

Healthy Grandparenthood: How Long Is It, and How Has It Changed?

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Abstract Healthy grandparenthood represents the period of overlap during which grandparents and grandchildren can build relationships, and grandparents can make intergenerational transfers to younger kin. The health of grandparents has important implications for upward and downward intergenerational transfers within kinship networks in aging societies. Although the length of grandparenthood is determined by fertility and mortality patterns, the amount of time spent as a *healthy* grandparent is also affected by morbidity. In this study, we estimate the length of healthy grandparenthood for the first time. Using U.S. and Canadian data, we examine changes in the length of healthy grandparenthood during years when grandparenthood was postponed, health improved, and mortality declined. We also examine variation in healthy grandparenthood by education and race/ethnicity within the United States. Our findings show that the period of healthy grandparenthood is becoming longer because of improvements in health and mortality, which more than offset delays in grandparenthood. Important variation exists within the United States by race/ethnicity and education, which has important implications for family relationships and transfers.

Keywords Grandparenthood · Intergenerational relations · Population aging · Sullivan method

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Introduction

Changes in fertility and mortality shift the age at which we transition into different family roles and the length of time that our lives overlap with those of our kin. Because of fertility postponement over multiple generations, adults in North America and Europe are now becoming grandparents later in life than ever before (Leopold and Skopek 2015a; Margolis 2016). However, this later transition to grandparenthood may be offset by gains in longevity, which increase the time spent as a grandparent (Margolis 2016). Postponed grandparenthood and longer lives mean that generational overlap occurs later in the lives of grandparents, when health concerns are more common.

When the period of generational overlap occurs, how long it lasts, and how many of those years are spent healthy together affect the significance, experience, and activities performed during grandparenthood as well as the direction of intergenerational transfers. Grandparenthood is reported to be one of the most satisfying parts of older age (Lye 1996), and this role may be most fulfilling during healthy years, when grandparents can be active in grandchildren's lives. Grandparents can aid in grandchildren's cognitive achievement and personal development (Chan and Boliver 2013; Silverstein and Ruiz 2006), but the degree of interaction is determined by the health status of the older generation. The health of grandparents also affects intergenerational family dynamics because it determines whether they are providers or recipients of transfers.

The time spent as a healthy grandparent depends on fertility timing, life expectancy, and morbidity. Each of these factors varies across national contexts, social groups, and time, which leads to differences in the demography of healthy grandparenthood within and across countries, populations, and historical time. In this article, we estimate the length of *healthy* grandparenthood for the first time. We examine the length of healthy grandparenthood in the United States and Canada as well as how it has changed over time. Then, we examine how healthy grandparenthood varies within the U.S. population by education and race/ethnicity. This article provides a base of knowledge about the demography of healthy grandparenthood and discusses the demographic assumptions made in its estimation.

Background

Healthy Grandparenthood Across Historical and National Contexts

Patterns of mortality and the timing of childbearing among two generations determine the length of time that people spend as grandparents. Fertility postponement since the 1960s has delayed the transition to grandparenthood across cohorts (Leopold and Skopek 2015a; Margolis 2016) despite past expectations that the length of grandparenthood would continue to increase because of gains in longevity (Murphy 2011; Uhlenberg 1996). Leopold and Skopek (2015a) examined transitions to grandparenthood across the 1929–1958 birth cohorts in East and West Germany, finding that grandparenthood had been delayed by about three months per year across succeeding cohorts. Among women, the age of transition to grandparenthood shifted from late 40s to mid-50s in East Germany and from mid-50s to early 60s in West Germany. Among men, the age at transition to grandparenthood moved from early 50s to mid-50s in East

Germany and from late 50s to mid-60s in West Germany. Margolis (2016) documented even larger delays in the timing of grandparenthood in Canada. She found that the age at which one-half of women and men become grandparents increased by about 10 years between 1985 and 2011 (from mid-40s to mid-50s among women and from early 50s to early 60s among men) (Margolis 2016).

Several other studies have estimated the timing of the transition to grandparenthood in different countries, but these studies did not examine change over time or use a universal method. Mean ages at the transition to becoming a grandmother and grandfather were, respectively, 46 and 49 in the early 1990s in the United States (Szinovacz 1998); in Europe, these ages range from 46 and 49 in Ukraine to 57 and 58 in Switzerland (Leopold and Skopek 2015b). The estimates from the United States are based on those with grandchildren in the 1992–1994 National Survey of Families and Households (NSFH) and exclude those who did not yet have grandchildren. The European estimates come from a variety of surveys conducted in the early 2000s and are based on survival estimates among those with a child at least 16 years of age (Leopold and Skopek 2015b). The timing of grandparenthood is being studied in a variety of contexts, but analyses of different birth cohorts, analytic samples, and the use of varied estimation techniques have made it difficult to compare results across contexts and cohorts.

Very few studies have documented the duration of the grandparent role and the extent to which gains in longevity balance the postponement of grandparenthood. Only two studies have addressed the *length* of grandparenthood. First, Leopold and Skopek (2015b) estimated the average length of grandparenthood in 25 countries by subtracting the median age at grandparenthood from life expectancy at birth for the year 2000. This measure varies from 21 years in West Germany and for Spanish men, to 35 years in East Germany and among American women. However, this measure does not have a straightforward demographic interpretation. Second, Margolis (2016) considered the length of grandparenthood in Canada by estimating the period life expectancy for the grandparent state and found it to be 24 years for women and 19 years for men. This measure has a straightforward demographic interpretation: the expected number of years that one will spend in the grandparent state if he/she experiences the levels of grandparenthood and mortality of that period.

The length of *healthy* grandparenthood is perhaps more important than the overall length of grandparenthood for understanding the experience of grandparents and their families. Grandparenthood may be most fulfilling when grandparents can be active with grandchildren and facilitate grandchildren's development (Chan and Boliver 2013; Silverstein and Ruiz 2006). The health of grandparents also likely affects the direction of intergenerational resources transferred within families (Aassve et al. 2012; Grundy 2005; Hank and Buber 2009; Igel and Szydlik 2011).

The determinants of healthy grandparenthood—mortality, fertility, and morbidity—vary across countries. Improvements in life expectancy have occurred every year to date in both the United States and Canada, and Canadian life expectancy has been one to two years longer than in the United States since the 1960s (Human Mortality Database n.d.). Canadian mortality is on par with that of France and several central European countries, while the United States has the shortest life expectancy relative to most Western countries (Human Mortality Database n.d.). Mean age at first birth has been rising in both the United States and Canada since the early 1960s in Canada and early 1970s in the United States. In the United States, mean age at first birth was 26.8 in 2014, up from 22.3 in 1960.

The timing of fertility in Canada is similar to many European countries, with the mean age at first birth being 28.5 in 2011, up from 23.6 in 1960 (Human Fertility Database n.d.). Finally, when considering morbidity, years without disability have increased over the last several decades in both the United States and Canada, but the increase in healthy years has been slightly larger for Canada than the United States (Salomon et al. 2012). In both countries, gains in life expectancy have not been made up entirely of healthy years; both disability-free years and years with chronic conditions have increased (Crimmins and Beltrán-Sánchez 2011; Crimmins and Saito 2001; Mandich and Margolis 2014; Martel and Bélanger 1998; Roberge et al. 1999; Salomon et al. 2012). Moreover, the extent to which morbidity is being compressed in older age can depend on the measure of health used (Crimmins 1996; Crimmins and Beltrán-Sánchez 2011; Parker and Thorslund 2007). Crimmins and Beltrán-Sánchez (2011) reported that disability-free life expectancy has been consistently shown to be increasing since the 1980s. Trends in self-rated health over time, however, have been more ambiguous (Salomon et al. 2009). We do not know the extent to which changes in fertility and mortality, which affect the timing and length of grandparenthood, are counterbalanced by changes in morbidity across different contexts. We also do not know how estimates of healthy grandparenthood may be affected by the measure of health used.

Variation in Healthy Grandparenthood by Race/Ethnicity and Education in the United States

The demographic changes that affect the timing, length, and health of grandparenthood are not uniform across the U.S. population. Not only are large differences in fertility, mortality, and health evident between countries, but these factors also vary markedly by race/ethnicity and educational attainment. Thus, the demography of healthy grandparenthood is also likely to differ across racial/ethnic groups and educational levels.

First, differential fertility patterns lead to large racial/ethnic and educational differences in the *timing* of grandparenthood. On average, U.S. black and Hispanic women become parents earlier than non-Hispanic white women (Matthews and Hamilton 2009). Second, the more-educated also have higher median ages at first birth, which affects spacing between generations (Yang and Morgan 2003). These differences compound across generations, leading to shorter generational length among blacks and Hispanics and less-educated families than non-Hispanic whites and highly educated families (Swartz 2009; Szinovacz 1998) as well as more generations of living kin available to less-educated and Hispanic middle-aged Americans (Matthews and Sun 2006; Margolis and Wright 2016). For example, a recent study of Americans aged 50 or older showed that two-thirds of blacks and Hispanics have grandchildren compared with only 59 % of non-Hispanic whites (Stykes et al. 2014a). Using data from the 1992–1994 NSFH, Szinovacz (1998) found that non-Hispanic white men become grandparents an average of nine years later than black women. Differences by educational attainment are even more dramatic. More than three-quarters of Americans aged 50 and older without a high school education were grandparents in 2008, compared with only 43 % of Americans of the same age with a college degree (Stykes et al. 2014b).

Longevity also varies considerably by race/ethnicity and education in the United States (Brown et al. 2012; Elo and Preston 1996; Matthews and Sun 2006). Mortality is lowest among Hispanics, followed by non-Hispanic whites, and then non-Hispanic

blacks (Borrell and Lancet 2012). Moreover, those with higher educational attainment have lower mortality than the less-educated (Brown et al. 2012). These well-documented racial/ethnic and educational differences in mortality may shorten the length of grandparenthood among groups with higher mortality if their higher mortality outweighs earlier childbearing.

In addition to fertility and mortality, health and disability-free life expectancy also vary greatly by race/ethnicity and education (Crimmins and Saito 2001; Crimmins et al. 1996; Mendes de Leon et al. 2005). Blacks report both higher levels and earlier onset of disability than other subpopulations in the United States (Mendes de Leon et al. 2005). Non-Hispanic whites have the longest disability-free life expectancy, while blacks have longer life expectancy spent with disability (Crimmins et al. 1989; Hayward and Heron 1999). Differences in disability-free life expectancy by education are even greater than racial differences (Crimmins et al. 1996) and greater than educational differences in total life expectancy (Crimmins and Saito 2001). Higher levels of education are associated with both significant delays in disability and the compression of morbidity into older ages (Crimmins and Saito 2001). Moreover, educational differences in self-rated health and disability-free life expectancy have been increasing over time among middle-aged and older adults (Crimmins and Saito 2001; Liu and Hummer 2008). Thus, differences in health may lead non-Hispanic whites and the more highly educated to be healthier grandparents for longer. These differences may also potentially enable them to be more actively involved in their grandchildren's lives while also preventing them from drawing resources away from the middle generations. However, such benefits are possible only if the advantage in healthy life expectancy afforded to non-Hispanic whites and the more-educated outweighs their delayed transition to grandparenthood due to fertility postponement.

Patterns of fertility, mortality and morbidity all vary by gender. On average, women have earlier fertility, lower mortality, and higher morbidity than men. Previous research has found that the transition to grandparenthood occurs several years earlier for women than men (Dykstra and Komter 2006; Szinovacz 1998). Thus, women may have more years of overlap with grandchildren. However, the fact that women also have higher levels of disability than men in old age may equalize the length of *healthy* grandparenthood by sex and may lead to a longer period of *unhealthy* grandparenthood for women.

The Current Study

Our study provides the first estimates of the demography of healthy grandparenthood. We address (1) how the length of healthy grandparenthood and the percentage of grandparent years that are spent healthy have changed over time for men and women in the United States and Canada, and (2) how healthy grandparenthood varies within the United States by race/ethnicity and educational attainment. We conduct our analyses separately for men and women to assess gender differences in healthy grandparenthood.

Methods

We estimate remaining years of life in each state of health and grandparenthood for Canada and the United States, and within subpopulations in the United States. To do so,

we use health expectancy methods, which break down life expectancy into different states of health until death by combining information on both morbidity and mortality. We follow Sullivan's (1971), approach, which was elaborated later by Jagger et al. (2006). The estimates of life expectancy in different states reflect the number of remaining years that an individual can expect to live at a particular age. The measures are adjusted for mortality levels and are independent of age structure. Moreover, they can be used for comparison across populations or different points in time for a given population (Jagger et al. 2006). The Sullivan method has been widely used to examine whether morbidity is either being compressed or expanded as longevity increases by dividing the remaining years of life into healthy and disabled years (Crimmins and Saito 2001; Crimmins et al. 1989; Mathers et al. 2001). This is the first application of the method to healthy grandparenthood.

The Sullivan method requires two sources of data: (1) age-specific proportions of the population in different states (from surveys), and (2) age-specific mortality information from a period life table. We use survey data from three sources: the Canadian General Social Survey, the U.S. NSFH, and U.S. Health and Retirement Study (HRS). (More details about each data source are in the upcoming Data section.) With these surveys, we estimate weighted cross-tabulations of grandparenthood status and health status by age and sex. The first set of tabulations focus on change over time within Canada (1985; 2011) and the United States (1992–1994; 2010). The second set of tabulations focus on race/ethnicity and education within the United States. We tabulate the prevalence of five grandparent states in each age/sex group: (1) healthy and grandchildless, (2) unhealthy and grandchildless, (3) healthy grandparent, (4) unhealthy grandparent, and (5) missing health or grandparent data. The second source of data used are life tables collected from the Human Mortality Database, Statistics Canada, Brown et al. (2012), and Arias (2010). We use the following three columns of the life table: e_x (remaining years of life at age x), ${}_nL_x$ (the number of person years lived in each age interval (x to $x + n$)), and l_x (survivorship to each age).

The length of time in each of the five states that we estimate (healthy grandchildless, unhealthy grandchildless, healthy grandparent, unhealthy grandparent, and missing) sums to life expectancy at age x . To compute the length of these states, we first multiply the total number of person-years lived in each age group from the life table (${}_nL_x$) by the proportions of that age group spent in each health/grandparenthood state (π_x) (Eq. (1)). For example, person-years spent as a healthy grandparent are calculated as the proportion in each age group that are healthy grandparents multiplied by the number of person-years lived in the age interval.

$$(\pi_x \times {}_nL_x). \quad (1)$$

Second, we sum the total number of person-years lived past each age in each health/grandparent state (Eq. (2)). The sum of this across all five groups is T_x of the life table, which accounts for total number of person years lived above age x .

$$\sum(\pi_x \times {}_nL_x) \quad (2)$$

from age x to infinity. Third, we estimate the number of remaining years as a healthy grandparent and years in each of the other four states by taking the total number of

person-years lived above age x in that state and dividing it by the number surviving to age x (l_x):

$$\sum(\pi_x \times {}_nL_x)/l_x. \quad (3)$$

Last, 95 % confidence intervals are estimated for each of the five states (Jagger et al. 2006).

Period life expectancy as a healthy grandparent has a straightforward demographic interpretation: it is the number of years that a hypothetical cohort of individuals could expect to live if they experienced each of the different states of health and grandparenthood across all ages observed in the period data. It makes the same assumption of stationarity as period life expectancy at birth (Imai and Soneji 2007). However, period life expectancy assumes only that the hypothetical cohort transitions through the observed states of alive/dead from that period. Healthy life expectancy requires an additional assumption, which is that the hypothetical cohort experiences the health and mortality conditions observed in that period, and the comparable transition probabilities. For healthy grandparenthood, we assume that a hypothetical cohort would experience the health, grandparenthood, and mortality conditions of that period as well as the transition probabilities between the states observed in the period data. Some discrepancy will always exist between the period measure and an actual cohort except in the case that all population characteristics are stable in time (Jagger et al. 2006). Using demographic techniques to create a period measure is necessary because comparable cohort measures of healthy grandparenthood cannot be estimated. To do so would require longitudinal data on health and grandparenthood over a long period until the cohort expires. Thus, estimating comparable cohort measures would be possible only for historical cohorts, not contemporary ones.

Multistate life tables are another method of estimating expectancies in different periods. These draw on large longitudinal data sets to estimate state transitions rather than states observed in a given period.¹ Multistate life tables have been found to provide similar estimates of healthy life expectancy as those found using the Sullivan method when all transition rates are smooth and regular over time (Mathers and Robine 1997; Robine and Mathers 1993). In the case of healthy grandparenthood, changes in grandparenthood, health, and mortality have been rather smooth, increasing the likelihood that this method provides a relatively good estimate of the period value of grandparenthood. However, if incidence rates between states of health or grandparenthood change rapidly, then discrepancies can arise because the prevalence of health/grandparenthood at older ages reflects the past probabilities of becoming ill or a grandparent (Mathers 1991). A rapid increase in the mean age at first birth could quickly lower the proportion of grandparents in middle age, which would lead to an overestimation of the time spent as a healthy grandparent with the Sullivan method.

¹ We use data from two panel studies here (HRS; NSFH), but we treat them as cross-sectional because we are focusing on estimating changes over time and differences within subpopulations in healthy grandparenthood. The Sullivan method allows us to address our research questions. A multistate analysis would need to be focused on the entire United States over the period of the HRS because even this large study is likely not large enough to estimate transition probabilities for health and grandparenthood by subpopulations or time periods.

Data

Our analysis draws on data from U.S. and Canadian surveys and life tables. Table 1 presents the data used for each part of the study. Our analysis of changes in healthy grandparenthood over time in Canada draws on the 1985 and 2011 Canadian General Social Survey (GSS) as well as life tables by sex for the corresponding years. The GSS is an annual cross-sectional survey conducted by Statistics Canada to gather data on social trends. The 1985 survey was the first to include questions about grandparenthood and health, and the 2011 wave is the most recent survey with this information. The GSS is representative of all persons aged 15 or older in Canada, excluding those residing in the Yukon and Northwest Territories (0.22 % of the 2011 population) and those who are full-time residents of institutions (approximately 0.02% of 2011 population) (Statistics Canada 2013, 2014a). Surveys are weighted to account for the two different stratified sampling designs used and nonresponse.

One major strength of the GSS is the ability to identify early transitions to grandparenthood because the study asked respondents of *all* ages whether they had grandchildren. Another strength is the ability to compare healthy grandparenthood at two points in time that span a 26-year period. However, sample sizes in the GSS do not permit the examination of within population differences in the length of healthy grandparenthood in Canada. The 1985 life tables were obtained from the Human Mortality Database (n.d.). The 2011 life tables were calculated by Statistics Canada's Demography Division in a special tabulation for the researchers (Statistics Canada 2014b).

For analysis of changes in healthy grandparenthood over time in the United States, our study uses the NSFH, HRS, and life tables. The NSFH 1992–1994 is a survey of American family life and provides the earliest nationally representative estimates of grandparenthood and health.² The HRS is a longitudinal aging study, which also provides nationally representative estimates of grandparenthood, demographic characteristics, and the health status of older Americans. To examine change over time in healthy grandparenthood between 1992–1994 and 2010, we use the 1992–1994 NSFH and the RAND Family and RAND HRS data files (1998, 2010), the earliest and most recent years for which nationally representative family data are available. Moreover, with the HRS (1998, 2010), we test the comparability of our results when we use two different measures of health (disability and self-rated health) and grandparenthood (including grandchildren from biological children only compared with all children). The weakness of these data is that the HRS does not capture grandparents younger than age 50, who are more likely to be black or Hispanic and are more likely to be healthy. The U.S. life tables used in the analysis are by sex and come from the Human Mortality Database for the corresponding years 1993 (for the NSFH 1992–1994), 1998, and 2010 (Human Mortality Database n.d.).

Finally, to examine how the demography of healthy grandparenthood varies across subgroups in the United States, we analyze the HRS and life tables by sex, race/ethnicity, and education. The HRS is large enough to allow this subgroup analysis because it oversamples Hispanics and blacks.³ We include respondents interviewed

² The HRS was not nationally representative of those older than 50 until 1998.

³ The GSS and NSFG are not large enough to permit subgroup analysis.

Table 1 Data sources used for the analysis of healthy grandparenthood

	Canada: Over Time	United States: Over Time	United States: By Educational Attainment	United States: By Race/Ethnicity
Source for Survey Data on Grandparents and Health, Years of Analysis	Canadian General Social Survey, 1985, 2011	NSFH Wave 2, 1992–1994; HRS 1998, 2010	HRS native-born respondents 1992–2006	HRS 1998–2010
Source for Life Tables	Human Mortality Database 1985, Statistics Canada 2011	Human Mortality Database: 1993, 1998, 2010	Estimated by Brown et al. for 2012 <i>Demography</i> paper for native-born HRS respondents 1992–2006	Arias (2010) U.S. Life Tables by Hispanic Origin for year 2006 (NCHS)
Ages of Respondents	Ages 20+	1992–1994 Age 20+; 1998 and 2010, Ages 50+	Ages 50+	Ages 50+
Measure of Health	Self-rated health “In general, would you say your health is excellent, very good, good, fair, or poor?”	NSFH: Self-rated health “Compared with other people your age, how would you describe your health? Very poor, poor, fair, good, excellent?” HRS: Self-rated health “Would you say your health is excellent, very good, good, fair, or poor?”	Self-rated health “Would you say your health is excellent, very good, good, fair, or poor?”	Self-rated health “Would you say your health is excellent, very good, good, fair, or poor?”
Measure of Grandparenthood	Self-reported number of grandchildren	1992–1994 NSFH: Self-reported number of grandchildren; 2010 HRS: Respondent’s number of children (includes step- and adopted children)	Respondent’s children’s number of children (includes step- and adopted children)	Respondent’s children’s number of children (includes step- and adopted children)
Sensitivity Analysis: Disability as Health Measure	No	1992–1994; No; 1998, 2010: Yes	Yes	Yes
Sensitivity Analysis: Grandchildren From Biological Children Only	No	1992–1994; No; 1998, 2010: Yes	Yes	Yes

either directly or through proxy who were aged 50 and older, using the years where the survey is representative of the population aged 50 and older. Life tables by sex, race, and Hispanic identity are published by the National Center for Health Statistics (NCHS), and we use those for the year 2006, which provide data that are closest to the midpoint of the period when the HRS was fully representative of the older population (1998–2010).

Our analysis by race/ethnicity excludes respondents from the “other” race category in the HRS (not non-Hispanic white, non-Hispanic black, or Hispanic) because the NCHS does not provide life tables for this group. Life tables by sex and educational attainment come from Brown and colleagues for the native-born U.S. population (2012). They were estimated directly from the HRS (1992–2006) using the approach outlined by Teachman and Hayward (1993). Our sample aligns with their native-born sample and study period (1992–2006).

Measures

The key measures that we examine are grandparent status, health, age, and sex. Both the Canadian GSS and the NSFH include a self-reported measure of respondents’ number of grandchildren. Respondents were not asked to distinguish between biological, step-, and adopted grandchildren; thus, this measure includes all types of grandchildren. Those reporting any grandchildren are coded as grandparents, and the few respondents with missing data are coded into a “missing” category to preserve the representativeness of the samples. The HRS includes measures of the number of children that respondents have and the number of children that these children have. We combine these measures to determine respondents’ grandparent status. Our main analyses include grandchildren from all children (e.g., biological, stepchildren, adopted), and our sensitivity analysis includes only grandchildren from biological children.

Respondents’ health is coded from a question about self-rated health asked in each survey, allowing for comparative analyses across periods and countries. A binary variable collapses the responses to differentiate those with (1) poor or fair health from those who rated it as (2) good, very good, or excellent in the Canadian GSS and the HRS. The NSFH uses slightly different response categories to capture self-rated health, which we code into a comparable binary variable combining (1) very poor, poor, or fair health and (2) good or excellent health. Missing data on self-rated health from all three sources of data is retained in a category to keep the representativeness of the sample.

We use self-rated health as our primary measure of health because comparable questions on disability were not included in the NSFH or GSS. However, we conduct additional analyses with disability for the United States using data from the 1998 and 2010 HRS. Age is coded in five-year intervals starting with the group aged 20–24 for the GSS and NSFH surveys and the group 50–54 for the HRS, and ends with those aged 80 and older in each survey.

Results

First, we examine how the percentage of men and women with grandchildren and in good health have changed over time in the United States and Canada (Fig. 1, panels a

and b, respectively). In both countries, fertility postponement across multiple generations has delayed the transition to grandparenthood. The gray dotted lines show the percentage with grandchildren at the start of the study period. The solid gray line is shifted to the right, showing that fewer adults are grandparents at comparable ages at the end of the study period. For example, 62 % of U.S. women aged 50–54 were grandparents in 1992–1994, compared with 55 % in 2010. Among U.S. men, the percentage with grandchildren has decreased among men ages 55–59, from 69 % in 1992–1994 to 53 % in 2010.

Delays in grandparenthood are more drastic among Canadians. Between 1985 and 2011, the percentage of Canadians aged 50–54 with grandchildren decreased from 58 % to 29 % among women and from 44 % to 21 % among men. If we look at the percentage with grandchildren at older ages, we see that having grandchildren at age 70 and older has become more common over time in both countries.

Both countries have seen improvements in self-rated health over the study period. The black dotted lines of Fig. 1 show the percentage in good health for the earlier period (1992–1994 for United States; 1985 for Canada), and the solid lines show the increase in the percentage in good health in 2010 for the United States and 2011 for Canada. At all ages, the percentage of U.S. women reporting good or better self-rated health increased between 1992–1994 and 2010. For example, the percentage of women aged 50–54 reporting good health increased from 72 % to 82 %. The differences over time are more dramatic at older ages; among Americans aged 80 and older, 56 % of women and 68 % of men reported good or better self-rated health in 1992–1994 compared with 69 % and 71 % in 2010. Canadians experienced similar improvements in self-rated health over the study period. Comparable descriptive figures by race/ethnicity and education for the United States, provided in Online Resource 1, Fig. S1, show well-documented differences across U.S. subpopulations: earlier transitions to grandparenthood among blacks and Hispanics relative to whites, earlier grandparenthood among those with less education, and a strong education and race/ethnic gradient in self-rated health.

Mortality has declined over the period of observation among men and women in both the United States and Canada. In the United States, life expectancy at age 50 was 26.7 years for men and 31.5 years for women in 1993 (numbers shown in upcoming Tables 2 and 3). Between 1993 and 2010, it increased by 3.0 years for men and 1.8 years for women. In Canada, between 1985 and 2011, life expectancy at age 50 increased 5.2 years for men (from 26.4 to 31.6 years) and 3.2 years for women (from 31.9 to 35.1 years).

Changes in Healthy Grandparenthood Over Time

Figure 2 presents remaining years of life from age 50 in the United States and Canada for each combination of the grandparenthood and health states by sex and year. The expected number of years as a healthy grandparent (shaded black), unhealthy grandparent (dark gray), healthy grandchildless (white), unhealthy grandchildless (light gray), and missing (striped) are charted for the years 1992–1994 and 2010 in the United States, and 1985 and 2011 in Canada. Together, these five numbers sum to the number of remaining years at age 50 from the period life table.

Figure 2 shows that despite the postponement of grandparenthood, the length of healthy grandparenthood has increased for men and women in the United States and

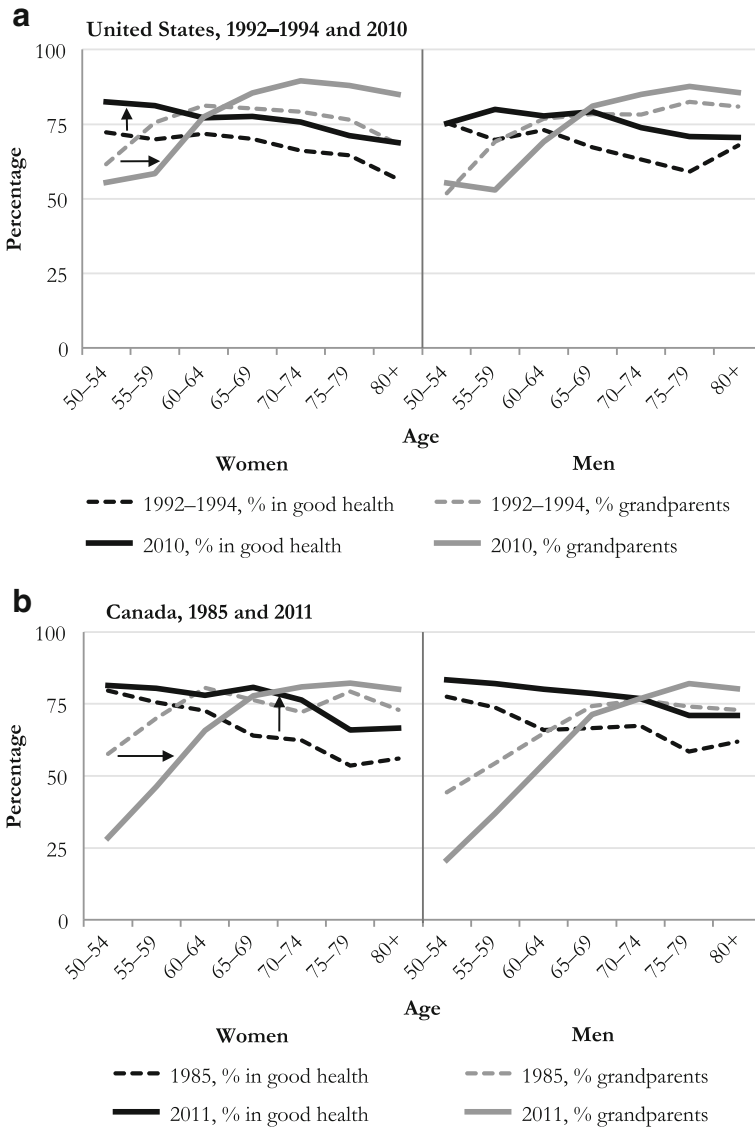


Fig. 1 Percentage with grandchildren and percentage in good health by sex

Canada. In 1992–1994, U.S. men could expect to spend 13.2 years as a healthy grandfather, which increased to 15.8 years in 2010. American grandmothers had, on average, 15.9 healthy years with grandchildren in 1993, which increased to 18.9 years in 2010. The number of healthy years overlapping with grandchildren increased for Canadian women from 15.1 years in 1985 to 17.4 years in 2011 and for Canadian men from 11.3 to 14.2 years.

The height of the bars for healthy grandparenthood (black) and unhealthy grandparenthood (dark gray) together account for the average length of grandparenthood. The

Table 2 Remaining years of life expectancy in each grandparent/health state from age 20 and 50: United States (1992–1994) and Canada (1985, 2011)

	Men		Women	
	Age 20	Age 50	Age 20	Age 50
United States (1992–1994)				
Healthy grandparent years	13.5	13.2	17.3	15.9
Unhealthy grandparent years	5.4	5.3	7.7	7.1
Healthy grandchildless years	27.2	5.2	26.6	5.4
Unhealthy grandchildless years	5.3	1.7	6.5	1.9
Missing years	2.2	1.2	1.7	1.3
Total: Remaining years at age 50	53.5	26.7	59.9	31.5
Subtotal: Grandparent years	18.9	18.5	25.0	23.0
Subtotal: Grandchildless years	32.5	6.9	33.1	7.3
% Grandparent years spent healthy	71.4	71.3	69.2	69.1
Canada (1985)				
Healthy grandparent years	11.5	11.3	16.6	15.1
Unhealthy grandparent years	6.3	5.5	8.1	8.0
Healthy grandchildless years	30.7	6.8	30.1	6.2
Unhealthy grandchildless years	5.4	2.8	5.6	2.4
Missing years	0.4	0.2	0.2	0.1
Total: Remaining years at age 50	54.3	26.4	60.7	31.9
Subtotal: Grandparent years	17.9	16.8	24.7	23.1
Subtotal: Grandchildless years	36.2	9.6	35.7	8.6
% Grandparent years spent healthy	64.2	67.3	67.2	65.4
Canada (2011)				
Healthy grandparent years	14.2	14.2	17.9	17.4
Unhealthy grandparent years	4.4	4.4	6.0	5.8
Healthy grandchildless years	36.6	10.4	34.4	9.0
Unhealthy grandchildless years	4.4	2.0	4.7	2.0
Missing years	0.8	0.6	0.9	0.7
Total: Remaining years at age 50	60.2	31.6	64.2	35.1
Subtotal: Grandparent years	18.6	18.6	23.9	23.2
Subtotal: Grandchildless years	41.0	12.4	39.1	11.0
% Grandparent years spent healthy	76.3	76.3	74.9	75.0

Notes: Grandchildren from biological and nonbiological children are included.

duration of grandparenthood has significantly increased over the study period for American men and women, and for Canadian men. In 1992–1994, American men and women were grandparents for 18.5 and 23.0 years, respectively; but by 2010, grandparenthood had increased to 21.5 and 25.4 years, respectively. Similarly, the number of years spent in the grandparent role increased from 16.8 in 1985 to 18.6 in 2011 for Canadian men. The small increase in the length of grandparenthood for Canadian women between 1985 and 2011 was not statistically significant (from 23.1

Table 3 Remaining years of life expectancy in each grandparent/health state from age 50, measuring health as self-rated health and disability: United States (1998, 2010)

	Men			Women		
	1998	2010	1998 vs. 2010	1998	2010	1998 vs. 2010
Health Measure: Self-rated Health						
Healthy grandparent years	12.9	15.8	*	16.2	19.0	*
Unhealthy grandparent years	5.9	5.7	n.s.	7.6	6.5	*
Healthy grandchildless years	6.7	6.7	n.s.	5.9	6.4	n.s.
Unhealthy grandchildless years	2.0	1.5	n.s.	2.1	1.4	*
Missing years	0.0	0.0	n.s.	0.0	0.0	n.s.
Total: Remaining years at age 50	27.6	29.7		31.8	33.3	
Health Measure: Disability						
Healthy grandparent years	16.1	17.9	*	19.4	21.1	*
Unhealthy grandparent years	2.7	3.6	*	4.4	4.4	n.s.
Healthy grandchildless years	7.8	7.3	n.s.	6.6	6.7	n.s.
Unhealthy grandchildless years	0.9	0.9	n.s.	1.4	1.1	*
Missing years	0.0	0.01	n.s.	0.01	0.01	n.s.
Total: Remaining years at age 50	27.6	29.7		31.8	33.3	

Notes: Grandchildren from biological and nonbiological children are included.

* $p < .05$

to 23.2 years). In addition to a longer period of grandparenthood in later life, older Americans and Canadians are also spending a greater proportion of their grandparent years healthy than in the past. The difference is most dramatic among Canadian men, for whom two-thirds of their grandparent years were spent healthy in 1985 compared with three-quarters in 2011.

Healthy Grandparenthood by Race/Ethnicity and Education

Figure 3 presents remaining years of life expectancy in each grandparent/health state from age 50 by race/ethnicity (left) and education (right) in the United States. Non-Hispanic white men and women in the United States experience significantly longer periods of healthy grandparenthood (15.0 years for men and 18.5 years for women) than blacks (11.3 and 13.7) or Hispanics (13.1 and 12.8).⁴ However, Hispanic men and women experience a longer period of grandparenthood (healthy and unhealthy grandparenthood combined) than their black or white counterparts due to greater longevity and an earlier transition to grandparenthood. Yet, even with the longest period of grandparenthood, Hispanics have the lowest percentage of grandparent years spent healthy. Among Hispanic men, only 53 % of their grandparent years are spent healthy (13.1 / (13.1 + 11.5)). This figure for Hispanic women is only 45 % (12.8 / (12.8 + 15.5)). Non-Hispanic black men and women have the shortest grandparent life expectancy due to higher mortality, and just 62 % (11.3 / (11.3 + 7.0)) of these years are spent

⁴ Significance tests across race/ethnicity and education groups are shown in Table 4.

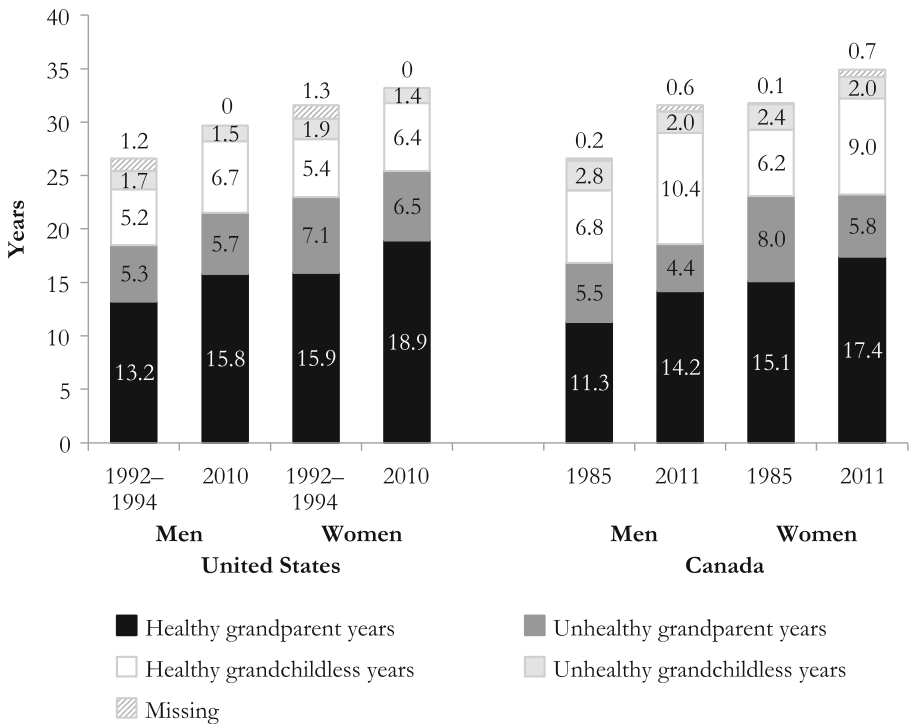


Fig. 2 Remaining years of life expectancy in each grandparent/health state at age 50, over time, by sex and country: United States 1992–1994 and 2010, and Canada 1985 and 2011. Grandchildren from biological and nonbiological children are included

healthy for men, and 57 % for women. Non-Hispanic white men and women have more years as grandparents than non-Hispanic blacks and fewer than Hispanics, but non-Hispanic whites have the longest period of healthy grandparenthood, with three-quarters of their grandparenthood years spent healthy.

Large differences also exist in the length of healthy grandparenthood across education groups in the United States. Men and women with less than 12 years of education have the shortest periods of healthy grandparenthood (11.8 years for men and 13.8 years for women). Men and women with 12 years or with more than 12 years of education have longer periods of healthy grandparenthood, and differences between these education groups are small. Men with 12 years of education spend an average of 16.1 years as a healthy grandparent, and those with more than 12 years spend 16.8 years as a healthy grandparent. Women with 12 years and more than 12 years of education spend, on average, 20.7 and 20.8 years as healthy grandmothers, respectively (differences not significant).

Across education groups, the length of grandparenthood (healthy and unhealthy combined, shown by the black and dark gray bars) is quite similar. Expected number of years as a grandparent ranges from 20.9 years to 22.1 years for men of different education levels, and from 25.8 to 27.8 years for women of different education levels. Among all educational groups, those with 12 years of education have the longest period of overall grandparenthood. We see the largest education gradient in the period of unhealthy grandparenthood, which is longest for the least-educated men and women

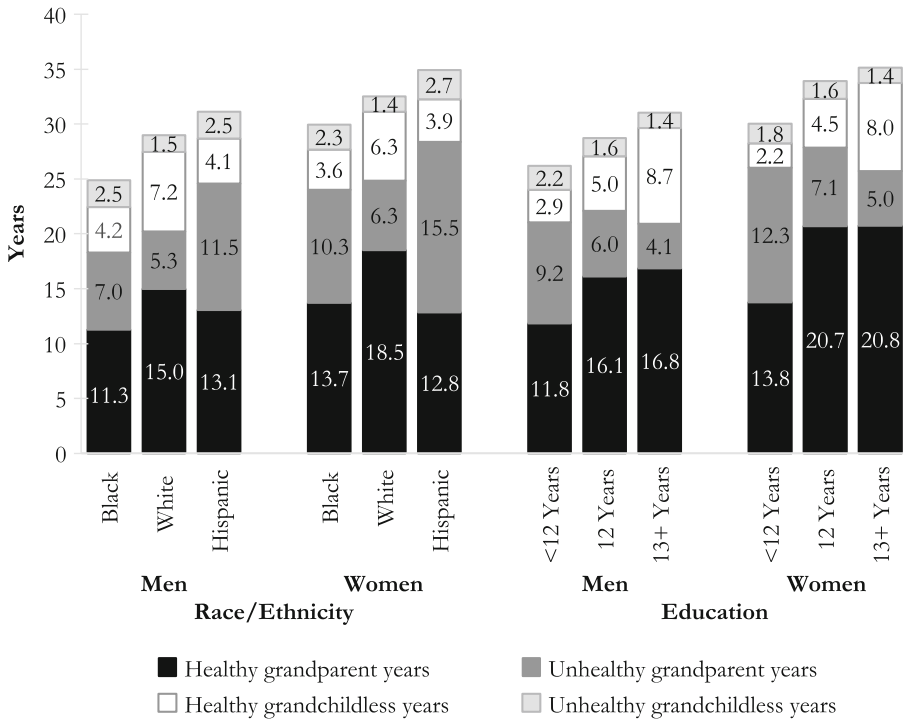


Fig. 3 Remaining years of life expectancy in each grandparent/health state at age 50 by sex, race/ethnicity (1998–2010), and educational attainment (1992–2006): United States. Missing category not shown because negligible in size. Estimates for missing category are shown in Tables 2 and 3

(9.2 years for men; 12.3 years for women) and shortest for the most-educated men and women (4.1 years for men; 5.0 years for women). The least-educated spend more years as an unhealthy grandparent, and by far, the largest proportion of their grandparent years are spent unhealthy compared with other education groups.

Sensitivity Analysis

In addition to our primary analyses, we conduct four sets of sensitivity analyses. First, we test the sensitivity of our estimates of healthy grandparenthood to the age at which healthy grandparenthood is estimated. Many aging studies are representative of the population aged 50 or 55 and older. In these studies, we do not observe grandparenthood or health status below age 50, and thus we may underestimate healthy grandparent years. To test how sensitive estimates of healthy grandparenthood are to the exclusion of the younger grandparent years, we compare estimates of expected years in each grandparent/health state with data that include younger adults. Table 2 presents remaining years of expected life from age 20 and age 50 for the United States in 1992–1994 and for Canada in 1985 and 2011.

We find that in these populations, estimates of the length of healthy grandparenthood, unhealthy grandparenthood, total grandparenthood (healthy and unhealthy), and the percentage of grandparent years spent healthy do not differ greatly depending on whether estimates start at age 20 or 50. For example, there are negligible differences in

length of the healthy grandparenthood estimates among men (0.3 years for U.S. males in 1992–1994; 0.2 years for Canadian males in 1985; and 0.0 for Canadian males in 2011). Differences are slightly larger but overall remain relatively minor among women (1.4 years difference for U.S. women in 1992–1994; 1.5 years for Canadian women in 1985; and 0.5 years for Canadian women in 2011). However, we do find larger differences for both healthy and unhealthy grandchildless years when comparing the age groups 20 and older and 50 and older. Researchers estimating healthy grandparenthood should note that among populations with substantial fertility postponement, estimates of healthy grandparenthood starting at age 50 will likely be of high quality. Differences will be much larger in populations where the transition to grandparenthood occurs earlier.

Second, we test how estimates of healthy grandparenthood and changes over time differ when health is measured as disability rather than as self-rated health. Table 3 compares remaining years of healthy grandparenthood and other states between the two measures of health for the United States in 1998 and 2010, the earliest and latest years for which we have both measures of health. The period of disability-free grandparenthood is two to three years longer than healthy grandparenthood measured with self-rated health. The length of both disability-free and healthy grandparenthood increased significantly for both men and women over the period of analysis. The gains in the length of healthy grandparenthood are larger when health is measured as self-rated health rather than as disability. Although the overall conclusions about increases in healthy grandparenthood hold for both measures, the trend is stronger for self-rated health than disability.

Third, we estimate disability-free grandparenthood by race/ethnicity and education and compare these results with those using self-rated health (Table 4). Across all groups, the period of disability-free grandparenthood is longer than healthy grandparenthood estimated with self-rated health. However, the patterns by race/ethnicity and education are largely consistent across the two measures. Table 4 notes significant differences across race/ethnicity and education for each measure of health. Comparing the patterns for disability and self-rated health by race/ethnicity and education, we find almost the same patterns and significant differences. One exception that we find across the two health measures is that when we use self-rated health, non-Hispanic white grandfathers experience the longest period of healthy grandparenthood. When we use the disability measure, however, Hispanics have the longest healthy grandparenthood. A second exception is that when self-rated health is used, the difference in the length of healthy grandparenthood between those with 12 and more than 12 years of education is small, but this difference is larger when the disability measure is used.

Last, we estimate healthy grandparenthood including only grandchildren from biological children and compare results with our main results that include grandchildren from all children (biological and nonbiological). Increasing family complexity has increased the numbers of stepchildren and step-grandchildren (Wachter 1997), and this is an important determinant of relationships between grandparents and grandchildren (Seltzer and Yahirun 2014).

Table 5 examines patterns of healthy grandparenthood by sex, race/ethnicity, and education in the United States, showing estimates for grandchildren from all types of children (top panels) and from biological children only (bottom panels). The period of healthy grandparenthood is approximately two years longer when estimated including

Table 4 Remaining years of life expectancy in each grandparent/health state from age 50, measuring health as self-rated health and disability: United States by sex and race/ethnicity (1998–2010), and United States by sex and education (1992–2006)

Health Measure: Self-rated Health	Men			Women		
	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic White	Non-Hispanic Black	Hispanic
	15.0	11.3	13.1	18.5	13.7	12.8
Healthy grandparent years	5.3	7.0	11.5	6.3	10.3	15.5
Unhealthy grandparent years	7.2	4.2	4.1	6.3	3.6	3.9
Healthy grandchildless years	1.5	2.5	2.5	1.4	2.3	2.7
Unhealthy grandchildless years	0.0	0.0	0.0	0.0	0.0	0.0
Missing years	29.0	24.9	31.2	32.6	30.0	34.9
Total: Remaining years at age 50						
Health Measure: Disability	Men			Women		
Healthy grandparent years	17.4	14.7	19.7	20.8	17.5	20.2
Unhealthy grandparent years	2.8	3.6	4.9	4.1	6.5	8.1
Healthy grandchildless years	8.0	5.5	5.3	6.7	4.5	5.1
Unhealthy grandchildless years	0.8	1.1	1.2	1.0	1.4	1.4
Missing years	0.0	0.0	0.1	0.0	0.0	0.0
Total: Remaining years at age 50	29.0	24.9	31.2	32.6	30.0	34.9
Health Measure: Self-rated Health	Men		Women			
	<12 Years	12 Years	<12 Years	12 Years		
Healthy grandparent years	11.8	16.1	16.8	20.7		
Unhealthy grandparent years	9.2	6.0	4.1	7.1		
Healthy grandchildless years	2.9	5.0	8.7	4.5		
Unhealthy grandchildless years	2.2	1.6	1.4	1.6		
Missing years	0.0	0.0	0.0	0.0		
Total: Remaining years at age 50	26.2	28.7	31.0	34.0		
			>12 Years	>12 Years		
Healthy grandparent years			20.8	20.8		
Unhealthy grandparent years			5.0	5.0		
Healthy grandchildless years			8.0	8.0		
Unhealthy grandchildless years			1.4	1.4		
Missing years			0.0	0.0		
Total: Remaining years at age 50			35.2	35.2		

Table 4 (continued)

Health Measure: Disability													
Healthy grandparent years	16.6	19.1	18.6	a, b, c	19.2	23.5	21.9	a, b, c					
Unhealthy grandparent years	4.4	3.0	2.3	a, b, c	6.8	4.3	3.8	a, b, c					
Healthy grandchildless years	4.2	5.9	9.4	a, b, c	2.9	5.1	8.5	a, b, c					
Unhealthy grandchildless years	1.0	0.8	0.8	a, b	1.1	1.1	1.0	b					
Missing years	0.0	0.0	0.0		0.1	0.0	0.0						
Total: Remaining years at age 50	26.2	28.7	31.0		30.1	34.0	35.2						

Notes: Grandchildren from biological and nonbiological children are included. Superscripted letters a, b, and c denote significant differences (at $p < .05$) across groups.

^aNon-Hispanic white versus non-Hispanic black; <12 years education versus 12 years.

^bNon-Hispanic white versus Hispanic; <12 years education versus >12 years.

^cNon-Hispanic black versus Hispanic; 12 years education versus >12 years.

Table 5 Remaining years of life expectancy in each grandparent/health state from age 50, measuring grandchildren from all children and only biological children (United States by sex and race/ethnicity 1998–2010, United States by sex and education 1992–2006)

	Men				Women			
	Non-Hispanic White		Hispanic		Non-Hispanic White		Hispanic	
	<12 years	>12 years	<12 years	>12 years	<12 years	>12 years	<12 years	>12 years
Grandchildren From Biological and Nonbiological Children								
Healthy grandparent years	15.0	11.3	13.1	13.7	18.5	13.7	12.8	a, b, c
Unhealthy grandparent years	5.3	7.0	11.5	10.3	6.3	10.3	15.5	a, b, c
Healthy grandchildless years	7.2	4.2	4.1	3.6	6.3	3.6	3.9	a, b
Unhealthy grandchildless years	1.5	2.5	2.5	2.3	1.4	2.3	2.7	a, b
Missing years	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total: Remaining years at age 50	29.0	24.9	31.2	30.0	32.6	30.0	34.9	
Grandchildren From Biological Children Only								
Healthy grandparent years	12.9	9.2	11.4	12.1	16.0	12.1	11.7	a, b
Unhealthy grandparent years	4.5	5.6	10.2	9.4	5.6	9.4	14.4	a, b, c
Healthy grandchildless years	9.3	6.2	5.8	5.2	8.8	5.2	5.0	a, b
Unhealthy grandchildless years	2.3	3.9	3.8	3.2	2.2	3.2	3.8	a, b, c
Missing years	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total: Remaining years at age 50	29.0	24.9	31.2	30.0	32.6	30.0	34.9	
Men								
	<12 years	12 years	>12 years	>12 years	Women			
					<12 years	12 years	>12 years	>12 years
Grandchildren From Biological and Nonbiological Children								
Healthy grandparent years	11.8	16.1	16.8	20.7	13.8	20.7	20.8	a, b
Unhealthy grandparent years	9.2	6.0	4.1	7.1	12.3	7.1	5.0	a, b, c
Healthy grandchildless years	2.9	5.0	8.7	4.5	2.2	4.5	8.0	a, b, c
Unhealthy grandchildless years	2.2	1.6	1.4	1.6	1.8	1.6	1.4	a, b, c
Missing years	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total: Remaining years at age 50	26.2	28.7	31.0	34.0	30.1	34.0	35.2	

Table 5 (continued)

Grandchildren From Biological Children Only									
Healthy grandparent years	10.1	14.1	14.7	a, b, c	12.2	18.3	18.0	a, b	
Unhealthy grandparent years	7.7	5.2	3.5	a, b, c	11.2	6.4	4.4	a, b, c	
Healthy grandchildless years	4.7	7.0	10.9	a, b, c	3.7	6.8	10.8	a, b, c	
Unhealthy grandchildless years	3.7	2.5	1.9	a, b, c	2.9	2.4	2.0	a, b, c	
Missing years	0.0	0.0	0.0		0.0	0.0	0.0		
Total: Remaining years at age 50	26.2	28.7	31.0		30.1	34.0	35.2		

Notes: Health is measured by self-rated health. Superscripted letters a, b, and c denote significant differences (at $p < .05$) across groups.

^aNon-Hispanic white versus non-Hispanic black; <12 years education versus 12 years.

^bNon-Hispanic white versus Hispanic; <12 years education versus >12 years.

^cNon-Hispanic black versus Hispanic; 12 years education versus >12 years.

all grandchildren. When comparing patterns across race/ethnicity and education, we find no notable differences across the different measures of grandchildren.

Discussion

Healthy grandparenthood is an important phase of life for demographers to consider. It marks the period of overlap in the lives of grandparents and grandchildren when they can build relationships and participate in activities together. It is also the period during which older adults, if their health allows, can provide important transfers to their younger kin. One example of a potential transfer that healthy grandparents can provide is childcare to grandchildren, which serves as critical aid to adult children during their prime career-building phase of life. On the other hand, unhealthy grandparenthood represents a period when the middle generation may be more likely to provide care upward, and relationships between grandparents and grandchildren may not be as active. To the best of our knowledge, this article provides the first estimates of the healthy and unhealthy grandparenthood periods in later life. How these periods vary within and across populations is important for understanding the ways in which resources are transferred across generations—an area that has been understudied in both demography and sociology (Mare 2011).

The length of healthy grandparenthood is shaped by the timing of fertility for two generations, which shapes the timing of grandparenthood as well as patterns of morbidity and mortality. Studying intergenerational overlap in societies where demographic rates are changing is not a simple process (Herlofson and Hagestad 2011). The length of healthy grandparenthood at the population level and how it has changed are questions that must be addressed using demographic techniques. Cohort estimates of healthy grandparenthood for contemporary cohorts do not exist because it is possible to calculate the average length of time from the birth of the first grandchild to death only after the cohort has died. Therefore, we must create period estimates using demographic techniques. In our study, we use health expectancy methods to create estimates for the average length of healthy grandparenthood in the United States and Canada during a period when fertility was postponed, health of older adults improved, and mortality declined.

This period of healthy grandparenthood from age 50 is 15.8 years and 18.9 years for American men and women, respectively, in 2010; and 14.2 years and 17.4 years, respectively, for Canadian men and women in 2011. Despite the delays in the transition to grandparenthood and the fact that the population of grandparents is now older, the length of healthy grandparenthood has increased over the study period for men and women in both countries. Grandparents have significantly more healthy years overlapping with grandchildren than they did two decades ago.

In addition to a longer period of healthy grandparenthood, a greater proportion of overall grandparent years are spent healthy for men and women in both countries. Three-quarters of grandparent years for American and Canadian men and women are healthy (2010 for United States, 2011 for Canada), compared with 70 % in the United States in 1993 and two-thirds in Canada in 1985. This shift is likely due to improvements in self-rated health among the adult population in the United States and Canada (Martel and Bélanger 1998), especially among those who are grandparents (Margolis and Iciaszczyk 2015).

Large racial/ethnic and educational differences exist in the length of healthy grandparenthood in the United States. Non-Hispanic white grandparents have the longest period of healthy grandparenthood, and a greater proportion of their years as grandparents are spent healthy than non-Hispanic blacks or Hispanics. Non-Hispanic white grandfathers are healthy for 15.0 years and grandmothers for 18.5 years, compared with 11.3 and 13.7 for non-Hispanic black men and women, and 13.1 and 12.8 years for Hispanic men and women. Grandparents with an intermediate level of education (12 years) have the longest overall period of grandparenthood, but it is the most-educated grandparents who have the longest period of *healthy* grandparenthood. Among the most highly educated men, 16.8 years are spent as a healthy grandparent, compared with 16.1 among men with a high school diploma and 11.8 for the least-educated men. The least-educated women spend only 13.8 years as a healthy grandparent, compared with 20.7 for those with a high school diploma and 20.8 for those with more than a high school education.

Our results show that less-educated, Hispanic, and black Americans spend less time as healthy grandparents and more time as unhealthy grandparents. These grandparents may be more likely to have fewer resources, which may become further strained in the face of earlier morbidity. Non-Hispanic black and Hispanic grandparents are more likely to provide in-kind transfers, such as childcare and practical support, than non-Hispanic white grandparents (Sarkisian and Gerstel 2004; Sarkisian et al. 2007), and earlier declining health of these grandparents may reduce their ability to contribute to younger generations earlier than white and more highly educated grandparents.

Gender is an important theme in the research on grandparenthood (Dubas 2001; Leopold and Skopek 2015a, b; Stelle et al. 2010; Szinovacz 1998; Uhlenberg and Hammill 1998). Grandmothers, and particularly maternal grandmothers, have longer overlap with grandchildren than grandfathers because of age differences between spouses compounded over two generations and sex differences in mortality (Hagestad and Lang 1986; Keck and Saraceno 2008). This study adds gender differences in morbidity as another dimension, which has implications for the healthy period of overlap between grandmothers/grandfathers and grandchildren. Earlier grandparenthood, longer lives, and higher morbidity lead to more overall grandparent years for women than men, but these additional years are made up of both healthy and unhealthy grandparent years.

When health expectancy methods are used for the analysis of healthy grandparenthood and other family research, some important methodological points should be noted. First, the length in a given state is a period measure that is an average for the population examined. Just as some people in a population live much longer than the period life expectancy whereas others live a much shorter time, the length of healthy grandparenthood also varies within a population. Some will become grandparents very early and will experience a much longer period of healthy grandparenthood than the period expectancy. Others will never become grandparents but still contribute to the population average.

Second, the survey data on health and grandparenthood should represent the same population as that covered in the mortality data. However, survey data will often exclude some subpopulations. For example, in our Canadian data, the survey data exclude the very small populations residing in the Northwest and Yukon territories and those in institutions, but the mortality estimates are for the entire population. The bias

resulting from this is likely very small, given that only 0.24 % of Canadians resided in those excluded areas in 2011 (Statistics Canada 2012, 2013, 2014a). For the U.S. analysis by education, the survey covers the same native-born population as the mortality data. The researcher should be careful to note discrepancies in the coverage of different data sources.

Finally, researchers should note that the length of healthy grandparenthood is sensitive to the measure of health that is used. We found longer periods of healthy grandparenthood using disability as a measure of health rather than self-rated health. Both can yield important insights for how healthy grandparenthood will affect family dynamics. For some questions, it may be more pertinent to use one measure of health than another.

To the best of our knowledge, this analysis presents the first estimates of healthy grandparenthood at the population level for U.S. men and women of different racial/ethnic and educational groups and of the changes in healthy grandparenthood over a quarter-century in the United States and Canada—a period in which grandparenthood occurs later in life and poor health and mortality are also being postponed. During the study period, healthy grandparenthood increased substantially for men and women in both countries. This increase has important implications for intergenerational relationships: the length of time that grandparents overlap with grandchildren while still in good health is increasing. How healthy grandparenthood changes in the future depends on the extent to which morbidity compression and mortality decline outweigh delays in fertility and grandparenthood. Future research should build on this demographic foundation of healthy grandparenthood and study its effects on families.

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