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Is There a Cohort Explanation for Declines in Elderly Migration?

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Article

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Résumé

Des recherches antérieures ont mis en évidence le déclin marqué de la mobilité résidentielle des Canadiens âgés (65 ans et plus) depuis 1961. Nous avons examiné des données plus récentes issues des recensements de 2011 et 2016 pour mettre à jour les résultats et approfondir les recherches précédentes. Nous avons constaté que la mobilité résidentielle des personnes âgées a de nouveau diminué. Des baisses substantielles de 20 pour cent et plus ont été observées pour tous les types de mobilité résidentielle. Par ailleurs, l'analyse descriptive de l'évolution (1871 à aujourd'hui) de la proportion de la population vivant dans une province différente de celle à la naissance suggère que les cohortes nées entre 1906 et 1925 ont connu des taux de migration légèrement supérieurs à ceux des cohortes semblables qui ont suivi. Aussi, une analyse multivariée des données de migration interprovinciale de 1971 à 2016 montre que les cohortes nées entre 1906 et 1925, composées de jeunes adultes pendant la Seconde Guerre mondiale, ont présenté des taux de migration plus élevés que les cohortes antérieures ou postérieures. Le facteur associé à la cohorte a expliqué 10 pour cent de la diminution de la migration des personnes âgées entre 1981 et 2016. Cette approche par cohortes permet donc d'apporter une explication sur la diminution de la migration des personnes âgées, mais de nombreuses questions restent à explorer dans les recherches futures.

Abstract

Previous research documented a dramatic decline in the residential mobility of elderly Canadians (65 years and older) since 1961. We examine more recent data from the 2011 and 2016 censuses to update findings and extend previous research. We first found that elderly residential mobility has continued to decline. There were substantial declines of 20 per cent and more for all types of residential mobility. Second, descriptive analysis of changes over time in the proportion of the population that lives in a different province than their province of birth for 1871 to the present suggests that the 1906–1925 birth cohorts experienced migration rates that were slightly higher than comparable later cohorts. Third, multivariate analysis of 1971–2016 interprovincial migration data shows that the 1906–1925 birth cohort who entered early adult years during World War II had higher migration rates than earlier or later birth cohorts. The cohort explanation accounted for 10 per cent of the decrease in elderly migration between 1981 and 2016. A cohort explanation can therefore contribute to understanding decreased elderly migration, but many questions remain for future study.

Introduction

Demographers and other social scientists have been interested in Canada's internal migration or mobility for almost a century (Whiteley, 1932–33). In the early twentieth century, topics of great interest were the mass migration and settlement of the Prairies and the large movement from rural to urban areas. In recent decades, migration research has focused on the relationship of migration and employment (Greenwood, 1997), migration and housing (Myers, Pitkin, & Park, 2002), and differences in the internal migration of Canadian-born and foreign-born residents (Edmonston, 2011). Another topic of interest has been the dramatic decline in the geographic mobility of elderly Canadians (Edmonston & Lee, 2014; Northcott & Petruik, 2013). Studying patterns, changes over time, and determinants of the mobility of older Canadians has become increasingly important as the population ages. We review recent work on trends in elderly migration, possible explanations for decreasing mobility, and examine evidence for a cohort explanation for the recent declines.

Declines in Elderly Migration

Elderly Canadians are less mobile than younger adults (Edmonston, 2011, pp. 199–201). Nevertheless, older persons display moderate geographic mobility, with approximately one in

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Table 1. Mobility status of Canadian Population, 65 years of age and older, by sex and year, 1961–2016

			Movers				
Sex and Year	Sample Size	Non-Movers	All Movers	Local	Intraprovincial	Interprovincial	External
Females							
1961[a]	680,270	72.0%	28.0%	17.9%	7.4%	1.5%	1.2%
1971	9,439	68.1%	31.9%	20.0%	8.4%	1.7%	1.8%
1981	24,588	73.1%	26.9%	16.2%	7.4%	1.8%	1.5%
1986	28,483	77.5%	22.5%	13.6%	6.4%	1.4%	1.2%
1991	50,295	77.1%	22.9%	12.3%	7.8%	1.5%	1.3%
1996	50,066	79.1%	20.9%	11.7%	6.6%	1.3%	1.4%
2001	54,851	80.2%	19.8%	11.5%	6.2%	1.3%	0.9%
2006	60,901	79.4%	20.6%	11.9%	6.6%	1.2%	0.9%
2011	66,483	81.0%	19.1%	10.9%	6.0%	1.2%	1.1%
2016	77,991	81.4%	18.6%	10.5%	6.0%	1.0%	1.1%
Mean		78.3%	21.7%	12.6%	6.6%	1.3%	1.2%
Trend[b]		2.3%	−2.3%	−1.7%	−0.4%	−0.1%	−0.1%
Males							
1961[a]	680,270	74.7%	25.3%	16.1%	7.3%	1.4%	0.6%
1971	7,686	71.0%	29.0%	17.7%	8.5%	1.7%	1.1%
1981	19,079	75.6%	24.4%	13.6%	7.6%	1.8%	1.3%
1986	21,419	79.8%	20.2%	11.2%	6.5%	1.5%	1.1%
1991	37,940	78.6%	21.4%	10.6%	7.9%	1.6%	1.3%
1996	38,057	80.7%	19.3%	9.8%	6.7%	1.4%	1.4%
2001	42,964	81.8%	18.2%	9.6%	6.5%	1.1%	0.9%
2006	48,836	80.8%	19.2%	10.2%	6.8%	1.2%	1.0%
2011	55,951	81.9%	18.1%	9.6%	6.2%	1.2%	1.1%
2016	67,722	82.5%	17.5%	9.3%	6.1%	1.0%	1.1%
Mean		79.9%	20.1%	10.9%	6.8%	1.3%	1.1%
Trend[b]		1.9%	−1.9%	−1.5%	−0.3%	−0.1%	0.0%

Note. Mobility status measures the percent moving during the 5 years prior to the census date.
[a]Census data for 1961 are adapted from published data in Dominion Bureau of Statistics, 1965, Table 11. The sample size reported is the population total for the age group.
[b]Trend over time is measured by linear regression, with the regression coefficient representing the percentage point change in mobility over a 10-year period.
Source. Dominion Bureau of Statistics, 1963 and 1965; Statistics Canada, Census public use microdata files for 1971, 1981, 1991, 2001, 2011 & 2016 censuses.

five people moving between 2011 and 2016. Table 1 updates previous work of Northcott and Petruik (2013) and Edmonston and Lee (2014) with 2011 and 2016 data. This table shows the percentage of elderly Canadians, 65 years of age or older, who moved locally, or migrated intraprovincially or interprovincially, as well as moving from outside Canada during the 5 years prior to the census date, as reported in Canadian censuses from 1961 to 2016.[1] At the bottom of each panel for males and females, the mean per cent for all years, as well as the linear regression trends for the percentage point change in mobility over a 10-year period, is reported. Overall, for 1961–2016, there has been a 2.3 percentage point decline for all movers over a 10-year period for females, and a comparable 1.9 percentage point decrease for males. There have been decreases in all types of geographic mobility during the 1961–2016 period. Overall, elderly mobility rates have declined substantially from a peak in 1971, when almost one in three elderly persons moved during the 1966–1971 time frame, to fewer than one in five in 2011–2016.

The motivation for this article's research is the widespread nature of the decrease in the geographic mobility of Canada's elderly population. Census data showing three consecutive decades of declining mobility and migration rates are historically unprecedented. The downward trend that began in the 1980s has important effects on Canadian society. Migration is one of the three fundamental ways in which local populations change (births and deaths are the other two ways). As a component of social change,

[1]Mobility status refers to the relationship between a person's current and previous residence. The Canadian census measures mobility status between the current date and 5 years earlier. Non-movers are persons who are in the same dwelling unit as the one they were in 5 years ago. Movers are persons who are in a different dwelling unit. Migrants are persons who reside in a different census community than at the previous date. Intraprovincial migrants are persons who were living within the same province 5 years ago. Interprovincial migrants are persons who were living in a different provinces 5 years ago. External migrants are persons who were living outside Canada 5 years ago.

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Table 2. Interprovincial migration rate for canadian-born males by age, 1961–2016

Age	Year							Average Percentage Point Decrease per Decade from Peak Rate
	1961	1971	1981	1991	2001	2011	2016	
5-9	4.3%	5.0%	6.1%	4.7%	3.7%	2.8%	2.9%	−0.9%
10-14	3.1%	3.6%	4.5%	3.6%	2.9%	2.3%	1.9%	−0.7%
15-19	2.9%	3.4%	4.1%	3.0%	2.6%	2.2%	1.5%	−0.7%
20-24	5.9%	7.1%	8.6%	5.3%	5.4%	3.9%	3.6%	−1.4%
25-29	6.8%	8.4%	10.2%	7.7%	7.9%	6.8%	5.9%	−1.2%
30-34	5.7%	7.0%	7.5%	6.3%	6.1%	5.3%	5.1%	−0.7%
35-39	4.6%	5.2%	5.9%	5.0%	4.5%	4.0%	3.8%	−0.6%
40-44	3.0%	3.3%	4.8%	3.8%	3.3%	3.0%	3.0%	−0.5%
45-49	2.8%	3.2%	3.5%	3.0%	2.6%	2.8%	2.2%	−0.4%
50-54	2.5%	2.9%	2.7%	2.3%	2.3%	2.0%	1.6%	−0.3%
55-59	1.7%	2.0%	1.8%	2.1%	1.9%	1.6%	1.5%	−0.1%
60-64	1.6%	1.8%	2.0%	1.8%	1.8%	1.4%	1.7%	−0.1%
65-69	1.2%	1.6%	1.9%	1.8%	1.3%	1.0%	1.5%	−0.1%
70-74	1.2%	1.5%	1.5%	1.4%	1.0%	0.6%	1.0%	−0.1%
75-79	0.8%	1.0%	1.1%	1.1%	0.8%	0.7%	0.9%	−0.2%
≥80	0.8%	1.1%	1.1%	1.5%	1.0%	0.6%	0.6%	−0.4%
All Ages	3.4%	4.0%	5.0%	3.8%	3.3%	2.7%	2.4%	−0.7%
Age ≥65	1.1%	1.4%	1.6%	1.5%	1.1%	1.0%	1.1%	−0.1%

Source: Dominion Bureau of Statistics, 1963 & 1965; Statistics Canada, *Census public use microdata files for 1971, 1981, 1991, 2001, 2011 & 2016 censuses.*

migration occupies a central place in demographic studies. The departure or arrival of migrants affects many important social institutions: the family, education, health care, and the economy. The arrival of elderly migrants, for example, has a large influence on the demand for different types of housing, retail stores, and health care services. Declines in elderly geographic mobility mean that there is a greater proportion of the elderly population remaining in their current homes and communities, again with important implications for communities and services, particularly those related to an aging population.

If attention is limited to trends in interprovincial migration rates for Canadian-born residents[2], elderly migration rates peaked in 1981 for both males (see Table 2) and females (see Table 3). Interprovincial migration rates have decreased not only for elderly Canadians, as overall migration rates also peaked for the total population in 1981.

Is the decreasing trend in overall mobility real, and, if so, what explanation can be offered for the specific case of declining overall mobility among elderly Canadians? An explanation in a previous publication (Edmonston & Lee, 2014) for decreases in elderly mobility is that the elderly population may have been getting older. Because the oldest old, those 85 years of age and older, have lower mobility rates, the possible aging of the elderly population may lead to declines in overall elderly mobility. To address this possibility, Edmonston and Lee (2014) standardized mobility rates on the 2006 age distribution. Age distribution did not influence the overall mobility rates of the elderly population: standardized overall mobility rates decreased from 30.6 in 1971 to 20.0 in 2006 compared with the same decline for the observed rates. Decreases in standardized elderly mobility rates occurred similarly across all mobility types: from 1971 to 2006, there were decreases in elderly mobility for local movers, as well as for intraprovincial, interprovincial, and external migrants. Elderly mobility declines are therefore real and are not the result of shifts in the age distribution of the elderly population.

Edmonston and Lee (2014) also examined population composition changes as a second possible explanation for declining elderly residential mobility by estimating a multinomial logit model that predicts the components of mobility over time. From this model, they calculated the predicted probability for overall mobility for each census year, holding constant all other explanatory variables. This analysis showed temporal trends that took into account all other influences on elderly mobility. There was an observed decline in overall mobility of 10.6 percentage points from 1971 to 2006. The predicted rates from the multinomial model showed a 9.0 percentage point decrease, which implied that 1.6 percentage points of the decline in mobility were accounted for by explanatory variables in the model. The variables in the model, therefore, accounted for approximately 15 per cent (1.6 divided by 10.6) of the temporal decline in overall mobility rates. This was an important finding because it showed that the 2006 elderly population, compared with the 1971 population, had some characteristics associated with lower overall mobility. Nonetheless, the multivariate model did not account for most of the downward trend in elderly mobility.

Previous research on trends in the residential mobility of elderly Canadians (Edmonston & Lee, 2014; Northcott & Petruik, 2013) emphasized that no single explanation is likely to offer a comprehensive explanation for the trends. In the next section, we discuss

[2]Attention is limited to the Canadian-born population in the remainder of this article, because the focus is on internal migration over one's lifetime from birth. The foreign-born population includes residents who arrived at any age, including elderly arrivals.

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Table 3. Interprovincial migration rate for Canadian-born females by age, 1961–2016

Age	Year							Average Percentage Point Decrease per Decade from Peak Rate
	1961	1971	1981	1991	2001	2011	2016	
5-9	4.1%	4.8%	6.0%	4.7%	4.0%	3.3%	3.0%	−0.9%
10-14	2.9%	3.4%	4.4%	3.7%	3.1%	2.1%	2.1%	−0.7%
15-19	3.3%	3.6%	4.4%	3.4%	2.7%	1.9%	1.8%	−0.7%
20-24	6.8%	7.9%	8.5%	6.2%	6.1%	4.6%	3.9%	−1.3%
25-29	6.6%	8.1%	9.6%	7.4%	7.7%	7.2%	6.6%	−0.8%
30-34	4.4%	5.3%	7.3%	5.7%	5.6%	5.4%	5.4%	−0.5%
35-39	4.0%	4.4%	5.4%	4.5%	4.0%	3.4%	3.5%	−0.5%
40-44	3.5%	3.9%	4.0%	3.4%	3.0%	2.6%	2.5%	−0.4%
45-49	2.5%	3.0%	2.7%	2.5%	2.4%	2.1%	1.9%	−0.2%
50-54	1.8%	2.1%	2.6%	2.3%	2.0%	1.8%	1.7%	−0.3%
55-59	1.5%	1.8%	2.1%	1.9%	1.8%	1.8%	1.6%	−0.1%
60-64	1.4%	1.6%	2.1%	1.5%	1.7%	1.6%	1.6%	−0.1%
65-69	1.3%	1.6%	1.9%	1.6%	1.3%	1.2%	1.4%	−0.2%
70-74	1.2%	1.5%	1.9%	1.3%	1.2%	1.0%	1.1%	−0.2%
75-79	0.7%	0.9%	1.3%	1.3%	1.1%	1.0%	0.8%	−0.2%
≥80	0.7%	0.9%	1.6%	1.3%	1.3%	0.9%	0.7%	−0.3%
All Ages	3.2%	3.8%	4.7%	3.7%	3.2%	2.6%	2.5%	−0.6%
Age ≥65	1.0%	1.3%	1.8%	1.4%	1.3%	1.0%	1.1%	−0.2%

Source: Dominion Bureau of Statistics, 1963 & 1965; Statistics Canada, *Census public use microdata files for 1971, 1981, 1991, 2001, 2011 & 2016 censuses.*

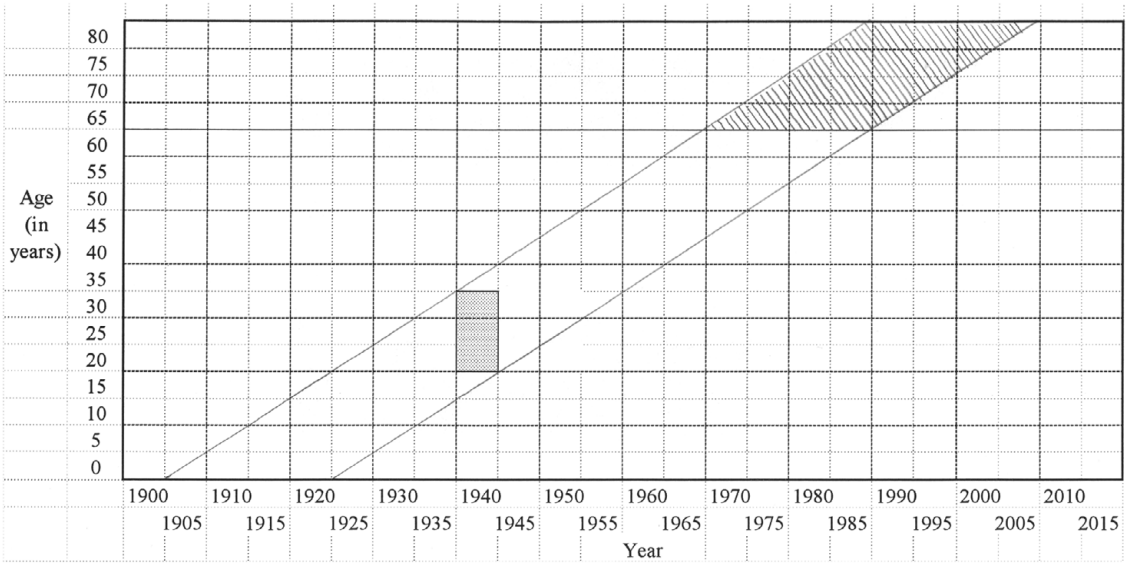

Figure 1. Diagram of age, year, and birth cohorts, highlighting the 1906–1925 birth cohorts who were 20–35 years old during the World War II years of 1940–1945.
Note: 1906–1925 birth cohorts are (1) shaded light grey for 1940–1945 and (2) noted with diagonal stripes at ages 65 years and older.

another potential explanation, a cohort explanation, for elderly migration declines, which was not examined in previous work.

A Cohort Explanation for Elderly Migration Declines

Canada's highest elderly mobility rates were in the 1970s and 1980s. Most of the elderly population during the 1970–1990 time period would have been born between 1906 and 1925 (see Figure 1). These birth cohorts grew up during the economic depression of the 1930s, were young adults during World War II, and completed their childbearing in the 1940s and 1950s. They enjoyed a period of post-World War II prosperity and began to retire in the 1960s and 1970s. Were these birth cohorts unusually mobile, having moved more before, during, and after WWII? Did their post-World War II prosperity influence their later mobility? Upon

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retirement, were they more motivated to move to a different home or community?

This article's focus on cohort effects develops from the concept of long-term changes associated with birth cohorts, a topic discussed in the classic article by Ryder (1965). Cohort analysis was later elaborated by Elder (1974) in his study of children growing up during the Great Depression of the 1930s who were re-interviewed in later years. This type of lifecourse research involves the continuous or repeated observation of the same individual over time (Elder, 1998). In this article, we conduct cohort analysis using successive cross-sectional census data on birth cohorts that are examined as they age over time.

In the next section, we present descriptive statistics for 1871–2016 on place of birth and current place of residence. We then examine 1971–2016 census microdata samples to conduct a cohort analysis of elderly mobility. We employ methods for examining age-period-cohort effects (Yang & Land, 2013) to examine possible birth cohort effects on elderly mobility.[3]

We expect that a cohort explanation will account for at least a portion of the declines in elderly migration rates. For example, we anticipate that higher mobility rates at younger adult ages, associated with possible movement away from place of birth, will be associated with higher mobility rates in later older ages. However, as previous researchers on this topic have concluded (Edmonston & Lee, 2014; Northcott & Petruik, 2013), there is no single explanation for declines in elderly residential mobility. This article's focus on a cohort explanation intends to contribute another piece of the puzzle to advance current knowledge on this topic.

Data and Methods

Data on province of birth by age and current province of residence for a single census year provide information about interprovincial migration. Because the census question asks about province of birth, it is a measure of lifetime migration because it indicates whether people have changed their provincial residence since their birth. These data do not measure the timing of migration: for the 2016 census, for example, interprovincial migration for those 0–9 years of age must have occurred between 2006 and 2016 and those 10–19 years of age must have moved between 1996 and 2016. For residents older than 20 years, however, the timing of migration could have occurred at any time over several decades.

A useful measure of geographic mobility based on province of birth is the "birth-residence index" that was first proposed by Thornwaite (1934) and further developed by Shryock (1964, p. 20). The index for all Canadian provinces is the number (or per cent) of Canadian-born residents who live in a different province than their province of birth. This index will be calculated for Canadian census data. A simple example for calculating the index is given.

If province of birth data are available for successive censuses, we can compute decennial changes in the birth-residence index for birth cohorts. Comparing changes in the birth-residence index for two successive censuses for cohorts provides a useful measure of decennial change in interprovincial migration. The sum of changes in the number of Canadian born for all ages for all provinces and territories is a measure of gross interprovincial migration during the previous decade. This measure is clearly a minimal estimate, however, because some residents may return to their birth province during the decade and offset some of the new interprovincial migrants.

Table 4 provides an example of the calculation of birth-residence indexes for 1941 and 1951, as well as the calculation of the percentage point change in the birth-residence indexes for the 1941–1951 decade. To prepare this table, the number of persons born in each province are tabulated by age for each census. Next, for each province, the number of persons by age who currently live outside their province of birth are tabulated for each census. The per cent living in a different province than their province of birth is calculated for all Canadian provinces, as shown in the 1941 and 1951 columns of Table 4 and in Figure 2. Finally, the percentage point difference between 1941 and 1951 (12.3% – 9.9% = 2.4%) is calculated and reported in Figure 3.

Although birth-residence data are useful and appropriate for studying migration, we note several limitations. First, there is little evidence about the accuracy of reported province of birth. However, the fact that an individual's birthplace does not change over time makes it easier to remember. For early Canadian censuses, some residents were born in Canadian territories outside existing provinces. Persons born within the three current Prairie provinces in the 1880s when provincial boundaries did not yet exist, for example, may be uncertain about whether they were born in Alberta, Manitoba, or Saskatchewan, unless they have not moved from their birthplace. Second, the question on province of birth applies only to Canadian-born residents. Birth-residence data are not useful for studying the interprovincial migration of the foreign born. Third, statistics on the number of persons born in one province but living in another province in 2016, for example, do not inform us about the timing or volume of interprovincial migration. These statistics do not measure possible intermediate moves, interprovincial migrants who have died, migrants who returned to their province of birth, or migrants who may have left Canada.

For descriptive analysis, the work provides evidence of cohort differences over longer periods of time. Fortunately, the Canadian census has asked respondents about their provincial place of birth since 1871.[4] These data can be used to show interprovincial differences in place of birth and current place of residence. Two types of data are available for descriptive analysis.

- 1871–1921 data are available in published tables for the total population. These data display long-term trends in the overall level of different birth-residence of the Canadian-born population. Because they do not have age information, however, they are not useful for the study of birth cohorts.

[3]There has been a long-standing interest in estimating age, historical period, and cohort effects (Mason, Mason, Winsborough, & Poole, 1973). The estimation of these three effects deals interpreting the extent to which changes in an outcome measure are the result of a person's age, or to the period or year of observation, or to that person's birth cohort. The primary methodological issue is that if one knows a person's age and the year (or period), then the birth cohort is also known: a person 30 years of age in 2010 must have been born in 1980. Knowing any two values of age, period, or cohort identifies the third value. This has led to methodological debates, primarily dealing with possible methods for sorting out the separate effects of age, period, and cohort. This article uses methods proposed by Yang and Land (2013).

[4]Historical data are from Canada, Department of Agriculture, 1873, 1882, and 1893; Canada, Census Office, 1902; Canada, Census and Statistics Office, 1913; Dominion Bureau of Statistics, 1925, 1935, 1941, 1946, 1953, 1963, and 1965; and Statistics Canada, census microdata samples for 1971, 1981, 1991, 2001, 2011, and 2016.

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Table 4. Example of the calculation of the birth-residence index and changes in the birth-residence index for two successive censuses

	Year		
Age	1941	1951	Notes
0-4	1.83%	3.32%	Percent of persons living in a different province than their province of birth, by age, for 1941 and 1951, calculated from 1941 and 1951 census data.
5-9	3.17%	6.03%	
10-14	4.01%	6.25%	
15-19	5.99%	8.97%	
20-24	9.81%	14.24%	
25-29	12.90%	15.90%	
30-34	14.00%	16.80%	
35-39	14.40%	17.10%	
40-44	15.40%	17.20%	
45-49	16.80%	16.60%	
50-54	18.30%	16.50%	
55-59	19.70%	17.40%	
60-64	20.30%	18.60%	
65-69	20.10%	20.52%	
70-74	18.70%	21.60%	
75-79	17.50%	26.10%	
80-84	17.30%	26.90%	
≥85	17.10%	26.90%	
All Ages	9.90%	12.30%	These are the birth-residence indexes for 1941 and 1951, which are shown in Figure 2.
Difference (1951 minus 1941)	2.39%		This is the decennial change between 1941 and 1951, which is shown in Figure 3.

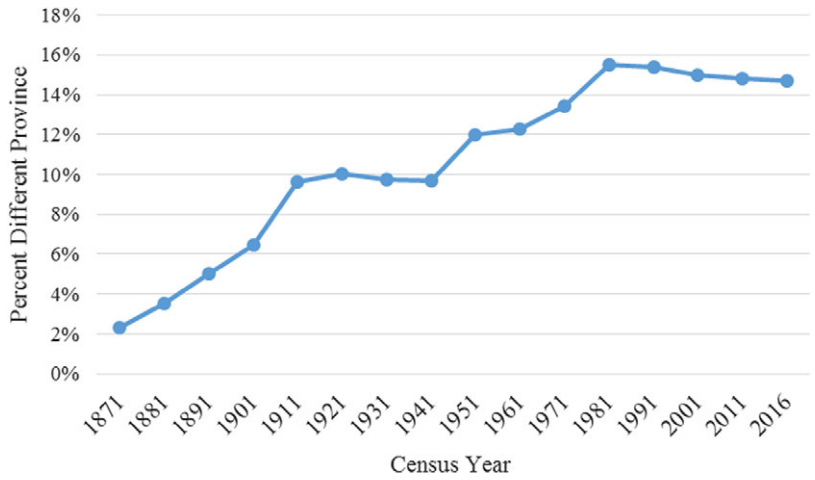

Figure 2. Percent of Canadian-born population living in a different province than province of birth, 1871–2016.
Source: Canada, Department of Agriculture, 1873, 1882, and 1893; Canada, Census Office, 1902 and 1913; Dominion Bureau of Statistics, 1925, 1935, 1946, 1953 1963, and 1965; Statistics Canada, Census public use microdata files for 1971, 1981, 1991, 2001, 2011, and 2016 censuses.

- 1931–2016 data are available in published tables or census microdata samples for place of birth and current residence for Canadian-born residents by age and sex. By examining changes between censuses for birth cohorts, these data provide information on whether there are unusual trends for the 1906–1925 birth cohorts.

Results

Descriptive Findings

1871–2016 Trends

Figure 2 for 1871–2016 shows trends in the birth-residence index. The birth-residence index for Canadian-born residents increased

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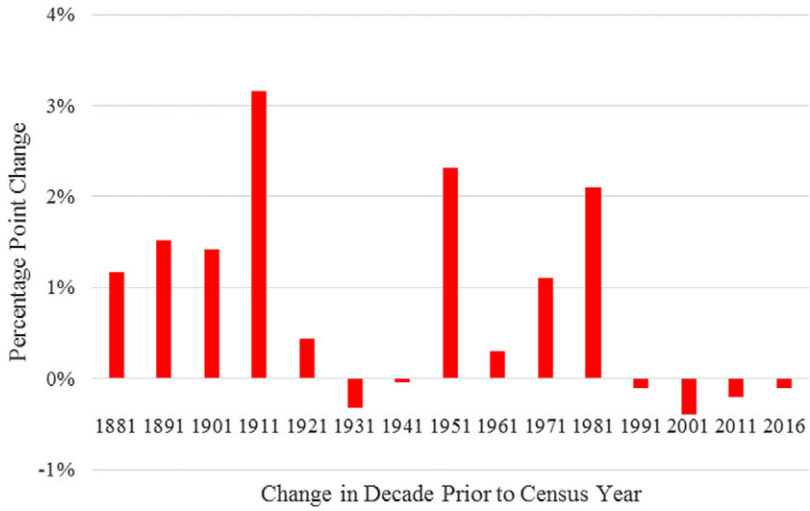

Figure 3. Percentage point change in the decade prior to the census year in the percent of the Canadian-born population living in a different province than province of birth, 1871– 2016. Source: Canada, Department of Agriculture, 1873, 1882, and 1893; Canada, Census Office, 1902 and 1913; Dominion Bureau of Statistics, 1925, 1935, 1946, 1953 1963, and 1965; Statistics Canada, Census public use microdata files for 1971, 1981, 1991, 2001, 2011, and 2016 censuses.

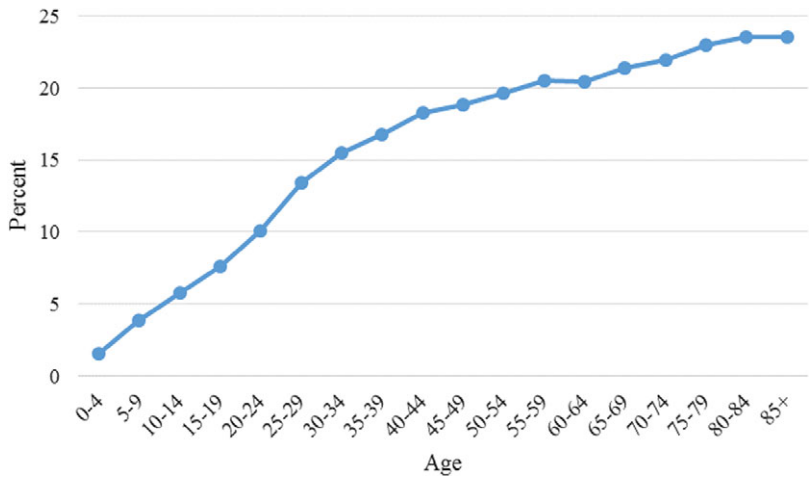

Figure 4. Percent of Canadian-born population living in a different province than province of birth, 1906–1925 male birth cohorts.
Source: Canada, Department of Agriculture, 1873, 1882, and 1893; Canada, Census Office, 1902 and 1913; Dominion Bureau of Statistics, 1925, 1935, 1946, 1953 1963, and 1965; Statistics Canada, Census public use microdata files for 1971, 1981, 1991, 2001, 2011, and 2016 censuses.

from 1871 to 1921, decreased between 1921 and 1941, increased steadily again to a peak in 1981, and declined slowly until 2016. Figure 3 presents the percentage point change in the birth-residence index by decade, 1871–1881 to 2001–2011, with the most recent value for the 5-year change from 2011 to 2016. The period from 1871 to 1911 was characterized by the large volume of Canadian-born settlers – as well as immigrant arrivals – moving to the Prairie provinces and British Columbia. During the 1920s and the Great Depression of the 1930s, interprovincial migration slackened to low levels and, indeed, some residents probably returned to their province of birth. Interprovincial migration grew rapidly in the 1940s and continued to increase to a peak in the 1970s. Since 1981, lifetime change in the birth-residence index has been negative, with fewer Canadians moving from their province of birth.

1931–2016 Cohort Trends

Our focus is on the trends over time in the 1906–1925 birth cohorts, whose lives were disrupted when they were 20–35 years of age during the 1940–1945 World War II years (see Figure 1). We use descriptive analysis to demonstrate that 1906–1925 birth cohorts experienced unusually high interprovincial migration during the 1940s. Having changed their province of residence during their early adult years, we hypothesize that they continued to migrate at higher levels than earlier and later cohorts.

We include separate analyses of females and males because the economic depression of the 1930s and World War II in the 1940s potentially affected the migration of men and women differently. This is not a topic that has been investigated by demographers, and any differences uncovered in this research would warrant further study.

The age and sex data for the birth-residence index from 1931 to 2016 can be organized by birth cohorts. Figure 4 presents the birth-residence index for the average of the 1906–1925 male birth cohorts.[5] With the exception of a small decrease between ages

[5]Because of space limitations, Figure 4 does not show data for females. Data for females are available from the authors and show results similar to those for males.

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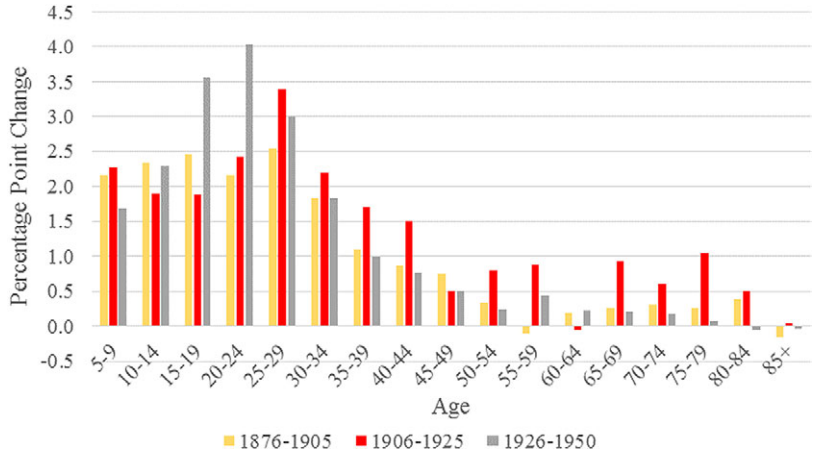

Figure 5. Percentage point change in the decade prior to the census year in the percent population living in a different province than province of birth, for three groups of Canadian-born male birth cohorts: 1876–1905, 1906–1925, and 1926–1950 (the 1906–1925 birth cohorts are shown as the red middle bar in each set of three bars.)
Source: Canada, Department of Agriculture, 1873, 1882, and 1893; Canada, Census Office, 1902 and 1913; Dominion Bureau of Statistics, 1925, 1935, 1946, 1953 1963, and 1965; Statistics Canada, Census public use microdata files for 1971, 1981, 1991, 2001, 2011, and 2016 censuses.

55–59 and 60–64 – when these cohorts were alive in the 1960s and 1970s – there were steady increases in the birth-residence index, indicating continuous interprovincial migration. By age 85 years and older, almost one fourth (24%) were living in a province different from their birth province. If similar calculations are made for the 1876–1905 and 1926–1950 birth cohorts, both the earlier and later male cohorts reached the 85 years and older category with lower levels of the birth-residence index than the 1906–1925 cohort: 19 per cent for the 1876–1905 cohorts and 23 per cent for the 1926–1950 cohorts. Elderly birth-residence indexes for male 1926–1950 cohort are approximately 4 per cent lower than for 1906–1925 cohorts. Elderly birth-residence indexes for female 1926–1950 cohorts are approximately 9 per cent lower than for 1906–1925 cohorts.[6] For both sexes combined, the 1926–1950 cohorts have lifetime birth-residence rates that are approximately 6 per cent lower than those for the 1906–1925 cohorts.

Figure 5 compares the 1906–1925 male birth cohorts with earlier 1876–1905 cohorts and later 1926–1950 cohorts by age (the 1906–1925 birth cohorts are shown as the middle bar in each set of three bars for each 5-year age group). The 1906–1925 cohort has somewhat lower birth-residence indices until approximately 20 years of age. But when they were 20–24 to 40–44 years of age, including the World War II and postwar years, the 1906–1925 cohort has birth-residence indices that are higher than those of earlier and later cohorts. The 1906–1925 cohort continued to have higher indices for ages 50–54 and 55–59 years, and relevant to this article's hypothesis, when they were 65 years of age and older.

Based on this descriptive analysis using census data for 1871–2016, male birth cohorts who were younger adults during World War II experienced higher rates of interprovincial migration during their early adult years and, subsequently, when they reached 65 years and older. Overall, we interpret this descriptive analysis to suggest that the 1906–1925 birth cohorts experienced higher interprovincial migration rates during their early adult years and subsequent ages of 65 and older, and that their migration rates were slightly higher (~ 2–8 percentage points higher) than comparable later birth cohorts.

[6]By 85 years of age and older, females have rates comparable to males of 18 per cent for the 1876–1905 cohorts, 23 per cent for the 1906–1925 cohorts, and 21 per cent for the 1926–1950 cohorts.

Multivariate Analysis and Findings

For multivariate analysis of age, period, and cohort factors affecting migration rates, we use 1971, 1981, 1991, 2001, 2011, and 2016 census microdata. The predicted variable is 5-year interprovincial migration rate for each census (for example, 1966–1971 migration rates for the 1971 census), for 5-year age groups, by sex, education, and marital status, for Canadian-born residents. The 1961 census collected information on 1956–1961 migration but are available only in published tables and summary tabulations. Although published tables provide information on migration rates by age that are cited in this article, we lack 1961 census microdata samples for individuals that are required for multivariate analysis.

We limit attention to the Canadian born because we study differences between province of birth and province of current residence. In order to compare migration rates over the lifetime, we need to compare birth cohorts who were in Canada during the early 1940s with earlier and later birth cohorts who were also born in Canada.

Analysis is limited to adults 20 years of age or older because the migration experience of children and youth relates to whether their parents moved. For the purposes of understanding the lifetime effects of birth cohorts affected by the higher migration levels of World War II, we focus on adults 20 years of age and older.

The predicted variable for analysis is interprovincial migration during the 5 years prior to the census, which is coded as a binary variable (0 = did not migrate, 1 = migrated).

Age-period-cohort models require special attention for multivariate analysis (Yang & Land, 2013) because exact age, period, and cohort data are over-identified. If single year age, period, and cohort data are used, a person observed in 2010 who was born in 1980 must be 30 years of age. The dependency of age on period and cohort is exact in this case, and a multivariate model cannot identify separate and stable age, period, and cohort effects. Our motivation in this article is to examine cohort effects on lifetime interprovincial migration. Toward this end, we simplify the age-period-cohort model. We estimate both age and year as continuous variables. We include age and age-squared in the model to take into account a possible non-linear relationship with logit(migration). We transform census year (0 = 1971, 10 = 1981, 20 = 1991, 30 = 2001, 40 = 2011, and 45 = 2016) to measure the average decline in migration rates over census periods since 1971. Analysis focuses on the 1906–1925 birth

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Table 5. Logit estimates for prediction of interprovincial migration for three Canadian-born cohorts born between 1886 and 1965, 20 years of age and older

Explanatory Variable and Variable Categories	Coefficient	Standard Error	Z-value	Exp (coefficient)	Predicted Probability
Age	−0.070844	0.001929	−36.72	---[a]	
Age-squared	0.000343	0.000020	17.13	---[a]	
Year	−0.015336	0.000585	−26.22	0.9848	
Birth cohorts					
1886-1905 (ref.)	0.000000	---	---		3.39%
1906-1925	0.072458	0.008024	9.03		3.53%
1926-1965	0.001885	0.008529	0.22		3.41%
Sex					
Males (ref.)	0.000000	---	---		3.47%
Females	−0.074504	0.009307	−8.01		3.23%
Marital status					
Single/Never married (ref.)	0.000000	---	---		2.80%
Married/Cohabiting	0.192532	0.009307	20.69		3.36%
Separate/Divorced	0.556010	0.002994	185.73		4.71%
Widowed	0.351963	0.004859	72.44		3.90%
Educational attainment					
Less than primary (ref.)	0.000000	---	---		1.40%
Primary completed	0.658476	0.054211	12.15		2.65%
Secondary completed	0.953857	0.054347	17.55		3.51%
University completed	1.378723	0.054730	25.19		5.22%
Constant	−1.693072	0.092960	−18.21		
Unweighted sample size	1,591,281				
Weighted population	67,049,503				
Log likelihood	−9,216,840				
Likelihood Ratio $\chi^2(df = 12)$	1,239,767				
Likelihood Ratio pseudo R^2	0.063				

Note. [a] See text for description of the effects of age and age-squared on the probability of migration.

cohorts by contrasting these birth cohorts with the earlier 1886–1905 cohorts and the later 1926–1965 cohorts for analysis.

We include several explanatory variables. Age is included as a continuous variable, with age and age-squared in the model. Period includes six census years and is estimated as a continuous variable for years 0, 10, 20, 30, 40, and 45 since 1971. Three birth cohorts are coded for 1886–1905, 1906–1925, and 1926–1965. The key interest is whether the 1906–1925 birth cohorts who were 20–35 years of age during World War II have higher overall migration levels. Sex is coded for two groups: male and female.[7] Educational attainment includes four groups: less than primary, primary certificate, secondary degree, and university degree and above. Marital status includes four groups: single (never married), married or consensual union, separated or divorced, and widowed.

Estimates for the logit model are presented in Table 5, with columns for the estimated logit coefficients, standard error based on the unweighted sample, the Z-values, the odds ratios computed as exp(coefficient), and predicted probabilities for categorical variables. The predicted probabilities reported here are the average predicted probabilities based on the logit estimates; they show the average probability of the outcome if everyone in the data were treated as if they were the same as the category specified.[8]

[7]The forthcoming 2021 census will collect data on sex and gender, which are considered two different concepts, with two questions rather than a single question on sex (male or female) as in previous censuses (Statistics Canada, 2020a). The 2021 census will ask respondents about their sex at birth (whether the person was assigned male or female sex at birth) and gender (what the respondents feel themselves to be, which can be reported as male, female, or some other gender). The 2021 census will note that current gender may be different than the sex assigned at birth and may be different from what is stated in legal documents. Data from the 2021 census will provide Canada's first data on gender variations and whether these variations affect geographic mobility.

[8]Predicted probabilities are called by different names in the statistical literature, such as marginal effects and predictive margins. Predictive probabilities are useful for interpreting the effects of categorical variables in non-linear models because the effect of change in a variable depends on the values of all variables in the model and is not simply equal to the estimated coefficients. The predicted probabilities reported in this article are calculated as marginal effects, using Stata 16's *margins* command. The predicted probabilities for males and females are calculated in the same way: the predicted probability for males or females each holds all other variables constant. Stated differently, the predictive

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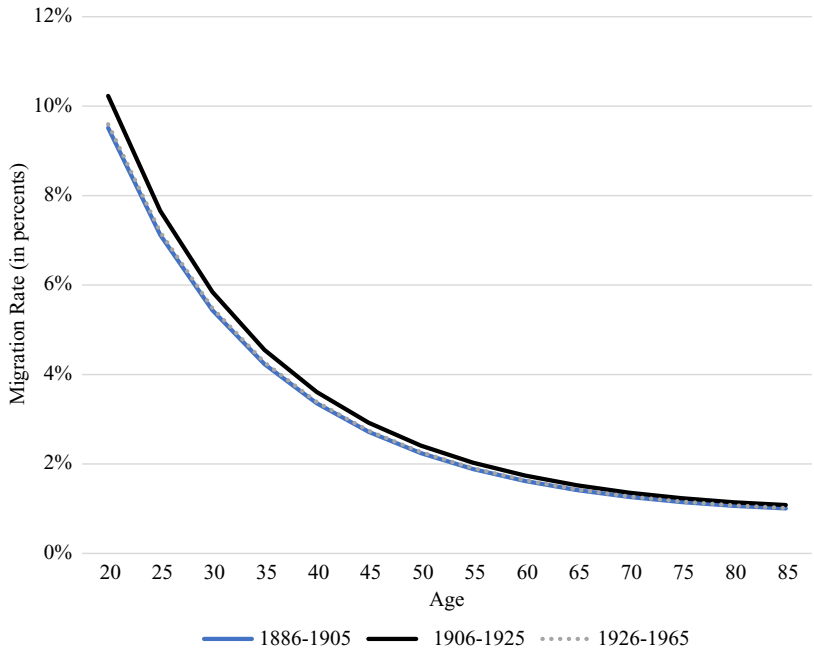

Figure 6. Predicted probability of migration by age for three Canadian-born birth cohorts, based on logit estimates reported in Table 4 (The 1906–1925 cohorts are the top black line in the figure. The 1886–1905 and 1926–1965 cohorts are shown in the two overlapping solid blue and dashed grey bottom lines.)

Age has a negative relationship with the probability of migration, although the positive term for age-squared indicates that migration rates decline less as age increases. The relationship between age (taking into account the effects of age and age-squared) and predicted probabilities for migration are displayed in Figure 6 for three birth cohorts. As expected, the predicted probability of migration decreases at a decreasing rate with age. The differences between birth cohorts, as will be discussed, are modest.

Year is negatively related to the probability of migration, with an estimated odds ratio of 0.9848, indicating that the odds of migration are reduced annually by 1.55 per cent.

The 1906–1925 birth cohorts have a statistically significant higher migration rate, 3.53 per cent per 5-year period, than the reference 1886–1905 birth cohorts rate of 3.39 per cent. The 1926–1965 birth cohorts, with a migration rate of 3.41 percent, are not significantly different from the reference category. A separate statistical test, not shown here, finds that the 1906–1925 cohorts have a statistically significant higher migration rate than the later birth cohorts.

Differences in the predicted probability of migration are apparent if we consider their size relative to changes over time. The difference between the 1906–1925 cohorts and the 1886–1905 cohorts is 0.14 per cent (3.53% minus 3.39%), or approximately 4 per cent higher for the level for the 1906–1925 cohorts. A 4 per cent change accounts for one tenth (10%) of the 39 per cent decrease that occurred in elderly interprovincial migration rates from 1981 to 2016.

Males are more likely to migrate than females, although the male rate of 3.47 per cent is not greatly higher than the female rate of 3.23 per cent.

Migration rates, taking other factors into account, vary with marital status. Single (never-married) adults have lower levels for the probability of migrating (2.80%). Married or cohabiting (3.36%) and widowed (3.90%) adults have somewhat higher probabilities of migrating. Separated and divorced adults (4.71%) display the highest probabilities of migrating.

Educational attainment has a striking relationship with the probability of migration, with a sizeable difference between adults with less than a primary education (1.40%), primary education completed (2.65%), secondary education completed (3.48%), and university degree completed (5.22%).

Overall, this multivariate analysis finds that cohort differences account for approximately one tenth of the change in interprovincial migration rates during 1981–2016, when comparing the 1906–1925 birth cohorts with later birth cohorts.

Discussion and Conclusion

This article began by noting that sizeable decreases in elderly mobility in Canada have occurred during the past 30 years. Declines have occurred for local, intraprovincial, and interprovincial migration, and are not explained by changes in only one type of geographic mobility (Edmonston & Lee, 2014). Recent declines in elderly migration rates are not explained by changes in the age composition of the elderly (Edmonston & Lee, 2014) or are only partly explained by changes in the individual characteristics of the elderly population, such as marital status, education, and housing (Edmonston & Lee, 2014).

Although decreases in elderly geographic mobility have persisted for the past 50 years, the ongoing COVID-19 pandemic may have potential immediate and long-term influences on elderly mobility trends. According to a recent World Bank Report (World Bank, 2020), the immediate effect of the pandemic on spatial mobility has been a dramatic reduction in both international and domestic movement. A recent report by Statistics Canada (2020b, p. 15) anticipates that internal migration of Canadians is likely to be disrupted in 2020; however, preliminary estimates for the first quarter of 2020 did not reveal any notable changes. Once further

probability for females shows the expected value for the outcome variables for being females, holding all other variables constant.

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data for 2020 are available, we should have more detailed information on how the pandemic may have affected geographic mobility as well as possible changes for different age groups. The long-term effects of the pandemic on mobility are uncertain, in part because we do not yet know how effective future vaccines and treatment might be for controlling the current outbreak, when they may become available, and when the pandemic may end.

This article investigated whether there is a cohort explanation for elderly migration trends.

In understanding why Canadian elderly migration rates have decreased in recent decades, our starting point was to examine trends in the birth-residence index, which measures lifetime changes from province of birth to current residence since 1871. The birth-residence index for Canadian-born adults showed increases to 1921, lower levels during 1921–1941, striking increases in the 1940s that continued to 1981 or thereabouts, and steady decreases after 1981. We interpreted these trends as evidence that selected birth cohorts experienced changing levels of migration as they aged.

Turning to data from 1931 to the present, analysis revealed that selected birth cohorts had higher levels of interprovincial migration, including the 1906–1925 cohorts, who entered the early adult years during World War II. Following the 1906–1925 birth cohorts into later years, these cohorts also had higher levels of elderly migration when they became 65 years of age and older in the 1970s and 1980s: the period when elderly migration rates were much higher than in later years.

From our study of historical trends for birth cohorts and multivariate analysis of a sample of census individual data, we conclude that there is a modest cohort effect: persons born during 1906–1925 experienced higher average geographic mobility during their younger adult years and, subsequently, had higher average mobility during their elderly years. Birth cohorts born before 1906 or after 1925 had slightly lower geographic mobility during their early adult years, and, pertinent to the purposes of this article, cohorts born after 1925 have been experiencing lower levels of geographic mobility in their elderly years, compared with the earlier 1906–1925 birth cohort.

Based on descriptive statistics, the comparison of the 1906–1925 birth cohorts with earlier and later birth cohorts suggests that approximately 2–6 percentage points of overall decreases of approximately 39 per cent for elderly Canadians may be the result of the higher elderly mobility rates of the 1906–1925 cohorts.

Our investigation of a multivariate age-period-cohort, including individual characteristics, finds that the 1906–1925 birth cohorts experienced higher average migration rates over their lifetime. As stated in an earlier section of this article, we expected that the difference between birth cohorts would be modest. As shown in Figure 6, there is little difference in the predicted probability of migration by age for the 1906–1925 birth cohorts and earlier and later birth cohorts. So, although the multivariate results support the hypothesis that the higher migration rates of the 1906–1925 cohorts in their early adult years continued with higher migration rates in their elderly adult years, that difference is not large.

Overall, the cohort explanation adds to our general explanation for declines in elderly geographic mobility rates. But current explanations are partial and there remains more to be done to further understand factors affecting trends in elderly geographic mobility.

To date, two explanations for decreases for elderly migration rates have found some empirical support. As previously noted, examination of changes in the composition of the elderly population from 1971 to 2006 (Edmonston & Lee, 2014) found that shifts in several explanatory variables – especially marital status, educational attainment, and homeownership – account for approximately 15 per cent of overall declines in elderly mobility. This article's investigation of a cohort explanation finds modest support for the idea that the 1906–1925 birth cohorts experienced unusually high levels of geographic mobility in their early adult years during World War II and after and continued to have higher mobility after they were 65 years of age, which may account for a small proportion of recent decreases in elderly migration.

Although this article has contributed new knowledge to advance understanding of elderly migration, many questions remain. More broadly, why have geographic mobility rates been declining in recent years, in Canada as well as the United States (Fry, 2017; Karahan & Li, 2016; Molloy, Smith, & Wozniak, 2011; Samuelson, 2014)? There have been relatively few empirical studies of trends in elderly migration rates in Canada or the United States, and there is an absence of studies in other developed countries. Geographic interprovincial migration rates for Canadian adults (see Tables 2 and 3) show declines for both males and females since 1981, with historical low rates in 2016. Elderly mobility rates have been decreasing for several decades in Canada (Edmonston & Lee, 2014; Northcott & Petruik, 2013) and, as noted in Table 1 of this article, were at their lowest level in 2016. Geographic mobility rates for all adults in the United States, as well as elderly Americans, have been declining since the 1980s, with unprecedented low rates for younger adults. European geographic mobility rates vary greatly by country (European Commission, 2014) but trends over time are complicated by shifts in recent refugee arrivals and changes in the eligibility for nationals to move to different countries within the European Union.

Decreasing migration trends are so widespread in Canada and the United States in recent decades that they must be driven by factors affecting a large proportion of the population. As succinctly stated by Molloy et al. (2011, pp. 15–16), the factors causing decreased migration must be a general increase in the costs of moving, a general decrease in the benefits of moving, or a combination of both. Several possible explanations deserve further consideration. Four explanations for all age groups have been proposed.

First, shifts to more attractive locations from 1950 to 1980 in warmer climates became possible with the availability of air-conditioning (Molloy et al., 2011, p. 15). Greater attractiveness of warmer areas increased migration during this period in the United States, after which migration returned to previous levels. However, this explanation is not helpful for Canadian migration patterns. For the United States, recent data are not consistent with such an explanation, because inter-regional flows have continued with the same pattern as that from 1950 to 1980.

Second, an increase in two-earner households might have reduced migration because relocation involves finding two jobs (Molloy et al., 2011, p. 15). For Canada and the United States, the proportion of households with two earners has remained relatively steady since the 1980s, which does not support this explanation. Furthermore, this explanation is not generally pertinent to elderly migrants, because most are not seeking employment.

Third, less expensive communication and transportation costs have reduced the need for younger adults to relocate for a job and for elderly adults to move to a new location (Malloy et al., 2011, p. 16). Canadians and Americans can now stay in their current residence and – through telecommuting, inexpensive video phone calls, or easy trips for visiting – work at home or remain in touch with friends and relatives. Although there is evidence that there

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have been changes in communication and transportation, this factor seems to be too minor to account for observed substantial decreases in migration.

Fourth, locations have become less specialized in their goods and services, and the distribution of amenities has become more homogeneous, reducing the incentive to relocate (Molloy et al., 2011, p. 16). This explanation argues that many metropolitan areas in Canada and the United States offer similar employment, non-employment services, and amenities. There has been little evidence assembled for whether the distribution of employment, services, and amenities has become more similar in recent decades, or whether the changes that have occurred are related to decreased migration.

Previous research on elderly migration, as noted in literature reviews by Fokkema, Gierveld, and Nijkamp (1993) and Walters (2002), focused on three major topics: the decision-making process, geographic patterns of migration, and the impact of migration on origin and destination communities. If elderly mobility has been declining, it raises questions for each of these three areas. What factors in the decision-making process may have changed? Are there new geographic patterns in elderly migration? With fewer elderly migrants, what effects has this had on origin and destination communities?

Elderly migration in general might be viewed as a population mechanism that redistributes people over time based on the perceived differences in quality of life at the current location and possible new destinations. When differences enlarge, elderly migration is expected to increase. When differences diminish, however, elderly migration from their places of origin is expected to decrease and there are fewer migrants arriving at the destination. The role of quality of life on elderly migration decision making deserves attention in future research. The elderly may evaluate quality of life and make comparisons about current and future residences differently from other age groups. In addition, different cohorts of elderly may have different ideas and understanding of what quality of life means, and how this may influence their migration behavior.

In addition to factors discussed, Northcott and Petruik (2013, p. 52) suggest that some seniors may decide to delay retirement or decide to work part time after retirement, in which case an increasing number of elderly Canadians and Americans may age in place rather than relocate.

Another possible reason for decreasing elderly migration rates is the increasing number of elderly who are seasonal migrants, spending several months a year away from their permanent home (Northcott & Petruik, 2013, p. 52). "Snowbirds" are common seasonal migrants to warmer locations for elderly residents of Canada and Northern U.S. states, and often spend several winter months in the Southern United States, Mexico, the Caribbean, and other warmer locations. A related phenomenon involves elderly residents who move from Canada or the United States to another country (Edmonston & Lee, 2014). Some work has focused on elderly migrants in Europe, for example, northern Europeans moving to Mediterranean countries (Warnes, 2009). Although there are long-established communities of elderly Canadians and Americans in Mexico, Costa Rica, Panama, and several Caribbean countries, there has been limited research on these flows and the extent to which they may account for overall trends in Canada and United States elderly migration.

Two important factors that influence elderly mobility have not previously been examined. One is health status, but Canadian and United States census data do not have such information, and prior analysis did not include this crucial variable (Edmonston & Lee, 2014, p. 397). Moves to a nursing home, for example, would not be captured in public-use census microdata that exclude persons in non-private households. It is possible, however, that improvement in health status and medical care may have reduced the need for elderly mobility.

A second important missing factor is information on the location of family and relatives (Edmonston & Lee, 2014, p. 397). If an elderly person wants to maximize proximity to relatives, he/she may remain in the same house if a relative is nearby. This would reduce elderly mobility. An elderly person may move to a different community, however, if relatives live there. It is also possible that some elderly adults move to distance themselves from relatives for personal reasons. Both of these possibilities would increase elderly mobility.

In thinking about other possible explanations, are there yet unknown economic and social processes that concluded their effects in the 1970s and 1980s, with migration then adjusting to new lower levels? It is worthwhile for researchers to consider these explanations, as well as other potential factors that may account for recent widespread migration declines among the elderly.

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