



University of Pennsylvania
ScholarlyCommons

Wharton Pension Research Council Working
Papers

Wharton Pension Research Council

8-10-2020

Does Working Longer Enhance Old Age?

Maria D. Fitzpatrick

Follow this and additional works at: https://repository.upenn.edu/prc_papers



Part of the [Economics Commons](#)

This paper is posted at ScholarlyCommons. https://repository.upenn.edu/prc_papers/690
For more information, please contact repository@pobox.upenn.edu.

Does Working Longer Enhance Old Age?

Abstract

Understanding the link between retirement and health is crucial for both improving people's wellbeing and for designing optimal public policy around retirement. Yet, to date, the economics literature has been inconclusive about whether retirement causes improvements or deterioration in health. The lack of consensus is likely driven by differences in study design, population, and the age of workers and set of health outcomes studied. In this paper, I explain and distill the literature, highlight patterns in the highest-quality studies, and discuss the implications of the findings for longevity risk management and worker and retiree health going forward.

Keywords

Retirement, health, social security, working longer

Disciplines

Economics

Does Working Longer Enhance Old Age?

By Maria D. Fitzpatrick

August 10, 2020

PRC WP2020-20

Pension Research Council Working Paper

Pension Research Council

The Wharton School, University of Pennsylvania

3620 Locust Walk, 3302 SH-DH

Philadelphia, PA 19104-6302

Tel.: 215.573.3414 Fax: 215.573.3418

Email: prc@wharton.upenn.edu

<http://www.pensionresearchcouncil.org>

Does Working Longer Enhance Old Age?

Maria D. Fitzpatrick

Abstract

Understanding the link between retirement and health is crucial for both improving people's wellbeing and for designing optimal public policy around retirement. Yet, to date, the economics literature has been inconclusive about whether retirement causes improvements or deterioration in health. The lack of consensus is likely driven by differences in study design, population, and the age of workers and set of health outcomes studied. In this paper, I explain and distill the literature, highlight patterns in the highest-quality studies, and discuss the implications of the findings for longevity risk management and worker and retiree health going forward.

Keywords: Retirement, health, social security, working longer

Maria Fitzpatrick

Associate Professor

Cornell University Department of Policy Analysis and Management

2301 Martha Van Rensselaer Hall

Ithaca, NY 14853, USA

maria.d.fitzpatrick@cornell.edu

Does Working Longer Enhance Old Age?

Managing longevity risk is an important component driving the financial and labor market decisions of older Americans. Historically, most research on the relationship between health and retirement focused on the effects of poor health or negative health shocks on the labor market and financial decision making of older workers. More recently, research has expanded to focus on how labor market decisions about when to retire affect health outcomes. This paper summarizes the research of the effects of retirement on health and longevity. I distill the growing set of studies into a set of themes and focus on those most relevant for those interested in managing longevity risk for Americans.

How Might Retirement Affect Health?

Understanding the relationship between retirement and health is difficult because retirement typically involves multiple related changes to people's lives. Most prominent is the change to people's activity, particularly physical and social. The term retirement is often used to refer to someone moving from full employment to no employment, but it has many different meanings to different people and transitions are not as clearly defined as one might think (Chan and Stevens 2008). Here, I will use the term in the way that most people do: a transition from working at some person-specific historic level to working less than that, with the possibility of an associated start of collecting retirement benefits.

There are multiple ways in which the activity changes with retirement might be beneficial for people's health, wellbeing, and longevity. For example, from the perspective of someone employed in a physically demanding job, retirement may prove beneficial to health as it allows the person to limit or refrain from the strenuous activity. Retirement may allow people to invest more

time in self-care and healthy behavior, including eating healthier and exercising. If so, there are likely to be positive effects of these types of health investments. Also, in many cases, retirement is associated with a switch from a stressful and taxing work environment to a more relaxed and carefree schedule and experience. This may have beneficial effects on peoples' physical, mental, and emotional health, possibly also resulting in increased longevity.

Changes in activity with retirement may also have detrimental effects on people's health, wellbeing, and longevity. If employment and work give people's lives meaning and/or involve positive social interactions, then retirement may lead people's health to deteriorate. Additionally, there is a medical literature showing that physical inactivity can lead to increases in negative health shocks like infection. Therefore, if retirement means going from an active working life to a sedentary home-life, people's health may deteriorate. Also, if people replace their work time with negative healthy behaviors (e.g., more drinking or smoking), this can erode health and longevity.

The transition to retirement can bring on changes to income and other financial resources. Upon retirement, people typically shift from having an earned income from their employer to i) collecting pension benefits from their employer and/or withdrawal of funds from retirement savings accounts, ii) collecting public pension benefits, or iii) some combination of the two. They may also begin drawing down other types of assets. Depending on the size of earnings compared to the generosity of employer-provided and public pension benefits, as well as a person's own retirement savings, income could increase, decrease, or stay the same. Most often, it decreases or stays the same. For example, the replacement rate in the US social security system in 2005 was 64 percent of final earnings for the median quintile of earners ages 64 and 65 (Biggs and Springstead 2008). Relatedly, Chetty et al. (2016) found that longevity increases through the income distribution, which may, but does not necessarily, mean that changes to income will lead to changes

in longevity. More relevant for this discussion, Snyder and Evans (2006) showed that changes to retirement wealth driven by a change in social security benefit rules led to higher mortality.

Another shift occurring in retirement that may have effects on health is access to health insurance. In 2018, 61 percent of adults ages 19 to 64 were covered by employer-provided health insurance (Kauffman Family Foundation 2018). That proportion would be even higher if the sample were limited to those employed nearing retirement. As people transition out of employment and into retirement, many will lose their employer-provided health insurance. If they are age 65 plus, they will have access to and will likely utilize Medicare, so the effects on their health will depend on the coverage of their employer-provided insurance relative to Medicare. If they are not yet age 65, some (mostly those employed in the public sector) may have access to retiree health insurance through their former employers. Others must decide whether to forgo health insurance or to purchase it in the private market. Forgoing health insurance may prove detrimental to health and longevity, particularly for older people who forgo or postpone preventative or diagnostic measures when they lack health insurance coverage.¹

The combined effect of the above may differ across individuals and will therefore vary across populations, a point we will return to as we summarize the literature below. Similarly, the effects of retirement on health and longevity may be different, even of opposite sign, depending on the measures used. For example, it is possible that retirement may lead people to be happier and less stressed, while also involving negative physical shocks that lead them to die earlier.

Finally, changes to activity and health shocks may have immediate effects and may also serve to influence health and longevity in the long term. This is highlighted by considering the fact that in the canonical health economics models (e.g., Grossman 1972), health is a stock measure

resulting from both current and past inputs. For any given individual, the move to retirement may have positive or negative effects on health, depending on the horizon of interest.

Relationships between Retirement and Health

To determine the relationship between retirement and health, one might be tempted to compare the health and longevity of retired Americans to those not retired. This comparison is flawed for at least two reasons.

First, older Americans are more likely to be retired and to have poorer health and higher mortality rates than those even just a bit younger. Figure 1 presents information on the retirement rates and death rates of Americans by age for Americans ages 50 to 80.² From the figure, one can see that retirement and mortality increase with age. For example, the fraction of men in retirement goes from eight percent at age 50 to 45 percent at age 60, and 96 percent by age 70. At the same time, male mortality is low (just 0.5 percent probability) at age 50, then doubles again by age 60, again by age 70, and again by age 80. By age 80, 57 males out of every 1,000 have died.

[Figure 1 here]

Other health measures decline with age in similar ways to the mortality increase. Therefore, comparison of health outcomes for those retired versus those not retired would lead us to overestimate the relationship between retirement and health, because it would be attributing some of the effects of aging to the decision to retire.

One might think the solution to this was to compare the health of people of the same age who are retired with those still working. But, health and retirement decisions are intertwined in ways that make it difficult to identify the causal effects of retirement on health in this way. Most importantly, poor health is a common factor driving people to stop working and enter retirement.

Therefore, on average, even among people of the same age, retirees may be in poorer health than those who have not yet retired.

This is evident when we examine the health of retirees versus non-retirees. Insler (2014) used the HRS to show the health levels and changes in health by age separately for groups of retired people and those who are not retired. He found that average reported health was higher at every age for those not yet retired. Also, people who are retired had more negative changes in their health than those who had not yet retired. This is illustrative of the fact that unhealthier people retire earlier and healthier people work longer.

Because the relationship between retirement and health is multidirectional, studies have used a variety of techniques to identify the effects of retirement on people's health and wellbeing. Many of these involve making use of pension plan rules that create different incentives to retire for people who are otherwise quite similar. Using these rules in this way helps overcome the problem that differences in the types of people who are retired may drive differences in health outcomes rather than retirement itself.

The First Generation of US Studies: The Health and Retirement Study

One of the first studies to examine how health changes in retirement was Charles (2004). In order to study this question, the author used the rich information included in the Health and Retirement Study (HRS), an ongoing nationally representative panel survey of Americans above age 50. Charles focused on men in their 60s and 70s. He also used the Survey of Asset and Health Dynamics among the Oldest Head and the National Longitudinal Survey of Mature Men. To explore relationship between retirement and health, Charles used the fact that retirement patterns of the cohorts of men in his study were influenced by social security rules – and changes to those

rules over time – and by the elimination of mandatory retirement in the US. Social security eligibility changes quite a bit as people age, as do take-up rates for social security benefits and their labor supply. At age 62, most Americans are first eligible for Social Security’s Retirement and Survivors Insurance, and many claim at this age. For cohorts born before 1937, relevant to Charles’s analysis, the Full Retirement Age under the social security rules was set at 65.

Between ages 62 and 70 (or 72 for some cohorts in the analysis), there were changes to the incentives to retire or continue working driven by the social security benefit formula and the social security earnings test. The social security benefit formula encourages continued work after early eligibility by increasing the size of the benefit if one delays claiming. The earnings test taxes away social security benefits based on one’s earned income, making it less attractive to continue working while collecting benefits or, conversely, to claim benefits while still working. In the 1980s, the earnings test rules were changed to make continued work and postponing benefit collection even more attractive. In addition, some of the cohorts covered in the Charles study were making decisions about retirement before mandatory retirement policies were prohibited in the US.

Using a statistical method called instrumental variables estimation, Charles used these differences in eligibility and incentives to essentially compare the subjective wellbeing of men who retired at younger versus older ages because of these rules. Doing so allowed him to argue that the comparison returned an estimate of the effect of retirement itself on subjective wellbeing, at least for those whose retirement behavior was influenced by these rules. He found that retirement had the effect of increasing men’s reported wellbeing.³ An open question, however, is whether this was a change in the true underlying health of these men, or a change in their own perception of their health. Surely, improvements in subjective wellbeing are valuable and important, but they may not translate into changes in physical health.

In a similar setup, Neuman (2008) used the HRS and information about public and private sector pensions to estimate the effect of retirement on a wider set of health outcomes than Charles (2004). In addition to the social security benefit rule changes, Neuman used eligibility rules in survey respondents' employer provided pensions. He also used the tendency of spouses to retire at the same time, even if they were different ages; this means that one spouse's decision to retire may be affected by the other spouse's age and eligibility for social security. Neuman found that retirement has a positive effect on subjective measures of health, but more objective measures of physical health, like mobility, were either not affected at all or were negatively affected. As in Charles (2004), it may be the case that these changes in subjective health in the HRS reflect changes in respondents' perceptions of their health rather than underlying health conditions. Also using the HRS, Coe and Lindeboom (2008) and Coe et al. (2012) studied the effects of retirement on health and cognitive functioning, using the offer of early retirement windows by employers to their employees.

Since employers cannot offer these opportunities to employees of varying health status, these windows should drive retirement but be unrelated to people's health. Also, these windows are typically offered for short periods of time and are unanticipated by the workers, potentially making it harder for people to adjust their retirement decisions in ways related to their health than changes to social security eligibility rules. The authors showed small positive effects, if any, of retirement on subjective health outcomes measured in the first year or two after retirement, and no effects on objective health outcomes. Relatedly, there were small increases in cognitive functioning for blue-collar workers, but, they faded out over time. The authors concluded there was little relationship between increases in the length of working life and in longevity in the US.

Dave et al. (2008) take a different empirical approach using the HRS. To control for the tendency of less healthy people to retire earlier, the authors used a statistical technique called individual fixed effects, implying that the estimates of the relationship between retirement and health result from comparing individuals' health after they retired to their own health before they retired. Results showed deterioration across a range of health measures. For example, mental health measures declined by six to nine percent, mobility measures decreased by five to 16 percent, and rates of illness increased by five to nine percent. Nevertheless, if negative shocks to people's health (like an injury or a diagnosis) lead to retirement, these estimates are too negative because they attribute some of the pre-retirement shock to the retirement itself. This is partly why these estimates differ from those previously mentioned.

Insler (2014) took a slightly different tack. Instead of using the rules of pension plans to help make appropriate comparisons of individuals, he makes use of people's expectations of their retirement date in an instrumental variables strategy. The intuition is that he is removing the effect of unanticipated health shocks (the type that might be problematic in the Dave et al. (2009) study) by using people's predictions of when they will retire. To further remove differences in anticipated health, Insler (2014) controls for a rich set of covariates. He finds that retirement leads to improvements in a general measure of health he constructed. These improvements seem to be related to decreases in smoking and increases in exercise. If the set of controls included does not adequately adjust for underlying health differences in people who expect to retire at different ages, it may be the case that these estimates are biased.

Gorry, Gorry, and Slavov (2018) follow Charles (2004) to use age-based variation in eligibility for social security retirement benefits, applicability of the social security earnings test, and eligibility for retirement benefits in an employer-sponsored pension, to create arguably causal

estimates of the effects of retirement on physical and mental health, life satisfaction, and health care utilization. The idea is that these age-based retirement eligibility measures should not be directly correlated with health, except through their effects on retirement behavior, as they do not prompt discrete jumps in health status at these ages beyond what is controlled for with age trends. The authors reported that retirement improved measures of physical and mental health (significant after more than four years of retirement), and life satisfaction (significant in the first four years of retirement). They found no evidence that improvements were driven by increases in health care utilization.

The Next Generation of US Studies: Administrative Data

With a wealth of information on respondents, the HRS is a remarkable resource for research on older Americans, yet it is a relatively small sample. As a result, researchers have relatively low statistical power to identify effects of retirement on health, particularly if these are small. Without large samples, it can be difficult to use certain statistical techniques aimed at identifying causal effects and others aimed at identifying effects across different subgroups of the population, because such techniques are “data-hungry,” requiring larger amounts of data than do traditional techniques.

Another concern about the HRS, which is true of all survey data, is that it provides mainly self-reported information about health status and health conditions. A shift in retirement status may lead people to feel differently about their health or interpret their health conditions differently. For example, retiring from a physically strenuous job may make people with physical limitations feel less restricted by those limitations. Alternatively, becoming less active and more socially isolated may make people feel as though a health condition has worsened. Therefore, survey

responses on the effects of retirement on health capture some combination of the effects on underlying health and changes in the individual's interpretation of his health status.

More recent work in the US, and, as I detail below, in Europe, has succeeded in bringing administrative data to bear on the question of how retirement affects health. Administrative data often contains the universe of individuals in some population (e.g., a country), so it usually has more observations, and potentially more statistical power, than a survey like the HRS. Also, measures of health in administrative data often derive from health records, like death or hospital records. Analyzing the effect of retirement on health using these objective health measures is more likely to capture changes in underlying conditions or health care utilization, compared to survey respondents' perceptions. Yet, these benefits come at a cost, since most administrative data, particularly in the US, lacks rich information about household composition, savings, and other factors relevant for understanding retirement and health.

An example of research utilizing administrative data in the US is Fitzpatrick and Moore (2018). There, we make use of the Early Retirement Age for social security eligibility at age 62. Around 30 percent of Americans claim social security in exactly the month they turn age 62. Using the census of all death records in the US from the Center for Disease Control's Multiple Cause of Death Records, we document that there is a two percent increase in male mortality precisely at age 62. This increase in mortality is larger for single men, as well as for men with low levels of educational attainment. This increase in male mortality is the increase in male mortality in the entire population, not necessarily just those who retire. Although about 10 percent of men retire at this age, the death records data do not have information on employment and retirement, so we cannot directly identify a link between the two. Nevertheless, there are no other discontinuous changes to people's lives that occur exactly at age 62 that could possibly be driving the increase

in male mortality. We also show that there are no similar increases in mortality at any other age, including other birthday related ages, between ages 55 and 75, which suggests that this is not just a “birthday” effect. And we show that this increase in mortality at age 62 is only present for cohorts eligible for social security at age 62, not those first eligible at other ages.

To disentangle whether the increase in male mortality at ages 62 is due to the shift in activity, the change in income levels, or a change in health insurance status, we couple our analysis of the administrative death records with a set of analyses from the HRS. We look for correlations between the size of the mortality increases at age 62 among various subgroups with the size of their changes in other measures at age 62. There is little to no correlation between the size of the mortality changes and either income or health insurance coverage. Yet, there is a clear positive correlation between increases in mortality and drops in male labor market participation.

What Can We Learn from Studies in Other Countries?

Sometimes studies from other countries can be useful for showing what might occur in a particular context. There have been many studies conducted in other countries, particularly in European settings, that have investigated the effect of retirement on health. The European studies can be separated into two groups, as in the US research. The first round of these studies used HRS-like data and variation in retirement eligibility rules in pensions systems, or sometimes across different pension systems in different countries, to identify the effects of retirement on health (Bound and Waidmann 2007; Behncke 2012; Coe and Zamarro 2011; Delugas and Balia 2019; Lucifora and Vigani 2018; Bertoni et al. 2018). The second round has used variation in pension eligibility rules, sometimes long-standing eligibility rules and other times unanticipated early retirement windows, coupled with administrative data on health outcomes, health expenditures and

health care usage (Kuhn et al., 2019; Bloemen et al., 2017; Hallberg et al., 2015; Nielsen 2019; Grøtting 2019; Giesecke, 2019; Hagen 2018; Shai 2018; Zhang et al. 2018; Frimmel and Pruckner 2018; Rogne and Syse 2018; Zulkarnain and Rutledge 2018).

In both sets of studies using European data, the results are generally inconclusive. Some of this undoubtedly results from the fact that the studies use different outcome measures, ranging from subjective measures, to mental health, to expenditures on health, to mortality. Some of the heterogeneity also stems from different methods used. In addition, they use different populations, from ages 50s to 70s, army employees to entire populations, and men versus women. Yet, ultimately, some of the heterogeneity may result from the fact that there are many pathways through which retirement affects health, producing different estimates of the net effect.

Conclusion

The past 15 years have seen an explosion in economics research aimed at understanding the effects of retirement on health and longevity. Seeing how health factors enter the retirement decision is important for interpreting the resulting effect that retirement has on health. Many studies in the US and Europe have used a variety of data sources and methodologies to investigate this question, but the results are largely inconclusive. The pattern of evidence from studies of retirement in the US suggests there may be benefits of retirement on mental health and subjective wellbeing, but there may also be costs in terms of decreased physical health and increased mortality. In sum, the clearest conclusion from this review of the literature is that much more research is necessary. Large data sets with rich information on health inputs and outcomes, linked to administrative records, will likely be necessary to help us more fully understand the full nature of how health effects retirement, both on average and for population subgroups.

Importantly, the latest research showing that retirement has negative effects on health and increases mortality indicates that the relationship between retirement and longevity is more complicated than one might have thought. It has long been known that people take their expectations of longevity into account when making decisions about retirement. Now, we know that people's decisions about retirement may also affect their health and longevity in crucial ways. This makes planning for retirement by individuals more complicated than if the relationship were unidirectional.

It also has implications for companies with older employees and for governments working to design optimal retirement and pension policy. For example, it may be the case that bridge jobs or part-time work help avoid the negative health consequences of retirement. Employers may find it easier to retain older workers by offering them these kinds of flexible work arrangements, which could in turn benefit worker health and longevity. In another example, government policies aimed at delaying enrollment in social security may have the benefit of improving the health of older Americans as well as making them more financially secure during retirement. Future work should aim to understand more about how well the tools of business and governments can help ameliorate the negative health consequences of retirement.

References

- Behncke, S. (2012). ‘Does Retirement Trigger Ill Health?’ *Health Economics*, 21(3), 282–300. <https://doi.org/10.1002/hec.1712>.
- Bertoni, M., S. Maggi, and G. Weber (2018). ‘Work, Retirement, and Muscle Strength Loss in Old Age.’ *Health Economics*, 27(1), 115–128. <https://doi.org/10.1002/hec.3517>.
- Biggs, A. G., and G. R. Springstead (2008). ‘Alternate Measures of Replacement Rates for Social Security Benefits and Retirement Income.’ *Social Security Bulletin*, Vol 68(No 2). <https://www.ssa.gov/policy/docs/ssb/v68n2/v68n2p1.html>.
- Bloemen, H., S. Hochguertel, and J. Zweerink. (2017). ‘The Causal Effect of Retirement on Mortality: Evidence from Targeted Incentives to Retire Early.’ *Health Economics*, 26(12), e204–e218. <https://doi.org/10.1002/hec.3493>.
- Bound, J., and T. Waidmann. (2007). ‘Estimating the Health Effects of Retirement.’ *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.1082047>.
- Chan, S., and A. H. Stevens, (2008). ‘What You Don’t Know Can’t Help You: Pension Knowledge and Retirement Decision-Making.’ *The Review of Economics and Statistics*, 90(2), 14.
- Charles, K. K. (2004). ‘Is Retirement Depressing?: Labor Force Inactivity and Psychological Well Being in Later Life.’ *Research in Labor Economics*, 23:269-299.
- Chetty, R., M. Stepner, S. Abraham, S. Lin, B. Scuderi, N. Turner, A. Bergeron, and D. Cutler. (2016). ‘The Association between Income and Life Expectancy in the United States, 2001-2014.’ *JAMA*, 315(16), 1750–1766. <https://doi.org/10.1001/jama.2016.4226>.
- Coe, N. B., and M. Lindeboom (2008). ‘Does Retirement Kill You? The Evidence from Early Retirement Windows.’ CentER Discussion Paper Series No. 2008-93. Tilburg, ND: Tilburg University. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1295315.

- Coe, N.B., H.M. von Gaudecker, M. Lindeboom, and J. Maurer (2012). ‘The Effect of Retirement on Cognitive Functioning.’ *Health Economics*, 21(8): 913-927.
- Coe, N. B. and G. Zamarro (2011). ‘Retirement Effects on Health in Europe.’ *Journal of Health Economics*, 30(1), 77–86. <https://doi.org/10.1016/j.jhealeco.2010.11.002>.
- Dave, D, I. Rashad, and J. Spasojevic (2008). ‘The Effects of Retirement on Physical and Mental Health Outcomes.’ *Southern Economic Journal*, 75(2): 497-523.
- Delugas, E. and S. Balia (2019). ‘A Life Change for the Better? The Health Consequence of Retirement.’ Working paper presented at 60th Annual Conference (RSA) of the Italian Economic Association, Oct. 2019. https://siecon3607788.cdn77.org/sites/siecon.org/files/media_wysiwyg/227-delugas-balia.pdf.
- Federal Reserve Board (2016). *Survey of Household Economics and Decisionmaking*. https://www.federalreserve.gov/consumerscommunities/shed_data.htm.
- Fitzpatrick, M. D., and T.J. Moore (2018). ‘The Mortality Effects of Retirement: Evidence from Social Security Eligibility at Age 62.’ *Journal of Public Economics*, 157, 121–137. <https://doi.org/10.1016/j.jpubeco.2017.12.001>.
- Frimmel, W. and G.J. Pruckner (2018). ‘2018 Retirement and Healthcare Utilization.’ Working Paper, No. 1802. Johannes Kepler University of Linz, Department of Economics, Linz. <http://hdl.handle.net/10419/183261>.
- Giesecke, M. (2019). ‘The Retirement Mortality Puzzle: Evidence from a Regression Discontinuity Design.’ Rurr Economic Papers #800. RWI – Leibniz-Institut für Wirtschaftsforschung Hohenzollernstr. Essen, Germany. <https://doi.org/10.4419/86788928>.

- Gorry, A., D. Gorry, and S.N. Slavov (2018). ‘Does Retirement Improve Health and Life Satisfaction?’ *Health Economics*, 27(12), 2067–2086. <https://doi.org/10.1002/hec.3821>.
- Grossman, M. (1972). ‘On the Concept of Health Capital and the Demand for Health.’ *Journal of Political Economy*, 80 (2), 223–255.
- Grøtting, M.W. (2019). *Empirical Essays on Health and Aging*. Doctoral Thesis, University of Bergen. 190.
http://bora.uib.no/bitstream/handle/1956/20407/Dr.thesis_2019_Maja%20W%20Grøtting.pdf?sequence=1&isAllowed=y.
- Hagen, J. (2018). ‘The Effects of Increasing the Normal Retirement Age on Health Care Utilization and Mortality.’ *Journal of Population Economics*, 31(1), 193–234.
<https://doi.org/10.1007/s00148-017-0664-x>.
- Hallberg, D., P. Johansson, and M. Josephson (2015). ‘Is an Early Retirement Offer Good for your Health? Quasi-experimental Evidence from the Army.’ *Journal of Health Economics*, 44, 274–285. <https://doi.org/10.1016/j.jhealeco.2015.09.006>.
- Insler, M. (2014). ‘The Health Consequences of Retirement.’ *Journal of Human Resources*, 49(1): 195-233.
- Kauffman Family Foundation (2018). ‘Employer Sponsored Coverage Rates for the Nonelderly by Age.’ Accessed July 11, 2020. <https://www.kff.org/other/state-indicator/rate-by-age-2/?currentTimeframe=0&selectedDistributions=adults-19-64&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D>.
- Kuhn, A., S. Staubli, J. Wuellrich, and J. Zweimüller (2019). ‘Fatal attraction? Extended Unemployment Benefits, Labor Force Exits, and Mortality.’ *Journal of Public Economics*, 104087. <https://doi.org/10.1016/j.jpubeco.2019.104087>.

- Lucifora, C. and D. Vigani. (2018). 'Health Care Utilization at Retirement: The Role of the Opportunity Cost of Time.' *Health Economics*, 27(12), 2030–2050. <https://doi.org/10.1002/hec.3819>.
- Neuman, K. (2008). 'Quit Your Job and Get Healthier? The Effect of Retirement on Health.' *Journal of Labor Research*, 29(2): 177-201.
- Nielsen, N.F. (2019). 'Sick of Retirement?' *Journal of Health Economics*, 65, 133–152. <https://doi.org/10.1016/j.jhealeco.2019.03.008>.
- Rogne, A.F., and A. Syse (2018). 'The Effect of Retirement on Male Mortality. Quasi-experimental Evidence from Norway.' *European Sociological Review*, 34(5), 501–517. <https://doi.org/10.1093/esr/jcy023>.
- Shai, O. (2018). 'Is Retirement Good for Men's Health? Evidence Using a Change in the Retirement Age in Israel.' *Journal of Health Economics*, 57, 15–30. <https://doi.org/10.1016/j.jhealeco.2017.10.008>.
- Snyder, S.E. and W.N. Evans (2006). 'The Effect of Income on Mortality: Evidence from the Social Security Notch.' *Review of Economics and Statistics*, 88(3): 482-495.
- Social Security Administration (2019). *Historical Probabilities of Death*. <https://www.ssa.gov/oact/HistEst/Death/2019/DeathProbabilities2019.html>.
- Zhang, Y., M. Salm, and A. van Soest (2018). 'The Effect of Retirement on Healthcare Utilization: Evidence from China.' *Journal of Health Economics*, 62, 165–177. <https://doi.org/10.1016/j.jhealeco.2018.09.009>.
- Zulkarnain, A., and M.S. Rutledge (2018). 'How Does Delayed Retirement Affect Mortality and Health?' *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3261325>.

Endnotes

¹ It is worth noting that some of the options and decision making around health insurance coverage for workers who retire before age 65 is likely to have changed with the Affordable Care Act (ACA). By providing the opportunity to purchase health insurance coverage through the exchanges, the ACA gives more options to people retiring before Medicare eligibility.

² Information on cumulative probability of retirement comes from the 2016 Survey of Household Economics and Decisionmaking. Information on mortality rates is for 2016 and comes from the 2019 Social Security Administration Office of the Chief Actuary Report.

³ This was in contrast to a negative relationship when he does not use these techniques to control for the fact that men in poor physical and emotional health are likely to retire earlier.



Figure 1. Probability of being retired (left axis) and of mortality (right axis) by age

Sources: Federal Reserve Board (2016) and Social Security Administration (2019).