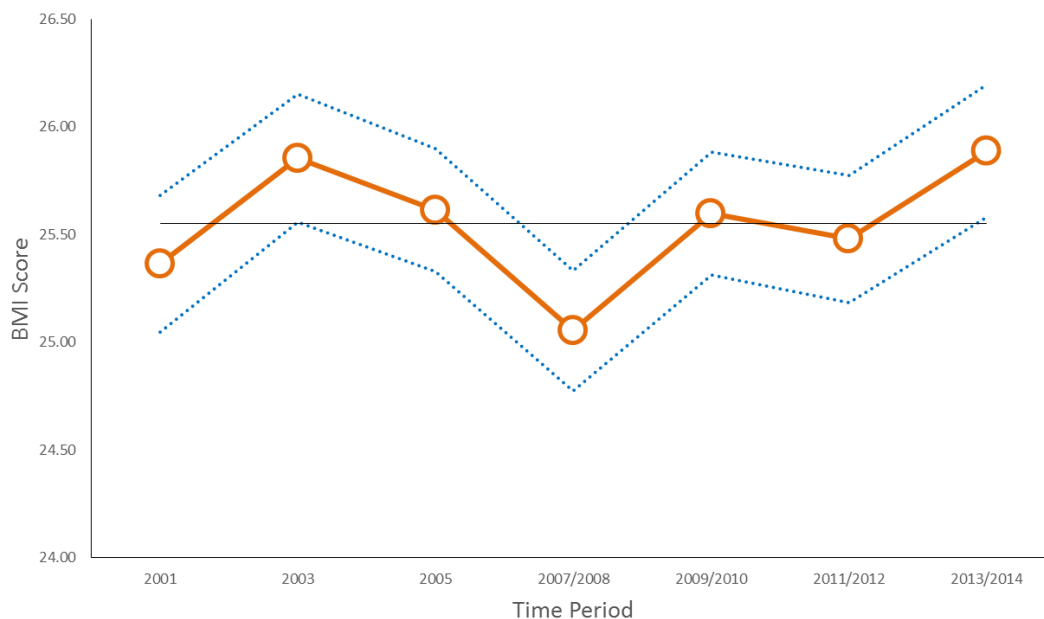


Figure 3A. *The effects of birth cohort on weight status for the Indigenous population.*

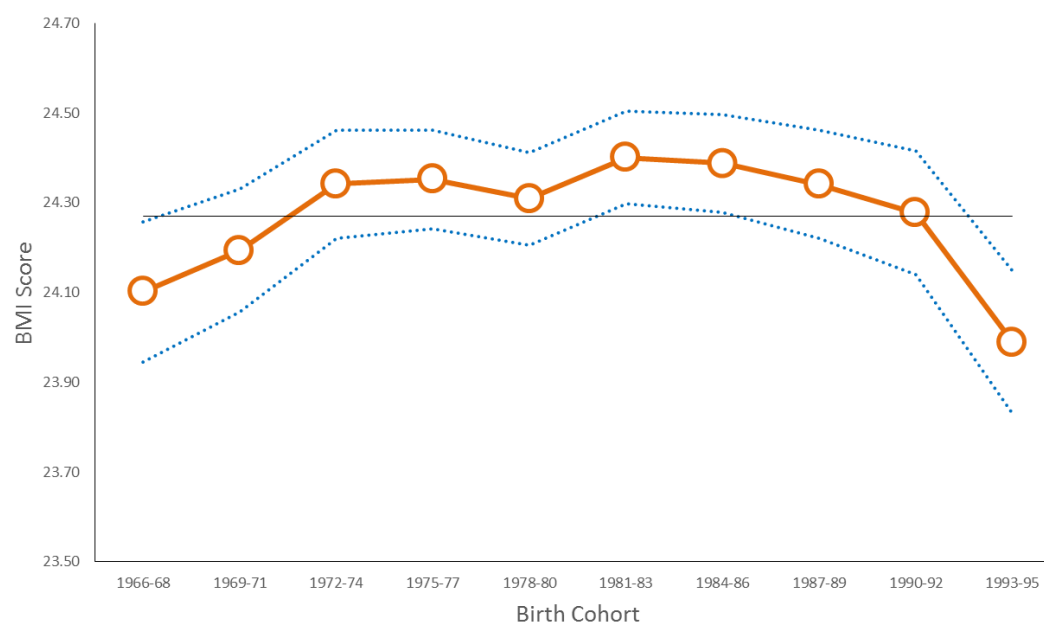


Figure 3B. *The effects of birth cohort on weight status for the non-Indigenous population.*

Discussion

Overweight and obesity continues to be an important public health issue among the Canadian population. Results from the current study indicate clearly that this remains particularly true for Indigenous peoples living off-reserve. Our analysis of the data from seven cycles of the CCHS suggests that close to 48 per cent of Indigenous people between ages 12 and 40, living off-reserve, were either overweight or obese; about 10 per cent more than non-Indigenous Canadians of the same age.

Results of the HAPC analysis suggest that the increase in BMI in the non-Indigenous Canadian population between 2000 and 2014 can be accounted for by age-related and secular (period) trends, as well as by cohort effects. Among Indigenous people, however, there was no clear evidence of period or birth cohort effects, which is likely due to the smaller sample size and differences in non-response patterns across time.

In terms of the age effect, we found that BMI increased with age among both Indigenous and non-Indigenous people. Previous studies have also found that BMI tends to increase with age, often followed by a decline in later life (Allman-Farinelli et al. 2008; Jaacks et al. 2013; Reither et al. 2009). However, as our sample only included those up to the age of 40, we were not able to observe a downward trend in BMI in later years. The effects of age were more pronounced among Indigenous people, with BMI increasing at a faster rate than in the non-Indigenous population. Within the Indigenous population, BMI increased at earlier ages among Indigenous males compared to Indigenous females; however, the average BMI scores for the two groups were almost identical at age 40. Compared to other groups, non-Indigenous females experienced the lowest increase in BMI. Previous studies have also indicated that overweight and obesity tend to be more prevalent among men (Statcan 2012), especially among Indigenous men (Katzmarzyk 2008; Tremblay et al. 2005), and the odds of overweight and obesity increase with age for both sexes (Statcan 2012; Tremblay et al. 2005).

Several studies investigating overweight and obesity trends using the HAPC approach have found statistically significant period effects (An and Xiang 2016; Jiang et al. 2013; Ng et al. 2012; Reither et al. 2009), suggesting that obesity epidemics may be due to nationwide changes over time that affect people of all ages (An and Xiang 2016). Reither and colleagues suggest the current obesity epidemic should be seen as principally due to period effects (Reither et al. 2009). In the current study, we found some evidence that period effects may play an independent role in explaining increasing rates of overweight among non-Indigenous Canadians. Specifically, the results of this study confirm that during the time period when the CCHS data were collected (2001–14), there was an upward trend in BMI scores that was independent of age and cohort.

Period effects were also found by Jiang and colleagues, who conducted a study using APC analysis on BMI trends in Ireland (Jiang et al. 2013), and both period and cohort effects were found in a recent longitudinal study conducted in China (Jaacks et al. 2013). Jiang and colleagues suggest that the period effects could be a result of dietary changes (e.g., increased consumption and availability of fast foods and takeaways) and a reduction in physical activities (Jiang et al. 2013). Similarly, Fu and Land (2015) examined the relationship between urban transformation and rising rates of overweight in China, and found that the period of increase in overweight coincided with China's urbanization (Fu and Land 2015). In comparison, Indigenous people in Canada have experienced even more rapid social change than the non-Indigenous population. However, in the current study, due to the relatively small sample size of Indigenous respondents and differences in non-response patterns across time, the results for the period effects were statistically insignificant and difficult to interpret.

In the United States, Reither et al. found that independent of age and period effects, birth cohort membership significantly increases the odds of becoming overweight (Reither et al. 2009). Birth cohort membership in our study was also related to weight status, controlling for age and period effects, for the non-Indigenous group. Prior research indicates that more recently born cohorts have a greater chance of becoming overweight than older cohorts (Allman-Farinelli et al. 2008; Jaacks et al. 2013; Reither et al. 2009). For example, Jaacks and colleagues found that younger Chinese cohorts have higher age-specific mean BMI than older cohorts (Jaacks et al. 2013). Unlike these studies, our results demonstrated that cohort trends among the non-Indigenous population followed an inverted U-shape pattern; while controlling for age and period, older and more recent cohorts have lower BMI compared to cohorts born between 1971 and 1989.

While this contradicts previous findings from other studies using HAPC analysis, it may suggest that BMI trends in Canada among younger cohorts are reversing or stabilizing; this has also recently been found among children and youth (3–19 years) using the CCHS from 2004/05 and the Canadian Health Measures Survey (CHMS) from 2009/13 (Rodd and Sharma 2016). According to Rodd and Sharma (2016) this may be a result of progress being made through public health initiatives and weight management programs. However, other researchers suggest that while preventive measures and treatment may be taking root, significant decreases in overweight and obesity are not yet occurring among this population (Jayaraman et al. 2016). In fact, Bancej et al. (2015) found that objectively measured BMI stabilized in children and adolescents but rose slightly in adults using data from the 2007–09, 2009–11, and 2012–13 cycles of the CHMS.

An and Xiang failed to find any consistent cohort effect in the US population; they suggest that given the strong period effect (along with the lack of cohort effect), the obesity epidemic may be primarily driven by nationwide changes over time that affect the entire population (An and Xiang 2016). Given the inconsistencies in the effects of birth cohort membership on BMI and the unexpected nature of these effects for the younger cohorts, further investigation is necessary.

Similar to the findings for period effects, birth cohort effects showed mixed results for Indigenous groups in this study. Our findings did not indicate a clear pattern for specific birth cohort effects, and the overall cohort effect was statistically non-significant. Comparably, research by Ng and colleagues was unclear whether cohort or age effects accounted for the divergent BMI trends among Indigenous Canadians (Ng et al. 2012). As this population has experienced profound social and cultural changes, investigating cohort effects using a larger sample of the population is warranted to better understand trends in overweight and obesity.

While this study provides important insight into the trends of weight status among the Canadian population, it is not without limitations. First, the height and weight data used to calculate BMI were self-reported, which tends to be subject to measurement error or social desirability bias (Connor Gorber et al. 2007; Shields et al. 2008). Moreover, it is unlikely that this bias is consistent across time, cohorts, and age groups. Given the tendency to underreport weight and overreport height, the study results would be a conservative account of the current weight status among these populations (Connor Gorber et al. 2007). Second, sampling in the CCHS does not include Indigenous populations living on reserve, and therefore the findings may not be generalizable to all Indigenous Canadians. As well, the Indigenous identity questions in the early waves of the CCHS make it impossible to separately identify First Nations, Inuit, and Métis groups, which may have different dynamics. Furthermore, due to a relatively small sample size and across-time differences in non-response patterns, the results for the Indigenous population are more difficult to interpret. Lastly, as the CCHS is a repeated cross-sectional study, no causal inferences can be made. Regardless, the use of a large, nationally representative sample is a strength of this study.

Conclusions

Overall, the results of this study give further support to the hypothesis that age and period effects are responsible for the current obesity epidemic. For the non-Indigenous population, all three effects were significant; however, cohort effects should be further investigated given the inconsistent results within the literature. Moreover, the non-significant effects for the Indigenous population highlight the need for better data among this group, in order to be able to explore trends in health.

It is evident that Indigenous Canadians experience higher rates of BMI compared to non-Indigenous Canadians, and therefore they may be at a greater risk for obesity-related co-morbidities. Furthermore, in line with the findings of Ng and colleagues, BMI tends to increase at a faster rate and be sustained longer among Indigenous peoples, which may have greater health implications (Ng et al. 2012). To curb the rates of overweight and obesity, especially among the Indigenous population in Canada, it may be necessary to develop nationwide initiatives that attend to changes in weight gain such as promoting healthy diet and physical activity. Specifically, targeting younger Indigenous people, particularly males, may help to lessen the rate at which BMI increases, thereby decreasing the severity and duration of overweight throughout the lifespan. Moreover, it would be

valuable for future research to explore changing patterns in more proximal determinants of health (e.g., health behaviours such as diet and physical activity), socioeconomic disadvantage, geographic variability (Public Health Agency of Canada 2011), and the influence of public health initiatives, as this would provide greater understanding of trends in overweight and obesity.

References

- Allman-Farinelli, M.A., T. Chey, A.E. Bauman, T. Gill, and W.P. James. 2008. Age, period, and birth cohort effects on prevalence of overweight and obesity in Australian adults from 1990 to 2000. *European Journal of Clinical Nutrition* 62(7):898–907.
- Amed, S., H.J. Dean, C. Panagiotopoulos, E.A. Sellers, S. Hadjiyannakis, T.A. Laubscher, D. Dannenbaum, B.R. Shah, G.L. Booth, and J.K. Hamilton. 2010. Type 2 diabetes, medication-induced diabetes, and monogenic diabetes in Canadian children: A prospective national surveillance study. *Diabetes Care* 33(4):786–91.
- An, R., and X. Xiang. 2016. Age-period-cohort analysis of obesity prevalence in US adults. *Public Health* 141:163–69.
- Bancej, C., B. Jayabalasingham, R.W. Wall, D.P. Rao, M.T. Do, M. de Groh, and G.C. Jayaraman. 2015. Trends and projections of obesity among Canadians. *Health Promotion and Chronic Disease Prevention in Canada: Research, Policy and Practice* 35(7):109–12.
- Bhaskaran, K., I. Douglas, H. Forbes, I. dos-Santos-Silva, D.A. Leon, and L. Smeeth. 2014. Body-mass index and risk of 22 specific cancers: A population-based cohort study of 5.24 million UK adults. *The Lancet* 384(9945):755–65.
- Connor Gorber, S., M. Tremblay, D. Moher, and B. Gorber. 2007. A comparison of direct vs. self-report measures for assessing height, weight, and body mass index: A systematic review. *Obesity Review* 8(4):307–26.
- Dietz, W.H. 1998a. Childhood weight affects adult morbidity and mortality. *Journal of Nutrition* 128(2 Suppl):411S–414S.
- . 1998b. Health consequences of obesity in youth: Childhood predictors of adult disease. *Pediatrics* 101(3 Pt 2):518–25.
- Fu, Q., and K.C. Land. 2015 (2017). Does urbanisation matter? A temporal analysis of the socio-demographic gradient in the rising adulthood overweight epidemic in China, 1989–2009. *Population, Space and Place* 23(1):1–17.
- Guh, D.P., W. Zhang, N. Bansback, Z. Amarsi, C.L. Birmingham, and A.H. Anis. 2009. The incidence of co-morbidities related to obesity and overweight: A systematic review and meta-analysis. *BMC Public Health* 9(1):88.
- Jaacks, L.M., P. Gordon-Larsen, E.J. Mayer-Davis, L.S. Adair, and B. Popkin. 2013. Age, period and cohort effects on adult body mass index and overweight from 1991 to 2009 in China: The China Health and Nutrition Survey. *International Journal of Epidemiology* 42(3):828–37.
- Janssen, I., P.T. Katzmarzyk, S.R. Srinivasan, W. Chen, R.M. Malina, C. Bouchard, and G.S. Berenson. 2005. Utility of childhood BMI in the prediction of adulthood disease: comparison of national and international references. *Obesity Research* 13(6):1106–15.
- Jayaraman, G.C., K.C. Roberts, and M. Tremblay. 2016. Reply to Recent trends in the prevalence of overweight and obesity among Canadian children. *Canadian Medical Association Journal*. DOI:10.11503/cmaj.150854 (eLetters)
- Jiang, T., M.S. Gilthorpe, F. Shiely, J.M. Harrington, I.J. Perry, C.C. Kelleher, and Y-K. Tu (2013). Age-period-cohort analysis for trends in body mass index in Ireland. *BMC Public Health* 13(1):889.
- Katzmarzyk, P.T. 2008. Obesity and physical activity among Aboriginal Canadians. *Obesity* 16(1):184–90.
- Keyes, K.M., R.L. Utz, W. Robinson, and G. Li. 2010. What is a cohort effect? Comparison of three statistical methods for modeling cohort effects in obesity prevalence in the United States, 1971–2006. *Social Science & Medicine* 70(7):1100–08.

- Lawlor, D.A., and D.A. Leon. 2005. Association of body mass index and obesity measured in early childhood with risk of coronary heart disease and stroke in middle age: Findings from the Aberdeen children of the 1950s prospective cohort study. *Circulation* 111(15):1891–96.
- Maffeis, C., and L. Tato. 2001. Long-term effects of childhood obesity on morbidity and mortality. *Hormonal Research* 55 Suppl 1:42–45.
- Ng, C., P.N. Corey, and T.K. Young. 2012. Divergent body mass index trajectories between Aboriginal and non-Aboriginal Canadians 1994–2009: An exploration of age, period, and cohort effects. *American Journal of Human Biology* 24(2):170–76.
- Ng, M., T. Fleming, M. Robinson, B. Thomson, N. Graetz, C. Margono, E.C. Mullany, S. Biryukov, C. Abbafati, S.F. Abera, J.P. Abraham, N.M.E. Abu-Rmeileh, T. Achoki, F.S. AlBuhairan, Z.A. Alemu, R. Alfonso, M.K. Ali, R. Ali, N.A. Guzman, W. Ammar, P. Anwar, A. Banerjee, S. Barquera, S. Basu, D.A. Bennett, Z. Bhutta, J. Blore, N. Cabral, I.C. Nonato, J.-C. Chang, R. Chowdhury, K.J. Courville, M.H. Criqui, D.K. Cundiff, K.C. Dabhadkar, L. Dandona, A. Davis, A. Dayama, S.D. Dharmaratne, E.L. Ding, A.M. Durrani, A. Esteghamati, F. Farzadfar, D.F.J. Fay, V.L. Feigin, A. Flaxman, M.H. Forouzanfar, A. Goto, M.A. Green, R. Gupta, N. Hafezi-Nejad, G.J. Hankey, H.C. Harewood, R. Havmoeller, S. Hay, L. Hernandez, A. Hussein, B.T. Idrisov, N. Ikeda, F. Islami, E. Jahangir, S.K. Jassal, S.H. Jee, M. Jeffreys, J.B. Jonas, E.K. Kabagambe, S.E.A.H. Khalifa, A.P. Kengne, Y.S. Khader, Y.-H. Khang, D. Kim, R.W. Kimokoti, J.M. Kinge, Y. Kokubo, S. Kosen, G. Kwan, T. Lai, M. Leinsalu, Y. Li, X. Liang, S. Liu, G. Logroscino, P.A. Lotufo, Y. Lu, J. Ma, N.K. Mainoo, G.A. Mensah, T.R. Merriman, A.H. Mokdad, J. Moschandreas, M. Naghavi, A. Naheed, D. Nand, K.M.V. Narayan, E.L. Nelson, M.L. Neuhauser, M.I. Nisar, T. Ohkubo, S.O. Oti, A. Pedroza, D. Prabhakaran, N. Roy, U. Sampson, H. Seo, S.G. Sepanlou, K. Shibuya, R. Shiri, I. Shiue, G.M. Singh, J.A. Singh, V. Skirbekk, N.J.C. Stapelberg, L. Sturua, B.L. Sykes, M. Tobias, B.X. Tran, L. Trasande, H. Toyoshima, S. van de Vijver, T.J. Vasankari, J.L. Veerman, G. Velasquez-Melendez, V.V. Vlassov, S.E. Vollset, T. Vos, C. Wang, X. Wang, E. Weiderpass, A. Werdecker, J.L. Wright, Y.C. Yang, H. Yatsuya, J. Yoon, S.-J. Yoon, Y. Zhao, M. Zhou, S. Zhu, A.D. Lopez, C.J.L. Murray and E. Gakidou. 2014. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: A systematic analysis for the Global Burden of Disease Study 2013. *The Lancet* 384(9945):766–81.
- Olshansky, S.J., D.J. Passaro, R.C. Hershow, J. Layden, B.A. Carnes, J. Brody, L. Hayflick, R.N. Butler, D.B. Allison, and D.S. Ludwig. 2005. A potential decline in life expectancy in the United States in the 21st century. *New England Journal of Medicine* 352(11):1138–45.
- Preston, S.H. 2005. Deadweight? The influence of obesity on longevity. *New England Journal of Medicine* 352(11):1135–37.
- Public Health Agency of Canada. 2011. *Obesity in Canada: A joint report from the Public Health Agency of Canada and the Canadian Institute for Health Information*. Ottawa: Canadian Institute for Health Information.
- Reither, E.N., R.M. Hauser, and Y. Yang. 2009. Do birth cohorts matter? Age-period-cohort analyses of the obesity epidemic in the United States. *Social Science & Medicine* 69(10):1439–48.
- Roberts, K.C., M. Shields, M. de Groh, A. Aziz, and J.A. Gilbert. 2012. Overweight and obesity in children and adolescents: Results from the 2009 to 2011 Canadian Health Measures Survey. *Health Reports* 23(3):37–41.
- Robinson, W.R., R.L. Utz, K.M. Keyes, C.L. Martin, and Y. Yang. 2013. Birth cohort effects on abdominal obesity in the United States: The Silent Generation, Baby Boomers and Generation X. *International Journal of Obesity* 37(8):1129–34.
- Rodd, C., and A.K. Sharma. 2016. Recent trends in the prevalence of overweight and obesity among Canadian children. *Canadian Medical Association Journal* 188(13):E313–20.
- SAS Institute Inc. 2013. SAS v.9.4.
- Shields, M., M. Tremblay, and S. Connor Gorber. 2008. Estimates of obesity based on self-report versus direct measures.” *Health Reports* 19(2).

- Srinivasan, S.R., W. Bao, W.A. Wattigney, and G.S. Berenson. 1996. Adolescent overweight is associated with adult overweight and related multiple cardiovascular risk factors: The Bogalusa Heart Study. *Metabolism* 45(2):235–40.
- St-Pierre, M., and Y. Béland. 2004. Mode effects in the Canadian Community Health Survey: A Comparison of CAPI and CATI. American Statistical Association Meeting, Survey Research Methods, Toronto, Canada, American Statistical Association.
- Statcan. 2012 (11 February 2013). Body composition of Canadian adults, 2009 to 2011. Health Fact Sheets, retr. 13 February 2017 from <http://www.statcan.gc.ca/pub/82-625-x/2012001/article/11708-eng.htm>.
- . 2013 (15 September 2016). Aboriginal Peoples in Canada: First Nations People, Métis and Inuit, National Household Survey, 2011. <http://www12.statcan.ca/nhs-enm/2011/as-sa/99-011-x/99-011-x2011001-eng.cfm>.
- . 2016 (24 June 2016). Canadian Community Health Survey - Annual Component (CCHS). <http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3226&lang=en&db=imdb&adm=8&dis=2>.
- Strauss, R.S. 2000. Childhood obesity and self-esteem. *Pediatrics* 105(1):e15.
- Telama, R., X. Yang, J. Viikari, I. Valimaki, O. Wanne, and O. Raitakari. 2005. Physical activity from childhood to adulthood: A 21-year tracking study. *American journal of Preventive Medicine* 28(3):267–73.
- Tremblay, M.S., C.E. Perez, C.I. Ardern, S.N. Bryan, and P.T. Katzmarzyk. 2005. Obesity, overweight and ethnicity. *Health Reports* 16(4):23–34.
- Twells, L.K., D.M. Gregory, J. Reddigan, and W.K. Midodzi. 2014. Current and predicted prevalence of obesity in Canada: A trend analysis. *Canadian Medical Association Journal* 2(1):E18–E26.
- Yamakita, M., H. Uchida, K. Kawamura, T. Homma, and Y. Odagiri. 2014. Effects of age, period, and cohort on the trends in obesity rate and energy intake ratio from fat in Japanese adults. *Nihon Koshu Eisei Zasshi (Japanese Journal of Public Health)* 61(8):371–84.
- Yang, Y., and K.C. Land. 2006. A mixed models approach to the age-period-cohort analysis of repeated cross-section surveys, with an application to data on trends in verbal test scores. *Sociological Methodology* 36:75–97.
- . 2008. Age-period-cohort analysis of repeated cross-section surveys: Fixed or random effects? *Sociological Methods & Research* 36(3):297–326.
- . 2013. *Age-Period-Cohort Analysis: New Models, Methods, and Empirical Applications*. Boca Raton, FL: Taylor & Francis Group.
- Young, T.K. 2003. Review of research on Aboriginal populations in Canada: Relevance to their health needs. *British Medical Journal* 327(7412):419–22.

Immigrants' initial firm allocation and earnings growth¹

Wen Ci²
Feng Hou

Abstract

While employers are playing an increasingly important role in immigration selection in Canada, little is known about how firm-level characteristics affect the economic integration of immigrants. Using a Canadian employer–employee matched dataset, this paper considers whether immigrants initially employed in low-paying firms in Canada experienced inferior earnings growth than those initially employed in high-paying firms. The results show that the large earnings differential observed between immigrants initially employed in low- and high-paying firms diminished only slightly over the subsequent 14 years, even when differences in demographic and general human capital characteristics are taken into account.

Keywords: immigrants, firms, employer–employee matched data, earnings, Canada

Résumé

Alors que les employeurs jouent un rôle de plus en plus important dans la sélection des immigrants qui s'établissent au Canada, on en sait peu sur la façon dont les caractéristiques au niveau de l'entreprise influencent l'intégration économique de ces derniers. Au moyen d'un ensemble de données appariées sur les employeurs et les employés, le présent document vise à déterminer si la croissance des gains des immigrants employés initialement au Canada par des entreprises à bas salaires est plus faible que celle des gains des immigrants employés au départ par des entreprises à hauts salaires. Les résultats montrent que l'écart important observé entre les gains des immigrants employés au départ par des entreprises à bas salaires et de ceux employés par des entreprises à hauts salaires ne diminuait que légèrement au cours des 14 années suivantes, même après avoir tenu compte des différences de caractéristiques démographiques et de caractéristiques générales du capital humain.

Mots-clés : immigrants, firms, employer–employee matched data, earnings, Canada

Introduction

Canada's economic immigration policy has been undergoing substantial changes that include increasing involvement of employers in selecting economic immigrants. Yet little is known about whether and how the characteristics of employers who select immigrants are associated with immigrant labour market outcomes in the short and long run. As a first step to providing relevant empirical evidence, this study asks whether immigrants starting with low- and high-paying firms have large gaps in initial earnings, and whether the initial earnings gaps narrow with increasing length of residence in Canada.

The characteristics of companies in which immigrants initially find employment may be strongly associated with the economic outcomes of immigrants for several reasons. First, immigrants are chosen by firms based

-
1. This is a revised version of an article that was published under the same title by Statistics Canada in June 2016 as part of its Analytical Studies Branch Research Paper Series (Cat. 11F0019M, No. 378); ISBN 978-0-660-05196-3, available online at <http://www.statcan.gc.ca/pub/11f0019m/11f0019m2016378-eng.pdf>.
 2. Wen Ci, Statistics Canada, Social Analysis and Modelling Division, R.H. Coats Bldg., 24th fl., Ottawa ON K1A 0T6, email: iwwen.ci@gmail.com; and Feng Hou, Social Analysis and Modelling Division, Statistics Canada.

on their general human capital (e.g., education, work experience, and language), specific occupational skills, and other wage-enhancing traits such as motivation and social skills. Immigrants selected by high-paying companies may be more likely to have skills that are highly rewarded by the labour market than those selected by low-paying companies. Second, even among immigrants with similar levels of educational attainment and work experience, those selected by high-paying firms may have greater opportunity to use and develop their skills and to achieve earnings growth through internal promotion and advancement. And third, in the event of job termination, immigrants from higher-paying firms may have greater opportunities to move on to other comparable jobs elsewhere, while immigrants from low-paying firms have fewer opportunities if their initial employment in a low-paying firm is regarded as a signal of poor skills/ability by other potential employers, and thus are limited in their job search choices and bargaining position.

Quantifying the empirical association between employers' characteristics and immigrant economic outcomes in both the short and long run has important social and policy implications. The types of firms that potential immigrants are being selected into could be a pertinent indicator, in addition to common human capital factors, of immigrants' potential to do well in the Canadian labour market.

Few empirical studies have examined the association between the characteristics of employers who select or sponsor immigrants and immigrants' labour market outcomes. Previous Canadian studies tended to focus on the effects of immigrants' individual human capital factors, such as education, language, foreign work experience, and Canadian work experience on their earnings, and how changes in these characteristics affect trends in immigrant earnings (Aydemir and Skuterud 2005; Bloom et al. 1995; Frenette and Morissette 2005; Hou 2013; Reitz 2007; Schaafsma and Sweetman 2001). Other studies have explored how distribution and mobility across firms are related to immigrant earnings and immigrant–non-immigrant earnings gaps, and how certain company characteristics, such as co-ethnic concentration, are related to immigrant earnings (Aydemir and Skuterud 2008; Barth et al. 2012; Hou 2009; Tomaskovic-Devey et al. 2015). These studies analyze companies where immigrants currently work (mostly many years after immigration), which is not directly relevant to the match between immigrants and Canadian employers before or at the time of immigration.

This study examines the association between the characteristics of the initial firm where immigrants started working after arriving in Canada and immigrants' earnings growth. Although the majority of immigrants to Canada are not (pre)selected by Canadian employers, and consequently their initial firms do not represent companies that would select immigrants from abroad, *initial firm allocation* is the result of Canadian employers selecting new immigrants based on their common human capital factors, job-specific skills, and other qualifications that employers can individually evaluate. Accordingly, the characteristics of initial firms largely capture the extent to which new immigrants' skills and abilities are validated and valued by Canadian employers. This study focuses on one specific and important characteristic of the initial firm—median payment to its employees, which is a simple yet comprehensive measure of a company's productivity as well as its employees' economic well-being, and is easily observable.

This study asks whether immigrants starting with low- and high-paying firms have large gaps in initial earnings, and whether this initial earnings gap narrows with increasing length of residence in Canada when differences in commonly observed human capital factors are taken into account. It further examines whether earnings returns to human capital among immigrants are larger if they start at high-paying rather than low-paying firms.

The remainder of this paper is presented in four sections. Section 2 reviews the literature on the effects of firm allocation on immigrant earnings. Section 3 discusses the data source, measures, and analytical approaches. Section 4 presents descriptive statistics and multivariate analysis results. Section 5 concludes the paper.

Firms and immigrant labour markets

A strand of research has examined the extent to which the immigrant–non-immigrant earnings gap originates from within-firm pay differentials or differential allocation across firms (e.g., Aydemir and Skuterud 2008; Pendakur and Woodcock 2010; Barth et al. 2012). These two sources of the earnings gap between immigrant and non-immigrant workers have distinct mechanisms and policy implications. Within-firm pay differentials

may arise from lower productivity among immigrants due to lack of certain job-specific skills, their difficulty signaling their productivity, shorter job tenure, or discrimination. Differential allocation across firms may result from immigrants' concentration in ethnic enclaves and large metropolitan areas where low-wage firms are more prevalent, their limited information and knowledge about alternative employers, or their signaling disadvantages in the sense that native-born employers are uncertain about foreign-acquired education and work experience (Aydemir and Skuterud 2008; Barth et al. 2012).

Using cross-sectional, employer-employee linked survey data, several previous studies have provided empirical evidence on the role of firm allocation in immigrant–non-immigrant earnings gaps. Aydemir and Skuterud (2008) showed that immigrant men's concentration in low-wage establishments within Canada's major cities and regions contributed more to the earnings gap between male immigrant and Canadian-born workers than within-establishment pay differentials. Immigrant women, however, experienced a low level of concentration in low-wage establishments but a relatively large within-establishment wage disadvantage. Using the same Canadian data but a different method of identifying the effect of sorting across establishments, Pendakur and Woodcock (2010) found that both immigrant male and female workers faced substantial concentration in low-paying firms, and inter-firm sorting accounted for one-quarter to one-half of their overall wage gaps relative to Canadian-born workers. Javdani and McGee (2013) also used the same Canadian data, and found that newly arrived female visible minority immigrants were disproportionately employed in firms offering limited opportunities for advancement. Furthermore, they demonstrated that immigrants—particularly newly-arrived visible minority immigrants—are less likely to be promoted in the economy as a whole because they are less likely to be promoted within any given firm.

The studies by Aydemir and Skuterud (2008) and Pendakur and Woodcock (2010) both showed that the likelihood of working in a higher-paying firm increases with the number of years immigrants have resided in Canada, and suggested that mobility into better-paying firms is an important pathway towards immigrant wage growth. However, Barth et al. (2012) argued that the comparison of longer-term and recent immigrants in cross-sectional data fails to separate assimilation effects from cohort differences in firm allocation. They demonstrated that after controlling for immigrant arrival cohort heterogeneity, there was little indication of favourable job mobility among immigrants. While early-entry cohorts tended to work in better-paying firms than recent-arrival cohorts, immigrants generally did not advance to high-paying firms over time at the rate of the native-born. As a result, the wage gap between immigrants from developing countries and native-born workers expanded with years in Norway, and about 40 per cent of the wage gap was attributable to the fact that immigrants worked and stayed in low-paying firms (Barth et al. 2012). Furthermore, Barth et al. (2012) found that immigrants in Norway received similar wage returns to experience and seniority within establishments to those of native-born workers. They took these results to imply that limited access to better-paying jobs, likely due to preference-based hiring practices, is the main driver of the widening immigrant–non-immigrant wage gap in Norway, while immigrants' lack of information about the host country labour market, language barriers, and inferior promotions within firms played a minor role. In contrast, using linked employer-employee longitudinal data, Eliasson (2013) found that in Sweden, immigrants' wage growth relative to the native-born came almost entirely from higher wage growth within workplaces, but that there was no wage catch-up from workplace mobility. This suggests that, at least in Norway, immigrants experience larger wage gains over time, as employers learn more about individuals' productivity and on-the-job performance.

Other studies have examined whether and how certain company characteristics are associated with immigrants' labour market performance. One characteristic that has attracted attention is the workplace concentration of immigrants. Immigrants working in companies with a high concentration of their co-ethnics have been shown to have lower earnings and slower earnings growth than immigrants in companies with lower concentrations of co-ethnics (e.g., Fong and Hou 2013; Hou 2009). However, using Swedish data, Tomaskovic-Devey et al. (2015) found that wage differences between immigrant and native-born blue-collar workers were smaller in workplaces with a larger presence of immigrants, and that the wage differences between immigrant and native-born white-collar workers were smaller in workplaces with more immigrant managers. Additional studies have also considered the effects of union membership, company size, industries, and broad geographic regions of company location (Aydemir and Skuterud 2008; Barth et al. 2012). Nevertheless, these company characteristics have mostly been investigated in a cross-sectional setting. As a consequence, little is known about how characteristics of the initial firms where immigrants started working in the host country are associated with longer-term immigrant labour market outcomes.

Note that it goes beyond the scope of this paper to establish clear mechanisms through which the initial allocation to low- or high-paying firms is linked with immigrant earnings trajectories. Low-paying firms might directly hamper immigrants' career development because of limited promotion opportunities and training resources for their employees. The returns-to-work-experience accumulated from low-paying firms could be low, making it difficult for immigrants to move to higher-paying firms. Alternatively, immigrants with fewer skills or less motivation may be more likely to be hired by, and remain in, low-paying firms. It is possible that these two mechanisms are at work at the same time.

This paper begins analysis by examining how common human capital factors could explain the initial allocation of immigrants across low-, medium-low-, and high-paying firms. The overall prediction power of commonly observed individual characteristics on immigrants' initial firm allocation was limited. This suggests that immigrant initial firm allocation may reflect unobserved characteristics of immigrants necessary for career success. This study goes on to examine the earnings growth patterns among immigrants initially working in low-, medium-low-, and high-paying firms. Finally, this study examines whether returns to immigrant education and language differ by initial firm allocation.

Data and methods

Data

This paper uses data from the Canadian Employer–Employee Dynamics Database (CEEDD), developed by Statistics Canada. The analytical file used for this paper draws information from four administrative datasets, including the T4 Statement of Remuneration file, the T1 Personal Master File, the Immigrant Landing file, and firm-level data from the Longitudinal Employment Analysis Program (LEAP). Observations in the first three datasets were linked using Social Insurance Numbers (SIN), while LEAP information was attached to individual-level records using the Longitudinal Business Registry Number.³ The T4 tax file contains variables on various sources of earnings reported by employers to the Canada Revenue Agency, while the T1 Personal Master File includes basic demographic characteristics of individuals who file taxes in a given year. The immigrant landing file provides immigrant sociodemographic characteristics measured at the time of entry among immigrants who landed in Canada from 1980 to 2011. Firm-level data include both public and private establishments, which are all referred to as *firms* (or *companies*) in this paper.

The study sample is restricted to immigrants who landed in Canada from 1998 to 2001, were aged 20–49 at the time of landing, and had annual T4 earnings of more than \$1,000 (in 2012 Canadian dollars) in at least one year from 1999 to 2012.⁴ About 490,500 immigrants aged 20–49 at landing who arrived in Canada from 1998 to 2001 were identified from the landing records, among whom 418,800 earned a positive employment income of more than \$1,000 in at least one year during the reference period. Immigrants are tracked over years starting from their first full year in Canada,⁵ and their multi-year observations are pooled to estimate their earnings growth.

The outcome variable in the analysis is *annual employment earnings*, while the independent variable of interest is the firm in which immigrants were initially employed after landing in Canada. This variable is divided into three groups, according to firms' annual median payment to employees: *low-paying*, *medium-low-paying*, and *high-paying* firms.⁶ *Low-paying* firms are those with median employment earnings at or under 25th percentile among all firms, *medium-low-paying* firms are those with median employment earnings from the 25th to 50th percentiles, and *high-paying* firms are those from over the 50th to 100th percentile.⁷ The median annual employment earnings of workers were lower

3. Multiple SIN holders are consistently connected over years using the Greenberg file available at Statistics Canada.

4. For employees who have earnings from more than one employer in a given year, only firms with the highest earnings are kept in the analysis.

5. For example, 2000 is the first full year for those who landed in 1999.

6. The analysis was replicated using annual average (rather than median) payment. The results are similar.

7. In additional analysis, *high-paying firms* are defined as those with median earnings in the upper 25 percentile and *medium-paying firms* are defined as those with media earnings in the 25th to 75th percentiles. With this alternative definition, the earnings gaps between immigrants who started in high-paying firms and in low-paying firms were much larger, but the general

than \$11,000 (in 2012 constant dollars) in low-paying firms, between \$11,000 and \$21,000 in medium-low-paying firms, and over \$21,000 in high-paying firms. About 41 per cent of immigrant men who landed from 1998 to 2001 and were aged 20–49 found their first employment in low-paying (17 per cent) or medium-low-paying (24 per cent) firms. In comparison, only 27 per cent of Canadian-born workers aged 20–49 worked in low- or medium-low-paying firms. Among immigrant women, 58 per cent were initially employed in low- or medium-low-paying firms, compared to a much smaller share among their Canadian-born peers at 38 per cent.

Due to the absence of information on working hours, it is not possible to distinguish full-time, part-time, permanent, and temporary workers. Thus, a low-paying firm defined here could be a low-wage firm or a firm employing a relatively high proportion of part-time or temporary workers. This is not a major issue for this study, since its focus is on the overall employment conditions in the initial firm, with a prevalence of low-wages, part-time jobs, or high job turnover all being indicative of poorer economic outcomes among employees.

Although minimal attrition exists in the administrative data, it remains a concern that not all immigrants had paid employment every year after landing. First, it could take years for some immigrants to find their first paying job in Canada. More particularly, about 78 per cent of immigrant men and 63 per cent of immigrant women started working for companies in the first full year after landing; others found employment in later years. This study includes the year in which immigrants started their career in Canada in econometric models as a way to control for heterogeneity potentially associated with the year of entering the host-country labour market. Second, immigrants' paid employment is not necessarily continuous, as some immigrants might drop out of the labour market in some of the tracking years, either due to unemployment or leaving the labour force. These sample attrition issues will be examined in the robustness-check section.

Methods

This study first asks what factors are associated with the initial allocation of immigrants into firms with different levels of median annual payments to workers. To estimate the discrete dependent variable y with values of 1 to 3 measuring initial employment in low-, medium-low-, and high-paying firms, the following multinomial logistic regression model is used:

$$\Pr(y_i = j) = \frac{\exp(X_i \alpha_j)}{1 + \sum_{k \neq j} \exp(X_i \alpha_k)} \quad j = 1, 2, 3, \quad (1)$$

where the probability of being in each type of firm depends on the selected individual characteristics X and the vector of coefficients α corresponding to the alternatives 1 and 2. The reference group is initial employment in high-paying firms with $y = 3$. Covariates X include age at landing, marital status, immigration categories, source region, education, geographic region (major CMA/province), cohort, and mother tongue and official language.⁸

earnings trajectories remained the same. For instance, with the definition used in the study, the absolute earnings gap between immigrant men starting in high-paying and low-paying firms was about \$24,700 (in 2012 constant dollars) in the first year after immigration, and \$24,500 in the 10th year after immigration. Using the alternative definition, the corresponding gap was \$33,700 and \$36,900. In both cases, the earnings gap remained essentially constant over a ten-year period.

8. Age at landing was grouped into six categories: 20–24 (reference), 25–29, 30–34, 35–39, 40–44, and 45–49 years. Marital status includes three groups: married/common-law, divorced/separated/widowed, and never married (reference).

Immigrants were divided into six categories by their immigration class: principal skilled worker (reference), spouse of skilled worker, business, family, refugee, and other. The source region includes 11 groups: Northwest Europe (reference); Southeast Europe; Africa; East Asia; South Asia; Southeast Asia; other Asia; Oceania; Caribbean/ Central South America; other; and United States. Four education levels are included: high school or less (reference), diploma, bachelor's degree, and graduate degree. The geographical region includes Newfoundland, Prince Edward Island, Nova Scotia, New Brunswick, Montreal, other Quebec, Toronto (reference), other Ontario, Manitoba, Saskatchewan, Alberta, Vancouver, and other British Columbia. Mother tongue and official languages include English mother tongue (reference); French mother tongue; English and French mother tongue; other mother tongue and speak English; other mother tongue and speak French; other mother tongue and speak English or French; other mother tongue and do not speak English or French. The firm-size variable is grouped into four categories: (1) < 20 employees; (2) 20–99 employees; (3) 100–500 employees; and (4) > 500 employees. The industry variable uses the 2-digit North American Industry Classification System (NAICS).

The subscript i represents individuals. McFadden Pseudo R^2 (1974, 1979) is used to evaluate the model's goodness of fit. The value of the Pseudo R^2 between 0.2 and 0.4 is commonly regarded as a rule of thumb for a good-fit model. All analyses are carried out for men and women separately.

To address the main goal of this study, the following model is constructed to determine whether there are disparities in employment earnings in both the short- and longer-run between immigrants starting their careers in disadvantaged firms (low-paying and medium-low-paying firms) and those in high-paying firms:

$$\begin{aligned} \ln EARN_{it} = & \gamma_0 + \gamma_1 * LOW_i + \gamma_2 * (LOW_i * YSM_{it}) + \gamma_3 * (LOW_i * YSM_{it}^2) + \gamma_4 * (LOW_i * YSM_{it}^3) + \\ & \gamma_5 * MED_i + \gamma_6 * (MED_i * YSM_{it}) + \gamma_7 * (MED_i * YSM_{it}^2) + \gamma_8 * (MED_i * YSM_{it}^3) + \\ & \gamma_9 * YSM_{it} + \gamma_{10} * YSM_{it}^2 + \gamma_{11} * YSM_{it}^3 + X_{it}\beta + u_{it} \end{aligned} \quad (2)$$

The dependent variable, $\ln EARN$, represents the natural log annual employment earnings of immigrants.⁹ LOW and MED are variables of interest representing low-paying and medium-low-paying firms, respectively, with high-paying firms as the common reference group. YSM represents years since landing equaling the tax year minus the landing year.¹⁰ The vector X consists of other individual characteristics including age at landing, marital status, immigration categories, cohort, source region, education at landing, full- or part-time schooling, initial residential CMA/province, mother tongue and official language, starting year of employment, industry, and firm size.

When all the covariates are held constant, the gap in log earnings between immigrants who were initially employed in low-paying firms and those in high-paying firms is $\gamma_1 + \gamma_2 * YSM + \gamma_3 * YSM^2 + \gamma_4 * YSM^3$, which is determined by coefficients γ_1 , γ_2 , γ_3 , and γ_4 , as well as time spent in Canada. Similarly, $\gamma_5 + \gamma_6 * YSM + \gamma_7 * YSM^2 + \gamma_8 * YSM^3$ captures the earnings gap between those initially hired by medium-low-paying and high-paying firms in a given year after landing. The inclusion of the cubic function of YSM (i.e., the squared and cubic terms) and allowing each immigrant group by initial firm allocation to have their unique cubic function captures their observed earnings trajectories better than the commonly used quadratic function (i.e., without the cubic term). If the quadratic function of YSM was used, the estimated earnings of immigrants starting with high- and low-paying firms converged near the end of the study period, without controlling for any covariates. This is not consistent with the observed earnings trajectories, which show a slight upward trend among immigrants in high-paying firms and a stable line among those starting in low- and medium-low paying firms over the 14-year tracking period. Lack of the cubic terms will lead to misspecification of the real earnings trajectories of immigrants observed from the data.

Results

Initial employment in lower-paying firms

This section compares immigrants who started their initial employment in low-, medium-low-, or high-paying firms along several dimensions: age at arrival, gender, marital status, language, education, immigration category, and first entry year into paid employment after landing. Table 1 lists summary statistics for these variables. Immigrants who started in low-paying firms were more likely to be older and not married, with lower educational attainment and poorer official language proficiency, and not in the principal skilled-worker class like their counterparts starting in high-paying firms. Around 65 per cent of immigrant men starting in lower-paying firms found their first paid job in the first full year after arrival, compared with 80 per cent among those starting in high-paying firms.

These observations were generally confirmed in multivariate analyses. Table 2 presents odds ratios from multinomial logistic models for men and women separately, to show the effect of a given explanatory variable on the relative likelihood of immigrants to start at low- or medium-low-paying firms rather than high-paying firms (after controlling for other included variables).

9. Annual employment earnings in all years are measured in 2012 constant dollars.

10. All immigrants are tracked from their first full year after landing. For example, for immigrants in the 1998 landing cohort, 1999 is their first full year.

Table 1. Summary statistics of characteristics of immigrants by initial firm-level payments (% unless indicated otherwise)

	Men				Women			
	All	Low-paying firm	Medium-low-paying firm	High-paying firm	All	Low-paying firm	Medium-low-paying firm	High-paying firm
Age at landing: 20 to 24	10.3	13.3	12.1	8.8	16.3	18.6	18.1	13.5
25 to 29	24.6	22.1	23.7	25.7	27.0	24.4	25.5	29.9
30 to 34	26.5	23.6	24.6	28.0	24.3	22.8	23.1	26.3
35 to 39	19.5	18.6	18.7	20.1	17.2	17.2	17.3	17.2
40 to 44	12.3	13.7	12.9	11.6	10.2	11.1	10.5	9.3
45 to 49	6.7	8.7	8.0	5.7	4.9	5.8	5.5	3.9
Married or common-law	68.2	65.5	68.2	68.9	77.4	80.7	78.1	74.8
Language								
English mother tongue	8.8	5.5	6.3	10.7	8.9	6.7	7.3	11.5
French mother tongue	1.4	1.3	1.5	1.4	1.2	0.9	1.0	1.4
English and French mother tongue	1.9	1.2	1.4	2.3	1.6	0.8	1.1	2.4
Other mother tongue, English	53.3	51.4	52.3	54.3	44.3	41.9	42.1	47.5
Other mother tongue, French	4.4	5.8	5.1	3.7	4.0	4.1	4.4	3.5
Other mother tongue, Bilingual	5.6	5.4	5.0	5.9	4.3	3.2	3.4	5.7
Other mother tongue, neither Engl./Fr.	24.6	29.4	28.4	21.7	35.8	42.4	40.5	28.0
Education								
High school or less	23.0	28.8	28.5	19.2	30.2	37.1	35.7	21.7
Diploma	22.5	24.5	24.1	21.3	26.5	27.1	28.3	24.8
Bachelor	37.2	34.1	34.5	39.1	32.7	28.6	28.4	38.5
Beyond bachelor	17.3	12.6	12.9	20.4	10.6	7.2	7.5	15.0
Immigration class								
Skilled principal	52.9	43.3	44.6	58.9	18.2	11.4	13.7	25.8
Skilled spouse	8.6	9.1	9.6	8.1	31.7	33.2	30.3	31.7
Business	3.4	7.7	4.4	1.8	3.8	6.2	3.9	2.1
Family	20.1	19.5	23.5	19.0	31.8	33.8	35.1	28.2
Refugee	13.8	19.3	16.6	11.1	10.4	12.4	11.8	8.0
Market entry year								
First	78.2	65.2	75.7	83.0	63.4	54.6	64.6	68.3
Second	8.5	12.5	9.0	7.2	12.2	14.4	11.9	11.1
Third	4.5	7.3	4.9	3.6	7.1	8.6	6.7	6.4
Fourth	2.6	4.3	3.0	2.0	4.7	5.9	4.6	4.1
Later	6.1	10.7	7.3	4.3	12.6	16.6	12.2	10.1
Observations (number)	211,541	36,188	49,907	125,446	207,296	58,135	62,095	87,066

Source: Statistics Canada, Canadian Employer–Employee Dynamics Database.

Note: Figures given as percentages except as indicated.

Several distinct patterns are observed using the estimates. First, there was a strong effect of age at landing for both men and women. Immigrants who landed at age 25–29 had the lowest likelihood of initially working in low-paying firms, followed by those aged 30–34. Immigrants who landed at age 20–24 and those at age 35–39 had similarly low likelihoods of starting in low-paying firms. The relative risks of starting in low-paying firms increased beyond age 40 at landing (Table 2). Second, common human capital factors that are generally associated with successful economic outcomes among immigrants also played a significant role in affecting their initial firm allocation. Immigrants whose mother tongue was English were least likely to start in low-paying firms. Higher educational attainment was associated with a lower likelihood of starting in low- or medium-low-paying firms. Among immigrant classes, *skilled-worker* principal applicants (the reference group) had the lowest likelihood, while *business class* had the highest likelihood of starting in low-paying firms. Third, immigrants who started with low-paying firms tended to begin their paid employment in later years after landing than other immigrants. That is, immigrants who found their initial jobs in high-paying firms often did so immediately after landing, while immigrants who found their initial jobs in low-paying firms were more likely to have waited to take a job or to have experienced longer job searches in the years after landing.

Table 2. Relative risks from multinomial logit models predicting initial employment in low-, medium-low-, and high-paying firms by individual, firm-level characteristics (relative risk unless indicated otherwise)

	Male		Female	
	Low-paying firm	Medium-low-paying firm	Low-paying firm	Medium-low-paying firm
Age at landing				
25 to 29	0.831 ***	0.946 *	0.857 ***	0.902 ***
30 to 34	0.905 ***	1.011	0.939 **	0.984
35 to 39	1.035	1.118 ***	1.022	1.087 ***
40 to 44	1.268 ***	1.306 ***	1.167 ***	1.164 ***
45 to 49	1.485 ***	1.479 ***	1.257 ***	1.245 ***
Married or common-law	0.806 ***	0.887 ***	1.036 †	1.018
Divorced	0.869 *	1.005	1.030	1.026
Language				
French mother tongue	1.900 ***	2.093 ***	1.391 ***	1.420 ***
English and French mother tongue	1.275 ***	1.366 ***	1.046	1.196 **
Other mother tongue, English	1.471 ***	1.557 ***	1.395 ***	1.403 ***
Other mother tongue, French	1.796 ***	1.838 ***	1.530 ***	1.640 ***
Other mother tongue, bilingual	1.426 ***	1.510 ***	1.082 †	1.127 **
Other mother tongue, not Engl./Fr.	1.529 ***	1.662 ***	1.683 ***	1.791 ***
Immigration class				
Skilled (spouse)	1.454 ***	1.486 ***	1.640 ***	1.377 ***
Family	1.503 ***	1.511 ***	1.660 ***	1.515 ***
Refugee	1.715 ***	1.522 ***	1.756 ***	1.541 ***
Business	2.977 ***	1.912 ***	2.952 ***	1.897 ***
Other	1.272 ***	1.346 ***	1.413 ***	1.778 ***
Education				
Diploma	0.944 **	0.926 ***	0.794 ***	0.824 ***
Bachelor	0.795 ***	0.780 ***	0.564 ***	0.564 ***
Beyond bachelor	0.541 ***	0.544 ***	0.366 ***	0.391 ***
Market entry year				
Second	1.911 ***	1.287 ***	1.442 ***	1.036 *
Third	2.153 ***	1.347 ***	1.462 ***	1.014
Fourth	2.261 ***	1.519 ***	1.493 ***	1.061 *
Later	2.581 ***	1.679 ***	1.625 ***	1.072 ***
Observations (number)	199,221	199,221	196,781	196,781
Pseudo R-squared (value)	0.0546	n/a	0.0465	n/a

Source: Statistics Canada, Canadian Employer–Employee Dynamics Database.

Note: Source region, geographic distribution, cohort, and constant are also controlled in each model. With the exception of geographic distribution, all the other covariates represent the initial characteristics of immigrants at landing.

* significantly different from reference category ($p < 0.05$); ** significantly different from reference category ($p < 0.01$);

*** significantly different from reference category ($p < 0.001$); † significantly different from reference category ($p < 0.10$)

To what extent did the observed characteristics of immigrants account for the probability of their initial employment in low-, medium-low-, or high-paying firms in the Canadian labour market? The Pseudo R-square of the multinomial model for both sexes was around 0.05, which is well below the accepted rule of 0.2–0.4 for a good fit. This indicates that overall, the observed characteristics of immigrants explained little about the initial employment of new immigrants across low-, medium-low-, or high-paying firms. Thus, initial firm allocation is possibly determined by immigrants' transferability of foreign skills and the match between individual-specific skills and employers' job requirements—factors that are not sufficiently captured by conventional human capital factors, but might be better known by employers.

Earnings growth trajectory

Figures 1 and 2 present earnings trajectories from the first full year to the fourteenth year after landing for immigrant men and women, respectively, by initial firm allocation. Immigrant men starting in low-paying or medium-low-paying firms in the first full year after landing earned, on average, about \$20,000–\$25,000 less

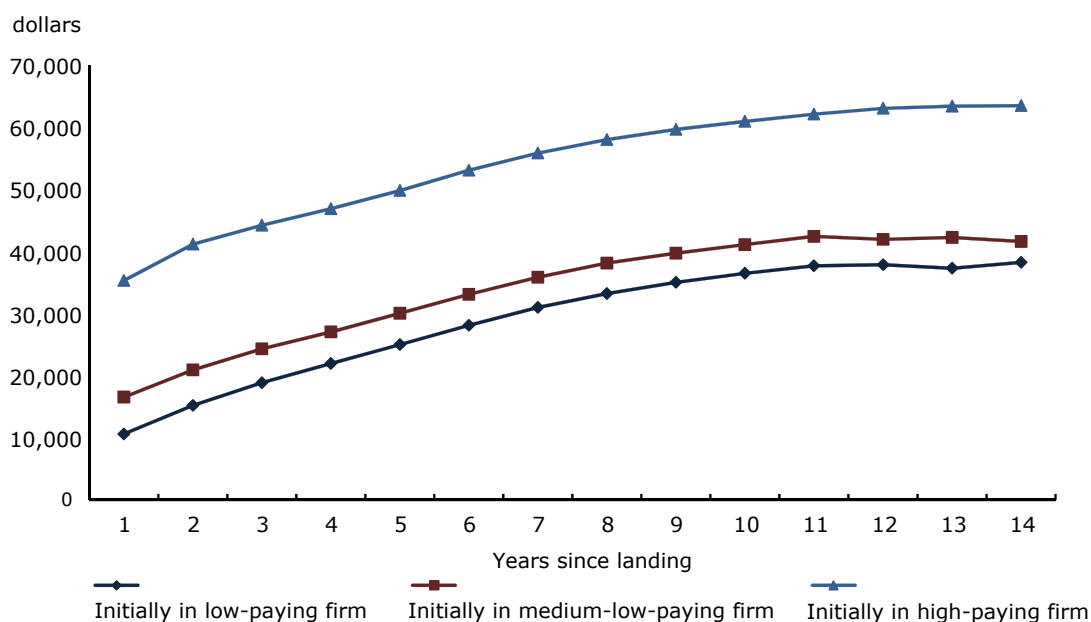


Figure 1. Earnings growth of immigrant men by initial employment firms.

Source: Statistics Canada, Canadian Employer-Employee Dynamics Database, 1999–2012.

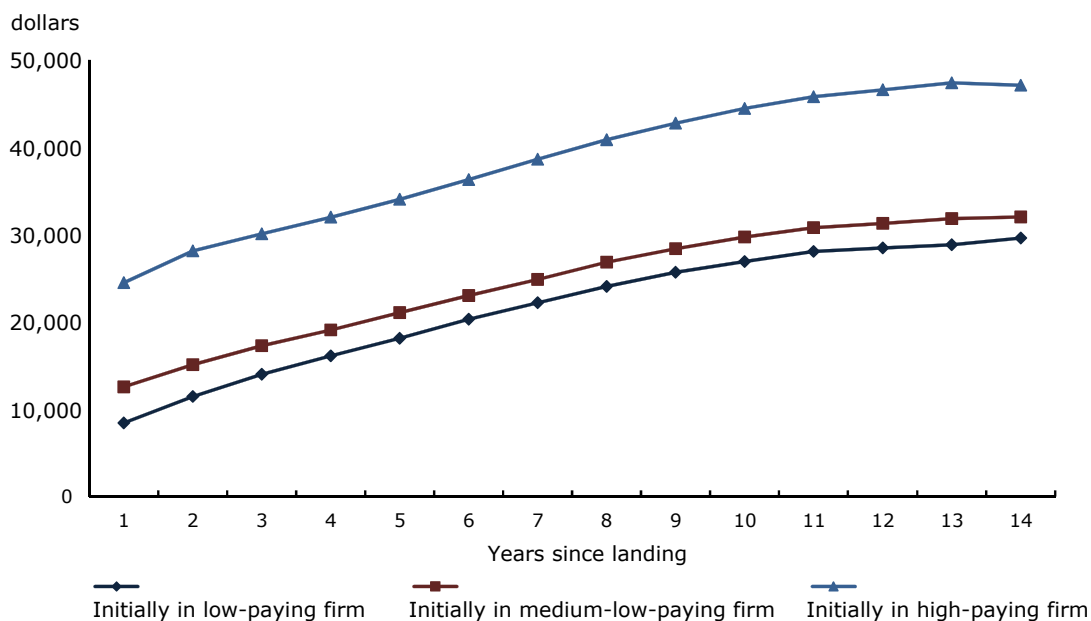


Figure 2. Earnings growth of immigrant women by initial employment firms.

Source: Statistics Canada, Canadian Employer-Employee Dynamics Database, 1999–2012.

than those who started in high-paying firms, and these observed earnings differences persisted over the next fourteen years. Similar patterns are observed among immigrant women. These results do not take into account observed differences such as age or educational attainment.

Table 3 reports the results of the regression models which examine the association between initial firm allocation and log earnings growth, while taking into account differences in observed characteristics. The models are estimated separately for men and women. For each sex, three models are estimated. Model 1 includes initial firm type, landing cohort, cubic function of years since landing, and the interaction between initial firm type and the cubic function of years since landing. Model 2 adds in individual characteristics of immigrants, and Model 3 further includes firm size and industry for the year in which the earnings were observed.

Table 3. Estimated coefficients from models of earnings by gender (log points unless otherwise indicated)

	Natural log of annual employment earnings					
	Men			Women		
	Model (1)	Model (2)	Model (3)	Model (1)	Model (2)	Model (3)
Initial low-paying firm	-1.382***	-1.234***	-0.751***	-1.161***	-1.022***	-0.667***
Initial low-paying firm interacted with years since landing	0.193***	0.220***	0.113***	0.167***	0.186***	0.114***
Initial low-paying firm interacted with years since landing squared	-0.016***	-0.020***	-0.009***	-0.016***	-0.018***	-0.011***
Initial low-paying firm interacted with years since landing cubed	0.0004***	0.001***	0.0002***	0.001***	0.001***	0.0004***
Initial Medium-low-paying firm	-0.762***	-0.632***	-0.332***	-0.630***	-0.499***	-0.273***
Initial medium-low-paying firm interacted with years since landing	0.059***	0.073***	0.019***	0.047***	0.053***	0.013**
Initial medium-low-paying firm interacted with years since landing squared	-0.003**	-0.005***	0.0005	-0.004***	-0.005***	-0.001
Initial medium-low-paying firm interacted with years since landing cubed	-0.00001	0.00009**	-0.00007*	0.0001**	0.0002***	0.00001
Years since landing	0.148***	0.163***	0.163***	0.096***	0.131***	0.131***
Years since landing squared	-0.010***	-0.012***	-0.013***	-0.002***	-0.006***	-0.007***
Years since landing cubed	0.0002***	0.0003***	0.0004***	-0.00006*	0.00006*	0.0001***
Cohort	Yes	Yes	Yes	Yes	Yes	Yes
Landing age	No	Yes	Yes	No	Yes	Yes
Marital status	No	Yes	Yes	No	Yes	Yes
Education	No	Yes	Yes	No	Yes	Yes
Further education	No	Yes	Yes	No	Yes	Yes
Mother tongue	No	Yes	Yes	No	Yes	Yes
Immigration	No	Yes	Yes	No	Yes	Yes
Source region	No	Yes	Yes	No	Yes	Yes
Geographic distribution	No	Yes	Yes	No	Yes	Yes
Entry year	No	Yes	Yes	No	Yes	Yes
Firm size	No	No	Yes	No	No	Yes
Industry	No	No	Yes	No	No	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Observations (number)	1,751,410	1,751,410	1,751,410	1,637,386	1,637,386	1,637,386
R-squared (value)	0.17	0.294	0.378	0.15	0.269	0.328

Source: Statistics Canada, Canadian Employer–Employee Dynamics Database.

Note: With the exception of geographical distribution, firm size, and industry, all other covariates represent initial characteristics of immigrants at landing. The industry variable uses the 2-digit North American Industry Classification System (NAICS). Firm size is grouped into four categories, based on number of employees: (1) less than 20; (2) 20–99; (3) 100–500; and (4) more than 500.

* significantly different from reference category ($p < 0.05$); ** significantly different from reference category ($p < 0.01$);

*** significantly different from reference category ($p < 0.001$)

The annual earnings advantages of immigrants starting in high-paying firms were reduced but did not disappear as the selected individual and firm-related characteristics were added from Model 1 to Model 3. This suggests that some of the earnings disparity between groups was attributed to the included characteristics, yet the remaining earnings gap remained large. The estimated coefficients of the low-paying (LOW) variable were -0.751 for men and -0.667 for women, based on Model 3, indicating that immigrants starting in low-paying firms earned significantly less upon landing (i.e., $YSM=0$) than their counterparts in high-paying firms. Put differently, male immigrants initially employed in low-paying firms initially received annual earnings roughly 53 per cent ($e^{-0.751} - 1$) less than their observationally equivalent counterparts who were initially employed in high-paying firms. Female immigrants initially employed in low-paying firms earned 49 per cent ($e^{-0.667} - 1$) less than their observationally counterparts initially employed in high-paying firms. The corresponding earnings gaps for male and female immigrants initially employed in medium-low-paying firms were 28 per cent ($e^{-0.332} - 1$) and 24 per cent ($e^{-0.273} - 1$) lower, respectively, than their observationally equivalent counterparts who were initially employed in high-paying firms.

The relative disparities in earnings by initial firm allocation narrowed with the number of years in Canada, as indicated by the significant and positive interaction term between low-paying firms and years since immigration. However, the absolute earnings differences between the three groups of immigrants changed little. Figures 3 and 4 show the estimated earnings trajectories of immigrant men and women initially employed in low-, medium-low-, and high-paying firms, based on Model 3 in Table 3. Clearly the differences in absolute earnings persisted

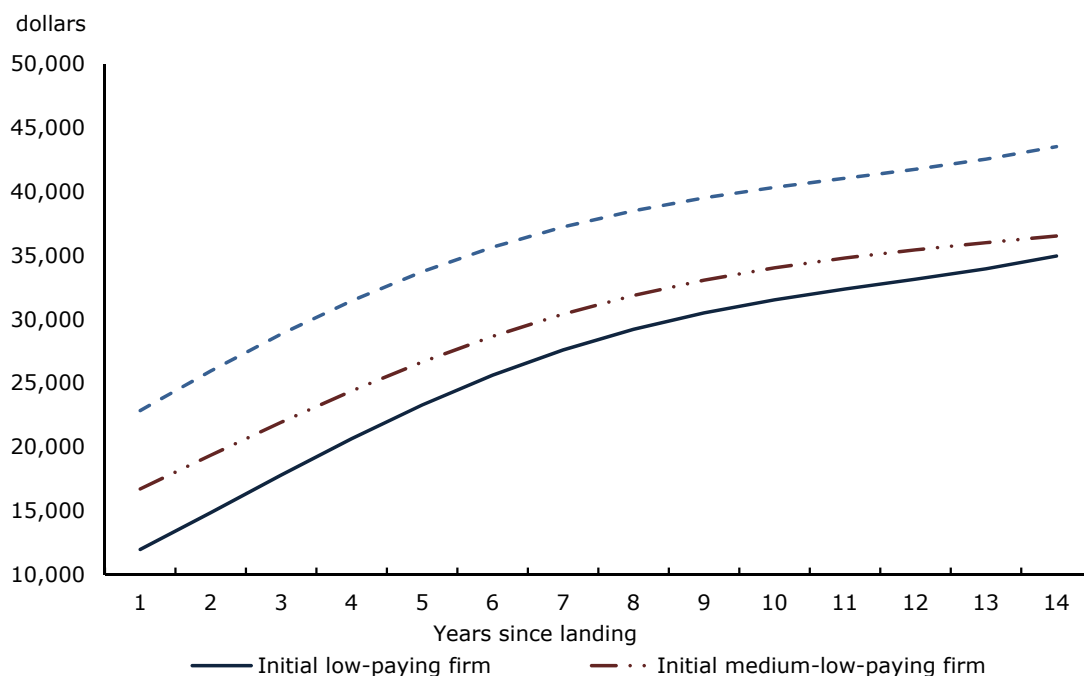


Figure 3. Estimated earnings growth pattern for immigrant men.

Source: Statistics Canada, Canadian Employer-Employee Dynamics Database, 1999–2012.

Note: Based on estimates in Model (3) of Table 3.

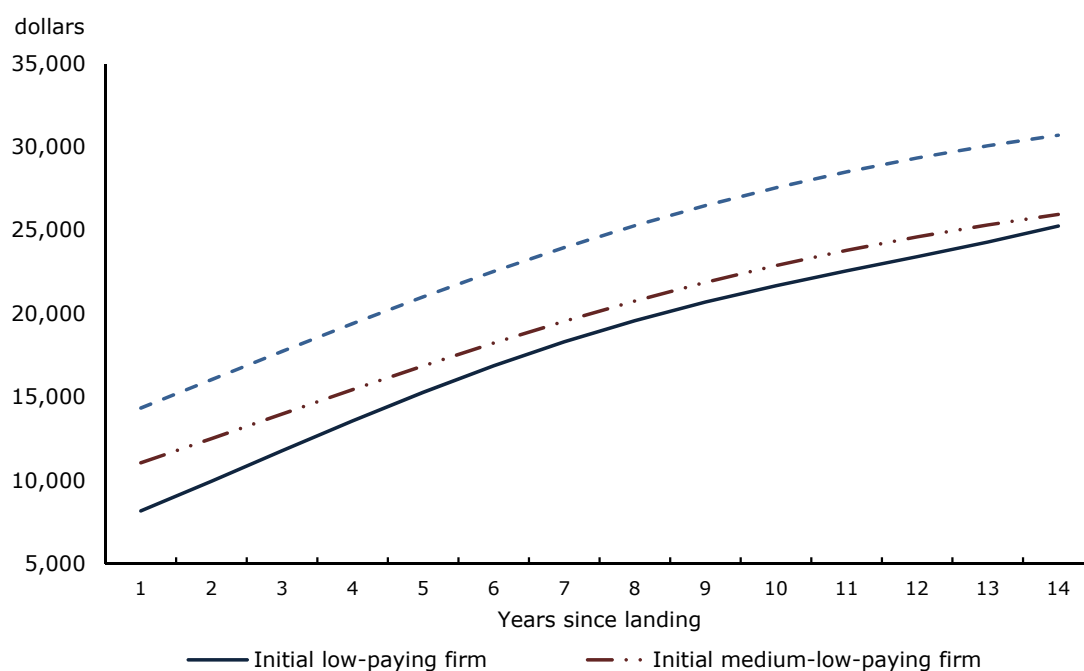


Figure 4. Estimated earnings growth pattern for immigrant women.

Source: Statistics Canada, Canadian Employer-Employee Dynamics Database, 1999–2012.

Note: Based on estimates in Model (3) of Table 3.

as immigrants resided in Canada over time. Relative to immigrants starting in high-paying firms, observationally equivalent immigrant men initially employed in low-paying firms were estimated to earn almost \$11,000 less in the first year after landing, with this earnings gap decreasing to about \$8,600 after 14 years in Canada. For men initially employed in medium-low-paying firms, the earnings gap increased from approximately \$6,000 in the first year to \$7,000 by the fourteenth year. The patterns were similar for immigrant women. The earnings difference between immigrant women starting in low- and high-paying firms was approximately \$6,000 in the first year after landing and \$5,500 in the fourteenth year. Among immigrant women starting in medium-low-paying firms, the differences were about \$3,000 and \$5,000 in the first and fourteenth years, respectively. These estimates indicate that immigrants starting in lower-paying firms had lower earnings in both the short and long term.

Returns to education and language proficiency by initial firm allocation

Do the short- and long-run earnings advantages associated with starting in high-paying firms differ by education and host country language proficiency? In other words, are returns to general human capital higher among immigrants who start in higher-paying firms? As noted above, two possible mechanisms may contribute to this. The first pertains to selection, as immigrants initially employed in high-paying firms likely have better abilities and skills beyond general human capital than immigrants in low-paying firms, and a lower likelihood of being overqualified for their job. The second pertains to skills usage and development, as high-paying firms may provide greater opportunity for immigrants to use and develop their skills. In both cases, those with higher levels of human capital may be more likely than other immigrants to benefit from employment in high-paying firms, and we can expect earnings differences between high- and low-paying firms to be largest among immigrants with high levels of human capital.

To examine this issue, Model 3 in Table 3 was estimated separately by education. The results are plotted to compare immigrants with a bachelor degree and those with only a high school diploma in Figure 5 for men and in Figure 6 for women. Similarly, Model 3 was estimated separately by official-language ability. Figures 7 and 8 compare the results for immigrants whose mother tongue is English or French with results for those who did not speak English or French at the time of landing.

As expected, the earnings gap between immigrants with a bachelor's degree vs. high school diploma was indeed larger among those initially employed in high-paying firms (figures 5 and 6). In the first few years after landing, the 'degree-diploma' difference among immigrants was approximately \$7,000 at high-paying firms and \$1,800 at low-paying firms. Over time, the magnitude of this difference remained larger among immigrants at high-paying firms.

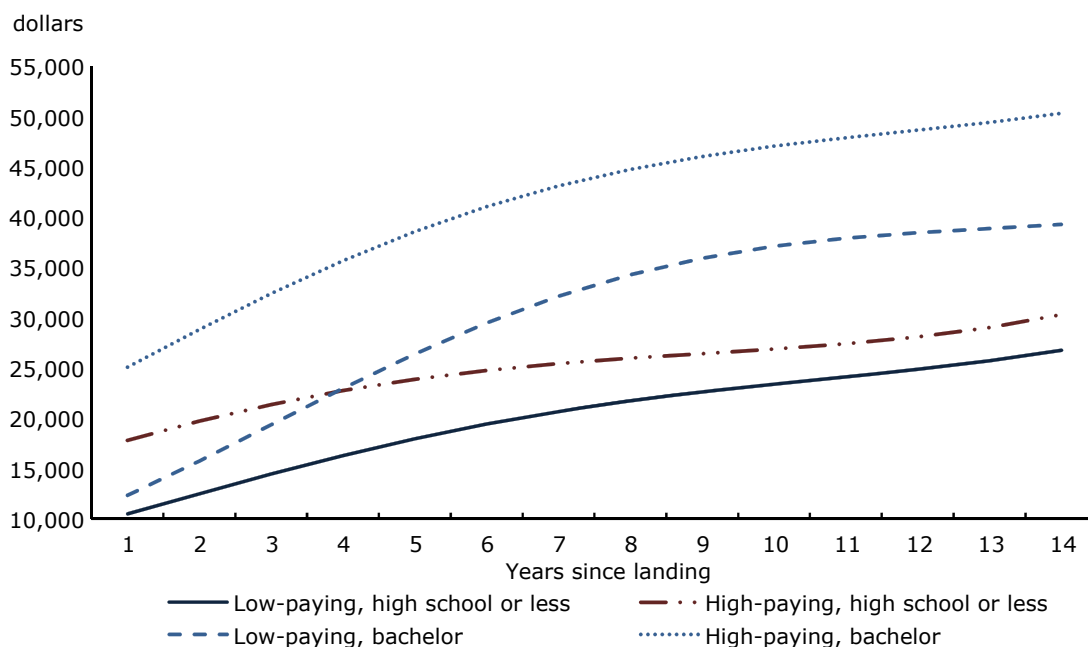


Figure 5. Estimated earnings growth pattern by educational level, men.

Source: Statistics Canada, Canadian Employer-Employee Dynamics Database, 1999–2012.

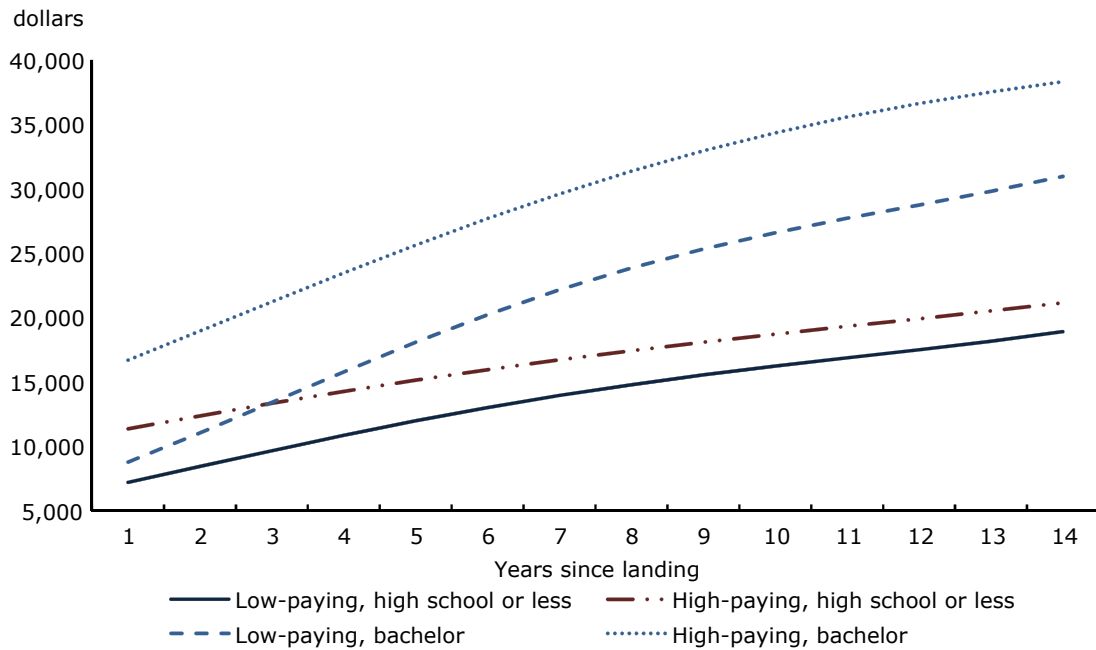


Figure 6. Estimated earnings growth pattern by educational level, women.

Source: Statistics Canada, Canadian Employer-Employee Dynamics Database, 1999–2012.

It is also clear from Figures 5 and 6 that among immigrants with a bachelor's degree, the earnings difference between those initially employed in high- or low-paying firms remained large and persistent over the fourteen-year reference period. This persistent gap is consistent with the view that among immigrants with a bachelor degree there are significant differences in skills and abilities that are not captured by educational attainment (i.e., unobserved characteristics), and that these unobserved characteristics contributed to the initial sorting of immigrants into high- and low-paying firms and to sustained earnings differentials over the longer-term. However, it is also possible that the persistent earnings gap between immigrant bachelor's degree holders initially employed in high- and low-paying firms is attributable to barriers preventing those who start in low-paying firms from catching up. This could include loss of skills resulting from under-employment, or reduced attractiveness to prospective higher-paying employers resulting from negative signals associated with low-wage employment or job turnover.

It is also clear from figures 5 and 6 that immigrants with a bachelor's degree starting in low-paying firms earned less than high school graduates starting in high-paying firms in the first few years after landing. However, by the fourth year, the former group outpaced the latter in earnings growth. This suggests that the long-run advantage of higher education was larger than the initial advantage of less-educated immigrants due to their other abilities or opportunities that high-paying firms had to offer.

Finally, among immigrants with a secondary education or less, the earnings gap by initial firm allocation decreased over time. For less-educated immigrants, the advantage of starting in high-paying firms may reflect differences in both selectivity and opportunities.

Similar patterns are observed from the results of model estimates by official language ability (figures 7 and 8). The earnings advantage of English or French mother tongue relative to not speaking either language was larger among immigrants starting in high-paying firms than among those starting in low-paying firms. Among immigrants whose mother tongue is English or French, the earnings gap by initial firm allocation decreased only slightly over the fourteen-year term after landing. Among immigrants who did not speak English or French, the earnings gap by initial firm allocation decreased over time among men, but changed little among women. Finally, immigrants whose mother tongue is English or French who started in low-paying firm did not have any earnings advantage in the initial years after landing than immigrants who did not speak English or French. However, the former group had higher earnings growth and earned more than the latter after 3 years among men, and after 2 years among women.

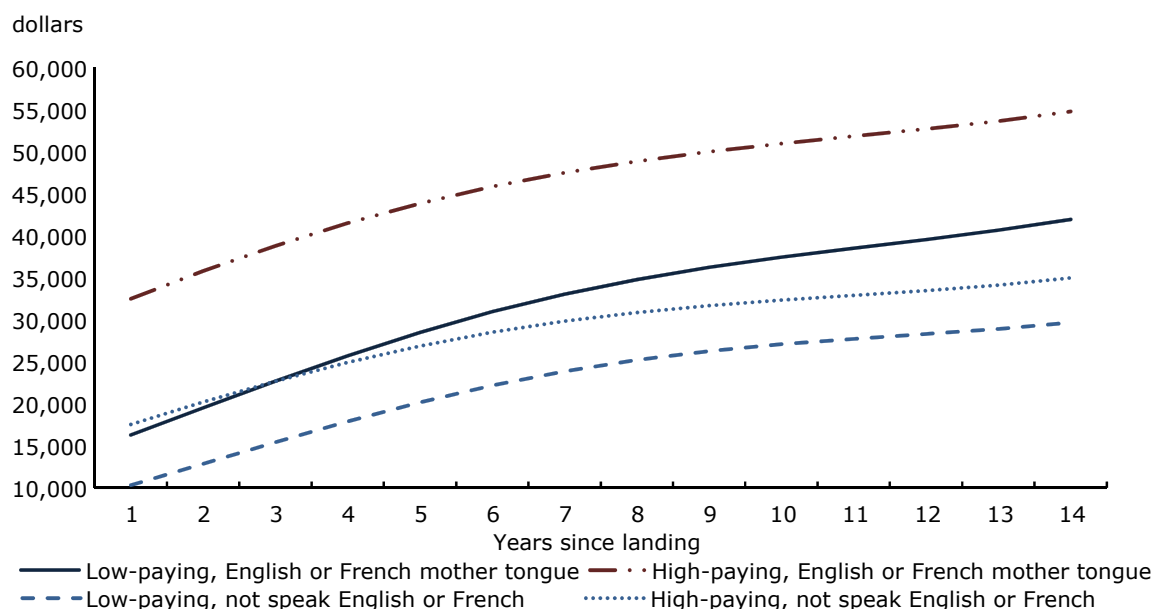


Figure 7. Estimated earnings growth pattern by mother tongue and language, men.

Source: Statistics Canada, Canadian Employer-Employee Dynamics Database, 1999–2012.

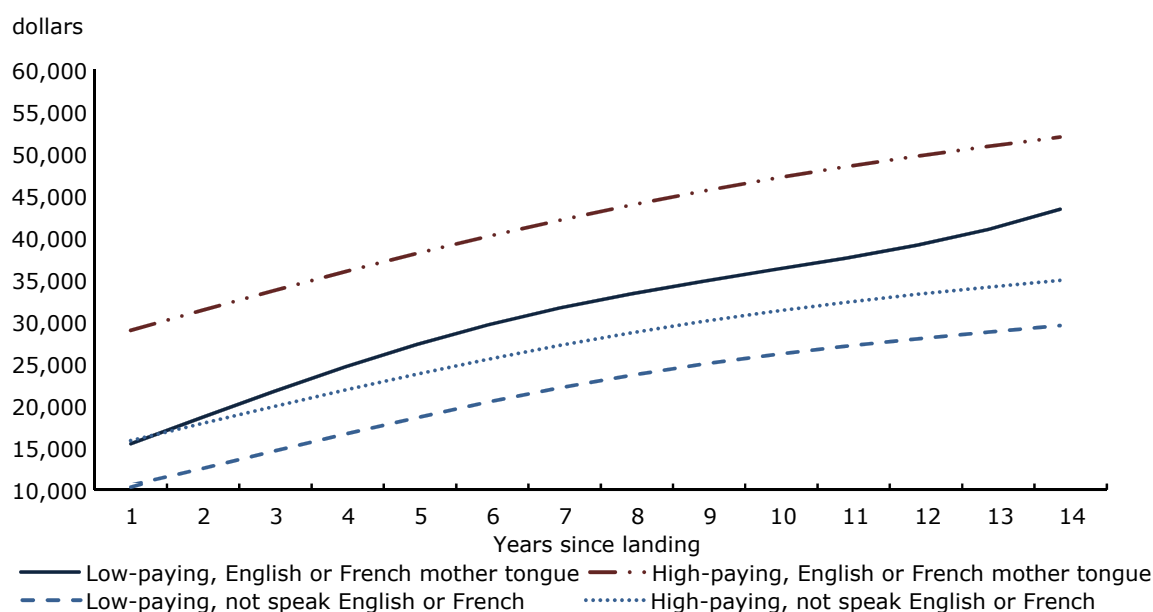


Figure 8. Estimated earnings growth pattern by mother tongue and language, women.

Source: Statistics Canada, Canadian Employer-Employee Dynamics Database, 1999–2012.

Robustness check

As discussed earlier, immigrants who started working in low-paying firms tended to delay their entry into the labour market and have fewer years of employment than immigrants who started in high-paying firms. In addition, about 12.4 per cent of immigrants who started in high-paying firms did not receive employment earnings in the following year, compared with a much higher interruption rate of 24.9 per cent among immigrants starting in low-paying firms. The different disruption and attrition patterns by initial firm allocation may bias the estimated earnings growth.

One simple way to address the attrition bias is to restrict the study sample to immigrants who were tracked for at least 8 years over the 14-year period. The earnings models were estimated on the restricted sample, and the results are shown in Table 4. These results are similar to those based on the overall sample presented in Table 3.

Table 4. Estimated coefficients from models of earnings by gender (log points unless otherwise indicated)

	Natural log of annual employment earnings					
	Men			Women		
	Model (1)	Model (2)	Model (3)	Model (1)	Model (2)	Model (3)
Initial low-paying firm	–1.332***	–1.159***	–0.691***	–1.150***	–0.996***	–0.642***
Initial low-paying firm interacted with years since landing	0.203***	0.215***	0.108***	0.184***	0.191***	0.116***
Initial low-paying firm interacted with years since landing squared	–0.017***	–0.019***	–0.008***	–0.017***	–0.018***	–0.010***
Initial low-paying firm interacted with years since landing cubed	0.0005***	0.001***	0.0002***	0.001***	0.001***	0.0003***
Initial Medium-low-paying firm	–0.746***	–0.601***	–0.308***	–0.622***	–0.484***	–0.254***
Initial medium-low-paying firm interacted with years since landing	0.065***	0.072***	0.017***	0.050***	0.051***	0.008
Initial medium-low-paying firm interacted with years since landing squared	–0.003***	–0.005***	0.001	–0.004***	–0.004***	0.0005
Initial medium-low-paying firm interacted with years since landing cubed	0.00001	0.0001**	–0.00007*	0.00008*	0.0001**	–0.00004
Years since landing	0.175***	0.178***	0.177***	0.129***	0.150***	0.148***
Years since landing squared	–0.015***	–0.016***	–0.016***	–0.006***	–0.010***	–0.010***
Years since landing cubed	0.0004***	0.001***	0.001***	0.0001***	0.0003***	0.0003***
Cohort	Yes	Yes	Yes	Yes	Yes	Yes
Landing age	No	Yes	Yes	No	Yes	Yes
Marital status	No	Yes	Yes	No	Yes	Yes
Education	No	Yes	Yes	No	Yes	Yes
Further education	No	Yes	Yes	No	Yes	Yes
Mother tongue	No	Yes	Yes	No	Yes	Yes
Immigration	No	Yes	Yes	No	Yes	Yes
Source region	No	Yes	Yes	No	Yes	Yes
Geographic distribution	No	Yes	Yes	No	Yes	Yes
Entry year	No	Yes	Yes	No	Yes	Yes
Firm size	No	No	Yes	No	No	Yes
Industry	No	No	Yes	No	No	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Observations (number)	1,490,088	1,490,088	1,490,088	1,337,599	1,337,599	1,337,599
R-squared (value)	0.16	0.29	0.379	0.162	0.266	0.329

Source: Statistics Canada, Canadian Employer–Employee Dynamics Database.

Note: With the exception of geographical distribution, firm size, and industry, all other covariates represent initial characteristics of immigrants at landing. The industry variable uses the 2-digit North American Industry Classification System (NAICS). Firm size is grouped into four categories, based on number of employees: (1) less than 20; (2) 20–99; (3) 100–500; and (4) more than 500.

* significantly different from reference category ($p < 0.05$); ** significantly different from reference category ($p < 0.01$);

*** significantly different from reference category ($p < 0.001$)

It is possible that the self-selection associated with attrition was largely captured by the included individual and work-related characteristics.

Further analysis was conducted for immigrants who were principal applicants in the skilled-worker class. These immigrants were selected under the points system. The results were generally in line with those obtained for all immigrants, although initial firm allocation had a stronger effect for principal applicants. Specifically, when individual demographic characteristics and firm-level covariates were controlled for in the model, male skilled-worker principal applicants starting in low-paying firms had roughly a \$15,000 earnings disadvantage relative to their counterparts who started in high-paying firms, and the gap narrowed slightly to \$13,000 by the end of the fourteenth year. Similarly, the earnings of those who initially worked in medium-low-paying firms were around \$9,000 lower than those of their peers who started in high-paying firms at the beginning, and the gap increased to around \$11,000 at the end of the 14-year period.

Some might raise concerns that the better earnings trajectories of immigrants starting in high-paying firms might be driven by their initial employment in the high-paying public administration industries. However, the estimation results are barely affected when the study sample is restricted to those who started their career in

private firms in Canada. This could be due to the fact that only a small proportion of immigrants can find their first job in the public service industry as citizenship is generally a priority in the process of government hiring and it takes several years for new immigrants to obtain their citizenship status.

Furthermore, descriptive statistics were produced to show earnings trajectories among immigrant men and women, respectively, by initial firm allocation within each of the following major industrial sectors: manufacturing; wholesale and retail trade; information and cultural industries, finance and insurance, real estate, professional, scientific and technical services; administrative and support; education services, health care, and public administration; accommodation and food services. In general, the pattern of earnings growth by initial firm allocation for both immigrant men and women in all industries combined, as illustrated in Charts 1 and 2, was also observed within each major industrial sector, with some noticeable variations. For both genders, the earnings gap between immigrants who started in high-paying firms and those stated in low-paying firms was the largest in the broad sector of information and cultural industries, finance and insurance, real estate, professional, scientific and technical services; and lowest in the accommodation and food services sector. In most of the major industrial sectors, the absolute earnings gap by initial firm allocation changed little with more years after immigration. However, in the education services, health care, and public administration sector, the absolute earnings gap between immigrants starting in low-paying firms and high-paying firms expanded over time. In comparison, the earnings gap between immigrants starting in low-paying and those in medium-low-paying firms disappeared about six years after immigration for both immigrant men and women in the sector of accommodation and food services, and about 8 years after immigration for immigrant women in the manufacturing industry.

Conclusion

Canada's economic immigration policy has been undergoing substantial changes that include increasing involvement of employers in selecting economic immigrants. Yet little is known about whether and how the characteristics of employers who select immigrants are associated with immigrant labour market outcomes in the short and long run. As a first step to provide relevant empirical evidence, this study asks whether immigrants starting with low- and high-paying firms have large gaps in initial earnings and whether the initial earnings gaps narrow with increasing length of residence in Canada. Although initial firms where immigrants started their work in Canada do not necessarily represent firms that would select immigrants from abroad, initial firm allocation is the result of Canadian employers selecting newly arrived immigrants based on their human capital factors, job-specific skills, and other qualifications that the employers can individually evaluate. This study argues that the characteristics of initial firms largely reflect the extent to which new immigrants' skills and abilities are validated and valued by Canadian employers.

Results show that whether new immigrants having their first paid employment in low-, medium-low-, or high-paying firms in Canada is a strong indicator of their long-run labour market outcomes. Immigrants starting in high-paying firms, in particular, had higher initial and long-term earnings than immigrants starting in low-paying firms, even after differences in individual demographic and human capital factors were taken into consideration. This earnings advantage is consistent with the view that the selection of immigrants into high-paying firms reflects a better match between skills and job requirements and selection on skills and abilities beyond those captured by educational attainment, age, and language ability.

This study further finds that earnings returns to educational attainment and knowledge of English and French were larger in both the short and long run among immigrants initially employed in high-paying firms than among those initially employed in low-paying firms. Furthermore, immigrants with high levels of human capital starting in low-paying firms earned less than immigrants with low levels of human capital starting in high-paying firms in the first few years after landing. However, the former group outpaced the latter in earnings growth. This indicates that, in the long run, the effect of high levels of human capital outweighs the initial advantage of low-skilled immigrants who started in high-paying firms.

The paper shows that the types of firms that potential immigrants are being selected into could be a pertinent indicator, in addition to common human capital factors, of immigrants' potential to do well in the Canadian

labour market. This might be because many unobserved characteristics of immigrants that could potentially attribute to their long-term earnings growth are captured by their initial allocation across high- or low-paying firms. These unobserved characteristics could include innate ability, skills, the degree to which their foreign educational credentials are valued in the Canadian labour market, and the match between skills and firm-specific demand. Since a firm's payment level can be easily measured and verified, it can be used as an important criterion in considering the importance of a job offer from a Canadian employer or previous Canadian work experience in immigrant selection.

References

- Aydemir, A., and M. Skuterud. 2005. Explaining the deteriorating entry earnings of Canada's immigrant cohorts: 1966–2000. *Canadian Journal of Economics* 38(2):641–72.
- . 2008. The immigrant wage differential within and across establishments. *Industrial and Labor Relations Review* 61(3):334–52.
- Barth, E., B. Bratsberg, and O. Raaum. 2012. Immigrant wage profiles within and between establishments. *Labour Economics* 19(4):541–56.
- Bloom, D.E., G. Grenier, and M. Gunderson. 1995. The changing labour market position of Canadian immigrants. *Canadian Journal of Economics* 46(28):987–1005.
- Eliasson, T. 2013. Decomposing Immigrant Wage Assimilation: The Role of Workplaces and Occupations. Working Paper No. 2013: 7. Uppsala: Institute for Evaluation of Labour Market and Education Policy. Available at <http://hdl.handle.net/10419/82263>
- Frenette, M., and R. Morissette. 2005. Will they ever converge? Earnings of immigrant and Canadian-born workers over the last two decades. *International Migration Review* 39:228–58.
- Fong, E., and F. Hou. 2013. Effects of ethnic enclave of neighborhoods, workplace, and industrial sectors on earnings. *Social Science Research* 42(4):1061–76.
- Hou, F. 2009. Immigrants working with co-ethnics: Who are they and how do they fare? *International Migration* 47(2):69–100.
- . 2013. Immigrant entry earnings over the past quarter-century: The roles of changing characteristics and returns to skills. *Canadian Studies in Population* 40(3–4):149–63. Available at <https://ejournals.library.ualberta.ca/index.php/csp/article/view/20859/15885>
- Javdani, M., and A. McGee. 2013. Intra-firm Upward Mobility and Immigration. IZA Discussion Paper no. 7378. Available at <http://hdl.handle.net/10419/80564>
- Pendakur, K., and S. Woodcock. 2010. Glass Ceilings or Glass Doors? Wage Disparity Within and Between Firms. *Journal of Business and Economic Statistics* 28(1):181–89.
- Reitz, J. 2007. Immigrant employment success in Canada, Part II: Understanding the decline. *Journal of International Migration and Integration* 8(1):37–62.
- Schaaafsma, J., and A. Sweetman. 2001. Immigrant earnings: Age at immigration matters. *Canadian Journal of Economics* 34(4):1066–99.
- Tomaskovic-Devey, D., M. Hallsten, and D. Avent-Holt. 2015. Where do immigrants fare worse? Modeling workplace wage gap variation with longitudinal employer–employee data. *American Journal of Sociology* 120(4):1095–143.

Individual and community-level determinants of retention of Anglophone and Francophone immigrants across Canada

Michael Haan¹

Jake Arbuckle

Elena Prokopenko

Abstract

This paper uses Cox Proportional Hazard models, the Longitudinal Immigration Database, and Harmonized Census Data files to investigate the individual and community determinants of retention of Anglophone and Francophone immigrants in Canada among 1990, 1995, 2000, and 2005 landing cohorts in the first five years after landing. We focus on both the official language capacity of immigrants and the linguistic composition of the communities in which they settle. We find that Official Language Minority Communities (OLMCs) successfully retained Francophone immigrants better than non-OLMCs outside of Quebec. We also find that most cohorts of Anglophone immigrants are more likely to exit Quebec if they started out in an OLMC than if they did not.

Keywords: immigration; recruitment; retention; integration; official languages

Résumé

Cette étude utilise des modèles à risque proportionnel de Cox, la Base de données longitudinales sur l'immigration, des fichiers de données harmonisés des recensements de la population afin d'examiner les déterminants au niveau individuel et communautaire sur la rétention à l'arrivée au pays des cohortes admises en 1990, 1995, 2000 et 2005 au cours des cinq premières années après leur établissement. L'accent de l'étude porte sur la capacité linguistique dans les deux langues officielles des nouveaux arrivants et la composition linguistique des communautés d'accueil. L'étude révèle que les communautés de langue officielle en situation minoritaire (CLOSM) ont plus de succès à maintenir les immigrants francophones que les communautés de langue officielle en situation majoritaire hors-Québec. L'étude révèle aussi que la plupart des cohortes anglophones sont plus susceptibles de quitter le Québec si initialement établies dans une CLOSM.

Mots-clés : l'immigration; recrutement; rétention; intégration; langues officielles

Introduction

Canada has long been a bilingual country. Federal policies on linguistic duality date as far back as the Constitution Act of 1867 (Section 133), with enshrinement of the right to use French or English in Parliament and in Federal Courts. Canada's 1982 Charter of Rights and Freedoms extended the linguistic duality even further, declaring that "English and French are the official languages of Canada and have equality of status and equal rights and privileges as to their use in all institutions of the Parliament and government of Canada" (Government of Canada 1982). Elsewhere, the Government of Canada has stated that it is "committed to promoting Canada's official languages, as well as the vitality of official language minority communities" (Government of Canada 2013).

1. Corresponding author: Michael Haan, Canada Research Chair in Migration and Ethnic Studies, Department of Sociology, 5306 Social Science Centre, Western University, London, ON, Canada, N6A 5C2, email: mhaan2@uwo.ca; Jake Arbuckle, Population Growth Division, Government of New Brunswick; Elena Prokopenko, University of New Brunswick.

Although English is spoken most widely across the country, a considerable proportion of the Canadian population either also speaks French or speaks French exclusively. According to the 2011 Census of Canada, 7.7 million people, or 23.2 per cent of all Canadians, identified French as their first official language spoken (Statcan 2011). While the vast majority of French speakers live in Quebec (6.1 million people in Quebec, or around 18 per cent of the total population of Canada, list French as their mother tongue), there are a considerable number of Francophones across the rest of the country, just as there are Anglophones in Quebec.²

In the current period of low fertility, immigration has for many years been responsible for nearly all population growth (Kalbach 1970), suggesting that Anglophone and Francophone immigration is extremely important for maintaining Official Language Minority Communities (OLMCs).³ The central purpose of this paper is to analyze the factors at the individual and community level that affect the retention of Anglophone and Francophone immigrants in OLMCs in Canada. Of particular interest is the role that OLMCs play in immigrant retention.

The primary questions that this study addresses are:

1. What are the individual and community characteristics that determine whether Francophone immigrants stay in their respective province of landing?
2. Do provincial retention rates vary depending on individual characteristics, such as level of education, marital status, presence of children, landing category, and year of landing?
3. How likely is it that a Francophone immigrant will stay in a predominantly Anglophone versus Francophone community? What about Anglophone or Allophone immigrants?⁴

To answer these questions, this study employs Cox Proportional Hazard models, the 1991–2006 Harmonized Census Files, and the Longitudinal Immigration Database (IMDB).

We first briefly outline current immigration policy and recent trends in Francophone immigration. As a study of the retention of immigrants in their location of landing, we briefly review the literature on the internal geographic mobility of immigrants. Next, our methodology is discussed, followed by a presentation and discussion of results.

Francophone immigration trends outside of Quebec

Although there are Official Language Minority Communities across Canada, most Anglophone and Francophone immigrants settle in a region where they can function in the official language of their choice. Although the majority of Francophone immigrants continue to settle in Quebec, there has been a shift in recent years (Day and Winer 2014). In British Columbia, for example, Francophone immigrants as a percentage of the French-speaking population grew from 18 per cent in 1991 to 24 per cent in 2006; from 8 to 13 per cent during the same period in Ontario, from 9 to 13 per cent in Alberta, and from 5 to 10 per cent in the Northwest Territories (Houle and Corbeil 2010). The Atlantic region, as well as Manitoba and Saskatchewan, experienced limited growth.

Of the permanent resident population that landed between 2008 and 2012, 76,315 identified French as their first official language spoken, while 133,275 declared both official languages spoken. Employing the First Official Language Spoken (FOLS) approach developed by Statistics Canada, this amounts to 76,315 plus 133,275/2, or roughly 143,000 Francophones. As a percentage of the total number of permanent residents landing for this period, 5.9 per cent identified French as their only official language spoken and 5.2 per cent identified speaking both official languages, thereby totalling roughly 11 per cent of all landings (CIC, Q3 2013 Data Cubes, 2013).

Though a sizable number, it still does not reflect the current linguistic balance of the country's two official languages. Between 1999 and 2001, a tour was taken across Canadian Francophone communities by the Fédéra-

2. According to the 2011 Census, 7.7 per cent or 599,230 members of the Quebec population reported their mother tongue as English; 9.8 per cent or 767,415 reported English as the language most spoken at home. See <https://www12.statcan.gc.ca/census-recensement/2011/as-sa/fogs-spg/Facts-pr-eng.cfm?Lang=Eng&GK=PR&GC=24> (accessed 28 January 2017).

3. Defined as an Anglophone Minority Community in Quebec, or a Francophone Minority Community in the Rest of Canada.

4. This study does not look at the *intra-provincial mobility* of immigrants, that is, immigrants who move from one community to another community *within the same province*. While this would be an interesting study, it is outside the scope of this article.

tion des communautés francophones et acadiennes du Canada (FCFA), and the topic of immigration and its importance to the vitality of the Francophone communities was discussed at great length (Roy Marcoux 2009: 1). Francophone Minority Communities (FMCs) were not benefiting from immigration to the same degree as Anglophone communities (Roy Marcoux 2009). The Federal Government released the *Roadmap for Canada's Linguistic Duality 2008–2013: Acting for the Future*, with five priority areas, as a reaffirmation of the government's commitment to linguistic duality and Canada's two official languages.

The *Roadmap* committed the federal government to facilitating the efficacious integration of French speaking immigrants by enabling their access to French services reflecting their needs.⁵ From the federal government's perspective, the *Roadmap* has had a positive impact for: better understanding the unique challenges affecting Francophone Minority Communities (FMCs); identifying an increase in the number of French-speaking newcomers migrating to FMCs (albeit with challenges quantifying the exact number); improving infrastructure to integrate French-speaking newcomers into FMCs; and other issues tackled by the *Roadmap* (CIC 2012).

In 2013, the federal government released a new iteration: the *Roadmap for Canada's Official Languages: Education, Immigration, Communities*. Like its predecessor, the latest manifestation of the *Roadmap* (*Roadmap 2*) specifically addresses immigration, recognizing the need to improve efforts to successfully recruit and retain French-speaking immigrants to Canada's FMCs.

Review of the literature on the inter-provincial mobility of immigrants in Canada

As provinces and regions invest considerable resources and programs (such as the Atlantic Immigration Pilot; Government of Canada 2017) into attracting immigrants to their respective jurisdictions, it is important to identify the characteristics of both individuals and communities that best facilitate the retention of immigrants destined for, and landing in, individual provinces and territories. The Constitution Act of 1982, specifically the mobility rights under section 6 (2), articulates that every citizen or permanent resident of Canada has the right to move and reside in any province (Canadian Charter, 1982, s 6(2) (a) (b)). The implication for immigrants (and provinces/territories where immigrants reside) is that irrespective of where they land, they are free to move wherever they choose, be it for employment, family, or other reasons. As a result, retention of immigrants is crucial, along with awareness of the individual- and community-level determinants of retention.⁶ Trovato (1988) has argued that recent immigrants tend to migrate to larger centres and subsequently remain there; if they then move, it tends to be to other larger centres. It is only after immigrants have resided in larger urban centres for ten years or more that one sees movement toward smaller urban areas (Trovato 1988).

Immigrants are more likely to migrate inter-provincially than the Canadian-born (Hou 2007; Rogers and Belanger 1990). Bigger cities with larger ethno-cultural communities (Toronto, Vancouver) exercise a stronger pull on immigrants (Newbold 1996). However, immigrants tend to pursue opportunities in the same manner as the Canadian-born; they migrate *to* areas offering better employment rates and opportunities, including higher earning potential and greater cultural affinity, but avoid locations with harsher climates, remoteness, great distance, and poor employment opportunities (Newbold 1996). Inversely, immigrants are less likely to migrate *from* areas containing the positive qualities described above (Newbold 1996). Immigrants with higher human capital characteristics, such as higher education, are more mobile (similar to the Canadian-born), but less mobile if they have families (i.e., married with children).

Trovato and Halli (1990) found that language was a more important determinant to migrate than ethnicity, although, as ethnicity and language associate closely, it was difficult to attribute the inclination to move solely to language separate from ethnicity (Trovato and Halli 1990).⁷

5. Since Quebec is largely responsible for its own immigrant streams, and minority communities are defined as Anglophone in the province, most of the report focused on Francophone immigration in the rest of Canada.

6. Of note, immigrants nominated by a province or territory generally sign a commitment to reside in the province that nominated them; however, as above, there is no legal basis for the revocation of permanent residency from a provincial nominee. As such, retention strategies become increasingly more important.

7. Trovato and Halli also note that the French were more likely to migrate *intra*-provincially within Quebec than *inter*-provincially outside Quebec.

Hou and Bourne (2006) argue that higher levels of immigration may be related to the out-migration of lower-educated and lower-skilled domestic-born populations from Canada's three major "gateway" cities: Toronto, Vancouver, and Montreal. They argue that, if correct, the effect of immigration growth on internal migration to and from major CMAs likely relates to economic factors, such as competition for lower-skilled jobs and more affordable housing among the lower-skilled domestic population and recently arrived immigrants (Hou and Bourne 2006). However, while there remains an unclear relationship between immigration growth and internal migration, the major CMAs (Toronto and Vancouver in particular), continue to attract a large share of international migrants; while receiving fewer internal migrants during the 1990s, they simultaneously had fewer migrants leave, "increasing the diversity distance between [these] gateway centres and the rest of the country" (Hou and Bourne 2006).

While the number of immigrants choosing Toronto and Vancouver remained high throughout the 1970s and 1980s, there was a decline in their concentration in the 1990s (Hou 2007). The earlier concentration relates to the initial destination of immigrants, likely related to the pull of global cities for highly skilled, lower-, and semi-skilled workers (Hou 2007). Hou (2007) also found that size of the ethnic community did not have an effect (when controlling for location fixed effects, i.e., regional unemployment rates) on the growing concentration of immigrants (Hou 2007). This contrasts with Newbold's assertion that large centres such as Toronto and Vancouver are able to attract immigrants because of the large size of their ethnic populations (Newbold 1996).

Earlier studies found a large difference between French- and English-speaking migrants; for example, while the French-speaking immigrants tended to relocate intra-provincially in Quebec, English-speaking immigrants tended to out-migrate from Quebec (Edmonston 2002; Krahn et al. 2005; Newbold 1996). Minority language speakers were less likely to leave their province of residence, as it would mean leaving their community, "which suggests the importance of cultural similarity" (Newbold 1996).

This paper's focus on immigrants speaking the minority official language in their region of landing (English in Quebec, French in the rest of Canada), and the linguistic composition of the communities in which they settle, is designed to build on the existing literature on inter-provincial migration. As stated earlier, it does not address intra-provincial migration, but acknowledges this as both a limitation of this paper and important area of inquiry. The policy initiatives designed to augment the national Francophone population, particularly outside of Quebec, has been a topic of considerable discussion and a focus of significant activity in the field.

Federal support for maintaining the vitality of OLMCs will continue to be a priority in the years to come. It is therefore important to help develop evidence that informs policies focused on attraction, recruitment, settlement, integration, and retention outcomes among⁸ Francophone newcomers in the rest of Canada, and among Anglophone newcomers in Quebec. In the remainder of this article, we model interprovincial migration rates of four cohorts of immigrant newcomers to Canada, assessing the comparative impact of individual and community-level factors. This research will provide policymakers with evidence-based information to support decisions regarding Canadian immigration policy, especially as it pertains to the recruitment and retention of Francophone immigrants in OLMCs, and for Quebec's immigration policies around Anglophone immigration.

Methodology and scope

Data

This study uses two sets of data. The first one is the 2011 Longitudinal Immigration Database (IMDB), a file that contains immigrant landing records linked to Canadian T1 tax return data. These data are annual, and span from 1982 to 2011. We extract the records from four landing cohorts (1990, 1995, 2000, and 2005), and follow their migratory patterns in the first five years after landing.

8. Anglophone immigrants in Quebec are also of interest, even though Citizenship and Immigration Canada's mandate does not include selection and integration in Quebec.

The longitudinal nature of this dataset allows us to identify and track individual immigrants according to place of tax filing, so that we can trace their geographical location over time. Detailed information on the immigrants' location at the level of census subdivision, and neighbourhood and some individual characteristics, are obtained from the 1991–2006 harmonized census files. Neighbourhood information is linked to longitudinal IMDB records using longitudinally consistent CSD identifiers. Since we only obtain community information in census years (1991, 1996, 2001, and 2006), it was necessary to impute data for the remaining years. We chose linear interpolation, which equates to a 'straight line' of data for adjoining censuses. For example, if the Consumer Price Index–adjusted median income in 2001 was \$30,000 and in 2006 it was \$35,000, the values for intervening years would be as follows: \$31,000 in 2002, \$32,000 in 2003, \$33,000 in 2004, and \$34,000 in 2005.

Values for 2007–11 were taken from the 2006 census. Generating annual Census Subdivision information allows us to identify Official Language Minority Communities and model how community characteristics affect migration as close to time of move and as accurately as possible. Community-level information is linked to landing and tax-filing records of immigrant newcomers, allowing us to model the effect of both individual- and community-level characteristics on provincial retention rates.

Statistical methods

We used Cox proportional hazard models to analyze the risk factors of provincial out-migration. To formulate this problem into survival analysis, an *event* is defined as leaving a province in a given year. Let t be a random variable, denoting an individual's *event time*, i.e., leaving province of landing (as defined by the first province where a tax return is submitted). The hazard function of exiting a province at time t is defined by:

$$h_{ik}(t) = h_0(t) e^{\beta_j X_{ij} + \delta_j Z_{kj}},$$

where $h_{ik}(t)$ is the predicted hazard for individual i leaving community k , $h_0(t)$ is the baseline hazard, β_j and δ_j are regression coefficients that measure the net effect of individual (X) and community (Z), respectively, on the risk of moving.

To denote any major differences between immigrant cohorts, separate regressions were performed on 1990, 1995, 2000, and 2005 arrivals in the following five years.⁹ Furthermore, we ran separate models for Quebec and the rest of Canada.

Measures

Independent variables

Individual-level variables

Age is calculated from date of birth of the respondent.

Language characteristics: “English” (reference category in Canada except Quebec models), “French” (reference category in Quebec models), “English and French” or “No Official Language” is a categorical variable about an immigrant's knowledge of an official language, indicating if a respondent is capable of communicating in English only, French only, both English and French, or no official language at the time of landing.

Marital status is a binary variable indicating the status of marriage of the respondent at the time of admission: “not married” includes never legally married (single)/ separated, but still legally married/ divorced/ widowed, and “married” includes legally married (and not separated) and common-law.

Presence of children indicates whether the individual has at least one child under the age of 18.

9. This means that we likely missed some mobility during the landing year. We chose to begin observing individuals in year $t+1$ because we didn't know when individuals landed in the prior year, which would introduce error into many of our parameter estimates (particularly the income variables).

Education refers to an individual's highest degree or diploma at the time of landing. Options include "High school diploma or less" (reference group), "College diploma," or "Bachelor's degree or higher."

Admission category refers to the immigrant class based on which the immigrant received admission into Canada. These include "Family Class," "Economic Class" (which consists of provincial nominee principal applicants, spouses and dependents, Federal Skilled Worker principal applicant, spouses and dependents, Entrepreneur, and Investor classes), "Refugees," and "Other Class" (i.e., those that are not in either Family, Refugee, or Economic classes).

Income: Individual income from all sources in year $t-1$. All dollar values are in 2010 dollars, and represented by four binary variables: < \$10,000, \$10,000–\$19,999, \$20,000–\$29,999, \$30,000–\$39,999, and more than \$40,000 (reference group).

Province of filing indicates the immigrant's place of residence in terms of province and territory as of December 31 of year $t-1$.

Country of citizenship indicates an individual's citizenship country, and only a small number of countries could be included. These include France, Haiti, China, Algeria, Romania, Morocco, Other French (i.e., other countries where French is the official language), Other English and Other for Quebec, and China, India, Philippines, United Kingdom, United States, Other French, Other English, and Other for the rest of Canada.

Community-level variables

Each of the community variables below indicate the community characteristics of an individual at time $t-1$. The reason for doing this is that we wanted to know the characteristics of where people lived in before they moved, rather than where they were currently situated.

OLMC indicates that an individual lives in a community that is an Official Language Minority Community. We define an OLMC as any census subdivision where there are either a minimum of 1,000 or at least 10 per cent of the population that speaks English (in Quebec) or French (in rest of Canada). We found that the results were largely consistent across the different definitions of OLMC.

*English*OLMC* indicates that an individual is both Anglophone and living in an OLMC (Quebec models only).

*French*OLMC* indicates that an individual is both Francophone and living in an OLMC (Canada except Quebec models only).

Percentage homeowner indicates the proportion of individuals who live in an owned dwelling.

% University degree indicates the proportion of individuals who hold a bachelor's degree or higher.¹⁰

% Immigrant indicates the proportion of individuals who are immigrants.^{11,12}

Rural is a binary variable that indicates if a census subdivision is primarily rural.

Median community income is a standardized measure of median income in the CSD.¹³

Dependent variable

The dependent variable is a binary variable that measures if person i at time t pays taxes in a different province at time t than they did at $t-1$. We assume that the stated location on the tax return at time t indicates where that individual lives at time t . A change in location from one year to the next indicates that a move has occurred.

10. Normalized for the Quebec models, due to less variation in the smaller sample.

11. Normalized through mean-centering for the Quebec models, due to less variation in the smaller sample.

12. Per cent internal migration was also considered; however, the variable was dropped to retain model stability.

13. Percentage of low-income households was also considered; however, the variable was dropped to retain model stability.

Descriptive results

Individual-level characteristics of immigrants to Canada

In Table 1, we outline the sample characteristics of the four arrival cohorts of interest.

Table 1. Characteristics of immigrants to Canada except Quebec, 1990, 1995, 2000, and 2005 cohorts (%)

	1990	1995	2000	2005
Average age	35	37	36	37
Married	66	76	81	81
Presence of children	55	54	57	58
Knowledge of official languages at landing				
French	1	1	1	1
English	57	68	62	67
Both official languages	2	2	3	5
Neither official language	39	29	34	27
Education at landing				
High school degree or less	45	42	23	22
College degree	47	49	59	59
Bachelor's or higher	6	8	16	16
Admission category				
Economic class	37	45	62	53
Refugee	20	14	11	14
Family class	30	29	22	25
Other class	13	12	5	8
Total individual income (2010)				
Less than \$10,000	7	13	9	8
\$10,000–\$19,999	16	18	14	13
\$20,000–\$29,999	20	21	18	18
\$30,000–\$39,999	19	16	17	18
\$40,000 or more	37	33	42	43
Country of citizenship				
China	5	8	21	19
India	5	9	13	15
Philippines	8	10	6	10
UK	17	14	5	3
USA	3	2	2	2
Other French	2	4	3	3
Other English	9	10	12	11
Other	51	44	38	37
<i>N</i>	68,980	72,725	89,580	93,605

Source: Longitudinal Immigration Database (IMDB) 2011.

Note: Percentages may not add up to 100 within categories, due to rounding.

Most of the sociodemographic information is consistent across cohorts. The average age of newcomers increases slightly (by two years) over the four cohorts. The percentage of immigrants that are married starts at 66 per cent for 1995 arrivals, peaks at 81 per cent among the 2000 cohort, and remains at this high level among 2005 arrivals. The percentage of individuals with children ranges from 54 per cent (1995 cohort) to 58 per cent (2005 cohort). Most immigrants to Canada (except Quebec) speak either English or neither official language.

Overall educational attainment levels trend upwards across the cohorts, and the proportion of Economic Class trends upwards, alongside a decline in the number of refugees and family class landings. Over time, more immigrants are found in the highest income bracket, and in the 2005 cohort, the \$40,000+ category contains almost half of all the immigrants.

The distribution of immigrants from different countries (as defined by citizenship status) remains relatively constant, with the only consistent trend being a general decline among arrivals from the U.K. and a steady increase in newcomers from India and China.

Turning now to Quebec (Table 2), average age is stable across cohorts, there is an increase in the percentage married, and the proportion of individuals with children declines across the cohorts. The proportion of immigrants who speak neither official language is smaller, and although the proportions of English and French speakers fluctuate, neither changes drastically.

Table 2. Characteristics of immigrants to Quebec, 1990, 1995, 2000, and 2005 cohorts (%)

	1990	1995	2000	2005
Average age	35	35	35	35
Married	64	72	72	74
Presence of children	57	55	51	52
Knowledge of official languages at landing				
French	23	29	29	26
English	22	29	24	19
Both official languages	24	17	26	43
Neither official language	31	25	21	12
Education at landing				
High school degree or less	47	35	25	19
College degree	45	52	59	61
Bachelor's or higher	6	12	14	18
Admission category				
Economic class	53	45	57	61
Refugee	12	23	19	14
Family class	19	27	22	19
Other class	17	5	3	6
Total individual income (2010)				
Less than \$10,000	12	14	12	12
\$10,000–\$19,999	23	25	22	19
\$20,000–\$29,999	23	25	24	24
\$30,000–\$39,999	19	14	17	19
\$40,000 or more	22	22	25	26
Country of citizenship				
France	5	12	11	9
China	3	6	11	9
India	4	6	4	4
Philippines	2	4	9	9
U.K.	1	5	4	7
USA	3	3	8	7
Other French	2	4	5	6
Other English	9	10	9	7
Other	71	50	39	43
<i>N</i>	13,340	10,930	15,460	20,890

Source: Longitudinal Immigration Database (IMDB) 2011.

Note: Percentages may not add up to 100 within categories, due to rounding.

As with the rest of Canada (Table 1), the level of education among immigrants to Quebec gradually increases over time. We see more individuals with post-secondary schooling, and fewer individuals with a high school diploma or less. However, income distribution does not change much over the time span, and compared to the rest of Canada, much fewer individuals are in the top income category.

There is a considerable change in the proportion of newcomers from several countries. Immigrants from Romania increased from 1 to 7 per cent, and Algeria from 2 to 9 per cent. The biggest change is seen among im-

migrants from Other (Non-English, Non-French) countries, which comprised 71 per cent of the 1990 cohort, but dropped to 43 per cent in 2005.

Intended destination

In Table 3, we display the intended destination of immigrants across the Canadian provinces.

Table 3. Intended province of destination by language group, 1990, 1995, 2000, and 2005 cohorts (%)

Knowledge of official languages at landing	Cohort	Province of intended destination										N
		Nfld	PEI	NS	NB	Que	Ont	Man	Sask	Alta	BC	
English	1990	0.5	0.1	0.9	0.5	8.7	59.4	3.7	1.1	10.1	14.9	47,930
	1995	0.4	0.1	1.7	0.3	5.7	62.2	1.9	1.1	6.8	19.9	57,690
	2000	0.2	0.1	0.6	0.2	5.9	66.6	2.0	1.0	7.1	16.3	64,660
	2005	0.2	0.1	0.8	0.4	6.3	62.6	3.5	1.0	8.9	16.2	73,895
French	1990	0	0	0.2	0.2	83.9	12.6	0.5	0	1.5	1.0	4,195
	1995	0	0	0.4	0.5	84.5	11.5	0.2	0.1	1.0	1.8	4,170
	2000	0	0	0.1	0.8	86.5	9.8	0.8	0	0.9	1.2	5,760
	2005	0	0	0	0.2	87.4	8.9	1.0	0.1	1.3	1.0	6,680
Both	1990	0.2	0	0.4	0.5	68.7	23.6	0.6	0.4	2.2	3.4	5,520
	1995	0	0	1.0	0.4	50.8	34.4	1.0	0.4	3.5	8.6	4,025
	2000	0	0	0.4	0.6	61.3	28.7	0.8	0.1	3.0	5.0	7,075
	2005	0.1	0	0.7	0.4	67.2	21.6	0.7	0.3	3.3	5.6	15,185
Neither	1990	0.1	0.1	0.6	0.3	15.4	54.9	4.0	1.4	9.9	13.2	35,570
	1995	0.3	0.1	1.2	0.4	12.7	48.2	2.4	1.4	8.3	25	26,570
	2000	0.1	0.1	0.5	0.3	10.8	57.4	2.2	0.8	6.5	21.2	36,475
	2005	0.2	0.1	0.3	0.2	9.7	51.7	3.0	0.8	8.8	25.1	30,030

Source: Longitudinal Immigration Database (IMDB) 2011.

Note: Percentages may not add up to 100 within categories, due to rounding.

For all four cohorts, Ontario is the most popular intended destination for English-only speakers and those who declare knowledge of neither official language. Among French speakers, Ontario declines in popularity over the time period (attracting 12.6 per cent of the French-speaking immigrants in 1990 and 8.9 per cent in 2005), while Quebec becomes an increasingly more popular destination. By contrast, fewer bilingual immigrants choose Quebec as their destination over time, with Quebec's share of bilingual immigrants gradually decreasing from 15.4 to 9.7 per cent.

Quebec also welcomes fewer Anglophone immigrants over time, reaching a peak with 8.7 per cent in 1990; the number drops slightly to 6.3 per cent by 2005. Ontario absorbed the large spike of immigrants who spoke neither English nor French in the 1990s, and thereafter. Although only 13 per cent of immigrants in 1990 chose British Columbia as their intended destination, that number nearly doubled in 1995 and 2000. From 1995 onward, Ontario becomes less popular for French-only and bilingual speakers, and Manitoba attracts a greater share of French-only speakers.

Table 3 indicates intended, not actual, destinations; however, people may not necessarily move to (or stay in) the intended province of destination. In Table 4, we present disparities between intended destination and province of tax-filing one year after landing. Although it appears that many people do file taxes in their intended destination province, there are some noteworthy disparities. First, although Atlantic Canada (especially Newfoundland and Labrador) initially had some of the lowest one-year retention rates of any province, the region improved its record considerably over time. That said, for some the settlement rates (defined as those who settle in their stated destination) remain fairly low. New Brunswick, for example, in 2005 continued to receive only about 2/3 of people whose stated destination was the province. Quebec and Ontario have consistently high retention rates across the cohorts.

What is interesting, however, is that there does not appear to be a clear trend regarding those who speak a language and are in the minority (English in Quebec and French in the rest of Canada). Although there are mixed settlement results for Francophones in Atlantic Canada, they tend to move on to Alberta and British

Columbia (and Saskatchewan for the last cohort). In two of the cohorts, Quebec receives a larger share of Anglophone immigrants than expected, but in most cases, there are fewer people of all language groups who file taxes in Quebec compared to the number of people claiming it as their destination.

The one trend that does stand out in Table 4 is the pull that western provinces have on newcomers to Canada. Already among the 1990 cohort, British Columbia receives a much larger share of immigrants than was intended, and it is joined by Alberta in subsequent cohorts (especially 2000 and 2005 arrivals) as a large beneficiary, as well as, increasingly, Manitoba and Saskatchewan.

Table 4. Disparity between numbers of immigrants intending to settle in province and numbers filing taxes in-province one year after landing,^a by official language spoken and cohort

Province	1990 Cohort				1995 Cohort			
	English	French	Both	Neither	English	French	Both	Neither
Newfoundland	68.1	n/a	100	44.4	69	n/a	n/a	22.2
Prince Edward Island	90	n/a	n/a	75	71.4	n/a	n/a	100
Nova Scotia	91.5	50	100	77.3	57.3	33.3	37.5	53.2
New Brunswick	80.4	100	83.3	81	83.8	50	66.7	50
Quebec	80.3	95.2	92.7	84	110.6	99	103.9	90.7
Ontario	99.3	110.4	111.5	100.2	98.5	93.8	93.5	96.9
Manitoba	86.2	100	100	82.2	88.4	100	62.5	84.4
Saskatchewan	74.3	n/a	100	64.9	81.1	0	66.7	77
Alberta	93.5	100	91.7	93.6	88.7	112.5	89.3	84
British Columbia	113.3	112.5	110.5	105.5	106.7	120	107.2	105.9
Province	2000 Cohort				2005 Cohort			
	English	French	Both	Neither	English	French	Both	Neither
Newfoundland	71.9	n/a	n/a	62.5	89.3	n/a	150	78.6
Prince Edward Island	81.8	n/a	n/a	100	72.2	n/a	100	60
Nova Scotia	101.3	100	60	75	96.7	n/a	95	93.8
New Brunswick	87.1	55.6	50	70	87	66.7	92.3	78.6
Quebec	109.3	98.6	99.3	87.6	97.1	99	97.2	98.6
Ontario	98.9	108.8	100.7	100.4	98.6	100	103.2	98.2
Manitoba	94.5	77.8	75	94.5	94.3	100	104.5	85.1
Saskatchewan	87.8	n/a	100	80.3	95.1	150	80	88
Alberta	100	120	95.3	100.4	108.3	127.8	121	110.9
British Columbia	98.7	114.3	107	100.9	101	107.1	105.9	99.8

Source: Longitudinal Immigration Database (IMDB) 2011.

Note: n/a denotes cells where counts are too small for disclosure.

^a Calculated as (number filing in province/number destined to province) × 100.

Looking at the percentage of immigrants in each province as a percentage of its initial landing cohort at the end of the 5th year (Table 5), we see stark differences between language groups.

Table 5. Net retention (%) of immigrants in Quebec and Rest of Canada five years after landing, by language group of immigrants and arrival cohort

		1990	1995	2000	2005
Quebec	Neither	78	76	84	80
	English	72	66	75	73
	French	79	76	82	86
	Both	74	66	77	77
Rest of Canada	Neither	88	91	91	91
	English	83	84	85	87
	French	83	109	96	107
	Both	81	89	88	95

Source: Longitudinal Immigration Database (IMDB), 2011.

In the Rest of Canada category, we see net retention rates consistently over 80 per cent, with a net gain of Francophone immigrants in the 1995 and 2005 cohorts. By contrast, Quebec retention is generally in the 70 per cent range, with no net gain of immigrants in any of the language groups. Francophone immigrants generally have the highest retention of the four groups.

We further examine the extent to which community characteristics are a critical component of attraction and retention. In particular, we focus on the effect of living in an Official Language Minority Community, hypothesizing that Francophone or Anglophone immigrants will be more likely to stay in a community where there is a critical number of people (at least 10 per cent of the overall population or a minimum 1,000 people in a Census Sub-Division) that speak the same language as them. If there is a positive effect on retention, the preservation of OLMCs is not only important for diversity purposes, as argued in the introduction, but also as a means for attracting and retaining immigrants. To identify the effect that OLMCs have on retention, in the section below we account for many more individual-, household-, and community-level characteristics in a Cox Proportional Hazard framework.

Multivariate results

Canada excluding Quebec

Table 6 presents the results of four Cox Proportional Hazard models, one for each arrival cohort, on the propensity to move out of province. Controlling for other factors, the relationship between age and moving is negative, indicating a reduced propensity to move as age increases. When marriage has a significant influence on the hazard of moving, it is associated with a greater risk of out-migration for two cohorts. After increasing the propensity to out-migrate among 1990 arrivals, the presence of children has no significant effect among 1995 arrivals, then increasing the propensity to remain within the landing province among the latter two cohorts.

Results are consistent with the notion that those with the most human capital are the most mobile. In every cohort, more years of education increase the likelihood of leaving the province. The results for the admission category do not vary vastly between cohorts. In nearly all cases, Economic Class migrants have the highest propensity to out-migrate, except for refugees in the 1990 and 1995 cohort. The family class is consistently less likely to move than Economic Class and Refugees, as are Other category immigrants in all four cohorts. In reference to the highest income group, all lower income groups are more likely to move. In every cohort, immigrants in the lowest income group are the most likely to move, with the relative likelihood decreasing as income increases, suggesting individuals seek better incomes elsewhere.

In general, Ontario shows the best retention rate, as immigrants are more likely to out-migrate from most other provinces than Ontario. Out-migration likelihood is highest in Atlantic Canada, with immigrants residing in all Eastern provinces showing a higher likelihood of out-migration compared to Ontario. The two western-most provinces of Alberta and British Columbia are the only ones to have lower out-migration propensities than the Ontario reference group, but for only one of the four cohorts each.

In terms of country of citizenship, immigrants from China are the most mobile in almost all cases. Over time, cohorts of Indian immigrants become less mobile compared to the reference group, and in the last cohort their out-migration rates do not significantly differ from those of the China group. Immigrants from the Philippines, U.K., and the U.S. are generally less likely than the Chinese to leave their province of landing. Immigrants from French-speaking countries are less inter-provincially mobile, and although the same is initially true for those from other English-speaking countries, the gap with the Chinese narrows and for the 2000 cohort the differences are not statistically significant. By 2005, “Other English” immigrants actually surpass Chinese in terms of out-migration.

Relative to English-only, French speakers and Bilingual immigrants are more likely to leave the original province of landing. Those who speak neither language are less likely to migrate in the first two cohorts, but interprovincial migration does not differ significantly between English-only and speakers of neither official language in the 2000 and 2005 cohorts.

Turning now to community characteristics, in all four cohorts the likelihood of remaining in province is higher when immigrants live in an OLMC, and even higher for French-speaking immigrants. This finding suggests that OLMCs do indeed help provinces retain immigrants, and that this is especially the case for minority-language immigrants.

Several other community characteristics may improve retention of immigrants in the province. Census subdivisions with high homeownership rates, strong levels of human capital, and higher concentration of immigrants are significantly correlated with higher retention rates in almost all cases. Immigrants who live in rural

Table 6. Proportional hazard analysis of the propensity to move out of a province by immigrant arrival cohort, Canada except Quebec

	1990	1995	2000	2005
Individual characteristics				
Age	0.98***	0.97***	0.97***	0.98***
Married	1.18**	0.95	1.07*	1.00
Presence of children	1.20***	0.96	0.92**	0.85***
Education at landing				
High school degree or less (Ref.)				
College degree	1.15***	1.20***	1.31***	1.18***
Bachelor's or higher	1.95***	2.14***	1.69***	1.43***
Admission category				
Economic class (Ref.)				
Refugee	1.55***	1.11***	0.84***	0.90**
Family class	0.84***	0.72*	0.58***	0.66***
Other class	0.87**	0.65***	0.43***	0.66***
Total individual income (2010)				
Less than \$10,000	5.76***	2.23***	3.43***	1.84***
\$10,000–\$19,999	2.64***	1.74***	2.16***	1.73***
\$20,000–\$29,999	1.75***	1.45***	1.69***	1.52***
\$30,000–\$39,999	1.42***	1.26***	1.45***	1.26***
\$40,000 or more (Ref.)				
Province of residence in previous year				
NFLD	4.65***	9.00***	2.99***	1.84***
PEI	7.10***	10.64***	4.50***	1.76**
NS	4.29***	6.83***	1.77***	1.51***
NB	6.84***	11.55***	2.38***	2.11***
ON (Ref.)				
MB	4.78***	7.45***	1.95***	1.30***
SK	5.92***	8.50***	2.58***	1.18
AB	2.74***	2.72***	1.06	0.53***
BC	0.78***	2.37***	1.29***	1.00
Country of citizenship				
China (Ref.)				
India	0.49***	0.89	0.90**	1.03
Philippines	0.24***	0.37***	0.59***	0.56***
U.K.	0.55***	0.43***	0.72***	0.47***
USA	0.59***	0.43***	0.55***	0.47***
French-speaking country	0.73**	0.62***	0.77**	0.82**
Other English	0.40***	0.56***	0.92	1.15**
Other	0.46***	0.65***	0.69***	0.80***
Knowledge of official languages at landing				
French (Ref.)				
English	2.20**	2.65***	4.05***	3.90***
Both official languages	3.17***	2.66***	3.82***	2.73***
Neither official language	0.90**	0.90**	0.96	1.05
Community characteristics				
French*OLMC	0.40***	0.49**	0.30***	0.31***
OLMC	0.44***	0.48***	0.46***	0.54***
% Homeowner	0.04***	0.04***	0.17***	0.15***
% With university degree	0.03***	0.02***	0.58	0.36***
% Immigrant	0.16***	0.14***	0.04***	0.03***
Rural	0.69*	0.61***	0.26***	0.47***
Median neighbourhood income	1.71***	1.48***	0.85**	1.33***
N	68,980	72,725	89,580	93,605

Source: Longitudinal immigration database (IMDB) 2011 and harmonized census files created by authors.

Note: All income values are lagged by one year, to capture the values prior to moving as closely as possible.

* p<0.01; ** p<0.05; *** p<0.001

CSDs are more likely to stay in their province than those in urban areas. In most cohorts, higher median neighbourhood income is associated with worse retention; it is perhaps because immigrants cannot afford living expenses in more expensive communities in their first 5 years after arrival, and then they give up, although this was not the case for only the 2000 cohort.

Quebec

For the most part, the trends in Quebec are similar (Table 7).

Table 7. Proportional hazard analysis of the propensity to move out of a province by immigrant arrival cohort, Quebec

	1990	1995	2000	2005
Individual characteristics				
Age	0.988**	0.988**	0.979***	0.998
Married	0.989	1.002	1.149*	0.768***
Presence of children	1.014	0.890*	1.067	0.965
Education at landing				
High school degree or less (Ref.)				
College degree	0.967	1.019	0.993	0.965
Bachelor's or higher	0.966	1.428***	1.200*	1.414**
Admission category				
Economic class (Ref.)				
Refugee	1.704***	1.343***	1.165**	0.796**
Family class	0.859	0.870*	0.822**	0.793**
Other class	1.226**	0.694**	0.533	0.749**
Total individual income (2010)				
Less than \$10,000	1.708***	1.365**	2.285***	1.328**
\$10,000–\$19,999	1.065	1.111***	1.707***	1.458***
\$20,000–\$29,999	1.056	1.155*	1.630***	1.427***
\$30,000–\$39,999	0.969	1.243**	1.185*	1.338***
\$40,000 or more (Ref.)				
Country of citizenship				
France	0.965	0.367***	0.629**	0.645**
China (Ref.)				
Haiti	0.312***	0.216***	0.246***	0.478**
Algeria	0.470**	0.523***	0.334***	0.294***
Romania	0.489**	0.616***	0.615**	0.622**
Morocco	0.550**	0.369***	0.032***	0.424***
Other French	0.578*	0.302***	0.648**	1.013
Other English	1.006	0.793**	1.112	0.987
Other	0.597***	0.596***	0.712***	0.748***
Knowledge of official languages at landing				
French (Ref.)				
English	1.580***	1.102	0.919	1.296**
Both official languages	0.967	0.838	0.634**	0.784**
Neither official language	1.519***	1.121	1.179	1.544***
Community characteristics				
English*OLMC	1.122	1.517***	1.670***	1.369**
OLMC	0.244***	0.272***	0.307***	0.251***
% Homeowner	0.111***	0.054***	0.062***	0.051***
% With university degree	0.776***	0.684***	0.675***	0.668***
% Immigrant	0.842***	0.972	1.153***	1.251***
Rural	0.601	1.22	0.872	0.860
Median neighbourhood income	2.520***	2.576***	2.995***	3.201***
N	13,340	10,930	15,460	20,890

Source: Longitudinal immigration database (IMDB) 2011 and harmonized census files created by authors.

Note: All income values are lagged by one year, to capture the values prior to moving as closely as possible.

* $p < 0.01$; ** $p < 0.05$; *** $p < 0.001$

As was the case for the rest of Canada, older people are significantly less likely to leave the province in all but one cohort. For most cohorts, marriage and children do not affect out-migration, although immigrants with children are significantly less mobile in the 1995 cohort, and married immigrants are more likely to move in 2000, and less likely in 2005. The relationship between human capital and migration is not as clear as it was in the Rest of Canada, although for three of the cohorts, post-secondary education is associated with a higher likelihood of migration. Those with a college degree do not have significantly different migration patterns from those with a high school diploma or less.

In terms of admission class, refugees are the most mobile group in the earliest three cohorts, but their propensity to out-migrate decreases with time, with Economic Class migrants being the most likely to leave the province in 2005. Family Class immigrants are consistently less likely to move than the reference group (though only significantly so for the latter three cohorts), and Other Immigrant category is more likely to move in the earliest cohort, but less likely in the 1995 and 2005 cohorts. Individuals in the lowest income category are, in most cohorts, the most mobile group. Unlike the rest of Canada, however, propensities do not decline as rapidly with increases in income.

As was the case with the rest of Canada, Chinese citizens are the most mobile—with all citizenship countries showing significantly lower out-migration rates, except for individuals from Other English in two cohorts and, in one case, Other French countries (who do not significantly differ). Immigrants from the Francophone countries Haiti, Algeria, Morocco, and Other French countries consistently show some of the lowest out-migration propensities. English speakers and those who speak neither official language are significantly more likely to out-migrate than French speakers in two of the cohorts, while bilingual speakers show better retention rates in the two latter cohorts.

The trends for linguistic characteristics of the community resemble those in the Rest of Canada in that OLMCs better retain immigrants, in general. However, English speakers tend to leave the province, in the three latter cohorts, when they live in an OLMC (as reflected in the English*OLMC interaction term).

Census subdivisions with high homeownership rates, and highly educated residents, tend to retain their immigrant neighbours, for the most part; but unlike the rest of Canada, regions with higher immigrant concentrations, although initially more likely to retain, have higher out-migration rates over time. Also contrary to the Rest of Canada, there is no significant difference in retention between rural and urban areas. As with the rest of Canada, higher median community income is associated with higher out-migration rates.

Is there an ‘OLMC effect’?

In the regression results above, we find statistically significant differences in out-migration propensities between OLMCs and non-OLMCs. In most instances, in Canada except Quebec (rest of Canada), OLMCs retain immigrants better than non-OLMCs, and retain Francophones better than other immigrants. Consequently, provinces interested in retaining both Francophone and non-Francophone immigrants should work to maintain their OLMCs.

In Quebec, the story is slightly different. Although OLMCs help with immigrant retention, the pull is not quite as strong for Anglophones. For three of the four cohorts, Anglophone immigrants are more likely than other immigrants to leave the province when they live in an OLMC. This finding is interesting, and warrants further investigation. One potential explanation is that because the majority of census subdivisions in Quebec are OLMCs, we are not measuring an ‘OLMC effect’ that is as pure as that in the rest of Canada. Although we chose to use the same definition of OLMC throughout Canada (and experimented with different thresholds), results may differ if a higher threshold was set for Quebec.

Using the 10 per cent or 1,000 threshold, in Figures 1 and 2 below we demonstrate the retention rates of immigrants in OLMCs versus non-OLMCs in Canada, holding all other characteristics constant.

In every instance, provincial retention rates are much higher in OLMCs than they are in non-OLMCs, suggesting that in addition to maintaining the lingual diversity of the country, OLMCs also seem to be effective tools of provincial retention for newcomers to Canada.

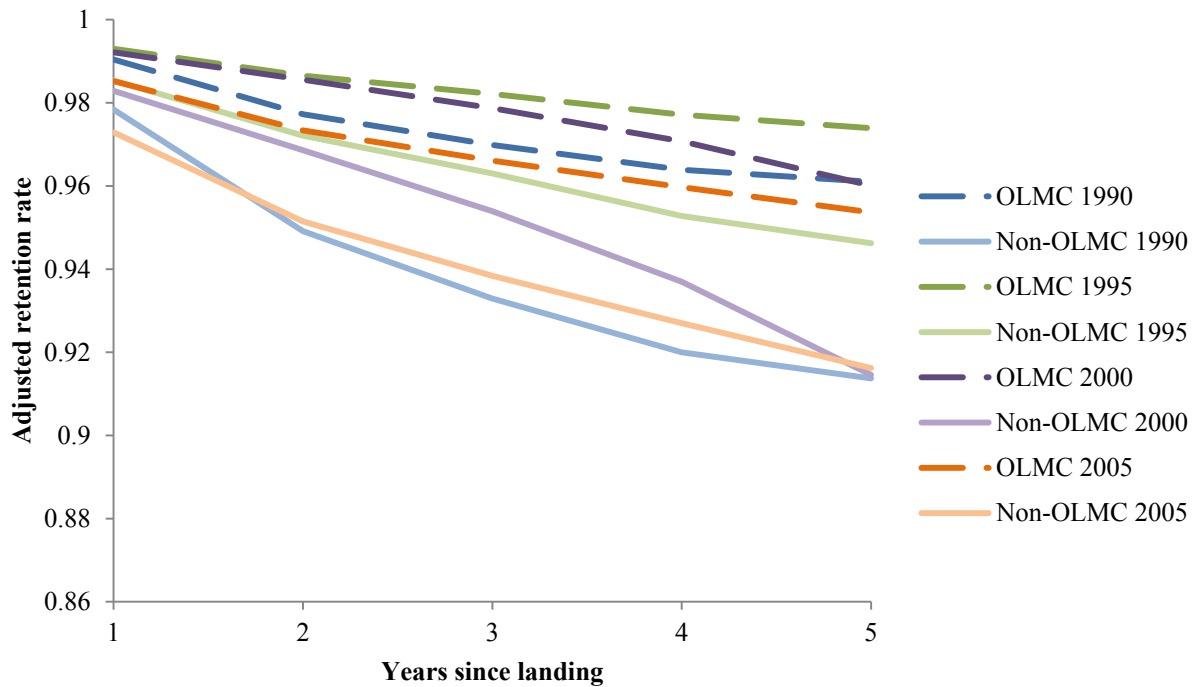


Figure 1. Adjusted provincial retention rates of official language minority communities, Canada except Quebec.

Source: Longitudinal Immigration Database (IMDB) 2011 linked file created by the authors.

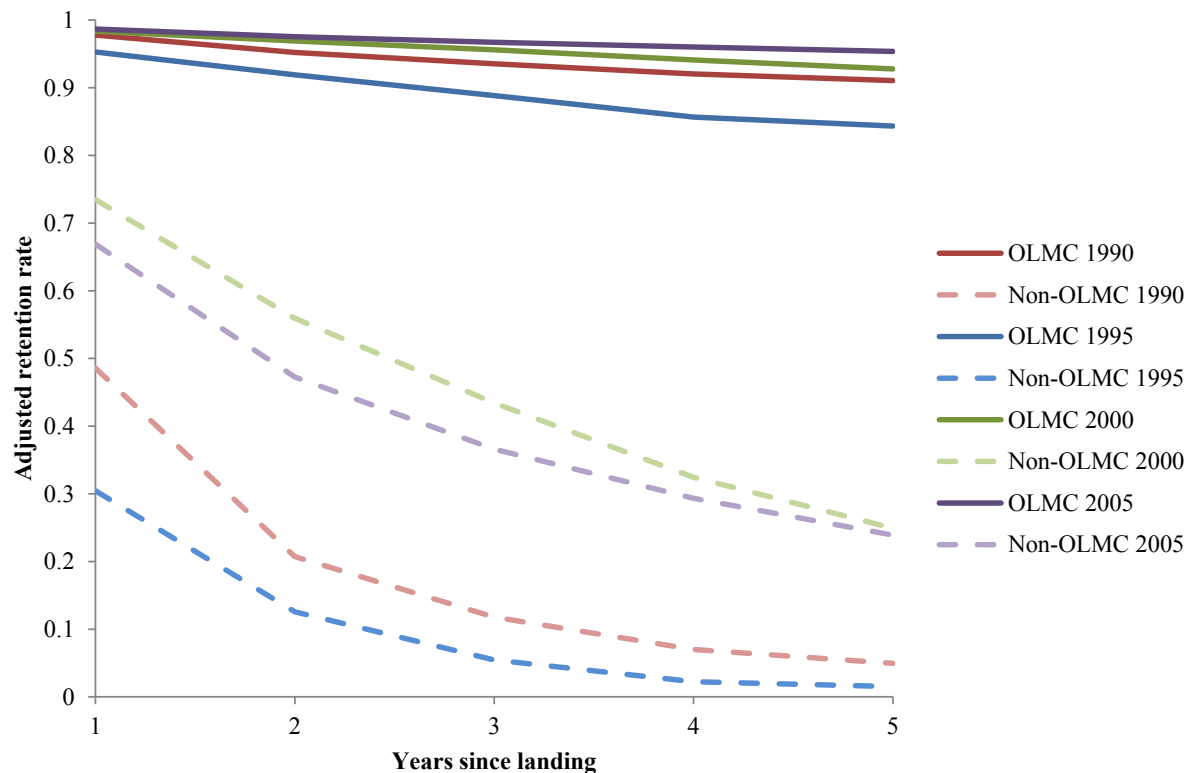


Figure 2. Adjusted provincial retention rates of official language minority communities, Quebec.

Source: Longitudinal Immigration Database (IMDB) 2011 linked file created by the authors.

A similar story is true in Quebec, although the OLMC/non-OLMC differences are even more pronounced for immigrants (keeping in mind that this result is for all immigrants, not just Anglophones). Although five-year retention rates for OLMCs are 80 per cent or higher for each of the above cohorts, for non-OLMCs it ap-

proaches 20 per cent for the 2000 and 2005 cohort. For the earlier two cohorts, it is even lower, suggesting that immigrants who land in a non-OLMC in Quebec have a very high out-migration propensity.

Discussion and conclusions

In this article we identify several individual and community-level characteristics of Anglophone and Francophone immigrant provincial retention. Of central interest is the effect of living in an Official Language Minority Community (OLMC) on the provincial retention of immigrants, and more particularly of immigrants of the official language minority. We define an OLMC as a Census Subdivision where either 10 per cent of the population or 1,000 people declare the ability to speak English (Quebec) or French (rest of Canada). This is an admittedly broad definition, and was chosen to ensure that each province contains at least one OLMC. One result of this choice, however, is that nearly three-quarters of all CSDs in Quebec were OLMCs, and the vast majority of immigrants in that province therefore settled in an OLMC. In future work, it might be better to use different definitions of an OLMC across the country.

We find that the propensity to leave a province shortly after landing declines with age, and that individuals immigrating through the Family Class are more likely to remain in their province of landing. Although not true for all cohorts, the propensity to move increases with levels of education, and decreases with a rise in income. Out-migration from Atlantic Canada was clearly evident, at least initially, with substantial improvements over the period. There were wide differences across countries of citizenship, with Chinese immigrants having the highest rates of out-migration in both Quebec and the rest of Canada.

For Canada except Quebec, French-speaking and bilingual immigrants are more likely to provincially out-migrate, and while immigrants who speak neither English nor French are more likely to stay in their landing province in the earlier cohorts, their migration trends do not differ from those of English speakers in the 2000 and 2005 cohorts. It is difficult to identify why this is the case without looking at the migration trends more directly, although one possibility is that French-speaking and Bilingual immigrants may have access to more opportunities for work outside their initial province of landing. In Quebec, the trend is less consistent, but we do find out-migration to be higher among Anglophones and those who speak neither official language. English/French speakers are more likely to stay in Quebec, in two of the cohorts. Even in communities with at least 10 per cent, or 1,000 English speakers, Anglophone immigrants are still more likely to out-migrate.

Another finding in this article is the importance of community characteristics. High homeownership communities have much higher provincial retention rates, as, for the most part, do regions with high average education levels. Immigrant communities have opposite effects in Quebec and the rest of Canada, with Quebec immigrant communities being less likely to retain other immigrants. Higher neighbourhood income consistently leads to higher rates of out-migration, presumably because recently arrived immigrants do not have the means to live in wealthier neighbourhoods (recall that in each cohort, at least 58 per cent of our sample had incomes below \$40,000).

Given that one of the primary goals of both Canada's 2008 and 2013 Roadmaps was to nurture the growth of OLMCs, the demonstrated impact of community characteristics is significant, because it shows how important communities are for the immigrant experience, especially for those who speak the minority language. In the rest of Canada, OLMCs successfully retained Francophone immigrants better than non-OLMCs. Considering that the Francophones make up roughly 1 per cent of the immigrant cohort, these OLMCs serve a crucial role in Francophone immigrant retention in the rest of Canada. Interestingly, the effect is the opposite for Anglophones living in English speaking communities in Quebec. Thus, these results strongly support the 2013 Roadmap's focus on immigration in Official Language Minority Communities, which support the vitality of linguistic minorities.

More research is needed on why the finding is different in Quebec, but for now it suggests that OLMCs can be used as anchors for those who speak French in the Rest of Canada. Follow-up research could investigate what exactly it is about OLMCs that fosters the retention of immigrants. Is the generation of social capital with same-language speakers in the community crucial to long-term settlement?

As with most statistical analysis, there is always the risk of unobserved heterogeneity between populations, and this is also the case here. Although the results show that OLMCs retain immigrants better, it may be because immigrants who move to OLMCs differ from those who don't. As such, part of the 'OLMC effect' may be in the ability to recruit, rather than retain, immigrants to a jurisdiction.

This study looked at how community characteristics shape provincial out-migration, but the scope may have been too wide to capture the full effect of OLMCs. After all, those who left an OLMC but stayed in the province are not captured in our analyses. Future research could identify the impact that OLMCs also have on that kind of intra-provincial retention.

There are also measurement issues at the individual level. Self-reported language ability may be unreliable, especially at time of landing, and it is possible that immigrants that identify as fluent in English or French are not as fluent as they initially believed. This could bias the OLMC effect towards zero, as individuals leaving an OLMC are actually not fluent in English or French, and would therefore gain none of the benefits of being surrounded by English- or French-speakers.

Future research might look more closely at the effect that the *choice of definition of OLMC* has on results. In our definition, over 90 per cent of immigrants land in an OLMC, and it might be useful to experiment with *different* definitions of OLMC, even if it means that some provinces no longer have an OLMC. This would be useful to identify the robustness of the patterns outlined in this article. The definition of OLMCs may be different in Quebec than in the rest of Canada, where even more CSDs were classified as OLMCs, and thus almost all immigrants landed in an OLMC. Further to this, it might be useful to delve deeper into the characteristics of the OLMC. Do OLMCs composed of immigrants, for example, have different retention characteristics than more established OLMCs?

Acknowledgments

An earlier version of this paper was presented at the 2015 Annual General Meeting of the Population Association of America, and at the 2015 Meeting of the Federation of Canadian Demographers. We wish to thank the audiences of both conferences for their helpful comments and questions, and to Kyle Crowder for his detailed feedback on a draft of this article.

References

- CIC (Citizenship and Immigration Canada). 2012. Evaluation of the Recruitment and Integration of French-Speaking Immigrants to Francophone Minority Communities Initiative. Retrieved from <http://www.cic.gc.ca/english/pdf/pub/recruitment.pdf>
- Day, K.M., and S.L. Winer. 2014. *Interregional Migration and Public Policy in Canada: An Empirical Study*. Kingston and Montreal: Queen's University Press.
- Edmonston, B. 2002. *Interprovincial Migration of Canadian Immigrants*. RIIM Working Paper Series 02-10. Vancouver: Vancouver Centre of Excellence.
- Government of Canada. 1982. Canadian Charter of Rights and Freedoms. Ottawa: Government of Canada.
- . 2013. Roadmap for Canada's Official Languages 2013–2018: Education, Immigration, Communities. Retrieved from <http://www.pch.gc.ca/eng/1358263602229/1358263791285>
- . 2017. Backgrounder: Atlantic Immigration Pilot. Retrieved from <http://news.gc.ca/web/article-en.do?nid=1182939>
- Hou, F. 2007. Changes in the initial destinations and redistribution of Canada's major immigrant groups: Re-examining the role of group affinity. *International Migration Review* 41(3):680–705.
- Hou, F., and L.S. Bourne. 2006. The migration-immigration link in Canada's gateway cities: A comparative study of Toronto, Montréal, and Vancouver. *Environment and Planning A* 38(8):1505–25.

- Houle, R., and J. Corbeil. 2010. *Statistical Portrait of the French-speaking Immigrant Population Outside Quebec (1991–2006)*. Statistics Canada Catalogue no. 89-641-X. Ottawa: Statistics Canada. <http://www.cic.gc.ca/english/pdf/research-stats/english-speaking-eng.pdf>
- Kalbach, W.E. 1970. *The Impact of Immigration on Canada's Population*. 1961 Census Monograph Series. Ottawa: Statistics Canada.
- Krahn, H., T.M. Derving, and B. Abu-Laban. 2005. Retention of newcomers in second- and third-tier Canadian cities. *International Migration Review* 39(4):872–94.
- Newbold, K.B. 1996. Internal migration of the foreign-born in Canada. *International Migration Review* 30(3):728–47.
- Richmond, T., and J. Shields. 2005. NGO-government relations and immigrant services: Contradictions and challenges. *Journal of International Migration and Integration* 6(3/4):513–26. Retrieved from <http://link.springer.com.proxy.hil.unb.ca/article/10.1007/s12134-005-1024-3#>
- Rogers, A., and A. Belanger. 1990. The importance of place of birth in migration and population redistribution analysis. *Environment and Planning* 22(2):193–210.
- Roy Marcoux, M.E. 2009. Citizenship and Immigration Canada: Francophone Minority Communities Steering Committee, in *Best Practices Manual on Francophone Immigration in Canada*. Ottawa: CIC Ministerial Conference on the Canadian Francophonie, p. 1–3.
- Seidle, L. 2013. Canada's Provincial Nominee Programs: Securing Greater Policy Alignment. IRRP Study no. 43. <http://www.irrp.org/assets/research/diversity-immigration-and-integration/canadas-immigration-programs/seidle-no43.pdf> (Accessed February 10, 2014)
- Statcan (Statistics Canada). 2011. French and the Francophonie in Canada: Language, 2011 Census of the Population. Catalogue no. 98-314-X2011003. Retrieved from http://www12.statcan.gc.ca/census-recensement/2011/as-sa/98-314-x/98-314-x2011003_1-eng.pdf
- Trovato, F. 1988. Interurban mobility of the foreign-born in Canada, 1976–81. *International Migration Review* 22(3):59–86.
- Trovato, F., and S.S. Halli. 1990. Ethnicity and geographic mobility, in *Ethnic Demography: Canadian Immigrant, Racial and Cultural Variations*, edited by F. Trovato, S.S. Halli, and L. Driedger. Ottawa: Carleton University Press, p. 75–90.

The moderating effect of sociodemographic factors on the predictive power of self-rated health for mortality in Canada

James Falconer¹
Amélie Quesnel-Vallée

Abstract

Self-rated health is a reliable predictor for mortality, but its predictive power varies depending on social characteristics. This study tests the moderating effect of age, sex, education, and income on the power of self-rated health to predict mortality in Canada using data from the National Population Health Survey. Predictive power trajectories are modelled using time-series generalized estimating equation logistic regression. Findings show that self-rated health is a predictor for mortality up to 14 years prior to death in Canada, and is weakly moderated by income and education, and age/sex interactions. Self-rated health remains reliable across population sub-groups in Canada.

Keywords: mortality; self-rated health; predictive power; sociodemography; Canadian population

Résumé

La santé auto-évaluée est un prédicteur fiable de la mortalité, mais son pouvoir prédictif varie en fonction des caractéristiques sociales. Cette étude examine l'effet modérateur de l'âge, du sexe, de l'éducation, et du revenu sur le pouvoir de la santé auto-évaluée pour prédire la mortalité au Canada utilisant des données de l'Enquête nationale sur la santé de la population. Les trajectoires de puissance prédictive sont modélisées avec une régression logistique de l'équation d'estimation généralisée. Les résultats montrent que la santé auto-évaluée est un prédicteur de la mortalité jusqu'à 14 ans avant le décès au Canada, et est faiblement modérée par le revenu, l'éducation, et les interactions entre l'âge et le sexe. La santé auto-évaluée demeure valide parmi les sous-groupes de la population du Canada.

Mots-clés : mortalité; santé auto-évaluée; prédicteur fiable; sociodémographie; population canadienne

Introduction

Much of the quantitative sociology of health research to date has relied upon self-reported measures of health and illness. In this context, *self-rated health* became a mainstay of population health research. Self-rated health is measured by asking respondents, “In general, how would you rate the overall state of your health?” with response options (1) Poor, (2) Fair, (3) Good, (4) Very good, or (5) Excellent. Since the beginning of its use in population health research, the validity of self-rated health for predicting mortality has been one of the most consistently reproduced findings in social epidemiology (DeSalvo et al. 2006; Idler and Benyamini 1997, 1999; Mossey and Shapiro 1982).

Self-rated health is a robust and valid predictor of mortality, but its predictive power varies across social contexts and population groups. For nearly as long as self-rated health has shown a predictive association with

1. Corresponding author: James Falconer, SSHRC Postdoctoral Fellow, Department of Sociology, 5-21 HM Tory Bldg., University of Alberta, Edmonton AB, T6G 2H4, email: james.falconer@ualberta.ca. Amélie Quesnel-Vallée, Department of Sociology and Department of Epidemiology, Biostatistics, and Occupational Health, McGill University.

mortality, the measure has come under criticism for its variability across social and cultural contexts—which, it is argued, undermines its comparative utility and brings into question the measure’s ability to capture “true” latent health (Huisman and Deeg 2010; Lindeboom and van Doorslaer 2004; Sen 2002). Some of these criticisms are based on studies which show that self-rated health varies according to social context, showing systematic differences by age, sex, socioeconomic status, and country (Bago d’Uva et al. 2008; Quesnel-Vallée 2007; Singh-Manoux et al. 2007). Differences in the conceptualization of health across social and cultural groups result in different subjective constructions of health, and therefore the question of what self-rated health really measures is unresolved. This may be problematic for the comparative utility of self-rated health across social and population groups. Health perceptions that do not correspond to an underlying latent state of health or to an actual risk for mortality may lead to the underestimation of health inequalities across social strata (Delpierre et al. 2009).

However, recent innovations in self-rated health research have begun to investigate the determinants of its *predictive power*, defined as the association between subjective health and actual risk of mortality (Stenholm et al. 2014). Rather than criticizing the measure’s failure to capture the same meaning of health across social contexts, this study investigates how the power of self-rated health to predict mortality varies in systematic ways that provide information about how different social groups conceptualize their health and construct their self-assessments. Measuring predictive power for mortality, rather than just self-rated health, permits an objective and quantifiable evaluation of this subjective variable and allows it to be compared across contexts where different social and cultural interpretations of health prevail. This study investigates some of the conditions under which self-rated health can be considered a valid proxy for “true” latent health.

This study tests the moderating effect of two demographic variables (age, sex) and two socioeconomic variables (income, education) on the predictive power of self-rated health for mortality in Canada. Systematic differences in predictive power across social covariates reflect different capacities of group members to accurately assess their own latent health, in terms of how closely their subjective health perceptions conform to their actual risk of mortality. For example, there is a well-known maxim in social epidemiology that “women are sicker, but men die quicker.” This expresses the “gender paradox” between women’s consistently worse self-reported health and men’s consistently higher risk of mortality at all ages (Case and Paxson 2005; Deeg and Kriegsman 2003; Idler 2003; Jylhä et al. 1998). Whether women’s subjective health is more strongly impacted by health conditions that are unassociated with mortality, or men’s subjective health fails to take into account serious mortality-relevant health conditions, these are two sides of the same coin: both may lead to diminished population-averaged predictive power.

Similarly, research has shown that the predictive power of self-rated health diminishes with age (Layes et al. 2012; Stenholm et al. 2014). This is attributed to excessive “health optimism” among very old respondents relative to their higher risk of mortality (Layes et al. 2012), and to survivorship bias, whereby only the healthiest respondents survive to very old ages, thus generating a sample of respondents with progressively improving health and less variation between respondents of different health statuses (Stenholm et al. 2014). Failing to differentiate deceased cases and surviving controls by prior health status reduces the overall population-average predictive power of their subjective health.

That socioeconomic status (SES) is associated with health and mortality is one of the most consistently reproduced findings in social epidemiology (see meta-analyses such as Kondo et al. 2009; Okun et al. 1984; Pinquart and Sörensen 2000). However, the effect of SES on the *predictive power* of self-rated health is not as clear and direct as its effect on health and mortality (Bago d’Uva et al. 2008; Burström and Fredlund 2001; Dowd and Zajacova 2007; Huisman et al. 2007; McDonough and Berglund 2003; Yao and Robert 2008; Zajacova and Dowd 2011). Generally, a high SES is associated with better predictive power. This may be explained by advantages in human capital such as education and health literacy (Jylhä 2009), and by better access to healthcare and the health information upon which health self-assessments depend (van Doorslaer et al. 2006).

However, some notable counter-examples challenge the direct relationship between SES and predictive power, suggesting that the gradient could be ambiguous or inverse. Singh-Manoux et al. (2007) found an inverse SES gradient in the strength of predictive power of self-rated health for mortality within an occupational sector in France. Against expectations, predictive power was *weaker* in the high occupation and income groups. They

found that members in the high-SES groups were more sensitive to minor health complaints, thus reporting “poor” health at a higher rate that was incommensurate with their lower risk of mortality. Similarly, Sen (2002) shows that there is an inverse gradient between per capita income and self-reported morbidity across the states of India: residents of the richest and longest-lived state (Kerala) report the most sickness, while residents of the poorest state with the lowest life-expectancy (Bihar) reported the least sickness. Like the example from the French occupational sector, this presents an incongruity between self-assessed health and actual risk of mortality.

Canada provides an interesting case in the investigation of an SES effect for predictive power in the context of its universal healthcare system. The research literature on the relationship between SES and the predictive power of self-rated health, based on studies from other countries, has not produced generalizable conclusions because the effect of SES appears to vary across different national populations. For example, SES appears to be a stronger moderator of predictive power where socioeconomic inequality is high, such as in the United States (Dowd and Zajacova 2007), and a weaker determinant where inequality is low and health information is distributed more equally across the social classes, such as in Sweden and the Netherlands (Huisman et al. 2007; Johansson et al. 2015). The effect of SES on predictive power in the Canadian context has not yet been researched, but will be a unique contribution because Canada is situated between the United States and Europe (from where most studies originate) on a number of social dimensions that determine good predictive power for mortality—namely education, healthcare, and socioeconomic inequality (Cingano 2014; Falconer and Quesnel-Vallée 2014; Fortin et al. 2012; OECD 2010; Paris et al. 2010).

This study will use the Canadian NPHS data to examine longitudinal trajectories of self-rated health and its predictive power for mortality in the final years of life, and the moderating effects of age, sex, income, and education.

Conceptualizing predictive power

The predictive association between self-rated health and mortality can be viewed as a measure of correspondence between health *perceptions* and *reality*. There exists no single definition for “true” health, which can mean something different across individuals and social groups. At best, self-rated health has been shown to be a reliable proxy for an underlying construct of latent health. *Latent health* can be defined in several ways, but always as an objective state of health that exists independently from the respondent’s subjective feelings about their own health (Layes et al. 2012). Whatever the elements of latent health informing a respondent’s subjective self-rating, they tend to make it a very reliable predictor for mortality (Jylhä 2010). We can define latent health for this study using a conceptualization of health that we can measure with the best accuracy and reliability, and which has the greatest overall impact on people’s lives (Quesnel-Vallée 2007): Mortality is the obvious candidate for such a measure, because measuring the timing of death is free from bias or cultural interpretation. Individuals and population groups have an underlying state of latent health that corresponds to their risk of mortality, and that also corresponds to some extent with how they *feel* about their own health. Understanding the degree to which different respondents’ self-rated health conforms to their latent health and actual risk of mortality are what motivates this study.

Self-rated health is almost universally measured using a single-item 5-point ordinal scale. The response options typically include “poor,” “fair,” “good,” “very good,” and “excellent.” Typically, the research questions in the literature aim to understand the validity of “poor” health for predicting mortality. When studies dichotomize the 5-point scale into “poor” versus “good” health, they are comparing the lower two options (“poor” and “fair”) against the higher three (“good,” “very good,” and “excellent”).

Predictive power is calculated as the population-averaged propensity to report “poor” self-rated health between deceased and surviving samples; it is a measure of how well subjective health corresponds to latent health and actual risk of mortality (DeSalvo et al. 2006; Dowd and Zajacova 2007; Huisman et al. 2007; Idler and Benyamini 1997; Jylhä 2009; Mossey and Shapiro 1982; Stenholm et al. 2014). Using longitudinal panel data, we can retrospectively examine how closely a respondent’s health perceptions through the life course correspond with their survival or mortality outcome, and investigate the factors which can improve or diminish this predict-

ive power. When studies and meta-analyses report that self-rated health shows predictive power for mortality, it means that they find systematic differences in previously reported self-rated health between those who died and those who survived. Studies typically show that sub-samples of deceased cases report poor health during their lifetimes at a rate 1.5 to 3.0 times higher than survivors, which quantifies the *power* of self-rated health to *predict* mortality in the sample (DeSalvo et al. 2006; Idler and Benyamini 1997). This predictive association has been detected up to 12 years prior to death, and is robust to statistical adjustments for a large set of objectively measured sociodemographic and health variables, suggesting that the power of self-rated health to predict mortality goes beyond the reach of objective health factors (Stenholm et al. 2014).

Objectives

This study situates Canada within the global literature, examining whether the predictive relationship between self-rated health and mortality operates similarly in Canada to other developed countries. Next, we investigate differences across social groups (in this case, age, sex, income, and education) to better understand how the magnitude of predictive power is moderated by these social covariates in Canada.

In this study, we analyze the time series prevalence of poor self-rated health among a sample of Canadians according to their status in a group of deceased cases versus a control group of matched survivors. The guiding research questions are: How does the predictive power of self-rated health in Canada evolve according to proximity to death? How do age, sex, income, and education moderate the predictive power of self-rated health in Canada?

Hypotheses

We expect to find that the power of self-rated health to predict mortality will be detectable long before death (up to 14 years—the limits of our longitudinal data), and that its predictive power will increase with proximity to death, as demonstrated in studies from other developed countries (Idler and Benyamini 1997; Stenholm et al. 2014).

Consistent with previous research, we hypothesize that self-rated health among older age groups will show diminished predictive power for mortality, holding proximity to death constant (Idler 1993; Layes et al. 2012).

Previous research has suggested that women's self-rated health may be overly sensitive to mortality-irrelevant health conditions, and/or men's self-rated health fails to take into account mortality-relevant health risks, in the formulation of their subjective health self-ratings (Case and Paxson 2005; Deeg and Kriegsman 2003). These are both reasons to expect diminished correspondence between self-rated health and latent health among both sexes, and thus there is no particular reason to hypothesize why one sex might show better or worse predictive power than the other, except insofar as women and men may differ across *other* types of relevant social covariates such as age, income, and education.

A higher individual SES is expected to be associated with better predictive power, due to advantages in human capital, health literacy, cognitive ability, and access to health information. Therefore, we expect to observe that higher levels of income and education will be associated with better predictive power of self-rated health for mortality.

Data

The Canadian National Population Health Survey (NPHS) is a nationally representative biennial panel study comprising 17,276 respondents over 9 survey cycles from 1994 to 2010. The survey includes measures of self-rated health, date of death, and a set of sociodemographic and health control variables. The NPHS surveys residents of households in all provinces and territories, except for people living on Indian Reserves, Canadian Forces bases, and some people in remote locations. The longitudinal panel had a 93.6 per cent follow-up response rate. Data are weighted to correct for sampling design, non-response, and post-stratification (Statcan et al. 1998). For these studies, we accessed the full NPHS confidential microdata file at the McGill University

branch of the Statistics Canada Research Data Centre Network (CRDCN). The NPHS is described in greater detail in Statcan (1998) and Tambay & Catlin (1995).

Dependent variable: predictive power of self-rated health for mortality

The predictive power of self-rated health for mortality is a measure of how well subjective health perceptions conform to one's actual risk of mortality. Between the sub-sample of deceased cases and a surviving control group, there are differences in their life-course propensity to report "poor" self-rated health. The relative ratio of reporting poor health between respondents who died and those who survived is quantified as its *predictive power for mortality*. Predictive power depends, of course, on the relationship between two values: self-rated health and mortality, discussed here in turn:

In each wave of data collection, the self-rated health question asks, "In general, how would you rate your health?" with response options (1) poor, (2) fair, (3) good, (4) very good, and (5) excellent. As per the norm throughout the research literature, the 5-point ordinal measure is dichotomized into "poor" health (poor or fair) versus "good" health (good, very good, or excellent). Poor health is then modelled as the predictor for mortality. The proportion of Canadians who report poor health ranges from 9.8 to 15.6 per cent across survey cycles.

The NPHS contains mortality data for respondents who died during longitudinal observation. Deaths are first reported by proxy survey respondents, then validated by matching to a mortality register in a national vital statistics database (Statcan 2012). The mortality data reports the day, month, and year of death.

Control variables: Sociodemographic, health behaviours, and diagnosed diseases

Several types of health covariates have well-demonstrated associations with self-rated health and mortality, and are thus controlled in multivariate models. These can be categorized into three types: (1) *Sociodemographic variables*, such as age, sex, income, education, race, and marital status (Browning et al. 2003; Case and Paxson 2005; Deeg and Kriegsman 2003; Ferraro et al. 1997; House and Williams 2000; McCullough and Laurenceau 2004; Yao and Robert 2008); (2) *Health behaviours*, such as smoking, body-mass index, and blood pressure (Kawachi et al. 1999; Okosun et al. 2001); and (3) *Diagnosed diseases*, such as heart disease, lung disease, cancer, diabetes, stroke, and psychiatric disease (Farmer and Ferraro 1997; Idler and Kasl 1995; Kawachi et al. 1999; Kennedy et al. 2001; Latham and Peek 2013; Mäilä et al. 1997; Stenholm et al. 2014).

Sociodemographic: *Age* in each of the survey cycles is derived from year of birth, and coded into three age groups: 30–64 (representing premature mortality), 65–79, and 80+. *Sex* is coded as male or female, with no alternate responses or missing values. *Race* is coded as "not visible minority" (white), "visible minority" (non-white), and "Aboriginal/Indigenous/First Nation." *Education* is reported in 10 categories, then re-coded into 3 categories: "Less than high school," "Completed high school," and "Post-secondary degree/diploma." *Income* is reported to the dollar value at the household level, then re-coded into sex-specific tertiles, with low, middle, and high income groups for each sex. The income inequality between men and women produced slightly different tertile thresholds for each sex. *Marital status* was re-coded from 7 to 4 categories: "Single," "Married/Cohabiting," "Divorced/Separated," and "Widowed."

Health behaviours: *Smoking* is coded as "non-smoker" (never smoked), "former smoker," and "current smoker." *Body-mass index* (BMI) is reported in the data to 1 decimal point, which we re-coded as "Underweight" (< 18.5 kg/m²), "Normal" (18.5–24.9 kg/m²), "Overweight" (25.0–29.9 kg/m²), or "Obese" (> 30 kg/m²). *Hypertension* is based upon a yes/no self-report of whether "a doctor [has] ever told you that you have high blood pressure."

Diagnosed diseases: *Heart disease, lung disease, stroke, cancer, diabetes, and psychiatric disease* are the leading causes of 68 per cent of all deaths in Canada (Statcan 2014). Diagnosis for each disease is reported in the NPHS based on self-reports of whether "a doctor [has] ever told you that you have..." (each disease asked in a separate question).

Table 1 reports the descriptive statistics for the dependent and independent variables in the analytic sample of deceased cases and surviving controls.

Table 1. Descriptive statistics of the analytic sample

	Deceased cases	Surviving controls	$p > H_0$
Sample size	1,749	2,782	–
Mean number of self-rated health measures	5.5	7.8	0.000
% “poor” self-rated health	34.4	17.3	0.000
Mean age at death (or last SRH measure)	78.2	72.7	0.000
Age groups (%)			
<30	0.6	1.3	0.000
30–64	16.0	40.0	0.000
65–79	29.2	43.5	0.000
80+	54.1	15.3	0.000
Sex (% male)	45.6	45.1	0.760
Race (%)			
Non-visible minority	96.4	95.3	0.082
Visible minority	3.5	4.7	0.026
Education (%)			
Less than high school	51.0	37.4	0.000
High school	30.2	32.8	0.077
Post-secondary	18.8	29.8	0.000
Income tertile (%)			
Lowest tertile	68.8	52.1	0.000
Middle tertile	21.8	29.6	0.000
Highest tertile	9.4	18.3	0.000
Marital status (%)			
Single	9.7	8.0	0.000
Married/Cohabiting	46.4	58.1	0.000
Divorced/Separated	9.3	11.2	0.000
Widowed	34.7	22.8	0.000
Smoking (%)			
Non-smoker	31.7	36.9	0.000
Ex-smoker	43.8	47.4	0.000
Current smoker	24.5	15.7	0.001
BMI (%)			
Underweight (<18.5)	3.7	1.3	0.000
Normal (18.5–24.9)	41.7	37.3	0.000
Overweight (25–29.9)	37.4	42.5	0.000
Obese (>30)	17.1	18.9	0.000
Health conditions ever reported (%)			
High blood pressure	36.2	33.3	0.000
Heart disease	21.0	11.2	0.000
Lung disease	7.7	3.9	0.000
Stroke	6.4	2.6	0.000
Cancer	6.3	3.1	0.000
Diabetes	16.2	8.9	0.000
Psychiatric disease	5.0	4.2	0.008

Sampling

The analysis uses a quasi-experimental nested case-control design to compare the self-rated health trajectories of deceased cases relative to surviving controls. We included all deceased cases who met the inclusion criteria. For each deceased case, we randomly selected up to three surviving controls matched for sex, race, and age (± 2 years), and who also matched the inclusion criteria. Inclusion in the analytic sample is limited to respondents who have self-rated health measures in at least two prior survey waves, with at least one proximal measure (0–6 years prior to death), and one distal (7–12 years prior to death). This proximal/distal criterion ensures that the

analysis capitalizes on the longitudinal nature of the panel data, and allows the modelling strategy to account for intra-individual correlation over time, which is not possible with a cross-sectional measure (Stenholm et al. 2014). Although 2 self-rated health measures are only the minimum criteria for inclusion, the sample had an average of 7 measures throughout longitudinal observation. We conducted a robustness check to detect any bias arising from differences between the sample of deceased cases that met the inclusion criteria, versus *all* deceased respondents in the data, and found no bias in self-rated health trajectories. These criteria resulted in an analytic sample of 1,749 deceased cases and 2,782 matched surviving controls.

Methods

We estimate the relative risk of poor health between deceased cases and surviving controls in each year prior to death, using a *Generalized Estimating Equation* (GEE) with a logit-binomial parameterization and an exchangeable correlation structure, with sampling weights applied. GEE models permit us to control for unobserved intra-individual correlation over time, such as a respondent's path dependency in responses over successive measurements, or an overall individual propensity toward biased responses (Hardin and Hilbe 2003; Liang and Zeger 1986; Zeger and Liang 1986). Under some mild assumptions about the respondent's auto-correlation structure, GEE produces unbiased estimates of the “treatment” effect, controlling for unobserved intra-individual error. Fully adjusted models were controlled for the above-mentioned set of *sociodemographic*, *health behaviour*, and *diagnosed disease* variables. Repeated models over the life course of a synthetic cohort, centred on proximity to death, generated trajectories of predictive power over the last 14 years prior to death. All statistical programming used STATA version 13.

Results

Results for the moderating effects of each of the four covariates of interest (age, sex, education, income) are presented here in turn:

The moderating effect of age group for predictive power

Figure 1 shows the proportion of deceased cases and surviving controls who report poor self-rated health up to 16 years prior to death, and its predictive power for mortality. Prevalence of poor health is based on unadjusted mean differences between case/control groups, while the predictive power trajectory is calculated from a fully adjusted multivariate GEE model.

Figure 1 shows that the prevalence of poor health among survivors rises gradually over time as a function of increasing age, which is expected. Poor health among deceased cases begins higher, and rises faster as death approaches. The widening gap in poor health reports between deceased cases and matched surviving controls suggests an increasing predictive power of poor health for mortality over time, which is indeed the case, shown by the black dotted line. Although the trajectories of poor health get higher with age, its predictive power for mortality declines.

In order to directly compare predictive power across the age groups, Figure 2 displays the predictive power trajectories for each of the three age groups, showing the raw data points on which the smoothed exponential trendlines from Figure 1 were calculated. Each data point represents a relative risk ratio for reporting “poor” health in each year prior to death, calculated from a fully adjusted GEE model. Only statistically significant point estimates are included, so only the last 14 (not 16) years prior to death are shown, and some point estimates are missing for the highest (80+) age group.

The trajectories of predictive power in the last 14 years prior to death in Figure 2 show more clearly the gradient in predictive power by age. As hypothesized, we see increased predictive power among the younger age groups (30–64 and 65–79), and diminished predictive power among the oldest group (80+). The predictive power estimates for the younger two age groups are not statistically distinguishable (falling within each other's 95 per cent confidence interval), whereas predictive power is significantly lower for the oldest 80+ age group within 7 years proximity to death.

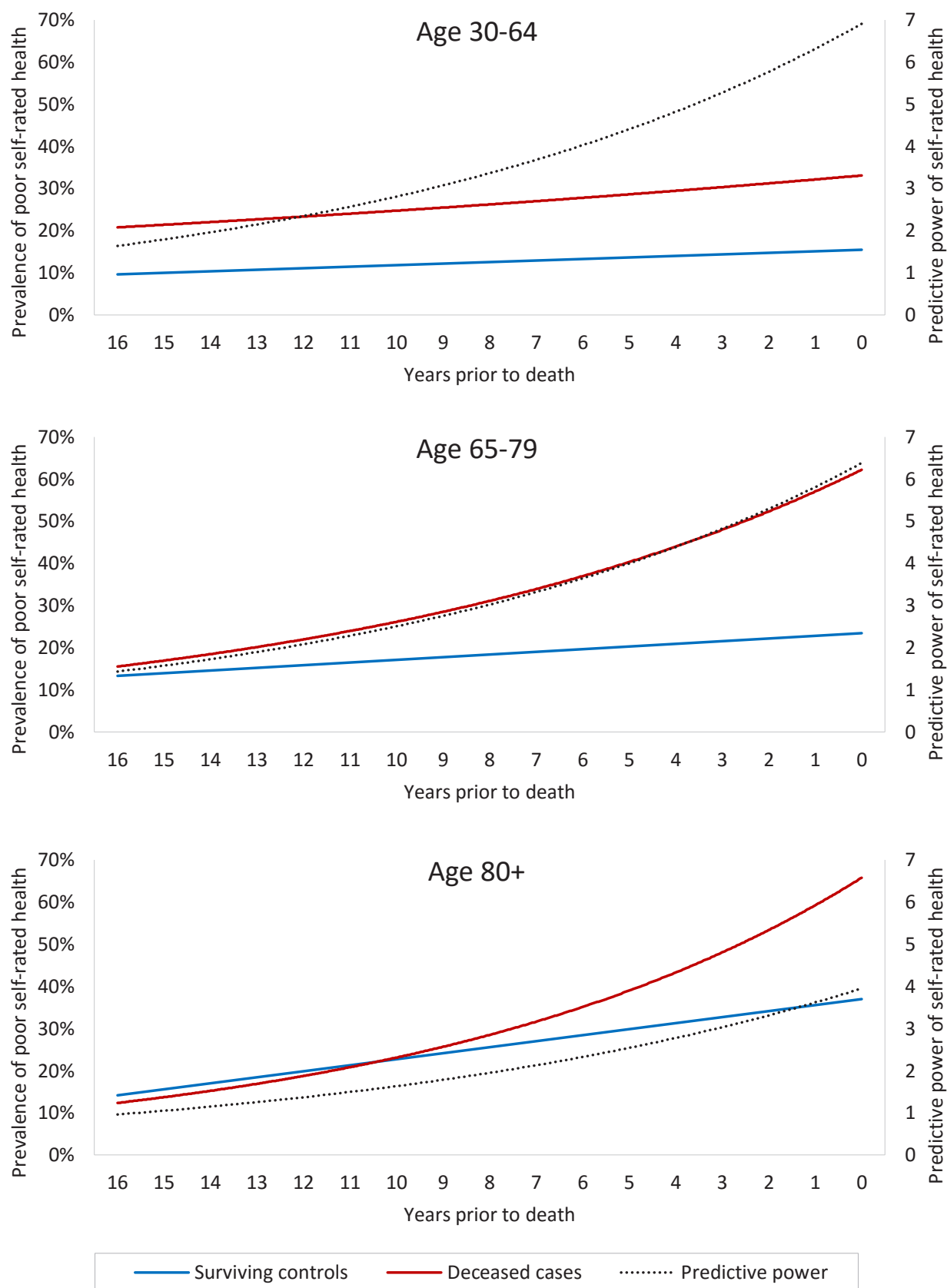


Figure 1. Prevalence and predictive power of “poor” self-rated health up to 16 years prior to death, by age group (smoothed exponential trendline).

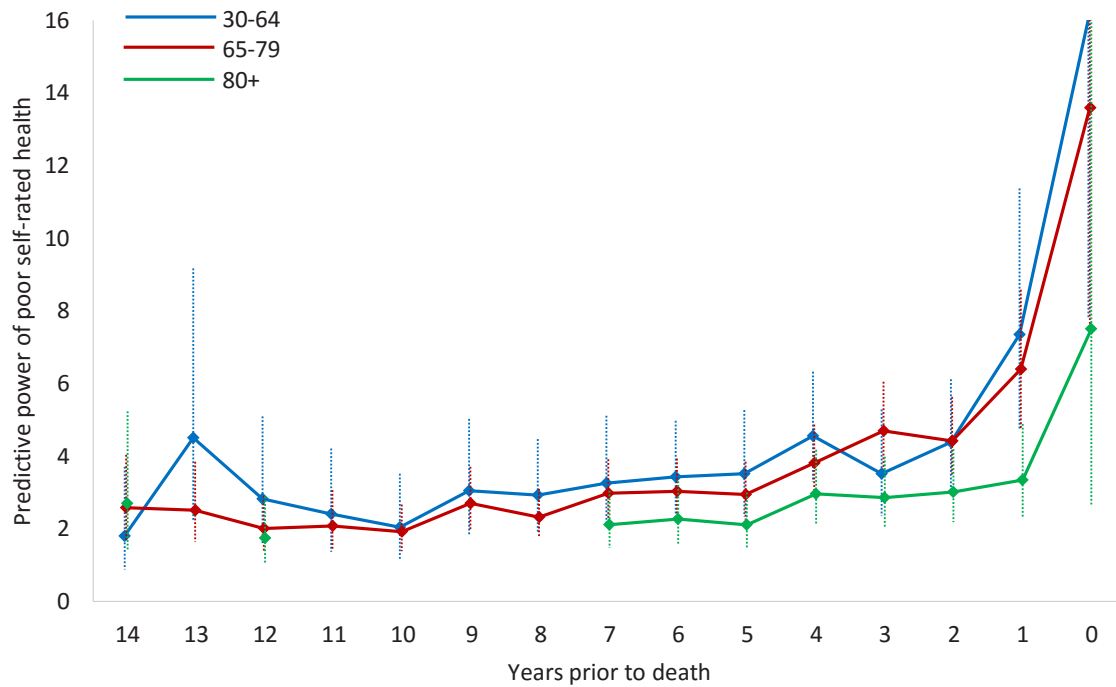


Figure 2. Predictive power of poor self-rated health by age group in the last 14 years prior to death: relative risk of reporting “poor” health for deceased cases versus surviving controls, fully adjusted GEE models (raw data points with 95 per cent CI).

The moderating effect of sex for predictive power

Figure 3 reports the predictive power trajectories for women (red) and men (blue). Data points represent predictive power estimates for the relative risk of reporting “poor” health in each year prior to death, calculated from a fully adjusted GEE model. Only statistically significant point estimates are included.

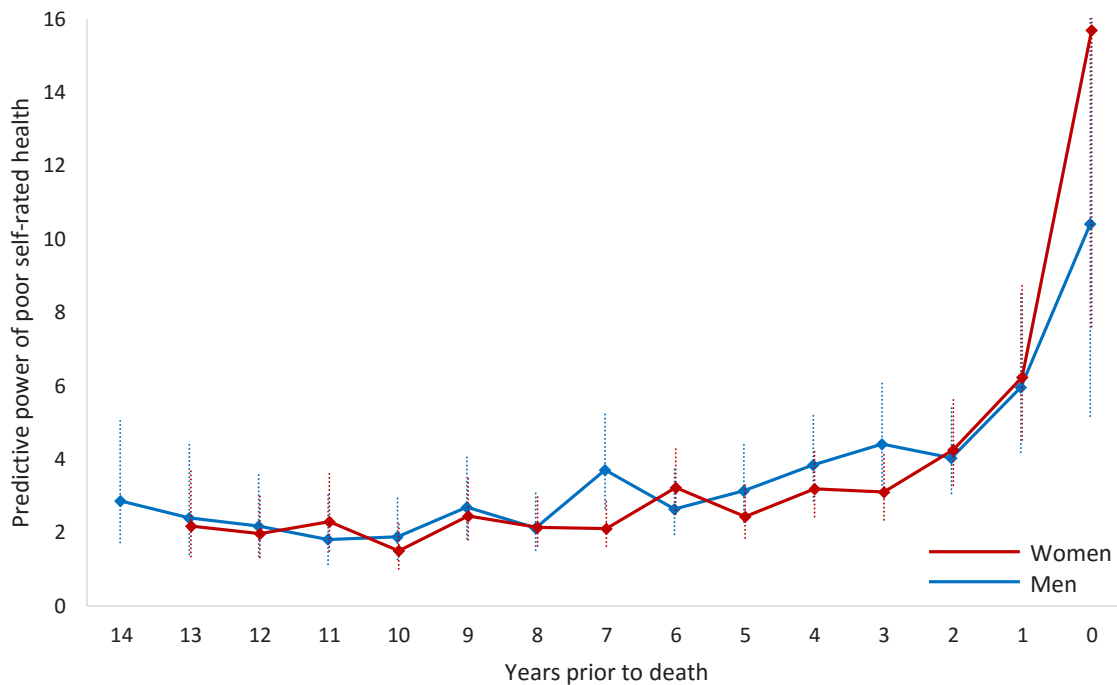


Figure 3. Predictive power of poor self-rated health by sex in the last 14 years prior to death: relative risk of reporting “poor” health for deceased cases versus surviving controls, fully adjusted GEE models (raw data points with 95 per cent CI).

Both sexes show statistically significant predictive power for mortality at all observations up to 14 years prior to death, and increasing predictive power as death approaches. Figure 3 offers no solution to the gender paradox; the trajectories of the predictive power of self-rated health by sex are statistically indistinguishable. However, it is possible that age and sex interact differently to affect the predictive power of self-rated health. Therefore, Figure 4 shows the predictive power trajectory by age group for each sex.

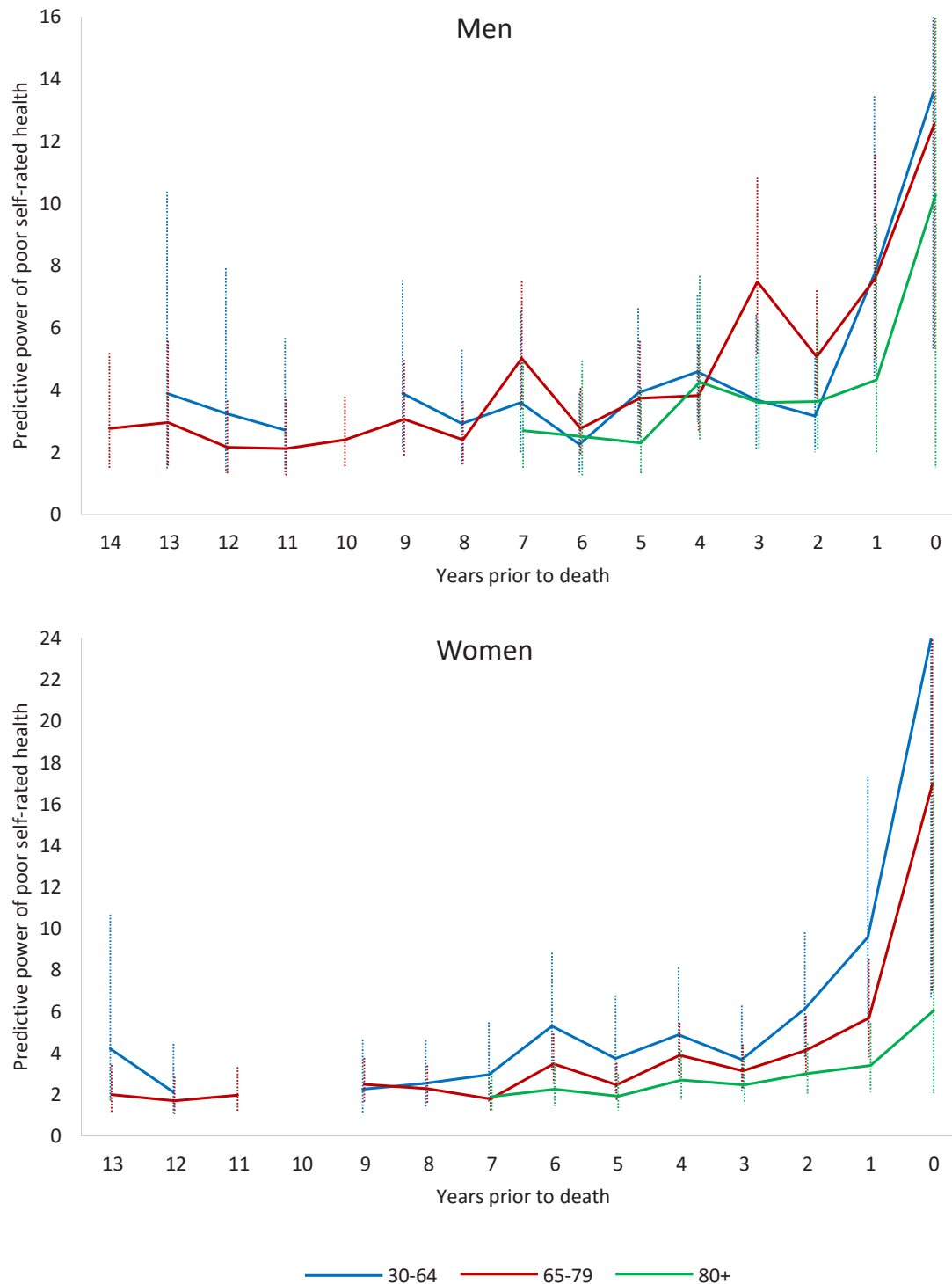


Figure 4. Predictive power of poor self-rated health by sex and age group in the last 14 years prior to death: relative risk of reporting “poor” health for deceased cases versus surviving controls, fully adjusted GEE models (point estimates with 95 per cent CI high/low lines).

Figure 4 shows that there is no discernible gradient in the trajectories of predictive power by age group among men. Except for a few anomalous observations, men's predictive power trajectories for all ages fall within each other's confidence intervals. Women's predictive power trajectories, on the other hand, show a consistently ordered gradient according to the initial hypothesis: reduced predictive power with increasing age. Among women, the youngest age group (30–64) is distinguishable from the middle group (65–79) at about half the observations. The oldest (80+) age group is distinguishable from both younger age groups (30–64 and 65–79) at most observations for which complete data are available.

The moderating effect of education for predictive power

Figure 5 reports the population prevalence of poor self-rated health among deceased cases and surviving controls for respondents of each level of education. Among both deceased cases and surviving controls, the health gradient by education in Figure 5 is in the expected direction, with increasing education associated with lower rates of poor health. The ratio in poor health between deceased cases and surviving controls forms the basis for predictive power. However, the ratios in Figure 5 are simple descriptive proportions. Figure 6, on the other hand, reports the relative risk ratio point estimates for reporting “poor” health between deceased cases and surviving controls for each education group up to 14 years prior to death, calculated from fully adjusted GEE models controlling for sociodemographic, health behaviours, and diagnosed diseases.

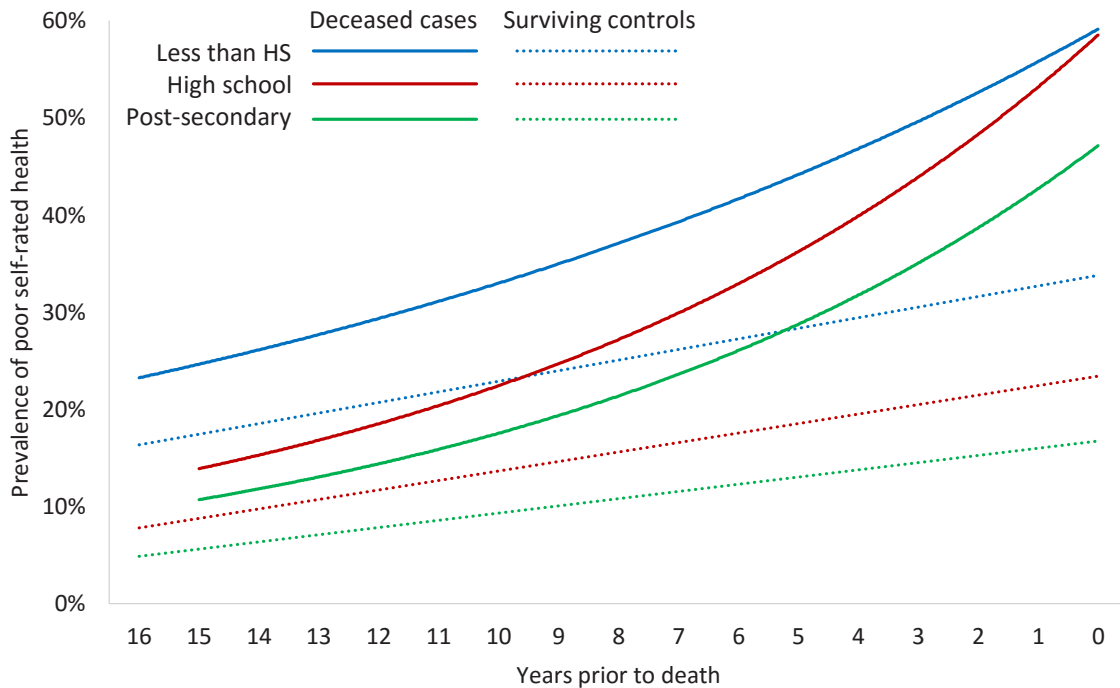


Figure 5. Prevalence of poor self-rated health by level of education, deceased cases and surviving controls.

The results in Figure 6 fail to show any discernible gradient in predictive power according to education level. Not only are the predictive power trajectories by education level statistically indistinguishable from each other, the trajectory for respondents with the highest level of education (post-secondary) is lower than that of high-school educated respondents at many observations. Like with age group, we tested sex differences in predictive power by educational group (not shown), and found that neither sex showed the hypothesized gradient in predictive power by education level.

The evidence for the moderating effect of education for predictive power fails to support the hypothesis of increasing predictive power for mortality with increasing education gradient. Neither did disaggregating education gradients by sex show that the hypothesis held for men or women. The analysis now turns to a second operationalization of SES, to examine the effect of the sex-specific *income* tertile on the predictive power of self-rated health.

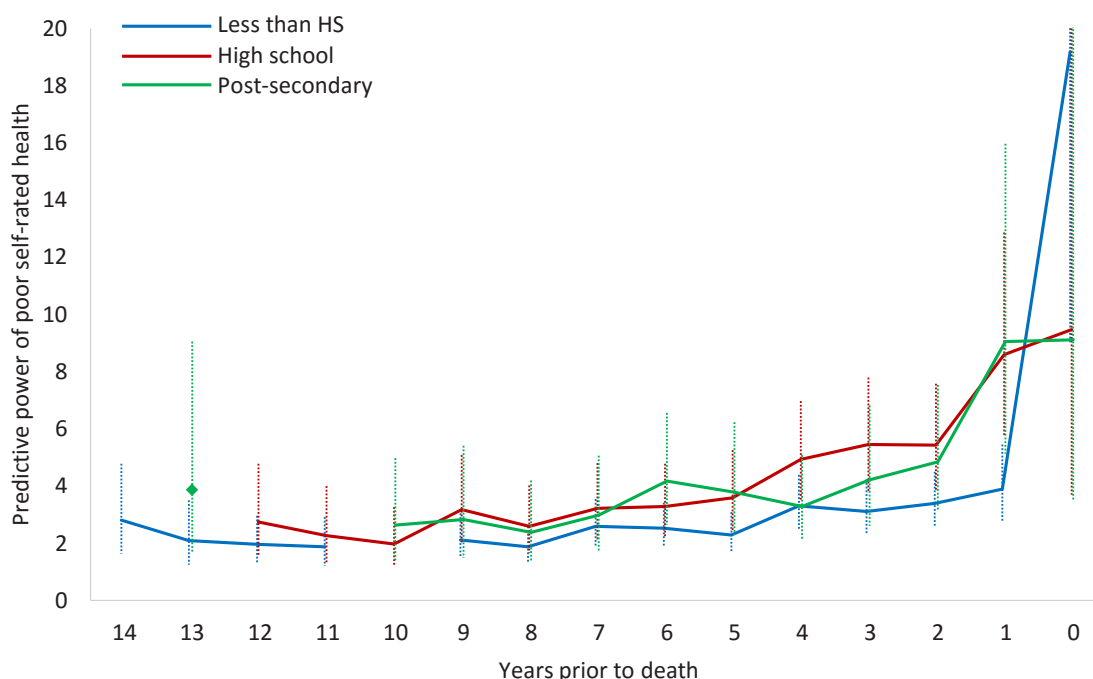


Figure 6. Predictive power of poor self-rated health by education in the last 14 years prior to death: relative risk of reporting “poor” health for deceased cases versus surviving controls, fully-adjusted GEE models (raw data points with 95% CI).

The moderating effect of *income* for predictive power

Figure 7 reports the population-average prevalence of poor self-rated health among deceased cases and surviving controls, according to the sex-specific income tertile up to 16 years prior to death. Like with education, the gradient in poor self-rated health is in the expected direction, among both deceased cases and surviving controls: the lowest-income respondents report the worst health, and the highest-income respondents the best. Figure 7

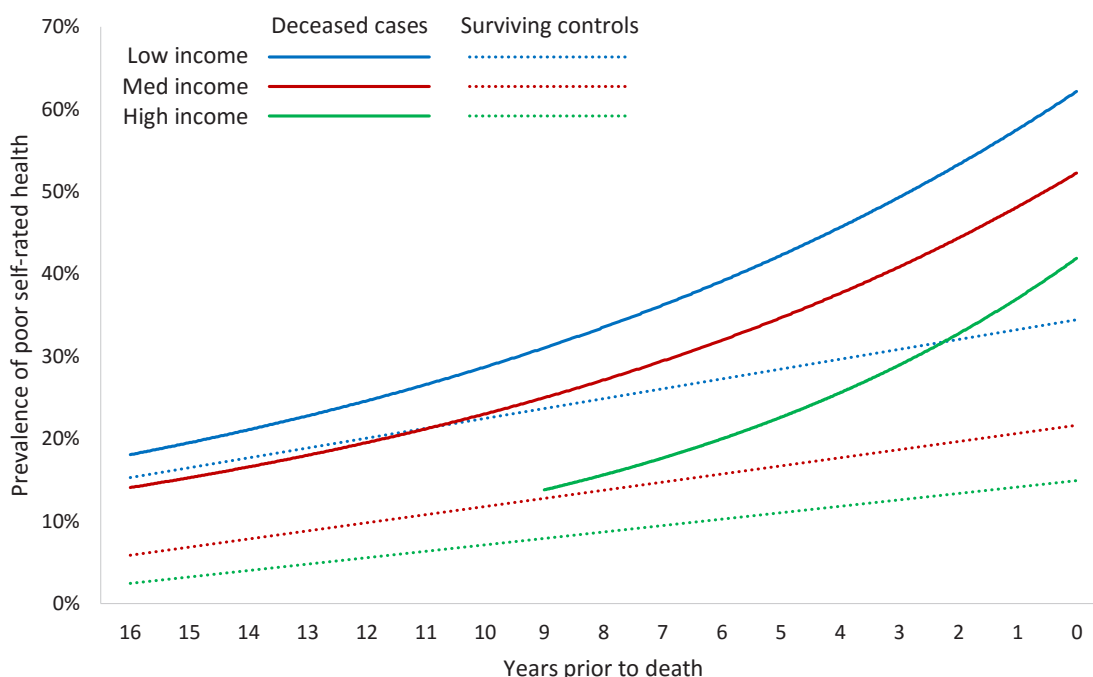


Figure 7. Prevalence of self-rated poor health by sex-specific income tertile in the last 16 years prior to death, deceased cases and surviving controls (exponential regression trendline).

shows unadjusted mean differences, whereas Figure 8 reports the relative risk of reporting poor health, calculated from multivariate GEE models and controlling for sociodemographics, health behaviours, and diagnosed diseases.

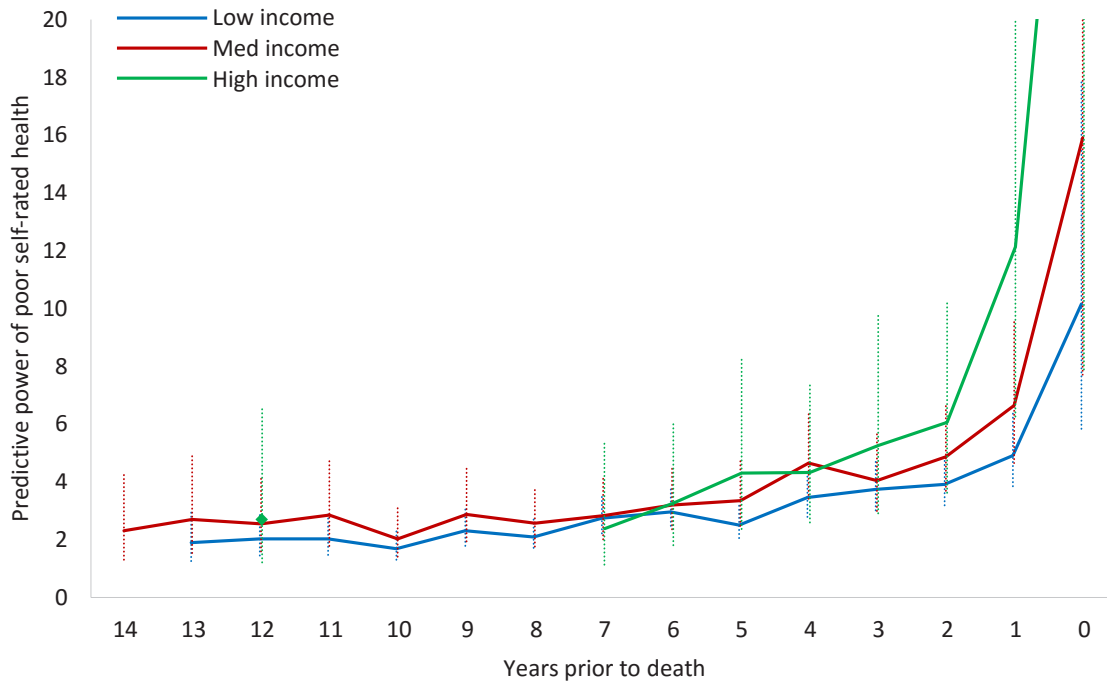


Figure 8. Predictive power of poor self-rated health by sex-specific income tertile in the last 14 years prior to death: relative risk of reporting “poor” health for deceased cases versus surviving controls, fully adjusted GEE models (raw data points with 95 per cent CI).

Unlike with education (in Figure 6), in Figure 8 income shows a more consistent positive gradient in predictive power, particularly in the last 3 years prior to death. However, only the highest and lowest income tertiles are statistically distinguishable from each other at most observations. Like with age and education before, we decomposed the income tertiles by sex (not shown), and find that neither sex is contributing disproportionately to the apparent income gradient in predictive power.

Discussion

Self-rated health predicts mortality in Canada up to 14 years prior to death among all ages, sexes, and socioeconomic classes, and the predictive power of self-rated health increases exponentially with proximity to death.

When undifferentiated by sex, there appears to be a declining gradient in the predictive power of self-rated health in Canada by increasing age group (Figure 2). However, the predictive power trajectories among the younger two age groups (30–64, 65–79) are not statistically distinguishable. The hypothesis for a clear age gradient could be more adequately supported by a replication that uses a larger sample to more conclusively distinguish the trajectories between younger age groups. The evidence in this study shows that the larger decline in predictive power occurs for respondents in the oldest (80+) age group. This finding of low predictive power of self-rated health for mortality among the oldest age group conforms to the hypotheses of excessive health “optimism” compared to their higher actual risk of mortality (Layes et al. 2012), and of the cumulative effect of attrition/survivorship bias in the sample (Idler 1993; Stenholm et al. 2014), and to findings in the research literature from other developed countries (Johansson et al. 2015; Kaplan and Baron-Epel 2003).

The trajectories of predictive power of self-rated health for mortality in Canada are not statistically distinguishable by sex (Figure 3). However, an investigation of sex differences in predictive power revealed an interaction with age group. The declining gradient in predictive power by age is only discernible among

women (Figure 4). Among men, there is no direct relationship between predictive power and age. There may be a justification for revisiting the established literature that shows consistent findings of declining predictive power among the oldest respondents, to determine whether this observed age gradient is driven equally by both sexes.

Education and income affect the health of both deceased cases and surviving controls. Improvements in SES showed a gradient in *decreasing* prevalence of poor self-rated health (i.e., better health). However, when we investigate the extent to which these prevalences of poor health correspond to actual mortality by measuring predictive power, the gradient is less clear. The findings from this study offer only weak support, if any, for the hypothesis that the predictive power of self-rated health varies according to socioeconomic status in Canada. There is no discernible moderating effect of education, although respondents in the lowest education group (less than high school) show a systematic and statistically significant disadvantage in predictive power at some observations up to 9 years prior to death. The middle and high education groups (high school; post-secondary) are not distinguishable. Likewise, although the trajectories of predictive power by income showed the expected gradient, only the highest and lowest income tertiles were statistically distinguishable at some observations prior to death. Neither sex contributed disproportionately to the apparent moderating effect of income or education.

One of the hypotheses guiding this study is that SES differences in health knowledge, and therefore predictive power, may not arise from circumstances where healthcare is universally available across all socioeconomic classes. In such a context, differences in health knowledge may only be detectable at the extremes of socioeconomic measures (Quesnel-Vallée 2007). The findings from this study suggest that this may be the case in Canada: there is no clearly ordered gradient between the predictive power trajectories across the educational groups, but the highest and lowest education group are often distinguishable from each other. This may offer support to the hypothesis that more equal access to objective information from healthcare across the socioeconomic classes reduces the moderating effect of SES.

Evidence from the United States shows that socioeconomic status is an important determinant of predictive power, but this is in a context where health, health literacy, access to healthcare, and health information are distributed unequally according to SES (Blackwell et al. 2009; Blendon et al. 2002; Dowd and Zajacova 2007, 2010). Conversely, evidence from Europe shows that SES is a weak or null determinant of predictive power, likely because health information is more equally distributed across the social classes (Huisman et al. 2007; Quesnel-Vallée 2007). The findings from Canada appear not to support a strong effect of SES, suggesting that the more equal distribution of health knowledge in Canada diminishes the moderating effect of SES to produce inequalities in predictive power. This study, therefore, situates Canada among its European counterparts in terms of the weak or null effect of SES on the predictive power of self-rated health, and differentiates it from the United States, where SES is a stronger moderator for the validity of subjective health. However, there is some evidence (Figure 8) that differences in predictive power are discernible across the extremes of socioeconomic status at some observations. Future studies should seek to explicitly articulate and test the influence of objective medical information, obtained from access to healthcare, for the validity of subjective self-rated health.

Conclusion

This study introduces Canada into the global literature on population-level predictive power of self-rated health for mortality by analyzing how its longitudinal trajectory is moderated by age, sex, education, and income. The concern that self-rated health measures different phenomenon across social groups, and thus cannot be used to evaluate inequalities in health, is not generally supported by the evidence from Canada. Self-rated health is a valid proxy for latent health in Canada, showing a predictive association with mortality that is detectable up to 14 years prior to death, and which is not significantly moderated by sociodemographic and socioeconomic covariates. The investigation of health inequalities using self-rated health in Canada is therefore not unduly biased by different conceptualizations of health across sociodemographic attributes.

Bibliography

- Bago d'Uva, T., O. O'Donnell, and E. van Doorslaer. 2008. Differential health reporting by education level and its impact on the measurement of health inequalities among older Europeans. *International Journal of Epidemiology* 37(6):1375–83. <http://doi.org/10.1093/ije/dyn146>
- Blackwell, D.L., M.E. Martinez, J.F. Gentleman, C. Sanmartin, and J-M. Berthelot. 2009. Socioeconomic status and utilization of health care services in Canada and the United States: findings from a binational health survey. *Medical Care* 47(11):1136–46.
- Blendon, R.J., C. Schoen, C.M. DesRoches, R. Osborn, K.L. Scoles, and K. Zapert. 2002. Inequities in health care: A five-country survey. *Health Affairs* 21(3):182–91. <http://doi.org/10.1377/hlthaff.21.3.182>
- Browning, C.R., K.A. Cagney, and M. Wen. 2003. Explaining variation in health status across space and time: implications for racial and ethnic disparities in self-rated health. *Social Science & Medicine* 57(7):1221–35.
- Burström, B., and P. Fredlund. 2001. Self rated health: Is it as good a predictor of subsequent mortality among adults in lower as well as in higher social classes? *Journal of Epidemiology and Community Health* 55(11):836–40.
- Case, A., and C. Paxson. 2005. Sex differences in morbidity and mortality. *Demography* 42(2):189–214.
- Cingano, F. 2014. *Trends in Income Inequality and its Impact on Economic Growth*. OECD Social, Employment and Migration Working Papers No. 163. Retrieved from http://www.oecd-ilibrary.org/social-issues-migration-health/trends-in-income-inequality-and-its-impact-on-economic-growth_5jxrjncwvxvj-en
- Deeg, D.J., and D.M. Kriegsman. 2003. Concepts of self-rated health: specifying the gender difference in mortality risk. *The Gerontologist* 43(3):376–86.
- Delpierre, C., V. Lauwers-Cances, G.D. Datta, T. Lang, and L. Berkman. 2009. Using self-rated health for analysing social inequalities in health: a risk for underestimating the gap between socioeconomic groups? *Journal of Epidemiology & Community Health* 63(6):426–32. <http://doi.org/10.1136/jech.2008.080085>
- DeSalvo, K.B., N. Bloser, K. Reynolds, J. He, and P. Muntner. 2006. Mortality prediction with a single general self-rated health question. *Journal of General Internal Medicine* 21(3):267–75.
- Dowd, J.B., and A. Zajacova. 2007. Does the predictive power of self-rated health for subsequent mortality risk vary by socioeconomic status in the US? *International Journal of Epidemiology* 36(6):1214–21. <http://doi.org/10.1093/ije/dym214>
- . 2010. Does self-rated health mean the same thing across socioeconomic groups? Evidence from biomarker data. *Annals of Epidemiology* 20(10):743–49. <http://doi.org/10.1016/j.annepidem.2010.06.007>
- Falconer, J., and A. Quesnel-Vallée. 2014. Les disparités d'accès aux soins de santé parmi la minorité de langue officielle au Québec. *Recherches sociographiques* 55(3):511. <http://doi.org/10.7202/1028377ar>
- Farmer, M.M., and K.F. Ferraro. 1997. Distress and perceived health: Mechanisms of health decline. *Journal of Health and Social Behavior* 38(3):298. <http://doi.org/10.2307/2955372>
- Ferraro, K.F., M.M. Farmer, and J.A. Wybraniec. 1997. Health trajectories: Long-term dynamics among black and white adults. *Journal of Health and Social Behavior* 38(1):38. <http://doi.org/10.2307/2955360>
- Fortin, N., D.A. Green, T. Lemieux, K. Milligan, and W.C. Riddell. 2012. Canadian inequality: Recent developments and policy options. *Canadian Public Policy* 38(2):121–45.
- Hardin, J.W., and J.M. Hilbe. 2003. *Generalized Estimating Equations*. CITY: Chapman & Hall/CRC.
- House, J.S., and D.R. Williams. 2000. Understanding and reducing socioeconomic and racial/ethnic disparities in health, in *Promoting Health: Intervention Strategies from Social and Behavioral Research*. Washington: National Academy Press.
- Huisman, M., and D.J.H. Deeg. 2010. A commentary on Marja Jylhä's 'What is self-rated health and why does it predict mortality? Towards a unified conceptual model' (69(2009:3):307–16). *Social Science & Medicine* 70(5):652–54. <http://doi.org/10.1016/j.socscimed.2009.11.003>

- Huisman, M., F. van Lenthe, and J. Mackenbach. 2007. The predictive ability of self-assessed health for mortality in different educational groups. *International Journal of Epidemiology* 36(6):1207–13. <http://doi.org/10.1093/ije/dym095>
- Idler, E.L. 1993. Age differences in self-assessments of health: Age changes, cohort differences, or survivorship? *Journal of Gerontology* 48(6):S289–S300.
- . 2003. Discussion: Gender differences in self-rated health, in mortality, and in the relationship between the two. *The Gerontologist* 43(3):372–75.
- Idler, E.L., and Y. Benyamini. 1997. Self-rated health and mortality: A review of twenty-seven community studies. *Journal of Health and Social Behavior* 38(1):21. <http://doi.org/10.2307/2955359>
- . 1999. Community studies reporting association between self-rated health and mortality. *Research on Aging* 21:392–401.
- Idler, E.L., and S.V. Kasl. 1995. Self-ratings of health: Do they also predict change in functional ability? *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences* 50(6):S344–S353.
- Johansson, S-E., P. Midlöv, J. Sundquist, K. Sundquist, and S. Calling. 2015. Longitudinal trends in good self-rated health: Effects of age and birth cohort in a 25-year follow-up study in Sweden. *International Journal of Public Health* 60(3):363–73. <http://doi.org/10.1007/s00038-015-0658-y>
- Jylhä, M. 2009. What is self-rated health and why does it predict mortality? Towards a unified conceptual model. *Social Science & Medicine* 69(3):307–16.
- . 2010. Self-rated health between psychology and biology. A response to Huisman and Deeg. *Social Science & Medicine* 70(5):655–57. <http://doi.org/10.1016/j.socscimed.2009.11.004>
- Jylhä, M., J.M. Guralnik, L. Ferrucci, J. Jokela, and E. Heikkinen. 1998. Is self-rated health comparable across cultures and genders? *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences* 53(3):S144–S152.
- Kaplan, G., and O. Baron-Epel. 2003. What lies behind the subjective evaluation of health status? *Social Science & Medicine* 56(8):1669–76.
- Kawachi, I., B.P. Kennedy, and R. Glass. 1999. Social capital and self-rated health: A contextual analysis. *American Journal of Public Health* 89(8):1187–93.
- Kennedy, B.S., S.V. Kasl, V. Vaccarino. 2001. Repeated hospitalizations and self-rated health among the elderly: A multivariate failure time analysis. *American Journal of Epidemiology* 153(3):232–41.
- Kondo, N., G. Sembajwe, I. Kawachi, R.M. van Dam, S.V. Subramanian, and Z. Yamagata. 2009. Income inequality, mortality, and self rated health: Meta-analysis of multilevel studies. *BMJ* 339. <http://doi.org/10.1136/bmj.b4471>
- Latham, K., and C.W. Peek. 2013. Self-rated health and morbidity onset among late midlife U.S. adults. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences* 68(1):107–16. <http://doi.org/10.1093/geronb/gbs104>
- Layes, A., Y. Asada, and G. Kephart. 2012. Whiners and deniers: What does self-rated health measure? *Social Science & Medicine* 75(1):1–9. <http://doi.org/10.1016/j.socscimed.2011.10.030>
- Liang, K-Y., and S.L. Zeger. 1986. Longitudinal data analysis using generalized linear models. *Biometrika* 73(1):13. <http://doi.org/10.2307/2336267>
- Lindeboom, M., and E. van Doorslaer. 2004. Cut-point shift and index shift in self-reported health. *Journal of Health Economics* 23(6):1083–99. <http://doi.org/10.1016/j.jhealeco.2004.01.002>
- McCullough, M.E., and J-P. Laurenceau. 2004. Gender and the natural history of self-rated health: A 59-year longitudinal study. *Health Psychology* 23(6):651–55. <http://doi.org/10.1037/0278-6133.23.6.651>
- McDonough, P., and P. Berglund. 2003. Histories of poverty and self-rated health trajectories. *Journal of Health and Social Behavior* 44(2):198. <http://doi.org/10.2307/1519808>

- Miilunpalo, S., I. Vuori, P. Oja, M. Pasanen, and H. Urponen. 1997. Self-rated health status as a health measure: The predictive value of self-reported health status on the use of physician services and on mortality in the working-age population. *Journal of Clinical Epidemiology* 50(5):517–28.
- Mossey, J.M., and E. Shapiro. 1982. Self-rated health: a predictor of mortality among the elderly. *American Journal of Public Health* 72(8):800–08.
- OECD. 2010. Health care systems: Getting more value for money. OECD Economics Department Policy Notes 2.
- Okosun, I.S., S. Choi, T. Matamoros, and G.E.A. Dever. 2001. Obesity is associated with reduced self-rated general health status: Evidence from a representative sample of White, Black, and Hispanic Americans. *Preventive Medicine* 32(5):429–36. <http://doi.org/10.1006/pmed.2001.0840>
- Okun, M.A., W.A. Stock, M.J. Haring, and R.A. Witter. 1984. Health and subjective well-being: A meta-analysis. *The International Journal of Aging and Human Development* 19(2):111–32.
- Paris, V., L. Wei, and M. Devaux. 2010. *Health Systems Institutional Characteristics: A Survey of 29 OECD Countries*. OECD Health Working Papers 50.
- Pinquart, M., and S. Sörensen. 2000. Influences of socioeconomic status, social network, and competence on subjective well-being in later life: A meta-analysis. *Psychology and Aging* 15(2):187.
- Quesnel-Vallée, A. 2007. Self-rated health: Caught in the crossfire of the quest for “true” health? *International Journal of Epidemiology* 36(6):1161–64. <http://doi.org/10.1093/ije/dym236>
- Sen, A. 2002. Health perception versus observation: Self-reported morbidity has severe limitations and can be extremely misleading. *BMJ* 324(7342):860–61.
- Singh-Manoux, A., A. Dugravot, M.J. Shipley, J.E. Ferrie, P. Martikainen, M. Goldberg, and M. Zins. 2007. The association between self-rated health and mortality in different socioeconomic groups in the GAZEL cohort study. *International Journal of Epidemiology* 36(6):1222–28. <http://doi.org/10.1093/ije/dym170>
- Statcan (Statistics Canada). 2012. National Population Health Survey – Household Component – Longitudinal (NPHS). Retrieved 2 July 2015, from <http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3225>
- . 2014. Leading causes of death, by sex: Both sexes. Retrieved August 18, 2015, from <http://www.statcan.gc.ca/tables-tableaux/sum-som/101/cst01/hlth36a-eng.htm>
- Statcan (Statistics Canada), M. Peaudet, J. Chen, C. Pérez, N. Ross, and K. Wikins. 1998. *National Population Health Survey Overview 1996/1997*. Catalogue 82-567. Ottawa: Statistics Canada.
- Stenholm, S., J. Pentti, I. Kawachi, H. Westerlund, M. Kivimäki, and J. Vahtera. 2014. Self-rated health in the last 12 years of life compared to matched surviving controls: The health and retirement study. *PLoS ONE* 9(9):e107879. <http://doi.org/10.1371/journal.pone.0107879>
- Tambay, J-L., and G. Catlin. 1995. Sample design of the national population health survey. *Health Reports* 7(1):29–38.
- van Doorslaer, E., C. Masseria, and X. Koolman. 2006. Inequalities in access to medical care by income in developed countries. *Canadian Medical Association Journal* 174(2):177–83. <http://doi.org/10.1503/cmaj.050584>
- Yao, L., and S.A. Robert. 2008. The contributions of race, individual socioeconomic status, and neighborhood socioeconomic context on the self-rated health trajectories and mortality of older adults. *Research on Aging* 30(2):251–73. <http://doi.org/10.1177/0164027507311155>
- Zajacova, A., and J.B. Dowd. 2011. Reliability of self-rated health in US adults. *American Journal of Epidemiology* 174(8):977–83. <http://doi.org/10.1093/aje/kwr204>
- Zeger, S.L., and K-Y. Liang. 1986. Longitudinal data analysis for discrete and continuous outcomes. *Biometrics* 42(1):121. <http://doi.org/10.2307/2531248>

Appendix

Data tables for the predictive power of self-rated health up to 16 years prior to death in Canada, by sex, age, education, and income. Relative risk ratios of reporting “poor” self-rated health between deceased cases and matched surviving controls, calculated from fully adjusted GEE models (rows excluded where models failed to converge).

Sex: Male							
Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]		
0	10.410	3.723	6.55	0.000	5.164	20.982	
1	5.964	1.083	9.83	0.000	4.177	8.514	
2	4.032	0.599	9.39	0.000	3.013	5.394	
3	4.419	0.713	9.20	0.000	3.221	6.064	
4	3.855	0.584	8.91	0.000	2.865	5.188	
5	3.138	0.537	6.68	0.000	2.243	4.390	
6	2.646	0.463	5.56	0.000	1.878	3.728	
7	3.702	0.651	7.44	0.000	2.622	5.226	
8	2.123	0.403	3.96	0.000	1.462	3.081	
9	2.696	0.564	4.75	0.000	1.790	4.062	
10	1.880	0.427	2.78	0.006	1.204	2.935	
11	1.812	0.474	2.27	0.023	1.086	3.025	
12	2.174	0.550	3.07	0.002	1.323	3.570	
13	2.409	0.740	2.86	0.004	1.319	4.399	
14	2.869	0.829	3.65	0.000	1.629	5.053	
Sex: Female							
Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]		
0	15.701	5.851	7.39	0.000	7.564	32.594	
1	6.242	1.068	10.70	0.000	4.463	8.731	
2	4.256	0.601	10.25	0.000	3.227	5.614	
3	3.108	0.448	7.86	0.000	2.342	4.123	
4	3.193	0.452	8.21	0.000	2.420	4.213	
5	2.439	0.376	5.79	0.000	1.803	3.298	
6	3.237	0.463	8.20	0.000	2.445	4.285	
7	2.105	0.328	4.78	0.000	1.551	2.856	
8	2.147	0.358	4.58	0.000	1.549	2.978	
9	2.451	0.433	5.08	0.000	1.734	3.465	
10	1.504	0.303	2.03	0.043	1.013	2.233	
11	2.294	0.529	3.60	0.000	1.460	3.604	
12	1.969	0.420	3.18	0.001	1.296	2.992	
13	2.184	0.580	2.94	0.003	1.298	3.677	

Age: 30–64

Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]
0	16.042	5.898	7.550	0.000	7.804 32.975
1	7.355	1.637	8.970	0.000	4.755 11.376
2	4.382	0.747	8.670	0.000	3.138 6.119
3	3.524	0.727	6.110	0.000	2.352 5.280
4	4.558	0.764	9.050	0.000	3.282 6.330
5	3.509	0.730	6.040	0.000	2.335 5.275
6	3.429	0.648	6.530	0.000	2.368 4.965
7	3.260	0.746	5.160	0.000	2.081 5.106
8	2.929	0.634	4.960	0.000	1.916 4.478
9	3.042	0.779	4.340	0.000	1.842 5.025
10	2.036	0.566	2.560	0.010	1.181 3.509
11	2.405	0.688	3.070	0.002	1.373 4.212
12	2.828	0.848	3.470	0.001	1.572 5.090
13	4.506	1.632	4.160	0.000	2.215 9.164
14	1.806	0.664	1.610	0.108	0.879 3.711
15	1.576	0.817	0.880	0.381	0.570 4.352
16	1.764	0.841	1.190	0.234	0.693 4.492

Age: 65–79

Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]
0	13.594	4.249	8.350	0.000	7.367 25.086
1	6.392	0.960	12.350	0.000	4.762 8.580
2	4.414	0.548	11.960	0.000	3.461 5.631
3	4.690	0.609	11.900	0.000	3.637 6.049
4	3.817	0.474	10.790	0.000	2.993 4.868
5	2.937	0.404	7.830	0.000	2.243 3.845
6	3.031	0.400	8.410	0.000	2.341 3.925
7	2.981	0.413	7.880	0.000	2.272 3.911
8	2.326	0.340	5.780	0.000	1.747 3.097
9	2.706	0.436	6.170	0.000	1.973 3.711
10	1.917	0.320	3.890	0.000	1.382 2.660
11	2.074	0.412	3.670	0.000	1.406 3.061
12	2.010	0.380	3.700	0.000	1.388 2.910
13	2.508	0.547	4.220	0.000	1.636 3.845
14	2.573	0.590	4.120	0.000	1.642 4.033
15	1.746	0.519	1.880	0.061	0.976 3.125

Age: 80+

Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]
0	7.499	3.987	3.790	0.000	2.646 21.257
1	3.348	0.647	6.250	0.000	2.292 4.891
2	3.016	0.504	6.610	0.000	2.174 4.184
3	2.863	0.484	6.220	0.000	2.055 3.988
4	2.968	0.517	6.250	0.000	2.110 4.175
5	2.107	0.376	4.170	0.000	1.485 2.991
6	2.273	0.435	4.290	0.000	1.562 3.307
7	2.115	0.396	4.010	0.000	1.466 3.051
8	1.229	0.256	0.990	0.321	0.818 1.848
9	1.397	0.290	1.610	0.107	0.930 2.097
10	1.191	0.275	0.760	0.449	0.757 1.872
11	1.544	0.437	1.530	0.125	0.886 2.690
12	1.741	0.451	2.140	0.032	1.048 2.893
13	0.876	0.275	-0.420	0.674	0.473 1.622
14	2.685	0.915	2.900	0.004	1.376 5.237
15	1.031	0.477	0.070	0.947	0.416 2.554

Appendix data tables (cont'd)

Men 30–64

Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]
0	13.545	6.466	5.460	0.000	5.315 34.522
1	7.720	2.185	7.220	0.000	4.432 13.445
2	3.169	0.748	4.890	0.000	1.996 5.033
3	3.684	1.043	4.610	0.000	2.115 6.418
4	4.581	1.005	6.940	0.000	2.980 7.043
5	3.917	1.052	5.080	0.000	2.314 6.629
6	2.254	0.627	2.920	0.004	1.306 3.889
7	3.599	1.096	4.210	0.000	1.982 6.535
8	2.916	0.887	3.520	0.000	1.606 5.292
9	3.900	1.313	4.040	0.000	2.016 7.543
10	1.939	0.808	1.590	0.112	0.857 4.389
11	2.714	1.021	2.650	0.008	1.298 5.672
12	3.254	1.475	2.600	0.009	1.339 7.910
13	3.888	1.949	2.710	0.007	1.456 10.386

Men 65–79

Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]
0	12.558	5.423	5.860	0.000	5.387 29.274
1	7.609	1.630	9.470	0.000	4.999 11.580
2	5.072	0.908	9.070	0.000	3.571 7.203
3	7.477	1.420	10.590	0.000	5.152 10.849
4	3.830	0.688	7.470	0.000	2.693 5.447
5	3.729	0.766	6.410	0.000	2.493 5.578
6	2.770	0.542	5.200	0.000	1.887 4.066
7	5.025	1.028	7.890	0.000	3.365 7.504
8	2.403	0.514	4.100	0.000	1.580 3.654
9	3.069	0.756	4.550	0.000	1.894 4.974
10	2.399	0.561	3.740	0.000	1.517 3.795
11	2.118	0.605	2.630	0.009	1.210 3.708
12	2.164	0.585	2.850	0.004	1.274 3.676
13	2.954	0.960	3.340	0.001	1.563 5.584
14	2.774	0.886	3.190	0.001	1.483 5.189
15	1.477	0.668	0.860	0.388	0.609 3.584
16	0.461	0.244	-1.460	0.144	0.164 1.301

Men 80+

Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]
0	10.273	10.073	2.380	0.018	1.503 70.197
1	4.333	1.697	3.740	0.000	2.010 9.337
2	3.637	1.002	4.690	0.000	2.119 6.243
3	3.591	0.986	4.650	0.000	2.096 6.151
4	4.257	1.279	4.820	0.000	2.362 7.671
5	2.301	0.675	2.840	0.004	1.295 4.087
6	2.498	0.870	2.630	0.009	1.263 4.943
7	2.690	0.817	3.260	0.001	1.483 4.880
8	1.091	0.379	0.250	0.803	0.552 2.154
9	1.354	0.488	0.840	0.401	0.668 2.744
10	1.033	0.427	0.080	0.938	0.460 2.321
11	0.791	0.410	-0.450	0.651	0.287 2.184
12	1.260	0.565	0.520	0.606	0.523 3.035

Women 30–64							
Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]		
0	23.956	15.718	4.840	0.000	6.621	86.678	
1	9.580	2.900	7.460	0.000	5.293	17.341	
2	6.112	1.476	7.500	0.000	3.807	9.813	
3	3.677	1.005	4.770	0.000	2.153	6.282	
4	4.870	1.274	6.050	0.000	2.917	8.133	
5	3.737	1.135	4.340	0.000	2.061	6.776	
6	5.281	1.386	6.340	0.000	3.158	8.832	
7	2.949	0.927	3.440	0.001	1.593	5.462	
8	2.523	0.780	2.990	0.003	1.376	4.625	
9	2.258	0.832	2.210	0.027	1.097	4.649	
10	1.691	0.620	1.430	0.152	0.825	3.468	
11	1.879	0.794	1.490	0.135	0.821	4.300	
12	2.107	0.798	1.970	0.049	1.003	4.427	
13	4.210	1.997	3.030	0.002	1.661	10.666	
14	1.299	0.654	0.520	0.603	0.485	3.484	
15	3.218	2.133	1.760	0.078	0.878	11.795	
16	1.060	0.678	0.090	0.928	0.302	3.713	
Women 65–79							
Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]		
0	16.955	7.758	6.190	0.000	6.915	41.572	
1	5.670	1.174	8.380	0.000	3.778	8.509	
2	4.115	0.712	8.170	0.000	2.931	5.777	
3	3.135	0.542	6.610	0.000	2.235	4.399	
4	3.879	0.675	7.790	0.000	2.758	5.456	
5	2.446	0.454	4.820	0.000	1.701	3.518	
6	3.460	0.623	6.890	0.000	2.431	4.925	
7	1.788	0.332	3.130	0.002	1.242	2.572	
8	2.267	0.466	3.980	0.000	1.516	3.390	
9	2.495	0.520	4.390	0.000	1.658	3.754	
10	1.472	0.345	1.650	0.099	0.930	2.330	
11	1.965	0.525	2.530	0.011	1.164	3.318	
12	1.690	0.447	1.990	0.047	1.007	2.838	
13	1.983	0.551	2.470	0.014	1.151	3.418	
Women 80+							
Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]		
0	6.044	3.291	3.300	0.001	2.079	17.570	
1	3.401	0.820	5.080	0.000	2.121	5.455	
2	3.004	0.606	5.460	0.000	2.024	4.460	
3	2.460	0.528	4.190	0.000	1.615	3.747	
4	2.683	0.585	4.520	0.000	1.749	4.114	
5	1.910	0.436	2.830	0.005	1.221	2.989	
6	2.250	0.503	3.630	0.000	1.452	3.487	
7	1.892	0.454	2.660	0.008	1.182	3.029	
8	1.308	0.345	1.020	0.310	0.779	2.195	
9	1.343	0.341	1.160	0.245	0.817	2.209	
10	1.225	0.344	0.720	0.471	0.706	2.123	
11	1.976	0.695	1.940	0.053	0.992	3.936	
12	1.883	0.621	1.920	0.055	0.986	3.595	
13	1.095	0.424	0.240	0.814	0.513	2.337	
14	2.250	1.093	1.670	0.095	0.868	5.830	

Appendix data tables (cont'd)

Education: Less than HS						
Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf.	Interval]
0	19.179	7.420	7.630	0.000	8.985	40.939
1	3.886	0.669	7.880	0.000	2.773	5.447
2	3.398	0.487	8.530	0.000	2.566	4.500
3	3.118	0.484	7.330	0.000	2.300	4.226
4	3.300	0.480	8.210	0.000	2.481	4.389
5	2.276	0.357	5.250	0.000	1.674	3.094
6	2.526	0.384	6.100	0.000	1.875	3.402
7	2.584	0.417	5.880	0.000	1.882	3.546
8	1.878	0.310	3.810	0.000	1.358	2.596
9	2.119	0.388	4.100	0.000	1.479	3.034
10	1.426	0.274	1.850	0.065	0.979	2.079
11	1.873	0.425	2.760	0.006	1.200	2.922
12	1.961	0.414	3.190	0.001	1.297	2.965
13	2.096	0.550	2.820	0.005	1.252	3.507
14	2.800	0.762	3.790	0.000	1.643	4.772
Education: High school						
Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf.	Interval]
0	9.469	4.551	4.680	0.000	3.691	24.290
1	8.597	1.768	10.460	0.000	5.746	12.865
2	5.418	0.928	9.870	0.000	3.873	7.578
3	5.449	0.991	9.320	0.000	3.815	7.784
4	4.930	0.870	9.040	0.000	3.488	6.967
5	3.576	0.704	6.470	0.000	2.431	5.261
6	3.279	0.632	6.160	0.000	2.248	4.784
7	3.207	0.660	5.670	0.000	2.143	4.800
8	2.581	0.584	4.190	0.000	1.656	4.023
9	3.175	0.762	4.810	0.000	1.984	5.081
10	1.970	0.503	2.650	0.008	1.194	3.251
11	2.263	0.660	2.800	0.005	1.278	4.008
12	2.745	0.777	3.570	0.000	1.576	4.780
13	1.824	0.717	1.530	0.126	0.844	3.942
14	1.656	0.660	1.260	0.206	0.758	3.618
Education: Post-secondary						
Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf.	Interval]
0	9.111	4.452	4.520	0.000	3.496	23.742
1	9.053	2.619	7.620	0.000	5.135	15.960
2	4.848	1.093	7.000	0.000	3.117	7.542
3	4.224	1.033	5.890	0.000	2.615	6.821
4	3.290	0.730	5.370	0.000	2.130	5.082
5	3.774	0.962	5.210	0.000	2.290	6.222
6	4.162	0.968	6.130	0.000	2.639	6.566
7	2.971	0.804	4.020	0.000	1.748	5.049
8	2.378	0.686	3.010	0.003	1.352	4.185
9	2.825	0.938	3.130	0.002	1.474	5.414
10	2.630	0.856	2.970	0.003	1.389	4.979
11	2.153	0.912	1.810	0.070	0.939	4.937
12	1.759	0.730	1.360	0.174	0.779	3.970
13	3.864	1.677	3.110	0.002	1.650	9.048

Low Income						
Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]	
0	10.158	2.915	8.080	0.000	5.787	17.828
1	4.905	0.652	11.960	0.000	3.780	6.366
2	3.915	0.438	12.190	0.000	3.144	4.876
3	3.735	0.433	11.370	0.000	2.976	4.687
4	3.468	0.393	10.970	0.000	2.777	4.331
5	2.506	0.302	7.630	0.000	1.979	3.173
6	2.969	0.354	9.130	0.000	2.350	3.750
7	2.734	0.340	8.100	0.000	2.144	3.488
8	2.085	0.277	5.520	0.000	1.606	2.706
9	2.307	0.330	5.840	0.000	1.742	3.053
10	1.688	0.265	3.330	0.001	1.241	2.297
11	2.020	0.365	3.890	0.000	1.418	2.879
12	2.020	0.359	3.960	0.000	1.426	2.861
13	1.902	0.421	2.900	0.004	1.232	2.936
Med Income						
Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]	
0	15.906	5.872	7.490	0.000	7.714	32.794
1	6.657	1.220	10.340	0.000	4.648	9.535
2	4.876	0.760	10.170	0.000	3.594	6.617
3	4.045	0.691	8.190	0.000	2.895	5.653
4	4.656	0.735	9.740	0.000	3.416	6.345
5	3.362	0.582	7.000	0.000	2.394	4.722
6	3.200	0.543	6.850	0.000	2.295	4.463
7	2.838	0.535	5.530	0.000	1.961	4.107
8	2.560	0.492	4.900	0.000	1.757	3.730
9	2.885	0.642	4.760	0.000	1.865	4.462
10	2.027	0.433	3.310	0.001	1.333	3.082
11	2.863	0.729	4.130	0.000	1.738	4.717
12	2.549	0.623	3.830	0.000	1.579	4.117
13	2.704	0.816	3.300	0.001	1.497	4.885
14	2.316	0.712	2.730	0.006	1.268	4.232
High Income						
Years prior to death	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]	
0	37.125	29.561	4.540	0.000	7.797	176.778
1	12.135	4.139	7.320	0.000	6.219	23.679
2	6.062	1.604	6.810	0.000	3.608	10.182
3	5.254	1.657	5.260	0.000	2.832	9.749
4	4.336	1.163	5.470	0.000	2.564	7.335
5	4.303	1.423	4.410	0.000	2.250	8.229
6	3.254	1.015	3.780	0.000	1.765	5.997
7	2.382	0.979	2.110	0.035	1.064	5.332
8	1.998	0.720	1.920	0.055	0.986	4.047
9	1.596	0.587	1.270	0.204	0.776	3.283
10	1.489	0.571	1.040	0.299	0.702	3.159
11	1.444	0.654	0.810	0.418	0.594	3.509
12	2.690	1.215	2.190	0.028	1.110	6.519
13	1.739	0.938	1.030	0.305	0.604	5.007
14	0.944	0.507	-0.110	0.914	0.329	2.705
15	3.479	2.111	2.050	0.040	1.059	11.428
16	0.536	0.324	-1.030	0.303	0.164	1.753

Mexicans on the Move: Migration and Return in Rural Mexico

by Frances A. Rothstein
New York: Palgrave Macmillan, 2016
ISBN: 978-1-137-55993-7
Hardcover, US\$67.50, 95 pp.

Reviewed by Claudia Masferrer
Centro de Estudios Demográficos, Urbanos y Ambientales, El Colegio de México

This book describes and analyzes migration patterns between San Cosme Mazatecochco in central Mexico and a community in the U.S. state of New Jersey. Rothstein's anthropological research on Mazatecochco began four decades ago. Although migration was not at the center of her initial research, her long-term knowledge of the community—both in Mexico and the U.S.—allows her to provide a comprehensive analysis of the causes and consequences of emigration and return. Her analysis focuses on the reasons, profiles, and ways in which returnees are reintegrated, by examining the way gender, family, and social networks shape the migration experiences in the U.S. and upon return.

The book comprises five chapters. Chapter 1 briefly discusses the various theoretical approaches for explaining migration and return in the context of the transformations that have taken place since the 1980s. Chapter 2 explores the effects of globalization and neoliberalism. The rural population previously employed in agriculture became factory workers, and the decline of the textile industry and the national economic crisis served as push factors. This chapter also highlights aspects that differentiate migration patterns in Mazatecochco from others: a relatively new sending area, a community with a large share of the population engaged in factory work, and a community where women migrated in order to find better economic opportunities rather than following their spouses or parents. Chapter 3 explores how life in New Jersey – defined by family, work, and leisure patterns – has changed over time, while chapter 4 explores what happens in these same dimensions on migrants' return. It discusses who comes back, why, and how they fare. The book concludes with a chapter with reflections on globalization and migration.

What do we know about return migration from the United States to Mexico? Recent estimated zero net migration rates are the result of a decline in emigration from Mexico and an increase in arrivals from the United States (Passel et al. 2012). This occurred during the past decade as a result of increasing deportations, enforcement, and an adverse economic and sociopolitical environment (Masferrer and Roberts 2016; Villarreal 2014). The old patterns involving circular or seasonal migration by male workers evolved into family migration and longer stays (Riosmena 2004). Economic factors are not the sole determinants of the decision to emigrate or go back; family reunification has proved to be of paramount importance for both emigration and return (Van Hook and Zhang 2011). The flow from the U.S. has increasingly included a large share of U.S.-born Mexican minors joining returnees; eligible for dual citizenship, they have not necessarily lived in Mexico before (Medina and Menjívar 2015; Zúñiga and Hamann 2015). In addition to changes in the composition of the flows, modifications in the geographical patterns of emigration (Riosmena and Massey 2012) and return have been documented, with a portion of returnees settling in places other than their communities of origin (Masferrer and Roberts 2012).

How does Rothstein's book contribute to this literature? The case study of San Cosme Mazatecochco addressed in *Mexicans on the Move: Migration and Return in Rural Mexico* explains the phenomenon of return to Mexico from an anthropological perspective. This complements results from the studies using mostly nationally representative

data summarized above. It analyzes some of the mechanisms behind the shift from male circular migration to increasing settlement in the U.S. and family formation, as well as family reunification, return, and reintegration, which are not always possible to explore through quantitative research. These mechanisms are clearly analyzed in the third and fourth chapters.

Key to understanding these mechanisms is knowing (a) how gender shapes social networks and social capital; (b) how weak and strong ties determine the experience of hard times in the U.S. as well as returning and re-integrating into the community; and (c) how the urban environment of the community facilitates return. By providing this information, Rothstein contributes to the growing literatures on gender and migration—particularly gender and return migration—as well as migration and social networks. A great deal of research on Mexico-U.S. migration has focused on emigration from rural areas and traditional sending states. However, emigration from new sending states and urban areas has increased over time. The unique position of Mazatecochco, located in the Metropolitan Area of Puebla-Tlaxcala—the fourth largest agglomeration in the country and 140km away from Mexico City—makes for an interesting case study that addresses the continuities between rural and urban areas that are often overlooked in migration studies.

What is missing from the book vis-à-vis the recent trends of return migration? Deportations. The book overlooks immigration enforcement enacted through border apprehensions, deportations with or without a criminal order, and local migration control measures. Why are deportations only mentioned at the end, in the conclusions? I do not know. Given its increasing importance during the period under study, I expected this issue to be addressed much earlier and more frequently. Also missing from the book, and partially associated with deportation, is the increasing number of U.S.-born minors and other family members that accompany returnees to Mexico, and the challenges they face. Did Rothstein consciously decide not to distinguish between modes of return in order to avoid the complex distinction between voluntary and involuntary return? Did participants avoid talking about deportations due to the stigma they carry? Is it the case that very few returnees to Mazatecochco were deportees? Is it that they mostly settled in New Jersey, which differs from other destinations? Are they returning somewhere else upon deportation? Did focusing on fieldwork carried out in the community of origin mean that this population was overlooked? Are deportees more likely to re-emigrate to the U.S. and therefore not observed in the community of origin? I wonder what differences would be found, if any, if the fieldwork had been conducted by following migrants back to Mexico even if they did not return to their home community.

Mexican return migration is an area of study that has recently received increased attention. It is expected to increase, partially due to U.S. President Donald Trump's threats of mass deportations. But enforcement is by no means a new phenomenon. Deportations reached a peak during Obama's administration, and it is uncertain how immigration policy will unfold after January 2017. However, the mechanisms explored and analyzed in Rothstein's book shed light on the mechanisms behind these issues. For example, I would expect social networks and social capital to continue to be key for migrants in coping with a likely adverse context in the U.S. and reintegration into Mexico. The migration experience in the U.S., values and attitudes towards returnees, and gender relations and expectations, as well as the economic and political institutions, will define how returnees fare back home.

For future editions, I would suggest revising the citations and references. I detected a few mistakes due to my own pedantic egocentrism! There is a typo in my last name on page 9—it says Masferrar instead of Masferrer—and later in the same paragraph, the author makes a mistake by writing my name as Massey—it says “Massey and Roberts” when referencing a comment we made on the entrepreneurial shift of returnees (which is not necessarily central to the arguments of our article, either).

Mexicans on the Move: Migration and Return in Rural Mexico is a short book and a quick read that provides a good overview of emigration and return from a non-traditional community in Mexico. Scholars interested Mexico-U.S. migration or return migration in general will find it stimulating. Its price might deter some students from buying a hardcover edition, but I would definitely recommend submitting a request to the university library to purchase a copy if money is an issue.

References

- Masferrer, C., and B.R. Roberts. 2012. Going back home? Changing demography and geography of Mexican return migration. *Population Research and Policy Review* 31(4):465–96.
- . 2016. Return migration and community impacts in Mexico in an era of restrictions, in *Migration in an Era of Restriction and Recession*, edited by D.L. Leal and N.P. Rodriguez. Cham (Switzerland): Springer, p. 235–58.
- Medina, D., and C. Menjívar. 2015. The context of return migration: challenges of mixed-status families in Mexico's schools. *Ethnic and Racial Studies* 38(12):2123–39.
- Passel, J.S., D. Cohn, and A. Gonzalez-Barrera. 2012. Net migration from Mexico falls to zero, and perhaps less. Washington: Pew Research Center. <http://www.pewhispanic.org/2012/04/23/net-migration-from-mexico-falls-to-zero-and-perhaps-less/>
- Riosmena, F. 2004. Return versus settlement among undocumented Mexican migrants, 1980 to 1996, in *Crossing the Border: Research from the Mexican Migration Project*, edited by J. Durand and D. Massey. New York: Russell Sage Foundation, p. 265–80.
- Riosmena, F., and D. S. Massey. 2012. Pathways to El Norte: Origins, destinations, and characteristics of Mexican migrants to the United States. *International Migration Review* 46(1):3–36.
- Van Hook, J., and W. Zhang. 2011. Who stays? Who goes? Selective emigration among the foreign-born. *Population Research and Policy Review* 30(1):1–24.
- Villarreal, A. 2014. Explaining the decline in Mexico-US migration: The effect of the Great Recession. *Demography* 51(6):2203–28.
- Zúñiga, V., and E.T. Hamann. 2015. Going to a home you have never been to: The return migration of Mexican and American-Mexican children. *Children's Geographies* 13(6):643–55.

Handbook of the Life Course: Volume II

edited by Michael J. Shanahan, Jeylin T. Mortimer, and Monica Kirkpatrick Johnson

New York: Springer, 2016

ISBN: 978-3-319-20879-4

Hardcover, \$349, 720 pp.

Reviewed by Susan McDaniel

University of Lethbridge, Canada Research Chair (Tier 1) in Global Population and Life Course

By its very title, *Handbook of the Life Course: Volume II*, edited by three esteemed American life course scholars, shows how far life course perspectives (it must be plural) and research have come. Two volumes are needed to adequately cover the material. The editors assure readers in the opening paragraphs of this large book that it is not an update of Volume I of the *Handbook*, published in 2003, but a second volume which identifies new and emerging concepts, methods, and research and analytical strategies. They then clarify by adding that the two volumes indeed connect, but that the Volume II remit is more on issues of the future.

This title is part of Springer's Handbooks of Sociology and Social Research series. A doorstopper of a book at over 700 pages, it is divided neatly into five sections of approximately equal length: Foundations of life course studies and future research; Changing social contexts and life course patterns; Health and development through the life course; Life course research methodologies; and lastly, The life course and policy: Building the nexus.

Bynner's lead chapter outlines how life course studies emerged out of an interest in interdisciplinary understanding of human development. The approach—or, more properly, approaches—grew along with longitudinal data sources, with broadening foci on multiple life course domains. Childhood studies were initially the purview of life course studies, and then the focus changed to particular life stages such as adolescence, adulthood, and old age, generally analysed as separate. Early studies, according to Bynner, were hampered by attention to data collection and management, and thus on "...inadequately thought out scientific programs lacking hypotheses" (p. 28). For the most part, there was a neglect of analyses that extended across the whole of the life course, with some notable exceptions. Many early life course studies were regional, small studies with particular foci. Some, however, such as the Framingham study of heart disease, started in 1947, have resulted in significant insights and are still collecting data. Over time, countries and consortia of countries took initiatives to develop longitudinal data surveys, propelling life course studies substantially forward. Canada is mentioned as starting the Longitudinal Survey of Children and Youth in 1994–95 (now discontinued), as well as being the first country to undertake a longitudinal survey of immigrants (also now discontinued). With many longitudinal surveys available across countries, the foundations of growth in life course studies, according to Bynner, is built. He provides a helpful multi-page table summarizing the many surveys by country, including when they started, what the samples are, and what follow-up ages are included in each. This table could save life course researchers time in searching for data.

The section on foundations of the life course continues with three thoughtful essays, by Elder and George, Dannefer et al., and Mortimer and Moen. In sum, these essays encourage future life course research to focus on how birth cohorts create social change, as well as on joining cohort with spatial data (Elder and George), moving into social contexts beyond the "free-floating" individual (Dannefer et al.), and how age phases of life courses

have become increasingly differentiated. This section closes with a provocative essay by Hagestad and Dykstra, contrasting American and European life course studies; the latter focus more on macro-level issues, while the former focus on the micro.

The section on changing social contexts of the life course is perhaps the most engaging for sociology and population researchers. Here, there are eight chapters, on family heterogeneity, educational pathways, new institutional conflicts for young adults, cross-national changes in educational inequality, gendered life courses, military service and criminal justice (both particular U.S. issues, as the editors note in their introduction), and disasters. The chapters together offer rich insights on what we know about the life course in rapidly changing social domains, and what is yet needed to be known. For example, it is understood that family life disruptions, at least in the U.S., are more likely among lower-income, less-educated families (Hofferth and Goldscheider). Much more research is needed about the consequences and, perhaps, interactions of cumulative exposures to different family types and the historical/biographical intersections at which these transitions occur. A 22-country comparative study (Blossfeld et al.) of educational inequality asks who benefits most from educational expansion and how intergenerational transmission of parents' education conveys advantages or disadvantages. Disasters are particularly to be noted (DeWaard), given their potential to dramatically alter human life courses, yet little research has been done so far on life courses and disasters. So much more is yet to be known.

Section III addresses health and human development, with seven chapters on early childhood poverty effects on health, adult health and social change, education and health, aging, and mental health. This, too, is a section of immense interest to demographers and sociologists. The 'long arm of childhood' is explored by Hayward and Sheehan, for example, revealing that not all childhood experiences are reflected in adult health, but they can be nuanced by ethnicity and timing, to name just two factors. These authors emphasize that the social precursors to health need to be examined with attention to cohort differences. Avison outlines the fruitful intellectual cross-fertilization of sociology of mental health with life course research, which since about 2000 has included insights into the longitudinal patterns of stressors, and the complex connections of stress over time to mental health. He urges continued study of the 'stress universe' as well as exploration of possible turning points that might redirect mental health trajectories. This is rich material indeed.

Section IV moves into the more practical, with attention to life course methods. This section of five chapters is hardly dull or dusty. Instead, consistent with the mandate of this volume, it introduces emerging and exciting approaches to doing life course research. Some might find it surprising, after all the discussion earlier in the volume about longitudinal data development, to find the opening chapter in the methods section to be on qualitative life course research. Hermanowicz has done long-term interview-based research on scientific careers. He shows that this methodology is well suited to understanding between and within cohort processes as well as social processes related to age. The challenge, of course, is that researchers must start this kind of project when they are very young. Other chapters on methods focus on the capacities of growth curve models (Macmillan and Furstenberg), on multi-generational research approaches (Thornberry), and on socio-spatial research (Browning et al.).

The last section of the *Handbook* looks at life course and policy as a fruitful nexus with six chapters. Bynner opened the first chapter in the book with an invocation of public relevance for life course research, given the significant investment that countries and research agencies have made in data collection. The authors in this section make the case of relevance for criminology, for disease trajectories, for social welfare policies and the understanding of risk, and for young lives in less-developed countries. Bynner's invocation is being heeded. In the last chapter, O'Rand and Bostic make the compelling point that life course studies should be placed front and centre in the context of global change. They propose dispensing with seeing life course in terms of age-gradation to seeing it in its huge complexity of the biological, social, and cognitive all occurring in the context of rapid global change and shifting inequalities, from birth to death. Thus, the life course becomes a "manifold cumulative phenomenon."

Handbook of the Life Course: Volume II could usefully sit on any life course researcher's desk—not on a shelf, because it is too useful. Each chapter offers rich and new insights into the adventure of life courses and life course research. It is not a book for undergraduates, but graduate students and researchers at all levels could beneficially dip into the book again and again for inspiration and guidance.

If there is a weakness in this edited volume, it is its predilection for American research in both focus and choice of chapter authors, though the first substantive chapter and the penultimate chapter are authored by non-Americans who are well-known life course researchers. And there is a smattering of European perspectives among the 32 chapters, as well as one chapter authored by a Canadian. But the overall tenor is overwhelmingly American. In particular, there is only a hint of the treasure trove of Asian research and data on the life course. This misses a good deal of the social and cultural contexts in which life courses are shaped and lived. Thus, a *Volume III* might be a good idea.

Handbook of Research on Gender and Economic Life

edited by Deborah M. Figart, Tonia L. Marnecke

Cheltenham (UK): Edward Elgar, 2013

ISBN 978-0-78254-749-5

Hardcover \$70, 592 pp.

Reviewed by Lorna Marsden
York University

This volume has all the best features of a true handbook. Besides being well organized and well edited, it explains its subject—feminist economics in the context of neoclassical economics—in detail, in its important elements, and from a variety of approaches. Work on this subject has been going on for some time, as the book documents, but economics has been far behind anthropology, demography, sociology, and history in incorporating feminist evidence and theory in its work. The dominance of neoclassical economics has been so powerful that alternative explanations advanced by Marxists or institutionalists have been sidelined, particularly in the USA. As Drucilla Barker says in chapter 2, “For most economists and lay people, neoclassical economics *is* economics.” Those arguing for the larger view—and doing so with evidence and the *scientific standards* claimed by neoclassical economists—have been ignored or dismissed. Yet a look at the lives of women in any period and any culture should cause them to expand, rather than assume away, the explanations of economic differences.

Feminist economics sets out to explain the realities beyond the principles of self-interested individualism in contractual exchange by looking at what has been assumed away—social hierarchies of gender, race, ethnicity, and sexuality, for example—and the unexamined masculinist values “deeply embedded in both theoretical and empirical economic scholarship” (p. 19). These ideas are explored at length in more than one chapter as are the challenges faced by those men and women who are developing feminist economics. Barker points out that the work of feminist economists “inherits the scientific prestige of economics and, to a certain extent, questions the methodologies that accord it its status as a science.” This, she argues, is the biggest challenge to feminist economists: to “both transform the discipline and work within it.”

This problem is not unique to economics, but the recent outrage in the US over Piketty’s methods in his *Capitalism in the 21st Century* is testimony to the blind tenacity with which many neoclassical economists cling to their mathematical modelling rock. After all, feminist history is well advanced, and so are anthropology, sociology, and even political science in incorporating the evidence of class, power, and gender in their research methods, as well as theories. Economists who read only their own journals will be startled by the changes sweeping around them, and are well advised to both read this volume and assign some of these chapters to their students.

The first two chapters deal extensively with the origins and theoretical basis of feminist economics and the methods involved. The remaining sections are organized according to the dominant areas in the field, such as institutional contexts, labour economics, public policy in both macro- and microeconomic terms, and human resources. In her Introduction, Marilyn Power situates the rise of feminist economics in the “revived women’s movement” at the end of the 1960s, which was institutionalized in the founding of the International Association for Feminist Economics (IAFE) in 1992 and the journal *Feminist Economics* in 1995. Indeed, that period of women’s history and those events are important. After all, very few economists explained their research findings in terms of the social provisioning approach used in most of this volume, although concepts of livelihood, making a living, and other ideas had been discussed by sociologists and others for many years. For women in

economics with feminist approaches who wanted to retain and advance in their university academic positions, however, it has been a tough slog.

There are 50 different authors in 33 chapters, and significant bibliographies attached to each chapter. While the authors are largely from or educated in the USA (24 of the 50 by my calculation), others come from the UK, a wide range of other European countries, Australia, South Africa, and Canada. As one might expect in this field, 47 of the authors are women; the three men come from the US, the UK, and Europe. The six Canadian women authors range from a professor and CRC chair holder and a doctoral candidate in sociology at UBC to a professor and CIHR Chair in the Faculty of Medicine and a medical student at the University of Calgary, to a dietician and senior research associate with the University of Alberta, and an economist and professor of environmental studies at York University. The background of these and other authors is extraordinarily rich in field experience, and some of the authors—including a former employee of Statistics Canada—are now working in international agencies. Most are well published, and several are closely associated with the IAFE.

Economists and other social scientists will want to keep this volume on their shelves for reference and to assist their students.

Determinants of Indigenous Peoples' Health in Canada: Beyond the Social

edited by Margo Greenwood, Sarah de Leeuw,
Nicole Marie Lindsay and Charlotte Reading

Toronto: Canadian Scholars, 2015

ISBN 978-1-55130-732-9

Softcover \$54.95, 291 pp.

Reviewed by Hannah Tait Neufeld

Department of Family Relations and Applied Nutrition, University of Guelph

In May 2012, Canada and other United Nations member states endorsed the *Rio Political Declaration on Social Determinants of Health*, which set out actions to address health inequities. Consistent with its commitment, Canada has pledged to invest in existing evidence-based health and social supports, while addressing challenges associated with outstanding inequalities such as Indigenous peoples' health (PHAC 2013). As discussed in the introduction of this timely edited collection, social determinants of health (SDoH) have historically acknowledged the need for an exploration beyond the individualistic, biomedical approaches to health that have dominated mainstream medicine and public health for many years (Commission on Social Determinants of Health 2008; Marmot 2005; Raphael 2009). The body of literature that has emerged in this area of research during the past decade has made it possible and necessary, I would argue, to investigate the complexities of health inequities that continue to exist for Indigenous peoples relative to majority population groups (Richmond and Ross 2009; Loppie Reading and Wien 2009; Adelson 2005). Previous SDoH approaches applied to Indigenous groups have not consistently addressed colonialism as one of the core determinants associated with the myriad of health disparities that persist (Gracey and King 2009). This edited collection proposes an evolution of the social. Chapter contributors integrate a broader perspective, with the incorporation of *Indigenous Knowledge* as a frame of reference towards a deeper understanding of current realities. The majority of perspectives presented are at the same time uniquely Indigenous, to allow for a reconceptualization of how the health of Indigenous peoples is determined in Canada.

The book is divided into four sections, with the first five chapters setting the context for a complex discussion of the unique dimensions of Indigenous health. Senior scholars such as Charlotte Loppie and Marlene Brant Castellano contribute their voices to the first part of the book. Dr. Loppie employs the eloquent metaphor of a tree's roots to represent the structural determinants or foundations from which the more visible determinants evolve. Rounding out this first section of the book are the holistic perspectives and dimensions of Indigenous knowledge systems described by Mi'kmaw Elders Murdena and Albert Marshall, in collaboration with Cheryl Bartlett. They present the concept of *Two-Eyed Seeing* as a guiding principle for bringing together Indigenous and Western worldviews, in order to expand perspectives and bring about balance and further understanding. Shirley Tagalik uniquely conveys an Inuit point of view in her chapter on knowledge systems. Like Dr. Brant Castellano, she advocates for spiritual harmony and healing by approaching health from a more interconnected and holistic outlook associated with Indigenous knowledge systems.

Locations and land form a central path beyond the social in part 2. Esteemed scholars Chantelle Richmond, Sarah de Leeuw, and Tribal Chief Terry Teegee describe and give examples of the relationships Indigenous

peoples have with their Territories, and how the land is an integral determinant of health. These authors build on the concept that health is a holistic phenomenon in their assertion that place is as fundamental to health as it is to cultural identity, and to self-determination in the re-possession of lands and resources. Authors of the three other chapters included in this section broach and bring unique perspectives to the critical topics of child health, youth suicide, and gender roles in Indigenous communities. In their chapter, Margo Greenwood and Elizabeth Jones build on the concept of control in the decolonization of early childhood education. Chandler and Dunlop similarly suggest advancing the resurgence of cultural practices and preservation of language as fundamental determinants to address in suicide prevention at a community level. Sarah Hunt advocates the restoration of diverse gender roles towards building more accepting, non-violent and therefore healthy environments through processes of decolonization.

The third and fourth sections of the book do a remarkable job of profiling examples of health and wellness among Indigenous peoples, both at a community level and in individualized medical practice. Indigenous scholar and Cree speaker Madeleine Dion Stout leads this conversation with the assertion that health determinants must be conceived as less mechanistic, and take into account the diversity of Indigenous languages, histories, imagination, experience, and knowledge. Distinctively personal Indigenous perspectives shared by other authors in part 3 provide justification for political responsibility in overcoming economic issues. Warner Adam, Karen Issac, and Katheen Jamieson recommend changes to policies across jurisdictions, to ensure preventative programming is delivered in collaborative partnership with Indigenous communities. The Blue Quills First Nations College's training program for Indigenous healthcare providers is profiled as a shining example by Steinhauer and Lamouche, as an act of sovereignty, resistance, and healing.

Overall, the chapters that stand out as part of this diverse anthology are those that contain personal perspectives and experiences with the healthcare system. Each of the chapters in part 4 bring to life, for example, the challenges and barriers that an Indigenous physician faces when tasked with honouring often divergent world-views. Drs. James Makokis, Nadine Caron, and Daniele Behn-Smith, in collaboration with Patricia Makokis and Leah May Walker, do a masterful job as storytellers struggling to bridge these boundaries. Other distinctive components of the book are the poems of Marilyn Iwama and Charles Peter Heit, along with the stories of Roberta Kennedy, Richard Van Camp, and Brenda Macdougall. Their words open a window into aspects of existence, knowledge, memory, identity, and humour that are not often found in academic collections. In unison, these are the images that further illuminate the realities of Indigenous peoples' health, far beyond the social determinants.

References

- Adelson, N. 2005. The embodiment of inequality: Health disparities in Aboriginal Canada. *Canadian Journal of Public Health* 96:S45–S61.
- Commission on Social Determinants of Health. 2008. *Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health: Commission on Social Determinants of Health Final Report*. Geneva: World Health Organization.
- Gracey, M., and M. King. 2009. Indigenous health, part 1: determinants and disease patterns. *The Lancet* 374(9683):65–75.
- Loppie Reading, C., and F. Wien. 2009. *Health Inequalities and Social Determinants of Aboriginal Peoples' Health*. Prince George: National Collaborating Centre for Aboriginal Peoples' Health.
- Marmot, M. 2005. Social determinants of health inequalities. *The Lancet* 365:1099–04.
- PHAC. 2013. *Rio Political Declaration on Social Determinants of Health: A selection of Canadian actions*. Ottawa: Public Health Agency of Canada.
- Raphael, D. (ed.). 2009. *Social Determinants of Health: Canadian Perspectives*. 2nd edn. Toronto: Canadian Scholars.
- Richmond, C., and N.A. Ross. 2009. The determinants of First Nation and Inuit health: A critical population health approach. *Health & Place* 15: 403–11.

Toward a Small Family Ethic: How Overpopulation and Climate Change Are Affecting the Morality of Procreation

by Travis N. Rieder

New York: Springer, 2016

Springer Briefs in Public Health Ethics Series

ISBN: 978-3-319-33871-2

Softcover US\$54.99, 78 pp.

Reviewed by Johanne Sanschagrin
Office of the Auditor General of Canada

Travis Rieder's *Toward a Small Family Ethic* is a concise and significant contribution to a series on critical dilemmas in population health. It is primarily aimed at scholars in public health programs but has relevance to other disciplines such as demography, environmental sciences, ethics, biology, geography, and international studies. Its core topic is not completely new—it joins a considerable literature on environment and overpopulation—but the book and its arguments extend the horizon to climate change at large, which is rather brave. The approach has the potential to enliven debates in all these disciplines. The author is Assistant Director for Education Initiatives at the Berman Institute, and Program Director for the Master of Bioethics degree program at Johns Hopkins in Baltimore.

Rieder's book is divided into five tightly argued chapters that build the case for a “small-family ethic.” The hyphen missing from the title is an unhappy typographical lapse; the book is not at all about a “small ethic.” Although there may not be dramatic surprises in the text—Rieder declares up front that he will argue in favour of small families against the alternatives—this does not diminish the persuasiveness of the entire book, not at all. In fact, each chapter constructs distinct layers of questions and arguments on the debates over procreation. Should we procreate at all, should we only allow one child per couple, should we reproduce up to the replacement level, and what about those who pass the threshold of two children? These are among the crucial and urgent questions under debate.

The book begins with the provocative statement that “there are too many people on Earth, together emitting far too much GHG much too quickly,” and that climate change is indeed occurring. But this is merely his starting point; the provocation itself is no longer the debate, and the book is neither about climate change nor about demography. Rieder's thesis is that overpopulation is itself a major driver of both climate change and resource scarcity, and that climate change is an urgent problem that needs to be dealt with urgently. Reducing overpopulation is an imperative. The strategy adopted in the remainder of the book is a passionate search of what might be our moral responsibility toward procreation in the light of an urgent public health crisis—global overpopulation.

In the second chapter, the author connects individual deeds to collective effects, asserting that individual actions such as procreative behaviour have significant effects on global problems, notably climate change. A single birth might seem to have an almost imperceptible consequence for global climate change, but Rieder argues that this would still not take a parent off the “moral hook” for that procreative behaviour. From his position as a bioethicist, global problems such as overpopulation and climate change nevertheless do generate individual obligations.

The nature of this moral hook is explored in the third chapter through three moral principles: the duty not to contribute to harm, the duty of justice, and the obligation to future children. Each principle points toward a specific reproductive outcome. For Rieder there is a clear and overarching justification to push for small families. His moral principles oblige all of us to not reproduce over past replacement levels.

Rieder does not shy away from opposing positions. In chapter 4 he offers arguments in favour of procreation without such constraint; that is, that an obligation to not procreate would threaten our integrity as moral agents. However, if an obligation to have no more than one child would maintain our integrity as moral agent, more generous procreative freedom would be more difficult to defend from a moral standpoint. Overall, the arguments in favour of procreation are weak; the author even seems to run out of arguments there, leading me to ask if it makes any difference to the arguments that the author is a male, not a mother, and that he has only one child. While it is true that prospective parents have the right to decide the number of their children, their spacing and the method of bringing them into the world, our procreative liberties are also limited by the interests of others.

In his summation, the author explores what other moral constructs may have to say about procreative behaviours. Green virtues, moral reasons, meaning and blame — all point toward a moral burden to live with (and in) small families. This perspective entails procreation-limiting obligations. As the author says, one might have *procreative rights*, but this does not mean that one is actually *acting rightly*. Overall, there are very compelling reasons to limit procreation, while there might not be as many good reasons to ignore those limits; furthermore, such “rights” seems to diminish as one has more children. As a result, we are left with a moral burden to have small families.

Though the book is brief, readers will benefit from the time taken to read and consider its arguments carefully. The text covers a wide range of arguments in the debate over procreation. In that sense the book might even be helpful for those who want to weigh their decision about procreation most thoughtfully, not just intellectually but personally “Family” is a serious decision at every scale.

Violence, Statistics, and the Politics of Accounting for the Dead

edited by Marc-Antoine Pérouse de Montclos, Elizabeth Minor, and Samrat Sinha
Cham (Switzerland): Springer 2016
Demographic Transformation and Socio-Economic Development Series
ISBN 978-3-319-12035-5
Hardcover \$129, 143 pp.

Reviewed by Johanne Sanschagrin
Office of the Auditor General of Canada

The subject: excess mortality resulting from mass violence. I knew when I started reading this book that I would need to be cautious about the tenor of its review. The topic is quite literally life-and-death and demands great care on several accounts. Beyond numerical indicators, deaths in conflict carry meanings that are not adequately conveyed by statistics. The subject encompasses the very substance of life. In this book, edited by Pérouse de Montclos et al., ten authors share their thematic analyses, historical accounts, and case studies on a particular kind of excess mortality, addressing a noticeable gap in the literature on population studies. The texts inherit the venerable tradition of “bearing witness,” the work of the International Practitioner Network of casualty recording organizations, and the campaign “Every Casualty Worldwide.”

The book starts with a text from Gates et al. and the argument that excess mortality (i.e., the rate of premature deaths in a given population) is an essential indicator to development studies. Looking at numbers of battle-related deaths and civilian casualties, the authors show in their piece that excess mortality and development are interrelated. This might not come as a surprise, since armed conflicts bring major disruptions, with destruction, civilian casualties, reduction of national revenues, and often diversion of expenditures from education and health. Perhaps countries where bloodshed has occurred tend to be among the less well developed, but this is a contentious topic.

Counting the bodies might seem a simple task at first sight, but Pérouse de Montclos, who sets the tone of the book with his introduction, a core piece, and the conclusion, demonstrates the difficulties in situations of mass violence. Only four main sources of information are available to accomplish this task (pre- and post-conflict censuses, ex-post victimization surveys, press reports on violence, and investigations of individual deaths), and none of these are complete or fully reliable. Reporting deaths is also prone to political manipulation, where numbers are conveniently altered to declare or finish a war, to require or deny humanitarian aid, or to justify or dissuade peacekeeping intervention. To add to the difficulty, excess mortality is also subject to propaganda, where the number of casualties is used to “frame the narratives of insecurity, the poverty trap and the ‘curse’ of failed states in comparison to developed countries” (p. 3).

Accounting for conflict deaths occupies a contested terrain where neutrality is essential to preserve credibility. Isabelle Vonèche-Cardia provides a valuable piece on the International Committee of the Red Cross and its pioneer work in tracing missing persons and documenting the circumstances of deaths. We learn, for instance, that the organization was instrumental in tracing the military with soldiers’ identity tags. Beginning from its work on tracing wounded soldiers and then war prisoners, the organization extended its work to civilians. However, the Red Cross did not take on the business of counting deaths, and the lack of a single international organization doing this work has proven problematic. These issues and others set the stage for the second part of the book, which comprises a set of case studies and conclusions.

The book presents three separate case studies of casualty-recording practitioners. Dodd and Perkins present the NGO Action on Armed Violence—a non-governmental organization working to reduce the incidence of harm of armed violence around the world—to illustrate the importance of counting the casualties, especially for civilian deaths that are insufficiently documented. It uses English-language news reports from around the world to record the casualties and to document their context (e.g., time, location, and weapon used), enabling it to provide incident-based monitoring, which is useful to track patterns and weapons to alert the public and decision-makers so humanitarian help can be best provided.

In the second case study, Samrat Sinha describes the use of local newspapers in the region of Manipur, India (2008–09) to measure the burden of conflict at the micro-level. A structured database makes it possible to track insurgency events and identify the agents of the conflict. However, local newspapers have inherent limitations. They do not document everything; the injured are underreported and remote areas are not always covered. In practice, violent civil strife poses serious difficulties for reporting and for the protection of non-combatant observers.

In the final case study, Igor Roginek shows how questionnaires and interviews documented human losses in the war in Croatia (1991–95). He illustrates how important it is to rigorously document deaths, their circumstances and locations, and to enable the mourning process. Furthermore, it is crucial to resolve the debate on responsibilities for the deaths, to initiate the reconciliation process, and ultimately to prosecute war criminals.

The book is a vital contribution for anyone involved beyond the numbers in this particularly difficult kind of excess mortality. It offers essential insights on the complexity and the difficulties of the task. It demonstrates repeatedly that the body count of the victims of violence is not only a statistic but decisive evidence for understanding and preventing violent conflicts, for peace-making processes, for mourning human losses, and for prosecuting criminals. The book performs a notable service in documenting methodologies to measure and evaluate this special kind of excess mortality within the realm of population studies.

Even so, it demonstrates that methodologies for counting the deaths from mass violence are not yet standardized. The reliability of the account often depends on the particular purpose of the particular effort. Scientific detachment meets long-lost cousin: scientific engagement. This book cannot be ignored by those engaged directly in this work and by those dealing with its consequences.

Social Statistics and Ethnic Diversity: Cross-national Perspectives in Classifications and Identity Politics

edited by Patrick Simon, Victor Piché, and Amélie A. Gagnon

New York: Springer, 2015

ISBN: 978-3-319-20094-1

Hardcover \$59.99, 244 pp.

Reviewed by Margot Almond
Unaffiliated researcher (ret.)

The topic of ethnicity is a hot topic in public debate. Countries around the world are increasingly affected by cultural pluralism, as a result of trends such as rising demands for recognition by indigenous groups, new waves of immigration and refugee flows, and the post-colonial maturation of societies. It is no coincidence that issues around the measurement of ethnicity, and the impact of the policy discourse on how we measure it, are also emerging on the scientific radar screen.

This 12-chapter volume addresses some very topical issues in the measurement of ethnicity. The editors set out to address both how countries measure ethnic identity as well as why they measure it, and what factors affect the debate on measurement. The various articles in the book refer to a diverse set of concepts, including ethnic identity, ethnic ancestry, race, language, and religion. The book is largely composed of case studies of individual countries, provinces, or indigenous groups, preceded by two chapters of multi-national analyses. In that sense, the two approaches complement each other well, offering both macro and micro perspectives on the same issue.

This volume draws heavily on the “International Conference on Social Statistics and Ethnic Diversity: Should We Count, How Should We Count and Why?” held in 2007. Most of the articles are reworked versions of papers presented at the conference, some of which were subsequently published in various journals.

The writers are from around the world, most of them based in the country they are writing about, obviously contributing to their insights into the politics of the statistical debates, which span many decades. The nine case studies include countries in the Americas, Asia, and Europe, but oddly none in Africa, even though chapter 2 notes that at least eight African countries use some sort of ethnic measurement (p. 22).

The introductory chapter by the three editors very capably situates the book in context, and provides some of the theoretical underpinnings taken from earlier work. The two multi-national chapters explore completely different topics, with the first, by Ann Morning, being a survey of the ethnicity measurement practices of a sample of 138 nations. This covers the first theme of the book, which is “who” gets counted. One of the interesting aspects explored in this book is the fact that what we do *not* measure can say as much about a society as what we *do* measure. The typology of data collection regimes has a category for the large number of nations which do not measure ethnicity (35 per cent, according to Morning¹). Several chapters discuss how nations opted NOT to count, or to count but not to publish, ethnicity data.

The second multi-national survey is by Kukutai and Thompson, and uses regression techniques to examine the second theme of the book, which is “why” we count. This chapter examines a series of internal variables (including ethnic claims, immigration, post-colonial sovereignty) and external factors (such as support for human rights instruments) to examine how the political environment influences the measurement of ethnicity.

1. Chapter 2, page 17.

This volume builds on earlier work by Simon and Piché, including *Accounting for Ethnic and Racial Diversity: The Challenge of Enumeration* (2013). For example, the multi-national surveys on how and why countries measure ethnicity are now global in scope.

Although the influence of sociopolitical discussion on ethnicity measurement is explored in depth, the reverse—the influence of ethnic measurement and resulting statistics on the political conversation—is surprisingly only briefly mentioned by a few authors. For example, Piché argues that the introduction of the term “allophone” started a new political discourse that continues even today (p. 92). Thompson observes that joining the European Union significantly affected ethnicity measurement in Britain (p. 133), which might suggest to the reader that Britain exiting the EU will also have an impact. Perhaps this reverse impact will be the subject of a future work.

Chapters 4 to 7 are case studies dealing with the influence of the socio-political debates on how states measure ethnicity. Simon offers an interesting set of observations on the various arguments against ethnicity measurement that are part of the ongoing debate in France. The continued evolution of ethnicity statistics over a long period of time confirms that this is an issue to be watched in the future. The chapter on Britain by Debra Thompson offers some unique and fascinating behind-the-scenes insight into the decision making on question design at the most senior political levels.

The third part of the book consists of five case studies focusing on the interplay between competing identities and statistics. Three of those studies devote significant attention to the impact of the socio-political environments on statistics, and offer some very interesting insights. The Uruguayan case study² is unique in that it is the only case study of a country where “racial identities are not frequently activated in everyday life” (p. 179), which might erroneously lead one to believe that there might be less social debate over such topics, and therefore less attention to ethnicity measurement. However this chapter, along with the chapter on the explosion in Aboriginal populations in Canada,³ both point out the impact of rising self-awareness of ethnic identity amongst indigenous populations. In addition, the Belgian case study⁴ emphasizes the impact of changing laws on Belgian citizenship on the counts of Belgian nationals; however, it does not go the extra step of examining the impact of the resulting data on the political debate.

The Malaysian case study⁵ is interesting in that it breaks from the norm and delves into the different definitions used in various government surveys, and how each of these constructs produces different statistical outcomes.

Although this volume deals with a somewhat subjective area for survey respondents, the topic of respondent confusion was not often discussed. For example, Debra Thompson made some interesting points about confusion among respondents in British field trials (for example in relation to terms such as “British Asian” and “Black British”; p. 124), while Morning (p. 27) and Guimond et al. (p. 230) mention it in passing. This aspect of the interplay between social dynamics and social statistics would be worth further exploration.

With the political debates on ethnicity and immigration increasing in volume in the face of new waves of refugees in Europe, political campaigns in the USA, and rising awareness of ethnic identity, this book is very topical and is an interesting addition to any library.

Reference

Simon, P., and Piché, V. 2013. *Accounting for Ethnic and Racial Diversity: The Challenge of Enumeration*. New York: Routledge.

2. Chapter 9 on Uruguay, by Wanda Cabella and Rafael Porzecanski.

3. Chapter 12 on Aboriginal populations in Canada, by Éric Guimond, Norbert Robitaille, and Sacha Senecal.

4. Chapter 10 on Belgium, by Nicholas Perrin, Luc Dal, and Michel Poulain.

5. Chapter 8 on Malaysia, by Shyamala Nagaraj, Tey Nai-Peng, Ng Chiu-Wan, Lee Kiong-Hock, and Jean Pala.

The Washington State Census Board and Its Demographic Legacy

by David A. Swanson
New York: Springer, 2015
Springer Briefs in Population Studies
ISBN 978-3-319-25947-5
Softcover \$54.99, 94 pp.

Reviewed by Alison Yacyshyn
Faculty of Management, Concordia University of Edmonton

One might read the title of this book and think it would be of interest only to those who had connections with the Washington State Census Board; however, this book reveals links to the demographic community in the United States and around the world. In general, it provides the reader with historical knowledge of the field of demography in the United States that he or she may not be familiar with. As Al Swift states in the Foreword of the book, it traces how population figures were gathered, compared, and projected at a time when technology was changing and impacting the profession of demography. Without a doubt, anyone reading this book will come across at least one unique piece of information that they did not know.

In the Preface, Charles Hirschman notes that the book identifies the importance of the field of demography and its connection to government, businesses, and organizations that need information for planning the future. Indeed, the book is a case study of the 1940s and 1950s in Washington state and how demographic data and models impacted decision making there at a time of rapid population increase. In compiling material for the publication, the author acknowledges several people who contributed to this book, including the late Dr. Wayne McVey, a past editor of *Canadian Studies in Population* (p. xiii). Sidebars appear throughout the book—including one for Dr. Warren Kalbach, who is the namesake of the Society of Edmonton Demographers' annual population conference (p. 24)—these extend the impact of the international connections and add personal details that connect the reader to the material. Even the rationale for renaming the Office of Population Research at the University of Washington in the late 1960s to the Center for Studies in Demography and Ecology (CSDE), provides context to today's reader. The CSDE continues to make an impact on the field, and updates to this book will be necessary down the road.

The book is a brief snapshot of time and contains five chapters, each containing key references. The first chapter (Overview) discusses the rapid growth of Washington State during WWI, and the beginnings of the Washington State Census Board. The second chapter (The Washington State Census Board, 1943–67) focuses on the history of the board and its activities. The third chapter (The Demographic Legacy) focuses on when the board was abolished in 1967, and its functions as it moved to a state agency. The fourth chapter (Impacts Beyond Washington State) spotlights Dr. Calvin Schmid's students, and the impacts they had and continue to have. In the fifth chapter, which is only four pages in length (The Emergency that Never Went Away), the author returns the book to its starting point and discusses why the functions of the board continue today. In the last two sentences of the book, the author notes that, "The work of the Board and its successors has touched the life of virtually every one of Washington's residents since 1943. In the process, the State Census Board left a demographic legacy that extends even beyond the borders of Washington, one in large part due to the efforts and vision of a single person, Dr. Calvin F. Schmid" (p. 80). Given the material presented in the seventy-nine pages, the reader is inclined to concur with the author and appreciate the significance of the statement.

The book ends with a condensed technical appendix, including key demographic methods: Population Estimates (distinguishing the difference between estimates, projections, and forecasts), the Housing Unit Method (HUM), the Censal Ratio Method, the Ratio-Correlation Method, the Component Methods, Component Methods II, and the Cohort-Component Method. The references in this section are particularly useful for identifying seminal demographic resources, such as *The Methods and Materials of Demography* and *Demographics: A Casebook for Business and Government*, for example.

The book is downloadable in PDF format online and can be purchased as a paperback book. The downside of the paperback copy is that the website links are long and not easy to transcribe if one wants to type them on their computer or tablet. Some colours used in the graphs are difficult to differentiate; however, one can get the essence of the discussion in the text portion.

By the end of this book, any demographer or general reader will feel somehow connected to it, if not by the fascinating stories about the people mentioned, then by the technological or methodological advancements that have taken place. The author does an excellent job in guiding the reader (and particularly those in the profession) through an important historical period for demography. The book is appropriate for higher-level demography courses and interest reading. It is apparent that the author worked meticulously on gathering information that will go on record as an important piece of demographic history.

Handbook of Palaeodemography

by Isabelle Séguy and Luc Buchet

translated by Roger Depledge

New York: Springer 2013

INED Population Studies Series

Original French edition Paris: INED 2011

ISBN 978-3-319-01552-1

Hardcover \$129, 351 pp.

Reviewed by Helena Fracchia

Department of History and Classics, University of Alberta

The *Handbook of Palaeodemography* by I. Séguy (archaeologist and historical demographer) and L. Buchet (historian and anthropologist), with contributions by D. Courgeau (migration modeling and methodology/epistemology of the social sciences) and H. Caussinus (statistician) is ambitious in its scope and stimulating in its presentation. The book is the 2nd volume of France's National Institute for Demographic Studies (INED, Paris) Population Studies series and is part of a long-term research initiative supported by that Institute.

The purpose of this manual is to illustrate how bone remains can be interpreted in demographic terms. The authors and contributors examine various methods for linking osteoarchaeological evidence with historical records for climatic change, for epidemics, etc., with written records from parishes and other archival sources, and with environmental sources to carry out this highly collaborative interdisciplinary research in order to construct models that plausibly shed as much light as possible on living conditions of past populations. As the authors themselves say, before such diverse data can be correlated, it is essential to understand thoroughly all the sources. In this volume, the emphasis is on skeletal material. This type of approach obviously generates a great deal of controversy, debate, and, indeed, error.

What exactly is palaeodemography? F. Héron, a past INED director, in his preface aptly entitled "At the crossroads of demography and archaeology," provides a succinct definition: "Palaeodemography...is no more than demographic analysis for population historians who want to use archaeological evidence." He further explains that palaeodemographers examine buried skeletons, so some of their techniques are like those of the forensic scientist but the objectives are quite different. The forensic scientist wants to identify the age of an individual, whereas the demographer is more focused on age-sex structure of a population and seeks to outline the general dynamics of a population and, in particular, the odds of survival at given ages. The authors themselves opt for a collective and probabilistic strategy for estimating the distribution of the ages at death of a population. It is critical and highly commendable that the authors do not attempt to standardize the buried populations at all costs, which would make everything equal to everything else. Instead, demographic differences caused by migration, or social differences (e.g., aristocratic membership in religious communities), or selective burial practices are addressed and discussed.

But how do palaeodemographers reconstruct a credible distribution of ages at death from the bone remains of a buried population, a population which is never completely representative of the "burying" population? This is the crux of the volume, and the organization of the argument guides the reader through the maze. The

Introduction provides an overview of the state of the discipline and an outline of the development of palaeodemography. Part I, “The Data of Interest,” contains chapters on the epistemology of the discipline (representativeness, small samples, migration, age issues, osteological data, and reference populations). How reference populations are established, including the question marks that remain in terms of estimating age at death for infants and for adolescents, are all honestly addressed in this portion of the book. Part II, “Reconstructing the Demographic Parameters,” addresses age at death and compares two specific methods, the Probability Vector and the “Estimator” method, as well as providing a review of current demographic population models and model life tables for pre-Industrial populations. A useful discussion on the constraints to be included in models, and a full discussion of the problems in modeling, is particularly important. This portion of the book ends with a definition and exploration of a pre-industrial standard. Part III, “Developing a Study Protocol,” offers a complete study protocol—an assessment of the usefulness of the study, a choice of methodology, a discussion of why and how to estimate the collective age at death of a buried population, and lastly, examples from four sites of the actual applications. Part IV, “Further Analysis,” is written by the two contributors, tying the entire book together. An extremely interesting, balanced historical overview and critique of current methods provides an excellent background to the innovative methodology based on the collective age at death for a buried population. This is certainly the most technical portion of the book, but the methodological innovation will, in time and with use, certainly become an indispensable reference tool. Demographers, archaeologists, social anthropologists, and ethnologists, as well as scholars working in the various aspects of cultural reconstructions, will find the statistical simulations, various models, and tables extremely useful in assessing the viability and validity of the new methodology. The authors of this handbook are to be complimented for their honesty in presentation, and their discussions of the problems in age determination of certain segments of the population, and of modeling in general, are excellent.

On the one hand, various portions of the book should be required reading for all interested parties and students of past populations and their reconstruction. For example, the Preface by Héron, the Introduction, and Parts I and III are of general interest and readily comprehensible to non-specialists. Nonetheless, the book as a whole is not an “easy read,” especially Parts II and IV, which by necessity are the most technical portions of the handbook.

The case study sites are all in France, where certain historic reasons—including the very existence of the INED, which was founded in 1945 to replace a foundation created by the (Nazi client) Vichy government in 1941—determined that numerous cemeteries were excavated extensively, more so than in other Mediterranean countries. Two of the case study cemeteries in northwest France, one urban and one rural, were of the 4th c. A.D. and had only biological material to study. Two other sites, one a monastic cemetery near Paris and the other the urban cemetery at Antibes (a small port and garrison town), date from the 17th through late 19th century, with both biological and statistical information available. The discussion of these sites breathes life into the statistical analyses and the discussion of modeling presented in the book.

As this volume documents, France is in the forefront of all the other Mediterranean countries in terms of paleodemographic studies. While the manual concentrates deliberately on the historical periods of Western Europe, it can only be hoped that such sites as Pontecagno (Salerno, Italy)—with 9,000 Etruscan, Greek, and indigenous tombs dating from the early Iron Age to the 3rd c. BCE—and various cemeteries in Spain—Cordoba, Bolonia, and Castulo come to mind, all with mixed populations of indigenous peoples, Romans, and Phoenicians—will eventually be tested using the newly proposed methodology. The epigraphic evidence from the Roman cemeteries would be very interesting to compare with the osteological dating of the skeletons. In testing other sites, the newly proposed methodology, based on collective age at death for various ethnicities living and working in the same city/area, will establish the validity of the methodology, and hopefully, in this way it will eventually become a standard tool for researchers.

Clearly, palaeodemography is a discipline in continual evolution. A greater number of case studies from a wider geographical area that use the method proposed by the authors will provide necessary controls, eventual

validation, and refinement for future palaeodemographic studies. It is critical that analyses of bone remains that are used by palaeodemographers can “talk” to one another, so developing a standardized protocol for such studies is essential for the full potential of the discipline. The authors of the Handbook of Palaeodemography have provided an excellent basis for future discussion and research. This is a manual done with honesty, with humility, and with great respect for the discipline.

Fundamentals of Demographic Analysis: Concepts, Measures, and Methods

by Gordon A. Carmichael
New York: Springer, 2016
ISBN 978-3-319-23254-6
Hardcover \$179, 394 pp.

Reviewed by Thomas K. Burch
University of Victoria

Not long ago there was a dearth of textbooks on techniques of demographic analysis. This is no longer the case, thanks to the publication of several new texts in recent years. Nonetheless, Carmichael's *Fundamentals of Demographic Analysis* is a welcome addition. A wide variety of texts on technical demography is useful because the subject is taught in so many different contexts—different departments, different programs, different levels. It's not likely that one size will fit all. But most of all this work is welcome because of its quality. Like most good texts, it has evolved, with early versions in course-note form used in different courses by different instructors. The book is comprehensive (with some exceptions noted below), thorough in its exposition, and extremely clearly written.

By the author's own account, the book is designed for an introductory course at the graduate level. In my view, it also could be used in an upper-division course for undergraduates, assuming some solid previous coursework on population studies. It makes use of no mathematics beyond secondary-school algebra (no calculus or linear algebra). This was based on the author's experience with students with a wide range of mathematical and statistical background, some with very little, something familiar to anyone who has taught demography in a sociology department. Carmichael speaks of "...my efforts to make demographic analysis more accessible to students with limited quantitative backgrounds, without being too pedestrian for those with greater mathematical aptitude" (p. vi). In my view, he has succeeded, although I have come to believe that the compromises come at a cost (see below).

In nine chapters, the book deals with: demographic data, standardization and decomposition, cohort/period, mortality, marriage, marital status and relationships, fertility, distribution, urbanization and migration, stable population theory, and population projections. There is an index of topics and names, and references at the end of each chapter.

An important omission: there is virtually no material on the demography of household, family, and kinship. Admittedly, the technical side of these topics is not highly developed, but there are several important measures and models. The Goodman/Kefitz/Pullum equations of kin numbers by type of kin come to mind as one of the most original contributions to formal demography in the last decades. (Absent a separate chapter, this model could easily have been included in a section on applications of stable population theory in chapter 8.) There is also a small body of material on the measurement of household/family size and composition, important for research on housing, consumer economics, old-age dependency, and many other topics.

Similarly, in the chapter on fertility, Carmichael devotes two and a half pages to the Coale-Trussell model. In the chapter on marriage, by contrast, there is no mention of the Coale-McNeil or Hernes models of first marriage, despite five or so pages on first marriage, and detailed presentations of nuptiality tables and Hajnal's singulate mean age at marriage (SMAM).

In his treatment of SMAM, Carmichael shows the common tendency in demographic texts to provide too many refinements and complications at the expense of a simple introduction of the basic concept. Using Bangladesh as the detailed example, he modifies the standard procedure to deal with marriages before age 10. Detailed data are given for ages up to 65+, although, as is correct, these are not used in the calculations, which deal with first marriages before age 50. The avoidance of mathematics comes into play here, since the relatively simple formulas for SMAM (using finite summation or the definite integral of proportion single by age) are not given, somewhat obscuring the basic idea of SMAM as an average measure of total person-years lived single by persons entering first marriages before a given age, divided by the proportion that eventually marries. His earlier treatments of real/ synthetic cohorts and of the concept of person-years had already laid the foundation for a ready understanding of the formula. The presentation of SMAM also omits any graph of the process/procedure. Along with the formula, such a diagram could give Carmichael's verbal explanation and computational recipe more clarity and force. But the focus is on an eight-step "recipe," that is, on a computational procedure (algorithm) rather than the basic idea underlying the algorithm.

In general, however, Carmichael makes effective use of graphs—for example, comprehensive graphs of all the main life-table functions (p. 174), or a somewhat novel age pyramid (pp. 8 ff), which uses shading to show excess males or females in each age interval, something not easily read from the garden-variety age pyramid.

The proper mathematical level for a demographic methods text is a difficult issue, on which there is considerable disagreement and variation in practice. Carmichael has chosen to make no reference to calculus or matrix algebra. As a result, a student of this work would not learn that population projections can be done using the Leslie matrix, or that the stable population theorem in demography is but a special case of some general theorems in linear algebra. The avoidance of calculus means the student never sees the basic equations underlying such concepts as exponential or logistic growth (discussed in the chapter on population projection). In each case, it is the differential equation that makes transparent the basic growth pattern: (a) growth as proportional to current population (exponential); and (b) proportional growth modified by a term showing the difference between current population and an assumed maximum population for a given environment (logistic). This text gives only the integral formulas, which do not directly reveal the underlying concepts.

More, and more up-to-date, information on computer resources for demographic calculations would also have been welcome, probably by many instructors as well as students. The author recommends the NCSS statistical package (over US\$350 for the academic license), but not R, for example, which is free. Nor does he mention that Excel or other readily available spreadsheets are well-suited to demographic analysis (the Excel Solver and Goal Seek add-ins can now do non-linear fits, such as the exponential or the logistic). To transform a five-year age distribution to single years, reference is to a mid-1940s set of actuarial tables. But modern software has given us better and more flexible ways to do this, using full-featured spreadsheets, or mainstream mathematics packages (R, Mathcad, Mathematica, Matlab, Maple, Derive, etc.), which provide a variety of built-in interpolation functions.

However, it's not entirely fair to compare Carmichael's text with an ideal or near-perfect introduction to demography, one that among other things would integrate technique and substantive theory, rather than treating them in separate courses and textbooks, as is the standard approach. But such a text exists only in my fantasies, and not in English so far as I am aware. His is a sturdy and readable work, to be recommended as a text or supplementary text in courses emphasizing demographic techniques, and as a handy reference for the working demographer or any serious analyst of human population.