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Short report

Time to retire – Time to die? A prospective cohort study of the effects of early retirement on long-term survival

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ABSTRACT

In a long-term prospective cohort study we try to assess selective and protective impacts of early retirement on life expectancy. The results are based on the members of a compulsory German health insurance fund (Gmünder Ersatzkasse). We analyzed 88,399 men and 41,276 women who retired between the ages of 50 and 65 from January 1990 to December 2004. Our main outcome measures are hazard ratios for death adjusted for age, sex, marital and socioeconomic status, year of observation, age at retirement, hospitalization, and form of retirement scheme. We found a significantly higher mortality risk among pensioners with reduced earning capacities than among old-age pensioners who either left the labor market between the ages of 56 and 60 or between 61 and 65. The youngest male and female pensioners who left the labor market between the ages of 51 and 55 because of their reduced earning capacity faced the highest mortality risk. But healthy people who retire early do not experience shorter long-term survival than those who retire late. On the contrary, if we take into consideration the amount of days spent in hospital during the last 2 years prior to retirement, early retirement in fact lowers mortality risks significantly by 12% for men and by 23% for women. Thus with respect to mortality, early retirement reflects both selective and protective processes. First of all, individuals with poor health and lower survival chances are filtered out of the labor market. However, healthy pensioners may be protected during retirement. For the former, early retirement is a necessity, for the latter it is an asset. Pension reformers should take health differentials into consideration when cutting back pension programs and increasing retirement age.

Introduction

Population aging puts worldwide pressure on unfunded pay-as-you-go pension schemes in which a shrinking number of employees have to pay the expenses for a growing group of pensioners. Recent reforms in many OECD countries stop early retirement (Bonoli & Palier, 2007; OECD, 2007). The financial consequences of these new old-age policies have been widely discussed (Bosworth, Burtless, & Steuerle, 2000; Fehr, Sterkeby, & Thogersen, 2003; Schmaehl, 2007). Their health implications, however, have received much less attention. Moreover, studies which have evaluated the general impact of early retirement on survival show mixed outcomes. Several analyses demonstrate that men and women who retire early face higher mortality (Bamia, Trichopoulou, & Trichopoulos, 2008; Ekerdt, Baden, Bosse, & Dibbs, 1983; Haynes, McMichael, & Tyroler, 1978; Karlsson, Carstensen, Gjesdal, & Alexanderson, 2007; Morris, Cook, & Shaper, 1994; Trichopoulos, 1996; Tsai, Wendt, Donnelly, de Jong, & Ahmed, 2005; Wallman et al., 2006). Experts perceive either the retirement phase as a risk factor or illness and frailty as the real reason for a negative selection into early retirement. On the other hand, other studies have detected no survival differences between those who take early retirement and normal pensioners, nor any beneficial effects on health (Litwin, 2007; Padfield, 1996; van Solinge, 2007). According to their argumentation, protection may result from less day-to-day stress and a healthier lifestyle during retirement.

Nevertheless, no study, to our knowledge, has yet attempted to assess selection and protection effects of early retirement simultaneously, although both processes may be taking place at the same time, generating inconsistent results. This is also due to the fact that unbiased population data are not readily available for many countries. For our prospective cohort analysis, we were able to make use of the entire data set from a compulsory German health insurance fund. This allowed us to account for age and overall health status at

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retirement. We observed 129,675 insured members after their exit from the labor market and discovered selective and protective effects of retirement on their survival.

Subjects, variables, and methods

At present, 85% of the total German population is covered by compulsory health insurance. Nearly 15% of the German population is covered by private health insurance, and only 0.2% of the German population is not insured (Bundesministerium für Gesundheit, 2005; Statistisches Bundesamt, 2007). Our study population includes all the insured members ($n = 129,675$) of the Gmünder Ersatzkasse (GEK), a compulsory German health insurance fund, who retired between the ages of 50 and 65 from January 1990 to December 2004. Nearly 81% of the members ($n = 104,914$) left the labor market due to old age, roughly 5 out of 10 between the ages of 60 and 65. People with ill health qualifying for a reduced earning capacity pension retired on average 5–10 years earlier in our age-restricted population. These figures are consistent with official German retirement statistics (Verband Deutscher Rentenversicherungsträger, 2007).

With approximately 1.5 million insured individuals, GEK is the fifth largest compulsory health insurance fund in Germany. Traditionally, male employees from the metalworking industry in Southwest Germany and their families were overrepresented. But in the early 1990s, roughly 50% of the population was given a free choice of health insurance when they entered the labor market, changed jobs or earned more than a legally defined income. In 1996, legislation was further liberalized. Since then almost all Germans can choose their health insurance fund freely, which has caused the membership composition of single funds to be more heterogeneous (European Observatory on Health Care Systems, 2000). Now, GEK insures more than 1% of the population in every German state (Grobe, Dörning, & Schwartz, 2006).

Our dependent variable was survival time since retirement. We observed each individual from the day of retirement until death ($n = 12,642$) or until the end of the study period, for a maximum of 15 years.

Age and overall health at retirement were our independent variables. To assess their impact on survival, we first compared old-age pensioners who retired between the ages of 56 and 60 ($n = 40,740$) and between the ages of 61 and 65 ($n = 64,174$) with pensioners receiving a reduced earning capacity pension and retiring between the ages of 51 and 55 ($n = 8850$), 56 and 60 ($n = 13,619$) or 61 and 65 ($n = 2292$). Complete and partial reductions in earning capacity were pooled due to legal changes during the study period (Ebbinghaus, 2006). Access to reduced earning capacity pensions is dependent on physical and mental invalidity. We used the type of pension as a first broad, cross-sectional indicator for health status at retirement.

A second more focused, longitudinal health measure summarizes the days spent in hospitals in the last 2 years prior to retirement. Hospitalization quantifies severe health problems more reliably than other utilization data as access is normally controlled by an independent out-patient physician and overuse is not in the interest of the patient. Table 1 shows the strong correlation of both health indicators. It displays stark differences between old-age and reduced earning capacity pensioners in the number of hospital days prior to retirement and across various diseases.

Confounders in our study were a linear age variable, calendar year of entry into the study and declining mortality over the study period. Also, we included marital status and socioeconomic class which have well-documented effects on mortality (Berkman & Kawachi, 2000; Brockmann & Klein, 2004). Core class characteristics, however, are missing in the data set. We differentiated between blue and white-collar workers receiving pensions from their respective pension funds. Given the highly stratified system of education and the traditionally status preserving welfare policies in Germany, the distinction between manual and desk work is a meaningful approximation of social class.

Unadjusted survival curves based on Kaplan–Meier estimates visualize our descriptive findings. We used Cox proportional hazard models to further estimate the hazard ratios of survival between male and female pensioners adjusting for age and health at retirement as well as confounders (Cox, 1972). A Wald test shows the significance of the hazard ratios. All statistical analyses were carried out with TDA version 6.4f (Rohwer & Pötter, 2005).

Table 1
Hospital days during the last 2 years before retirement of pensioners who held a German compulsory health insurance at GEK and retired between the ages 51 and 65 from January 1990 to December 2004.

	Average hospital days per person				
	Overall	Main diagnoses			
		Neoplasms	Mental & behavioral disorders	Diseases of circulatory system	Diseases of musculoskeletal system & connective tissue
Men					
Old-age pensioners retired at					
56–60	7.1	0.9	0.4	1.7	2.2
61–65	7.1	1.0	0.3	1.7	1.9
Reduced earning capacity pensioners retired at					
51–55	53.0	9.5	6.5	13.7	9.4
56–60	39.8	7.0	3.0	11.2	8.9
61–65	35.6	6.3	1.4	11.1	7.9
Women					
Old-age pensioners retired at					
56–60	5.1	0.6	0.4	0.7	1.7
61–65	6.7	0.9	0.5	1.1	1.9
Reduced earning capacity pensioners retired at					
51–55	44.6	11.1	8.9	5.2	9.4
56–60	31.2	7.8	3.9	4.4	8.1
61–65	29.2	6.3	2.4	4.7	6.5

Results

Owing to their lower labor force participation and the general overrepresentation of men in the GEK, women ($n = 41{,}276$) accounted for only one third of the study population (Table 2). Nearly 90% of them left the labor market with an old-age pension, while only 77% of the male population retired due to old age. We observed excess male mortality in all retirement groups, and in all marital and social status classes.

Kaplan–Meier survival curves show highly significant differences in life expectancy between employees who retire because of reduced earning capacity (4978 deaths) and those who retire because of old age (7664 deaths; $P < 0.001$, log rank test) (Fig. 1). These differences remain significant when the data are further broken down by sex and age groups. After 7.2 years, 2 out of 10 male pensioners with reduced earning capacities who had retired between the ages of 56 and 60 had died. In contrast, men of the same age group receiving an old-age pension lived an average of 5.8 years longer before 20% of them died. The difference is 4 years for pensioners who left the labor market between the ages of 61 and 65.

Likewise, mortality varies significantly between women with different retirement schemes, regardless of their higher life expectancy. A total of 8 out of 10 female pensioners with a reduced earning capacity survived 11.6 years after retiring between the ages of 61 and 65, 3 years less than women of the same age receiving an old-age pension. The survival gap between women who retired an average of 5 years earlier is even larger: 86% of old-age pensioners survived until the end of the observation period of 15 years, while only 80% of those with reduced earning capacity survived 15 years after retirement.

Strikingly, the youngest pensioners who left the labor market between the ages of 51 and 55 because of their reduced earning capacity faced the highest mortality risk. Every fourth pensioner died 5.6 years (men) or 10.4 years (women) after leaving the labor market. Early retirement with reduced earning capacity pensions tends to select frailer people out of the labor market than old-age pension schemes do.

In addition, mortality differences among old-age pensioners revealed further health risks. If we follow a retirement group for 10 or 15 years and compare its survival chances with old-age pensioners of the same age who left the labor market 5 or 10 years later, we see consistent survival advantages for men and women with a higher retirement age. For example, roughly 85% of male old-age pensioners retiring between the ages of 61 and 65 survived the next 10 years, while only 75% of those pensioners who retired between the ages of 56 and 60 reached the same age 15 years later, though for women the difference between both these groups is much smaller.

Table 2
Characteristics of pensioners from the compulsory health insurance GEK.

Characteristic	Men			Women		
	N	Deaths	%	*N*	Deaths	%
Total	88,399	10,315	11.0	41,276	2327	5.6
Old-age pensioners retired at						
56–60	26,554	2227	8.4	14,186	479	3.4
61–65	41,414	3607	8.7	22,760	1351	5.9
Reduced earning capacity pensioners retired at						
51–55	7046	1588	22.5	1804	234	13.0
56–60	11,322	2428	21.4	2297	235	10.2
61–65	2063	465	22.5	229	28	12.2
Not married	13,635	2084	15.3	8510	673	7.9
Married	74,764	8231	11.0	32,766	1654	5.0
Blue-collar worker	60,921	7520	12.3	26,803	1709	6.4
White-collar worker	27,478	2795	10.2	14,473	618	4.3

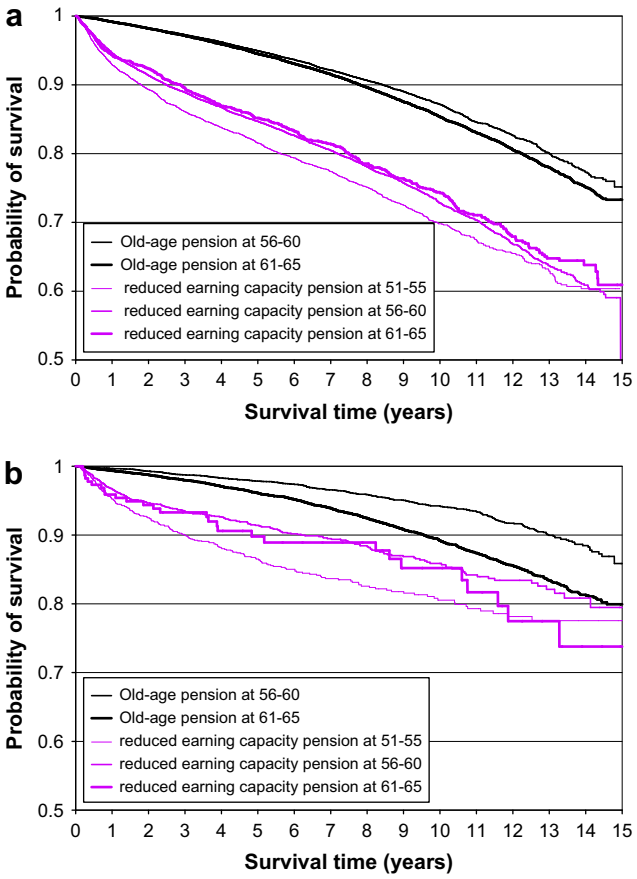

Fig. 1. Kaplan–Meier survival curves since retirement. (a) Men and (b) women.

To single out the influence of retirement time on mortality, we also adjusted for calendar year of retirement, age, marital and socioeconomic status. Here we find a significant year effect only for men, indicating a decline in mortality over calendar time. A stronger age effect for women than for men mirrors the particularity and vulnerability of older female workers. Moreover, hazard models revealed a significant marital status and socioeconomic gradient. Men benefit significantly more from being married than women. Women with higher socioeconomic status (white-collar) face a 17% lower risk of dying than female blue-collar workers (hazard ratio 0.83, 0.73–0.93). Male white-collar workers have 13% lower mortality (0.87, 0.82–0.92) than male manual workers (Table 3).

After controlling for these differences, it is apparent that applying for an old-age pension between the ages of 56 and 60 does not lower survival chances for men. For women, the effect on mortality even reverses: if they leave the labor market between 56 and 60, their mortality risk declines significantly by 25% (0.75, 59–95). Timing an early entry into old-age retirement may trigger a protective mechanism at least for women.

In contrast, an early exit from the labor market due to reduced earning capacity is generally determined by poor health and indicates a negative selection process. Men who receive a reduced earning capacity pension between the ages of 51 and 55 have more than three times the mortality risk (3.13, 2.54–3.86) of old-age pensioners who retire between the ages of 61 and 65. Applying for reduced earning capacity pensions at an older age reduces mortality remarkably, but even for pensioners between the ages of

Table 3
Adjusted hazard ratios for overall mortality of pensioners.

Explanatory variables	*N*	Events	Adjusted hazard ratios	(99% CI)
Pension scheme for men				
Old-age pensioners retired at				
61–65	26,554	2227	1.00	
56–60	41,414	3607	0.95	(0.87–1.04)
Reduced earning capacity pensioners retired at				
61–65	2063	465	2.10	(1.85–2.39)
56–60	11,322	2428	2.44	(2.17–2.75)
51–55	7046	1588	3.13	(2.54–3.86)
Year	88,399	10,315	0.98	(0.97–0.99)
Age	88,399	10,315	1.02	(1.00–1.05)
Family status				
Not married	13,635	2084	1.00	(0.64–0.72)
Married	74,764	8231	0.68	
Socioeconomic status				
Blue-collar worker	60,921	7520	1.00	(0.82–0.92)
White-collar worker	27,478	2795	0.87	
Pension scheme for women				
Old-age pensioners retired at				
61–65	14,186	479	1.00	(0.59–0.95)
56–60	22,760	1351	0.75	
Reduced earning capacity pensioners retired at				
61–65	229	28	2.16	(1.31–3.57)
56–60	2297	235	2.44	(1.73–3.44)
51–55	1804	234	4.89	(2.90–8.26)
Year	41,276	2327	1.01	(0.99–1.02)
Age	41,276	2327	1.07	(1.02–1.11)
Family status				
Not married	8510	673	1.00	(0.70–0.88)
Married	32,766	1654	0.78	
Socioeconomic status				
Blue-collar worker	26,803	1709	1.00	(0.73–0.93)
White-collar worker	14,473	618	0.83	

61 and 65 the mortality risk is twice as high as that of old-age pensioners of the same age group (2.10, 1.85–2.39). Mortality differences among female retirement groups are even greater. Women leaving the labor market between the ages of 51 and 55 and receiving a reduced earning capacity pension have nearly five times the mortality risk of female old-age pensioners retiring between the ages of 61 and 65 (4.89, 2.90–8.26). Interactions between retirement groups and confounders are mainly insignificant and do not alter the statistical results.

Repeating the analysis with a longitudinal health measure, however, reveals that each single day spent in a hospital in the last 2 years prior to retirement increases mortality significantly after retirement. What is more, timing of retirement from 56 to 60 also appears to be a significant protective mechanism for men (0.88, 0.81–0.95). Earlier exits from the labor market, however, have no or for women even a debilitating effect and increase their mortality after retirement significantly (Table 4).

Table 4
Hospital utilization in the 2 years prior to retirement.

	Men		Women	
	Adjusted hazard ratios	(99% CI)	Adjusted hazard ratios	(99% CI)
Age at retirement				
61–65	1.00		1.00	
56–60	0.88	(0.81–0.95)	0.77	(0.61–0.97)
51–55	0.91	(0.76–1.10)	1.98	(1.22–3.22)
Days in hospital 2 years prior to retirement	1.001	(1.001–1.001)	1.01	(1.01–1.01)

Note: Models control for year, age, marital status, blue and white-collar worker.

Discussion

Early retirement impacts long-term survival significantly. We observed lower survival chances for persons with poor health at early retirement compared with pensioners who retire later. However, employees who leave the labor market early *and* healthy may have better survival chances than people retiring between the ages of 61 and 65. This effect is even more pronounced for women.

At first glance, these findings seem contradictory as they provide evidence for detrimental and beneficial effects of early retirement at the same time, even though both of them have been separately detected in other studies (e.g. Litwin, 2007; Tsai et al., 2005). Having based our study on a prospective cohort design with 129,675 cases, we were better able to distinguish two processes potentially operating at the same time and contributing to mixed long-term survival outcomes: negative health selection into early retirement and protection during retirement.

Note, that our analysis may overestimate the protective mechanism of early retirement. Given the broad social class category in our data, we cannot entirely eliminate that richer white-collar workers systematically leave the labor market earlier than their poorer counterparts, and that both retirement and mortality profiles are mainly consequences of underlying socioeconomic conditions. Still, the distinction between blue and white-collar workers captures crucial class disparities. Also, very wealthy people are underrepresented in compulsory health insurances in Germany. Finally, it seems highly unlikely that new proximate living circumstances during early retirement (less work load, more disposable time) are of no influence. Unfortunately, the data to test this are not available.

Note also, that identifying these two processes, in which life course and health trajectories, institutional policies and mortality outcomes are intertwined, does not provide us with a full understanding of the logic and interaction of selection into and protection during early retirement. How do these processes interact to produce gender specific outcomes? While we cannot provide a complete answer here, we can offer the following ideas which may guide further research.

Firstly, we speculate about gender specific debilitating experiences across the life span or during retirement that result in significantly higher mortality risks for females who leave the labor market from the age of 51 to 55. We assume that there are certain stressors during untimely retirement which women unlike men usually face, such as caring for frail family members, which yield mortality differentials (e.g. Schulz & Beach, 1999). But without further information concerning their course of life, we cannot rule out the impact of gender-related health selection, which shows up in reduced earning capacity but not in our hospital data.

Secondly, our explanation as to why healthy women benefit more from an early exit than men is based on the finding that the decision to retire is often made by couples (e.g. Gustman & Steinmeier, 2004). But partners are often of different age. Healthy women who decide to retire between the age of 56 and 60 are more likely to exit at the same time as their generally older partners, while men of the same age often have a partner that is not yet eligible for pension. Transition into retirement is probably less stressful for a couple than for someone who is single.

Moreover, owing to the restricted personal and social background information in our data, we may also have missed out

important confounders like psychological state, specific occupational stress or social networks that may influence mortality significantly. Future research needs to address all these limitations, refine health measures, and should provide a systematic analysis of different early retirement programs.

In conclusion, we would like to point out one important policy implication of our study: as we have shown, early retirement is essential for people with ill health and it is an asset for healthy people leaving the labor market early. Severely sick people, as partners in an implicit intergenerational contract underlying all pay-as-you-go pension schemes and as victims of a significantly shorter life expectancy, have a legitimate right to obtain equivalent and early retirement payments to their more healthy peers. For them, not age but severity of the illness should be decisive for the timing of retirement. Healthy elderly people, however, stand to gain extended lifetime and pension payments from early retirement. For this reason, a cut in their pension payments seems fair.

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