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Evolving Internet Use Among Canadian Seniors

by Jordan Davidson and Christoph Schimmele

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Abstract

Among Canadians aged 15 to 64, Internet access reached near-saturation levels in 2016, but its diffusion into the senior population was far less extensive. This study uses four cycles of the General Social Survey (2007, 2010, 2013 and 2016) to describe changes in Canadian seniors' rates of Internet use, and examines the sociodemographic factors associated with such use. The findings suggest that age is the primary determinant of Internet use among seniors, but that differences in educational attainment and other demographic characteristics are also important. From 2007 to 2016, Internet use doubled from 32% to 68% among Canadians aged 65 and older. During this time, the absolute gap in the prevalence of Internet use between seniors and Canadians aged 45 to 54 declined from 49 to 28 percentage points. Within the senior population, Internet use progressively declined at older ages. Current age differences in Internet use likely correspond with the comparatively limited exposure of Canadian seniors to the Internet via their social networks, as well as differences in educational attainment and other characteristics correlated with Internet use. This suggests that the slow diffusion of Internet use in the senior population was rooted in historical circumstances more so than reflecting the aging process. Given the comparatively high rates of Internet use among middle-aged Canadians (aged 45 to 54) and younger seniors, it is anticipated that age gaps in Internet use will continue to decrease.

Keywords: Internet use, age, seniors, digital divide

Executive summary

Since 2016, Internet use rates among Canadians aged 15 to 64 have reached near-saturation (97.2%) levels. However, the diffusion of information and communications technology (ICT), including the Internet, has proceeded at a much slower pace among Canadians aged 65 and older. Given that Canada is an aging society, knowing about the factors associated with Internet use among seniors is crucial for ensuring their access to it. Several broad aspects may explain lower rates of Internet use within the senior population:

- (a) sociodemographic differences in exposure to ICT and associated differences in the motivation (needs and interests) and skills needed to use the Internet
- (b) differences in educational attainment and other characteristics correlated with Internet use
- (c) a function of the aging process, such as age-related declines in interest in using the Internet or the age-related onset of health problems (e.g., arthritis) that are barriers.

The first two explanations suggest that current age differences represent historical circumstances and that these differences will weaken or disappear as younger people age into the senior population. The third explanation suggests that age has intrinsic properties that decrease Internet use as individuals get older.

This study uses four cycles of data from the General Social Survey (2007, 2010, 2013 and 2016) and predicted probability models to examine trends and patterns of Internet use among Canadian seniors. The study first compares all seniors to non-seniors aged 45 to 54, and then disaggregates the senior population into four age groups to provide a more nuanced assessment. The study has three objectives:

- (a) to document changes in the gap in Internet use rates between seniors and non-seniors from 2007 to 2016
- (b) to compare how age contributes to the manner in which the Internet is diffused among seniors and to differences in Internet use among seniors
- (c) to examine the sociodemographic factors that influence whether a senior chooses to access the Internet or not.

Internet access rates among Canadian seniors grew from 32.2% in 2007 to 68.2% in 2016. Compared with the non-senior population aged 45 to 54, Canadian seniors closed the Internet use gap from 49 to 28 percentage points over this period. In addition to having lower levels of Internet use, Canadian seniors were less likely to report that technology makes their life better and less likely to use ICT to communicate with people, make informed decisions or save time.

Although all seniors have lower Internet use rates than non-seniors, the size of the gap is far smaller among seniors aged 65 to 69 than among older seniors. Moreover, the age gradient itself depends on characteristics such as education, health status and living arrangements. Among young seniors with more advantaged characteristics, Internet use is presently at near-saturation levels and is comparatively high among their counterparts in older age groups as well. Among disadvantaged seniors, Internet use is far lower among younger seniors and sharply declines among older groups.

Social differences in exposure to ICT (and interest in using the Internet) and in educational attainment and other characteristics seem to be the main factors behind the age gradient in Internet use among seniors. Factors intrinsic to the aging process also appear to have a role in declining Internet use, but their influence is comparatively weaker.

1 Introduction

The digital divide refers to the “haves” and “have-nots” in access to information and communications technology (ICT), the Internet in particular (Dewan and Riggins 2005, 299). In the recent past, the digital divide represented a potentially new source of inequality since it impeded people’s access to employment opportunities, news and current events, and an increasing amount of goods and services available online (Haight, Quan-Haase, and Corbett 2014). The difference between the haves and have-nots was not random, but instead reflected socioeconomic status and other disadvantages (Friemel 2016). Across the 10 provinces,¹ Internet use among Canadians aged 15 to 64 was at near-saturation levels (97.2%) in 2016, and sociodemographic characteristics no longer have a strong influence on basic access to the Internet.

Concerns about Internet access are well motivated since the Internet has become a utility on par with the telephone. Although the digital divide² has disappeared among Canadians aged 15 to 44, major differences in Internet use persist for older age groups. The gap in Internet use between seniors and non-seniors is referred to as the “grey divide” (Friemel 2016, 314). Not much is known about the grey divide in Canada, but studies from the United States, the United Kingdom and Australia have reported that seniors lag well behind non-seniors in Internet uptake, and that age is also a source of differentiation within senior populations (ACMA 2016; Anderson and Perrin 2017; Ofcom 2017).

The relationship between age and Internet use cannot be reduced to access issues, such as cost barriers (Lagacé et al. 2015). The age gaps between younger and older age groups have been attributed to several factors:

- sociodemographic differences in exposure to ICT and associated differences in attitudes toward technology and the skills needed to master it
- age-related declines in health status, which can decrease Internet use because computing technologies are not well designed for individuals with functional and cognitive limitations
- age-related declines in the motivation (personal needs and interests) to use the Internet (Charness and Boot 2009; Gilleard and Higgs 2008; Peacock and Künemund 2007; Van Deursen and Helsper 2015).

1. Data for this study do not include information for Canada’s three territories as they are not sampled in the General Social Survey (GSS). However, Internet access rates in these regions is known to be lower than the average for Canadian provinces because of their rural nature, insufficient high-speed Internet infrastructure and the high costs of Internet access (CRTC 2011; CRTC 2019).

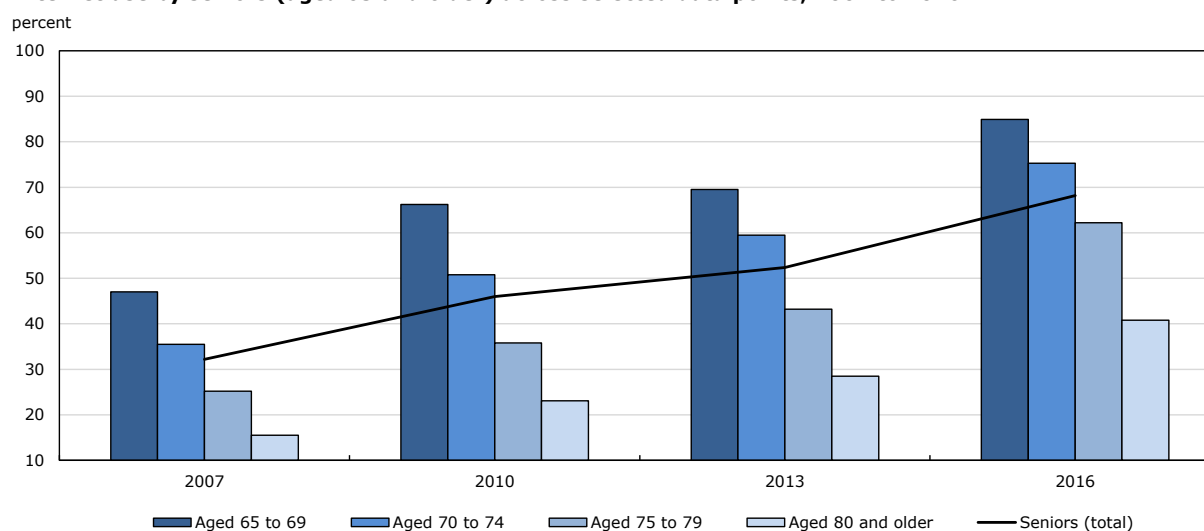
2. This study focuses on the first-level digital divide. The first-level divide refers to the haves and have-nots of Internet access. The second-level divide refers to differences in computing and Internet skills or digital literacy (Attewell 2001). Although sociodemographic characteristics no longer determine basic Internet access, these remain factors of inequality in digital capital and levels of access (Robinson et al. 2015).

This article makes a comparison between the Internet access by Canadian seniors and Canadian non-seniors from 2007 to 2016 using multiple cycles of Statistics Canada’s General Social Survey (GSS) (Statistics Canada n.d.a, b, c, d). The study describes how gaps in Internet access between these two groups have changed over time. Within the senior population, differences in life-course experiences and chronological age are potential sources of heterogeneity. This implies that the gap in Internet use between seniors and non-seniors involves an age gradient as well as a digital divide. Besides age, differences in other sociodemographic characteristics may also contribute to Internet use among seniors, particularly across advantaged and disadvantaged groups.

2 Seniors’ Internet use, 2007 to 2016

Chart 1 presents the trends in Internet use for Canadian seniors (aged 65 and older) from 2007 to 2016.³ For all seniors, Internet use has steadily increased between 2007 and 2016. In 2007, 32.2% of seniors used the Internet, and Internet use among the senior population more than doubled since that time, reaching 68.2% in 2016.

Chart 1
Internet use by seniors (aged 65 and older) across selected data points, 2007 to 2016



Source: Statistics Canada, General Social Survey, 2007, 2010, 2013 and 2016.

At each GSS cycle from 2007 to 2016, there was a persistent negative relationship between age and Internet use among seniors (Chart 1). In 2007, 46.9% of seniors aged 65 to 69 were Internet users compared with 15.5% of seniors aged 80 and older. Internet use increased for all senior age groups over the next decade, but large gaps remained. By 2016, 85.0% of seniors aged 65 to 69 were Internet users, compared with 62.0% of seniors aged 75 to 79 and 40.8% of seniors aged 80 or older.⁴ Comparing seniors aged 65 to 69 in 2007 to seniors aged 75 to 79 in 2016, we can see a large within-cohort increase, from 47% to 62%, in the prevalence of Internet use.

The 2016 GSS also includes data on the frequency of Internet use. Regular Internet use (defined as daily or near-daily use) reached near-saturation levels (94.9%) among Canadians aged

3. In this study, Internet use is defined as having used the Internet at least once in the past month, and thus measures basic access to the Internet. This measure is used because the GSS cycles in 2010 and 2013 asked respondents only about Internet use in the past month, preventing a comparison of how use frequency has changed over time.

4. These figures are remarkably similar to age patterns observed in the United States. In 2016, the percentage of U.S. seniors who were Internet users was as follows: 82% of seniors aged 65 to 69, 75% of seniors aged 70 to 74, 60% of seniors aged 75 to 79, and 44% of seniors aged 80 and older (Anderson and Perrin 2017).

15 to 64 in 2016. This is very similar to the overall Internet use levels (97.2%) of this age group, indicating that these Internet users were very likely daily or near-daily users. In comparison, 61.7% of all seniors used the Internet on a daily or near-daily basis, with this ranging from 78.5% of seniors aged 65 to 69 to 35.7% of seniors aged 80 and older. The comparatively high percentage of seniors who appear to have been non-users of the Internet is noteworthy. In 2016, 31.8% of seniors reported not using the Internet in the past month, which was over 10 times higher than the rate of non-use among non-seniors (2.8%). The rate of non-use was also much different for the youngest group of seniors (15.0% among those aged 65 to 69) than for the oldest group of seniors (59.2% of those aged 80 and older).

3 The gap between seniors and non-seniors

While Internet use among seniors grew steadily from 2007 to 2016, and more rapidly than among non-seniors, large differences between seniors and non-seniors persisted. Table 1 shows the absolute gaps in Internet use rates between seniors and middle-aged Canadians (aged 45 to 54⁵). Prior Canadian research measuring relative gaps in Internet use has shown that differences between seniors and non-seniors have narrowed over time. Veenhof and Timusk (2009) observed that from 2000 to 2007 the relative gap between middle-aged Canadians and seniors declined from 10-times to 4-times greater use. The present study focuses on absolute changes, and gaps between age groups are expressed in terms of percentage-point differences.

Table 1
Difference in Internet use between middle-aged Canadians and seniors, 2007 to 2016

	2007	2010	2013	2016
		percent		
Middle-aged Canadians (aged 45 to 54)	81.2	88.0	89.6	96.2
Seniors (aged 65 and older)	32.2	46.0	52.4	68.2
		percentage points		
Gap	49.0	41.9	37.2	28.0

Source: Statistics Canada, General Social Survey, 2007, 2010, 2013 and 2016.

In 2007, the absolute gap in Internet use between non-seniors and seniors was 49.0 percentage points (81.2% of non-seniors minus 32.2% of seniors), with this difference declining to 28.0 percentage points by 2016. Overall, the gap between seniors and middle-aged Canadians narrowed substantially (by 21 percentage points), but was still substantial in 2016.

Differences in Internet use between non-seniors and seniors appear to be a function of diffusion. Rogers (2003) described diffusion as a process whereby an innovation (e.g., the Internet) spreads among members of a specific population over time. What distinguishes early adopters from late adopters is the composition of their social networks and differences in the perceived risks and benefits of the innovation. Friemel's (2016) research on Internet uptake among Swiss seniors confirms Rogers' hypothesis, with social networks a key determinant of which seniors decided to become Internet users. Similarly, studies of older people in the United States and other European countries show that barriers to Internet uptake among seniors include lack of sufficient information about the Internet or a social contact to introduce them to it (Anderson and Perrin 2017; Peacock and Künemund 2007). Since many of the seniors in this study were semi-retired or retired at the time of the GSS, their previous exposure to the Internet was likely limited, particularly given early diffusion in school and worked-based social environments.

5. This age was chosen as the 2007 GSS did not include any respondents under the age of 45.

4 How seniors view technology

The perceived compatibility and complexity of the Internet are age-dependent and translate into what Gilleard and Higgs (2008, under “Introduction”) have described as “differential levels of generational openness” to the digital age. Prensky’s (2001, 1, 2) dichotomy of “digital natives” versus “digital immigrants” helps explain these differences in openness to ICT use. ‘Digital natives’ refers to the generations that grew up in the personal computer (PC) and ICT era. For these generations, exposure to computers and the Internet early in their lives has made the digital language of the Internet part of their vernacular. They are natives to the digital age, well aware of the benefits of the Internet and fluent in the skills needed to maximize its utility.

The youngest seniors in the present study were born in 1951 and would have all been over 50 years of age when the Internet became mainstream. Many of these seniors can be described as ‘digital immigrants’ because they were socialized in a pre-digital era and may, therefore, have outdated skills and attitudes that affect their openness to using the Internet. As recently as 2016, there were clear age differences in views on technology (see Table 2). In addition, fewer seniors (48.1%) than non-seniors (61.4%) believed that technology made their life better, and fewer seniors used ICT to communicate with people, make informed decisions or save time.

Table 2
Views on technology, 2016

	Always	Often	Sometimes	Rarely	Never
	percent				
ICT helps you communicate with other people					
Non-seniors (aged 15 to 64)	55.8	28.5	10.5	2.8	2.3
Seniors (aged 65 and older)	22.5	26.2	20.7	10.8	18.3
ICT helps you make informed decisions					
Non-seniors (aged 15 to 64)	23.0	34.5	29.4	6.6	6.3
Seniors (aged 65 and older)	9.0	20.2	26.7	10.1	31.7
ICT helps save you time					
Non-seniors (aged 15 to 64)	39.8	33.0	19.2	4.0	3.7
Seniors (aged 65 and older)	16.7	20.3	22.8	11.8	26.0

Notes: ICT: information and communications technology. The percentages for seniors and non-seniors may not add up to 100.0% because of item non-response.

Source: Statistics Canada, General Social Survey, 2016.

There is evidence that the Internet is less compatible with seniors’ lives than with the lives of younger people. That is, it appears to be less relevant to their needs. Previous studies find that disinterest is a common reason seniors give for Internet non-use (Morris, Goodman and Brading 2007; Peacock and Künemund 2007). Some seniors have been described as “want-nots” (as opposed to “have-nots”) when it comes to Internet use (Van Deursen and Helsper 2015, under “Background”). These seniors consider themselves too old for the Internet and see little purpose for using it themselves. Data from the 2012 Canadian Internet Use Survey (CIUS) mirror these findings; the most common reason for non-use among Canadian seniors was a combination of no need, no interest and a lack of perceived utility. However, Van Deursen and Helsper (2015) have cautioned against interpreting want-not strictly as a choice, because it may reflect knowledge-based barriers to Internet use, such as unfamiliarity with its benefits.

The perceived complexity of Internet use is another barrier to uptake. Anderson and Perrin (2017) reported that seniors have comparatively lower confidence in using electronic devices than non-seniors and often need someone to set up their devices and demonstrate how to use them. Friemel (2016, 332, Table 4) observed that “Use is too complicated” and “high effort to learn” are the top two reasons seniors give for non-use, followed by worries about safety and technical problems. Van Volkom, Stapley and Amaturro (2015) found that older people are less likely than younger people to perceive the Internet as user-friendly, get comparatively more frustrated using technology than younger people and feel that innovation is too rapid for their comfort.

The 2012 CIUS showed that many seniors were non-users because of a lack of skills or training, but provided little support for the notion that non-use among Canadian seniors was related to worries about technology or security and privacy concerns.

5 Age gradients in the digital divide

Table 3 compares changes in Internet use rates from 2007 to 2016 among Canadians aged 45 to 54 with those among seniors in different age groups. The gap in Internet use between the middle-aged and those aged 65 to 69 declined by about 23 percentage points from 2007 to 2016. In contrast, the gap between the middle-aged and seniors aged 80 and older declined by about 10 percentage points. The gap in Internet use between the middle-aged population and seniors aged 70 to 74 and 75 to 79 declined about 25 and 22 percentage points, respectively.

Table 3
Gap in Internet use between middle-aged Canadians (aged 45 to 54) and senior age groups, 2007 to 2016

Age (years)	2007	2010	2013	2016	Difference from 2007 to 2016
			percentage points		
65 to 69	34.2	21.8	20.1	11.3	-22.8
70 to 74	45.7	37.2	30.1	20.9	-24.7
75 to 79	55.9	52.2	46.4	34.0	-21.9
80 and older	65.6	64.9	61.1	55.4	-10.2

Source: Statistics Canada, General Social Survey, 2007, 2010, 2013 and 2016.

To better understand Internet use in the senior population, Table 4 shows raw gaps in Internet use between senior age groups, and Table 5 shows the predicted probabilities of Internet use among seniors. The results in Table 5 are based on a multivariate regression model that accounts for age, gender, employment status, household size, education, rural or urban residence and self-reported health.

Table 4
Proportions of Internet use by age cohort, 2007 to 2016

	2007	2010	2013	2016
		percent		
Seniors (aged 65 and older)	32.2	46.0	52.4	68.2
Age (years)				
65 to 69	47.0	66.2	69.5	84.9
70 to 74	35.5	50.8	59.5	75.3
75 to 79	25.2	35.8	43.2	62.2
80 and older	15.5	23.1	28.5	40.8

Source: Statistics Canada, General Social Survey, 2007, 2010, 2013 and 2016.

The bivariate relationship between age and Internet use (Table 4) remained strong when the selected covariates were controlled for. It is clear that age itself was the primary variable driving the age gradient in Internet use observed from 2007 to 2016. However, the differences in the percentage gaps between the bivariate and multivariate tables also demonstrate that the selected sociodemographic covariates contributed to the unadjusted age gradients in Table 4. Adjusting for these variables in Table 5 considerably reduced the gaps in Internet use among seniors at each time point.

Table 5
Predicted probability of Internet use by seniors across sociodemographic characteristics,
2007 to 2016

Sociodemographic characteristics	2007	2010	2013	2016
	percent			
Age (years)				
65 to 69 ¹	40.8	58.9	63.3	81.3
70 to 74	35.1 ***	49.7 ***	58.2 **	73.7 ***
75 to 79	28.3 ***	39.8 ***	46.4 ***	63.8 ***
80 and older	19.3 ***	29.4 ***	35.7 ***	49.2 ***
Gender				
Male ¹	34.4	48.4	52.4	69.3
Female	30.3 ***	44.1 ***	52.3	67.4
Employment				
Currently employed ¹	39.4	54.6	60.3	71.9
Not employed	31.1 ***	44.9 ***	51.3 ***	67.9
Household size				
Unattached ¹	27.7	39.6	47.0	62.7
Living with others	33.8 ***	48.4 ***	54.6 ***	70.6 ***
Highest level of education				
Less than a high school diploma ¹	16.4	21.9	27.9	46.2
High school diploma	30.7 ***	46.2 ***	52.3 ***	69.1 ***
Postsecondary below bachelor's degree ²	41.4 ***	54.6 ***	60.7 ***	76.7 ***
Bachelor's degree or higher	56.3 ***	69.7 ***	76.4 ***	89.0 ***
Location				
Rural ¹	30.1	43.5	50.6	68.2
Non-rural	32.7 ***	46.7 ***	52.8	68.3
Health status				
Excellent / Very good ¹	37.9	50.2	57.3	72.6
Good	30.5 ***	45.8 ***	51.2 ***	66.9 ***
Fair / Poor	22.4 ***	37.2 ***	41.7 ***	61.9 ***

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

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

1. Denotes reference category for the given variable.

2. Due to wording differences, in 2007 and 2010, this category includes a diploma/certificate from a community college or a trade/technical school, some university, some community college/CEGEP/nursing, or some trade/technical school. In 2013 and 2016 this category includes a trades certificate or diploma, college/CEGEP/other non-university certificate or diploma, or university certificate or diploma below the bachelor's level.

Source: Statistics Canada, General Social Survey, 2007, 2010, 2013 and 2016.

At all four time points, there were large differences in the predicted probability of Internet use between age groups. Compared with Canadians aged 65 to 69, all other senior age groups had significantly lower use probabilities, and these probabilities experienced a linear decline with age. In 2007, the predicted probability of Internet use among seniors aged 65 to 69 was 40.8%, compared with 35.1% for seniors aged 70 to 74, 28.3% for seniors aged 75 to 79 and 19.3% for seniors aged 80 and older. While the probability of Internet use increased for all seniors from 2007 to 2016, the absolute gap in Internet use between the youngest and oldest senior groups actually increased, despite the relative gaps between them having declined. For example, the absolute gap between seniors aged 65 to 69 and seniors aged 80 and older stood at 21.5 percentage points in 2007 but increased to 32.1 percentage points in 2016.

Over time, an increase in Internet use among older age groups is anticipated as younger people age. For example, the comparatively higher Internet use rates of those aged 70 to 74 years in 2007 could be expected among the 80 and older age group in 2016. If the diffusion of Internet use purely reflects levels of “generational openness” to Internet use, it could be assumed that age differences in Internet use will eventually disappear as younger people grow old (Gilleard and Higgs 2008, under “Introduction”).

Pre-retirement Internet use is a key factor in Internet use and non-use among seniors. People with pre-retirement exposure to computers are nine times more likely to be online than seniors

without pre-retirement exposure (Friemel 2016). The widening gap in Internet use between seniors aged 65 to 69 and seniors aged 80 and older observed in Table 5 is likely because of differences in workplace exposure to the Internet. In 2007, the difference in Internet exposure between these age groups was likely smaller than it was in 2016. Many seniors aged 65 to 69 in 2016 would have been working in 2007 and exposed to the Internet at work, while most seniors aged 80 and older in 2016 would have retired before the Internet became mainstream in the workplace, limiting their exposure to it. In contrast, the youngest and oldest seniors in 2007 all would have been retired before or around the time the Internet became mainstream. Therefore, there was a bigger difference in pre-retirement exposure to the Internet between younger and older seniors in 2016 than between these age groups in 2007.

It might be overly optimistic to assume that age differences will completely disappear over time because health-related issues in old age can lead to former “onliners” becoming “offliners” (Friemel 2016, 317). Technology and web page designs pose an age-related barrier that reduces access for seniors with functional limitations, such as changes in visual acuity, manual dexterity and cognitive ability (Charness and Boot 2009; Smith 2014). However, the results from this study have shown that age differences in Internet use remain after controlling for self-reported health status. Moreover, the 2012 CIUS reported that less than 1% of Canadian seniors stated that disabilities are a reason for not using the Internet.

6 Sociodemographic factors

Until recently, there were significant gender differences in Internet use among seniors, with a predicted use probability of 48.4% for men and 44.1% for women in 2010, after controlling for other sociodemographic characteristics. As of 2016, the predicted probabilities stood at 69.3% for men and 67.4% for women, a small and statistically non-significant difference.

Internet use often occurs in the workplace, making employment status an important predictor of Internet use among seniors. In 2007, 39.4% of seniors employed at the time of the GSS were Internet users compared with 71.9% of seniors employed in 2016. The difference in Internet use between employed and unemployed seniors declined over time, dropping to a statistically non-significant difference in 2013. This likely reflected the diffusion of Internet from the workplace into a greater number of households over time.

Across all periods, living with others was associated with a higher predicted probability of Internet use than living alone.

Education was a strong predictor of Internet use, but the absolute differences between educational groups have declined over time, except for seniors with less than a high school diploma. In 2007, 56.3% of Canadian seniors with a university education were Internet users, compared with 16.4% of seniors without a high school diploma, a gap of almost 40 percentage points. In 2016, the Internet use rates for these two educational groups were 89.0% and 46.2% respectively, a gap of about 43 percentage points. The gaps between university-educated seniors and seniors with postsecondary below bachelor’s degree and high school graduates were smaller and declined over time, but were still substantial and statistically significant in 2016

Until 2010, there were significant differences in Internet use between seniors living in rural and non-rural locations.⁶ This difference declined over time and was non-significant by 2013. In 2016, the predicted probabilities of Internet access were essentially the same (at 68%) for seniors in rural and non-rural areas. Rural Internet infrastructure, while still lacking compared to the rest of Canada, has seen steady improvements over the time period examined in this study (CRTC 2011; CRTC 2019).

6. Rural was defined as areas that fall outside population centres. Population centres have at least 1,000 residents and a population density of 400 people or more per square kilometre.

Health status is an important predictor of Internet use. Better self-reported health was a consistently higher predictor of Internet use, though its influence lessened somewhat from 2007 to 2016. The gap between respondents with very good or excellent self-reported health and poor or fair self-reported health was 15.5 percentage points in 2007 and 10.7 percentage points in 2016. This was because of stronger growth in Internet use among seniors who had poor or fair health—39 percentage points in nine years—versus 35 percentage points for seniors reporting excellent or very good health. However, a gap of over 10 percentage points between these groups remained in 2016.

Data limitations in the GSS prevented household income from being included as a control variable in the comparisons of changes in Internet use. However, the 2016 GSS is linked with tax-file data and allows the association of income and age gaps in Internet use to be examined for that year. Adding income to the model resulted in little change to the gaps discussed above (Table 6). However, income was itself an important predictor of Internet use, which tends to decline at lower levels of income. For seniors with a household income between \$60,000 and \$79,999, the probability of Internet use was 73.0%, compared with 54.1% among seniors with incomes under \$20,000 and 79.4% among seniors with incomes of \$100,000 and over.

Table 6
Predicted probability of Internet use by seniors across sociodemographic characteristics including household income, 2016

Sociodemographic characteristics	2016 (no income)	2016 (income)	Difference
		percent	
Age (years)			
65 to 69 ¹	81.3	81.4	-0.1
70 to 74	73.7 ***	74.0 ***	-0.3
75 to 79	63.8 ***	63.3 ***	0.5
80 and older	49.2 ***	49.2 ***	0.0
Gender			
Male ¹	69.3	69.2	0.1
Female	67.4	67.5	-0.1
Employment			
Currently employed ¹	71.9	69.4	2.5
Not employed	67.9	68.1	-0.2
Household size			
Unattached ¹	62.7	66.7	-4.0
Living with others	70.6 ***	69.0	1.6
Education			
Less than high school diploma ¹	46.2	49.4	-3.2
High school diploma	69.1 ***	69.8 ***	-0.7
Postsecondary below bachelor's degree ²	76.7 ***	76.0 ***	0.7
Bachelor's degree or higher	89.0 ***	86.8 ***	2.2
Household income			
Less than \$20,000 ¹	...	54.1	...
\$20,000 to under \$40,000	...	63.7 *	...
\$40,000 to under \$60,000	...	68.4 ***	...
\$60,000 to under \$80,000	...	73.0 ***	...
\$80,000 to under \$100,000	...	69.7 ***	...
\$100,000 and over	...	79.4 ***	...
Location			
Rural ¹	68.2	68.8	-0.6
Non-rural	68.3	68.1	0.2
Health status			
Excellent / Very good ¹	72.6	72.3	0.3
Good	66.9 ***	66.9 ***	0.0
Fair / Poor	61.9 ***	62.9 ***	-1.0

... not applicable

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

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

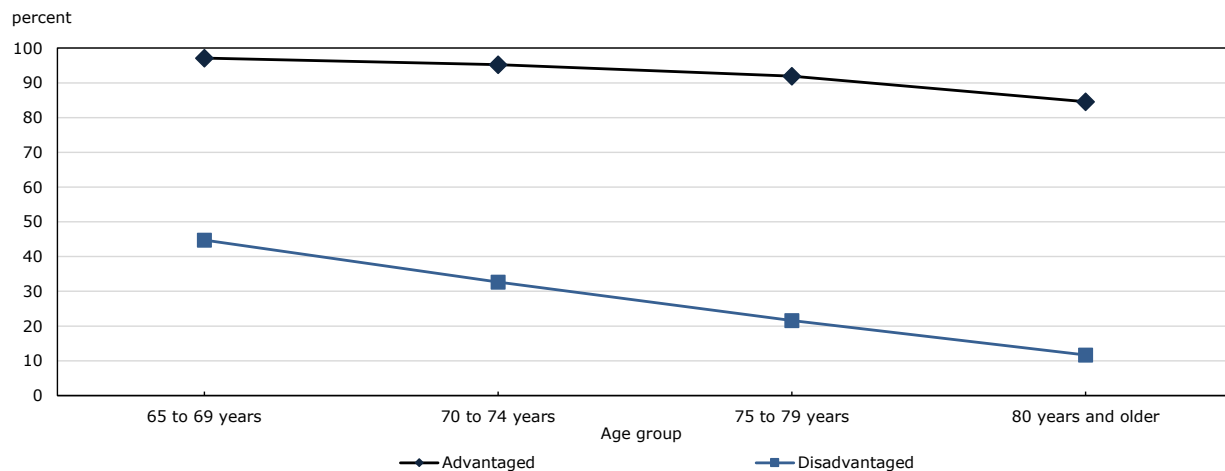
1. Denotes reference category for the given variable.

2. In 2016, this category includes a trades certificate or diploma, college/CEGEP/other non-university certificate or diploma, or university certificate or diploma below the bachelor's level.

Source: Statistics Canada, General Social Survey, 2016.

To help illustrate the magnitude that multiple sociodemographic factors can have among seniors, hypothetical advantaged and disadvantaged seniors were compared, by age, in terms of predicted probabilities of Internet use in 2016. An 'advantaged senior' refers to a senior with a university education, in very good or excellent health and living with at least one other person. A 'disadvantaged senior' refers to a senior without a high school diploma, in poor or fair health and living alone. Chart 2 presents the predicted probabilities for both disadvantaged and advantaged seniors in 2016 across age groups.

Chart 2
Predicted probability of Internet use for seniors by education, health status and household status, 2016



Note: An 'advantaged senior' refers to a senior with a bachelor's degree or higher, reporting very good or excellent health and living with at least one other person. A 'disadvantaged senior' refers to a senior with less than a high school diploma, reporting poor or fair health and living alone.
Source: Statistics Canada, General Social Survey, 2016.

Among young seniors (aged 65 to 69), the predicted probability of Internet use is 44.8% for disadvantaged seniors and 97.1% for advantaged seniors. Advantaged seniors have near-saturation Internet use rates and are indeed much more similar to non-seniors than all other seniors concerning Internet use. There is also a stark difference between disadvantaged and advantaged seniors in the relationship between aging and Internet use. At age 80 and older, the probability of Internet use drops to 11.7% among the disadvantaged group, but stands at 84.6% among the advantaged group. While the decline is far steeper among the disadvantaged group, the fact that Internet use also declined (about 13 percentage points) among the advantaged group supports the notion that factors intrinsic to the aging process can contribute to former online users becoming offline at older ages. The reasons for this age-related decline does not appear to be the onset of age-related functional limitations since the advantaged group includes seniors in very good or excellent health. Perhaps even these older, advantaged seniors would not have been exposed to the Internet prior to retirement, however that cannot be pinpointed from this analysis.

7 Conclusion

From 2007 to 2016, Canadian seniors were less likely than non-seniors to be Internet users, but the gap between these groups decreased substantially over this period, from a 49-percentage-point difference in usage rates to a 28-percentage-point difference. The percentage of seniors who accessed the Internet grew from 32.2% in 2007 to 68.2% in 2016.

It is likely that age disparities in Internet use will continue to decline as younger Canadians, who are almost all Internet users, become seniors (Veenhof and Timusk 2009). The findings of the present study support the perspective that current age differences in Internet use largely represent differences in sociodemographic characteristics and pre-retirement exposure to the Internet. Age gaps in Internet use (i.e., the grey divide) are, therefore, “a matter of historical contingency” rather than a pure function of age itself (Gilleard and Higgs 2008, under “Introduction”). However, factors intertwined with the aging process also seem to have negative effects on Internet use.

Internet use among current seniors is mainly a question of regular users versus non-users, since there are few casual users among them. Whether non-users are have-nots or want-nots is an open question. As discussed previously, there is some evidence that seniors, especially older seniors, have limited motivation to use the Internet, seeing it as a young person’s domain with little relevance to their own needs and interests. But this apparent age-related disinterest could reflect a lack of knowledge about what the Internet has to offer. This is a potential area for intervention (Peacock and Künemund 2007). Seniors can benefit from Internet use in multiple respects. Online resources such as social networking, delivery of groceries and other necessities and leisure activities can help seniors stay connected and prevent social isolation (Millward 2003). The Internet is also a good source of information for retirement planning and information about health conditions and self-care, and can therefore promote healthy aging (Veenhof and Timusk 2009).

If most seniors prefer using the Internet in the comfort of their own homes to using it in public settings, then equipment costs could still be a have-not issue, despite policy attempts to make broadband access universal. The 2012 Canadian Internet Use Survey shows that the majority of seniors who access the Internet do so from their own homes. Data from the 2016 General Social Survey indicate that 22.6% of Canadian seniors (compared with 2.1% of non-seniors) do not own a device capable of connecting them to the Internet. Studies from other countries confirm that costs remain barriers to Internet use among seniors (Friemel 2016; Peacock and Künemund 2007).

Ageism is another factor that could be suppressing Internet use among Canadian seniors. Some seniors are uncomfortable using information and communications technology despite having physical access to it. Lagacé et al. (2015) found that age-related stereotypes influence seniors’ Internet use because they affect how seniors perceive themselves and their capabilities. For example, ageist stereotypes about seniors’ competence and their learning abilities can diminish their self-efficacy, which tends to make them more hesitant and more anxious to adopt new technologies.

The key message is that the “grey divide” in Internet use needs to be reframed as an age gradient. Framing age differences in Internet use as a grey divide between non-seniors and seniors can conceal inequalities within the senior population that need special attention (Friemel 2016, 314). Although all seniors have lower Internet use rates than non-seniors, the size of the gap depends on age. The gap for young seniors is far smaller than it is for older age groups. Moreover, the age gradient among seniors itself depends on factors such as education, health status and living arrangements. Among seniors with these more advantaged characteristics, Internet use is at near-saturation rates for young seniors. Although Internet use decreases with age, it remains comparatively high in the older age groups as well. For disadvantaged seniors, Internet use is far lower among young seniors and sharply declines among older groups. These results confirm that Internet access is unevenly distributed within the older population.

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