



Timing of retirement and mortality - A cohort study of Swedish construction workers[☆]

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ABSTRACT

Recent studies indicate that early retirement per se may have a negative effect on health to such an extent that it increases mortality risk. One type of early retirement often referred to in these studies is retirement with disability pension/benefit. Given the overall objective of disability benefit programmes – to help the disabled live socially and economically satisfactory lives, freed from exposure to employment health hazards and thus avoid further declines in health – the finding is challenging. This paper examined the relationship between timing of retirement and mortality using a cohort of Swedish construction workers. The mortality risk of disability pensioners – excluding those with diagnoses normally connected to increased mortality – was compared with the risk of those continuing to work. Although initial indications were in line with earlier results, it became obvious that the increased mortality risk of disability pensioners did not depend on early retirement per se but on poor health before early retirement not explicitly recognized in the diagnosis on which the disability pension rested. The results indicate that there are no general differences in mortality depending on timing of retirement. Future studies of mortality differences arising from working or not working must sufficiently control for health selection effects into the studied retirement paths.

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Introduction

This paper examines the relationship between timing of retirement and mortality risk using data from a cohort of Swedish construction workers. The study takes as its departure point recent empirical research suggesting, quite surprisingly, that early retirement per se may actually be associated with lower chances of survival.

A Swedish study found increased mortality among disability pension recipients, mortality being highest among those granted disability pensions when young (Wallman et al., 2006). Factors such as smoking habits, underlying disease, and hospitalization were considered in the study. However, the possibility of using hospital

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admission as a sufficient control for health selection effects in the studied groups was not clearly specified. Another Swedish study controlled for illness, smoking, age, self-reported socioeconomic group, and other social factors (Lindholm & Fredlund, 2004). Although these adjustments resulted in considerable mortality reduction, some increased risk remained for early retirees (the reasons for early retirement were not clearly specified). Still another Swedish study found the greatest mortality risk among disability pensioners, a somewhat lower risk among part-time beneficiaries (diagnoses unspecified), and an even lower risk among those retiring early for labour market reasons. The lowest mortality was found among those not taking early retirement, adjusting for age and gender (Karlsson, Carstensen, Gjesdal, & Alexanderson, 2007). Similar results were reported in a US study in which those retiring at age 55 (reasons for early retirement were not clearly specified) displayed higher mortality after age 65 than did those who continued to work, adjusting for sex, socioeconomic background, and year of entry into study (Tsai, Wendt, Donnelly, de Jong, & Ahmed, 2005). A Danish study found that the mortality risk of disability benefit recipients was higher than the risk of those who retired early for labour market reasons, whose risk was in turn higher than the risk of

those who continued to work (Quaade, Engholm, Mette, Johansen, & Møller, 2002). The authors identified a methodological problem concerning the possibility of health-associated selection into both these retirement paths. It was suggested that the difference between the two groups of early pensioners depended on poor initial health among disability pensioners. Finally, and contrary to most research, an Israeli study could not find any difference in mortality between early retirees and those retiring at statutory age when controlling for age, income, education, and illness; however, the control variables were self-reported (Litwin, 2007).

Although the routes to early retirement vary or remain unspecified in these previous studies, most of these studies find that the earlier the retirement the higher the mortality risk. This finding, as mentioned, is also the core issue in the present study. The type of early retirement of interest here is withdrawal from the labour force due to eligibility for the disability pension, and the mortality of this group will be compared with that of those who continue working up to statutory retirement age. Before specifying our aim further, we must briefly consider disability pension as a welfare institution in relation to the above findings. We also must consider different explanations of the increased post-retirement mortality risk and poorer health.

In most Western countries, the receipt of disability benefits enjoys a special status as an early retirement path. Public disability benefits/pensions are normally regarded as a successful welfare state intervention that has contributed substantially to the independence and autonomy of the disabled (Marin, 2003; Stattin, 2005). Nevertheless, the societal and individual outcomes of such social security programmes have also been questioned. One line of reasoning cites the fact that the receipt of disability benefits has increased steadily in many countries since the 1970s, despite improved health and increased life expectancy and without any convincing medical or epidemiological explanations (Marin, 2003; OECD, 2003). Hence, disability pension programmes have contributed to an ongoing exclusion from work and served as an entrance into inactivity for millions of working-age people in Europe. A common explanation of this development is that disability pension programmes have been misused as a general route to early retirement, because of eligibility criteria that recognize social circumstances, labour market considerations, and unemployment in reaching disability pension decisions. Available evidence suggests that the inclusion and exclusion errors in these programmes are sizeable (OECD, 2003), hinting at the great difficulty of determining what constitutes disability and work incapacity and of distinguishing between those who can and cannot work. Such shortcomings in programme performance may prematurely remove people permanently from the labour market.

Given the overall objective with disability benefit programmes – to help the disabled live socially and economically satisfactory lives, freed from exposure to employment health hazards and thus avoid further declines in health – research results suggesting the opposite effect are indeed challenging. However, research in this area provides only tentative explanations of why disability pensions and other routes to early retirement are associated with increased mortality.

Seeking possible explanations for this difference in mortality, we will briefly examine the broad field of research on post-retirement health, which embraces studies of, for example, quality of life, psychosocial wellbeing, and physical health. Some studies do conclude that retirement as such negatively affects people's health (Barnett & Hyde, 2001; McGoldrick & Cooper, 1994). Such results imply the existence of a risk factor in the transition into retirement and/or a health factor inherent in labour market participation. It has been suggested that employment, as a side-effect, fosters non-financial values by bringing regularity and structure to time and activity, by allowing for participation in a collective purpose, and by maintaining social status and identity (Jahoda, 1982). It is also true

that paid work may provide positive physical activity, intellectual stimulation, and job satisfaction, all of which may be regarded as potentially health-promoting. Other studies support opposing arguments that leaving behind the demands and pressure of working life may benefit people's health and wellbeing (Bosse, Aldwin, Levenson, & Ekerdt, 1987; Doyle & Hind, 1998; Duxbury, Higgins, & Lee, 1994; Hall, 1992; Lundberg, Mårdberg, & Frankenhaeuser, 1994), or that retirement has no significance for health and wellbeing (Salokangas & Joukamaa, 1991; Kim & Moen, 2001; Midanik, Soghikian, & Ransom, 1995). Thus, some findings in post-retirement health research indeed suggest possible health-related explanations for the differences in mortality found between early retirees and those continuing to work, while other findings do not.

This inconsistency in results may be explained by the varying importance of given effects in different subpopulations (Pinquart & Schindler, 2007) and available theoretical models may have merits when it comes to explaining the effects of retirement for subgroups of retirees. It is therefore important to distinguish between groups of retirees who may be differently affected through their different circumstances, i.e., economic and social resources, previous health status, previous position in working life, and actual route into retirement (Dorfman, 1995; Dorfman, Kohout, & Heckert, 1985; Kim & Moen, 2001; McGoldrick & Cooper, 1994; Mein, Martikainen, Hemingway, Stansfeld, & Marmot, 2003; Hyde, Ferrie, Higgs, Mein, & Nazroo, 2004; Smith & Moen, 2004; Pinquart & Schindler, 2007). In addition, individual control over the time of and route to retirement is important to subsequent health (Crowley, 1986; De Vaus, Wells, Kendig, & Quine, 2007; Hyde et al., 2004; Isaksson & Johansson, 2000; McGoldrick & Cooper, 1994; Nordenmark & Stattin, 2009; Sharpley & Layton, 1998; Szinovacz & Davey, 2005).

One main lesson from existing research is that the determinants of post-retirement health are complex and non-uniform, which calls for analysis that separates different subgroups of retirees. Guided by this, and by other methodological problems in earlier studies, we can now formulate the aim of this study in more precise terms: This study aims to analyse the association between mortality risk and timing of retirement among Swedish construction workers when the effects of health selection and subgroup variations are accounted for.

There are several empirical difficulties involved in such a study based on comparing disability recipients and subjects healthy enough to keep working. Since a disability pension decision is based on an assessment of an individual's health and work capacity in relation to available jobs, disability pensioners by definition likely constitute a heavily health-selected group. In addition, comparing disability pensioners and those who continue to work is problematic, due to the influence of healthy-worker effects and to differences in exposure to hazardous work environments, business cycles, and various individual factors (Stattin & Järvalm, 2005). Obviously, it is crucial to control for confounders in the complex web of factors governing health and mortality when assessing the impact of early exclusion from working life per se.

The data used in the present study permit adjustments for sex, birth cohort, occupational position, pre-retirement diagnosis, pre-retirement hospitalization, and retirement age. To adjust for the potential influence of the positive effects of having a job, we will also control for time spent on disability pension. Furthermore, we will distinguish between those who are fully and partially retired, because in the latter case the individual may still benefit from the positive effects of having a job.

Data material and method

This study is based on a cohort of Swedish construction workers who participated in health monitoring between 1971 and 1993. The

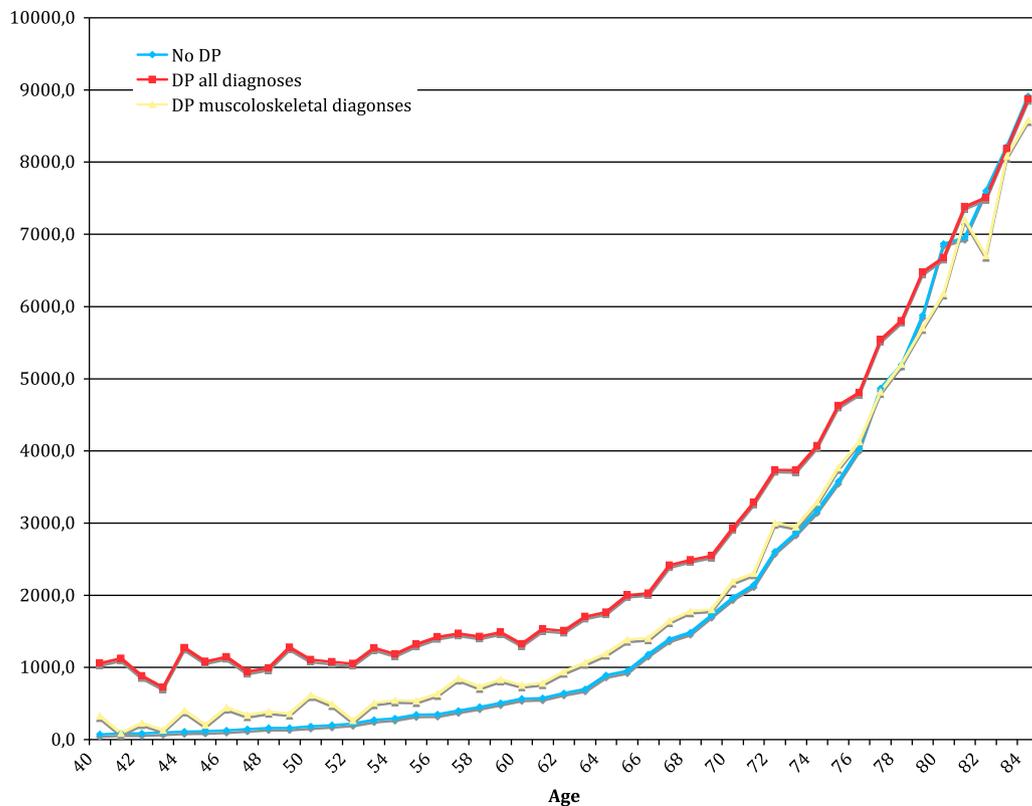


Fig. 1. Crude mortality rate for the entire cohort of construction workers by type of retirement and disability pension (DP) diagnoses.

health monitoring was provided by a nationwide occupational health centre and the participation rate was estimated to be at least 80% (Stattin & Järholm, 2005). Workers throughout the construction industry were included in the monitoring under the terms of collective agreements between unions and employers. The subjects in our subsample all worked in the same industry, were subject to similar selection into their occupation, and are retiring in a Scandinavian welfare society because of old age or diagnosed disability.¹ Linkage with official registers was possible through the workers' unique personal numbers. Information about pensions and diagnoses was collected through a linkage with data from the Swedish National Insurance Bureau. Death and emigration were determined using national registers of mortality and of emigration. Additional linkages (for data up to 2003) were established in several steps, but without identification numbers due to national integrity regulations. All steps of the research project were approved by the Swedish Regional Ethical Vetting Board.

¹ In Sweden, the disability pension is a public and universal social security programme that provides financial benefits to people aged 16–65 with permanent work incapacity caused by ill health. The programme also allows partial and time-limited benefits depending on whether the work capacity can be expected to improve in reasonable time. Over the past 30 years, there has been an inflow to the programme of roughly 35,000–70,000 new recipients annually (Försäkringskassan, 2007). Since there are virtually no other publicly financed options for early retirement in Sweden, the disability pension route constitutes the single most important route for premature withdrawal from the labour market in Sweden. Eligibility criteria for inclusion in the programme have changed considerably over time, which is one explanation of the large variations in annual inflow. At present, more than 500,000 individuals (or more than 10% of the Swedish labour force) are on the disability pension rolls, and re-entry into the labour market is extremely rare. Over the past decade, most changes to the programme have concerned measures to reduce the number of recipients by more strictly treating impaired health as the only criterion for receiving the benefit.

This study first considers the mortality risk by applying the person-year method to the entire sample (see Fig. 1). Study subjects are then selected in several steps governed by a number of restrictions reflecting the research question, sample limits, and the aim of reducing heterogeneity and thereby possible confounders (see Table 1). After satisfying the main restrictions, the data cover male, blue-collar construction workers, born between 1920 and 1932, all with a chance of having passed age 71 by 2003 (when our data regarding incidence of death ends). The dependent variable is the risk of dying between age 65 and age 72. The study event is death and survivors are censored out once passing age 71. All those who died or emigrated before age 66 are excluded from the study (the official retirement age in Sweden was 65 at the time of the study); the results of these restrictions are presented in Kaplan–Meier curves (Fig. 2) and analysed using Cox regression (Table 2). The possible violation of the proportionality assumption is continuously controlled for using time-dependent variables and by viewing strata from the regression models, following Singer and Willett (2003).

Since our study group consists of disability pensioners and since the research question is whether early retirement from the labour market affects subsequent health to such an extent that it influences the mortality pattern, it is essential to control for health selection effects. Because disability pension benefits are given to individuals with reduced work capacity due to ill health, it would be quite natural to find that individuals in such a study group are less healthy than non-disability pensioners. This bias will, to varying degrees due to varying disability pension diagnoses, have substantial implications for subsequent mortality in the two groups. In this study, we control for this selection effect in two steps: (i) by excluding all disability pensioners with diagnoses other than musculoskeletal disorders, which normally have no lethal consequences, and (ii) by excluding all disability

Table 1
Specification of data preparation.

Steps	Description	Exclusion (n)	Remaining (n)
Total number of construction workers			389,132
Excluding cases with data error		25	389,107
Excluding female construction workers		19,418	369,689
Excluding white-collar workers and supervisors		34,769	334,920
Excluding those with other than musculoskeletal disability diagnoses		37,880	297,040
Excluding those born before 1920 or after 1932		260,070	36,970
Excluding those who died or emigrated before age 66		4845	
<i>Cox Regression, models I–III, Table 2</i>	20,297 with no disability pension, 10,914 with full disability pension, and 914 with partial disability pension		32,125
Excluding those hospitalized on any occasion in the year of or the year before disability retirement plus those for whom we lack hospitalization information		7756	
<i>Cox Regression, model IV, Table 2</i>	20,297 with no disability pension, 3613 with full disability pension, and 459 with partial disability pension		24,369

pensioners who were hospitalized the year of or the year before retiring.

Another complementary perspective on health selection, as already mentioned, refers to the positive effects of having a job. This will be analysed by introducing a variable for retirement age. If work has a positive effect on health, we would expect a longer working life to be protective against early death after retirement. In addition, we will introduce a variable distinguishing between partial disability pension (which allows for a gradual transition into fulltime pension) and fulltime disability pension (which marks a more abrupt exit from working life). For detailed information concerning the data selection steps, see Table 1.

Results

As stated above, one of the most important adjustments to make when studying the relationship between disability pension and mortality risk is to control for the diagnoses on which the decision for disability pension rest. This becomes obvious when comparing construction workers with and without disability pension using the entire cohort (Fig. 1). The number of deaths per 100,000 person-years by age 40 is almost 15 times higher (1058/73) among disability pensioners than non-disability pensioners. With only a minor tendency to decrease, this substantial difference remains up to advanced ages; after age 70–72, however, the mortality

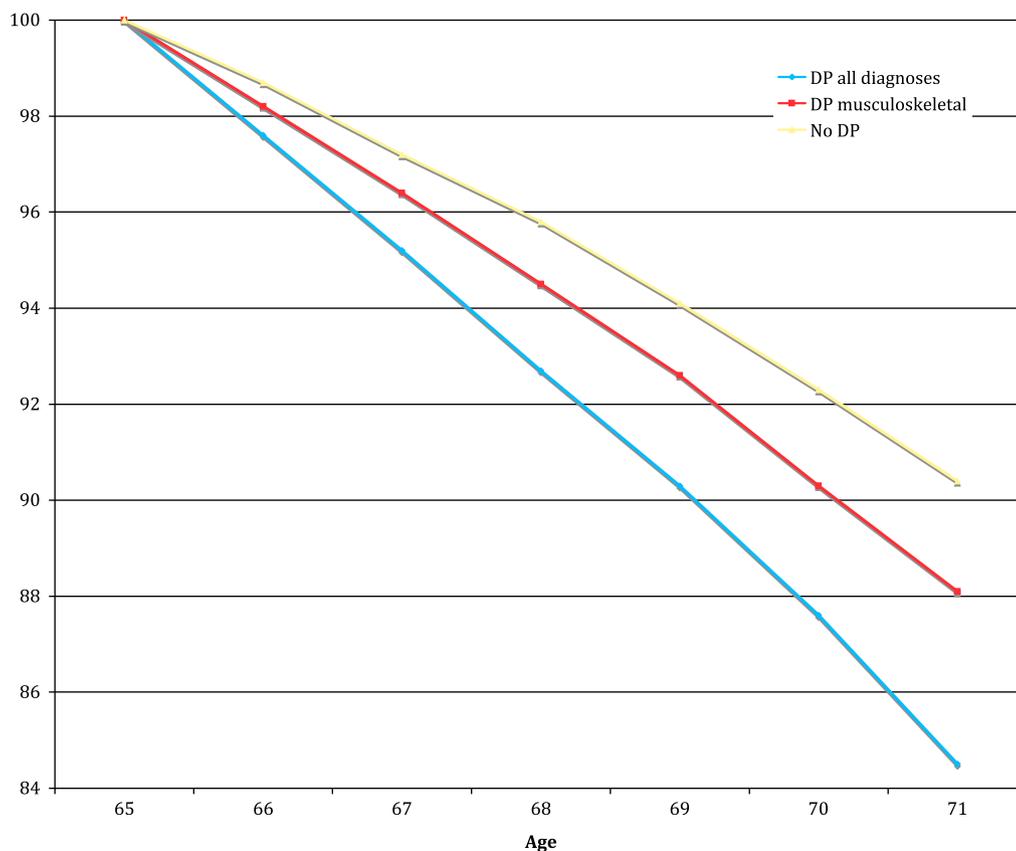


Fig. 2. The survival pattern between 65 and 72 years of age showing (i) all types of diagnoses, (ii) only musculoskeletal diagnoses, and (iii) no disability pension. All subjects born 1920–1932; Kaplan–Meier analysis.

Table 2

The risk of death between 65 and 72 years of age. Cox regression: predicted change in hazard for every unit increase in predictor.

	Model I		Model II		Model III		Model IV	
	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI
DP musculoskeletal (versus statutory retirement)	1.25***	1.17–1.34	–	–	–	–	–	–
Full DP musculoskeletal (versus statutory retirement)	–	–	1.28***	1.19–1.37	1.13**	1.03–1.22	1.11	0.97–1.26
Partial DP musculoskeletal (versus statutory retirement)	–	–	0.93	0.72–1.15	0.88	0.71–1.10	1.00	0.73–1.36
Retirement age: 60 years old or older (versus 59 or under)	–	–	–	–	0.72***	0.64–0.80	1.02	0.78–1.34
Generation: born 1926–1932 (versus those born 1920–1925)	–	–	–	–	0.84***	0.77–0.90	0.85***	0.78–0.93

Levels of significance: *** = *t*-value significant at 0.001 level, ** = 0.01 level, and * = 0.05 level. Models I–III display results for those retiring early and receiving disability pension based on musculoskeletal diagnoses and for those retiring at statutory age. Model IV displays results for those retiring early and receiving disability pension based on musculoskeletal diagnoses and for those retiring at statutory age. Those hospitalized the year of or before receiving disability pension are excluded.

curves tend to converge and no differences remain by age 80. The difference between disability pensioners with musculoskeletal diagnoses and non-disability pensioners is much smaller; above age 70, the difference declines to insignificance.

Fig. 1 illustrates two important matters. First, disability pension recipients indeed have a higher crude mortality rate than do non-disability pensioners. This is not surprising, since those who retired with diagnoses such as cancer or cardiovascular disease could be expected to display increased mortality. Second, receiving disability pension for musculoskeletal diagnoses is far less associated with increased crude mortality. Compared with analysing disability pensioners in general, the restriction to analyse only disability pensioners with musculoskeletal diagnoses clearly reduces the impact of health selection that might subsequently affect the mortality rate.

Fig. 1 obviously fails to give adequate attention to several important variables. Especially important in our case is birth cohort, since the full sample covers nearly the entire past century. Given the medical, health, and lifestyle developments and the general increase in life expectancy over the period, it is crucial to control for cohort when studying mortality risk. In Fig. 2, the sample is therefore further restricted to only male, blue-collar construction workers born between 1920 and 1932. Fig. 2 shows three Kaplan–Meier curves, each describing the age span from age 65 to 71. The curves depict the survival patterns of: (i) disability pensioners with all diagnoses, (ii) disability pensioners with only musculoskeletal diagnoses, and (iii) non-disability pensioners. Fig. 2 presents results similar to those in the previous figure. Non-disability pensioners are far more likely to survive the studied age span than are those with disability pensions, but the difference in survival between the two groups diminishes dramatically when we restrict the disability pensioners to only those with musculoskeletal diagnoses. The curves deviate significantly at the 0.001 level.

Table 2 presents four Cox regression models, based on the risk of dying in the 65–72-year age range. In model I, we see that those with disability pensions based on musculoskeletal diagnoses still display a significantly higher risk of dying before age 72 than those working to statutory retirement age. It is, however, possible that a gradual transition into retirement through partial disability pension would be protective by prolonging the positive effects of having a job. In model II, we see that this seems to be the case. When separating partial and full disability pensioners in the musculoskeletal diagnosis category, only those with full pension display a greater mortality risk than those who worked up to statutory retirement.

Saying that early full retirement is related to increased risk of dying before age 72 (compared with working until statutory retirement) is close to saying that early death is positively related to the length of time an individual has been deprived of participation in paid work. Thus, we must control for retirement age. We already have sufficient control of the retirement age for those working up to statutory retirement (formally age 65; turning 66 marks the

starting point of this study). The actual age of diagnosis leading to disability pension, on the other hand, varies in our sample from age 43 to 65, and thus also varies in relation to the year the study starts. To adjust for the differences in the length of time the disability pensioners have been retired, we introduced a retirement age variable. To increase the possibility of detecting violation of the proportionality assumption for Cox Regression, we recoded the retirement age variable into only two categories: (i) those who retired between age 43 and 59 and (ii) those who retired between age 60 and the statutory retirement age.

However, although the age at disability diagnosis may be the same for two individuals, the actual year of diagnosis can still differ. Because it is important to adjust properly for important changes over the years (such as healthier lifestyles, better medical treatments, less exposure to unhealthy work environments, and generally increased life expectancy) that may influence the chance of survival to advanced age, we also introduced cohort as a control variable. For the same reason as for the retirement age, we recoded cohort into two categories: (i) those born 1920–1925 and (ii) those born 1926–1932. In model III, we see the results of these restrictions. The first observation (Table 2, model III) is that the difference in survival between fulltime disability pensioners with musculoskeletal diagnoses and statutory pensioners has diminished. Instead, it is cohort (indicating societal changes over time) and retirement age (indicating the time deprived of paid work) that become important factors. Obviously, the later one is born and the later one leaves the labour market, the better one's chances of survival between ages 65 and 72.

Now, it could be argued that the change in hazard due to retirement age does not truly reflect the time deprived of labour market participation. Instead it may well reflect the case that the earlier a disability pension is granted, the poorer the health of the individual. It is true that we already adjusted for diagnosis, but it is still possible that the earliest retired suffer from more severe disabilities or from multiple diseases not recognized in the official diagnosis. To control for this possibility, we used information from hospitalization. In model IV, we see the result when early retirees with musculoskeletal diagnoses who were hospitalized at least once in the year of or the year before retirement are deleted from the equation. Model IV reveals increased confidence intervals and that retirement age is no longer significant when we adjust for pre-retirement health.²

Model IV indicates that retirement age is no longer significant when we adjust for pre-retirement health. Thus, the increased mortality risk for those retiring early in life did not depend on the length of time they were deprived of labour market participation;

² When making this type of restriction, the increase in the confidence intervals is to some degree a reflection of the decrease in *N*s, and may therefore also reflect a loss of statistical power. The restriction to musculoskeletal diagnosis surely reduces the total number of subjects analysed, but there are still more than 24,000 cases left in Model IV, securing a high level of statistical power (cf. Table 1).

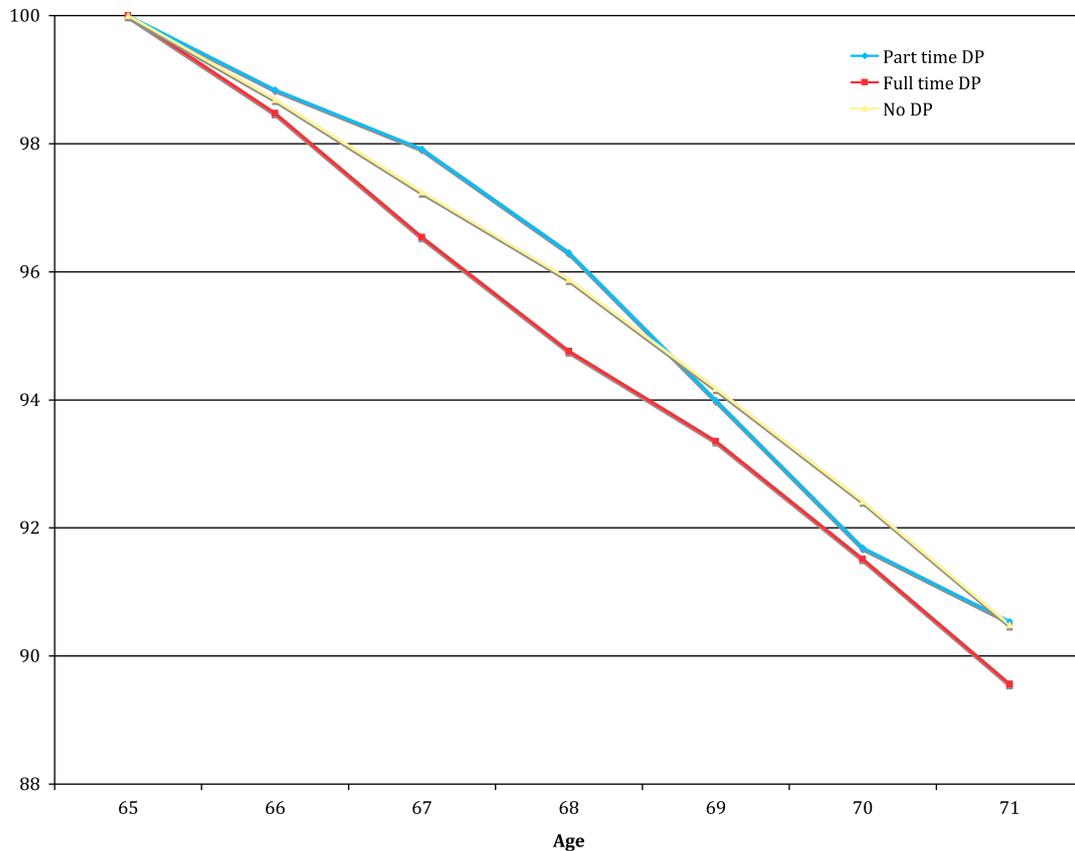


Fig. 3. Survival between 65 and 72 years of age. Musculoskeletal diagnosis and no disability pension. Strata from Cox Regression, Table 2, Model IV.

instead, it depended on their pre-retirement health. What is even more striking – given the results of earlier research – is that the observed difference in survival between fulltime early retirees and statutory retirees is now more or less eradicated. Thus, there is no difference in mortality risk between disability pensioners with musculoskeletal diagnoses and statutory retirees when pre-retirement health is adjusted for. Observed differences depend almost entirely on health selection into the two groups.

The variables entered into the Cox regressions displayed reasonable proportionality when tested for time and the logarithm of time. Fig. 3 shows the survival curves for the three final retirement categories, as they are taken directly as strata from model IV, Table 2. As can be seen, the estimated curve for partial disability retirement (which has never significantly deviated from that of statutory retirement) is irregular over time, while the curves for fulltime disability retirement and statutory retirement are more stable, although not significantly deviating.

Discussion

The starting point of this study was the fact that several studies have indicated that early retirement per se may negatively affect health to such an extent that it increases mortality risk. This finding is particularly challenging in the case of disability pensioners, since the results may indicate a negative outcome of the benefit itself. However, the result of the present study contradicts the results of these earlier studies.

Our major finding is that early-retired construction workers, who are not obviously health selected into early retirement for reasons other than musculoskeletal diagnoses, display no additional mortality risk compared to that of statutory retired

construction workers. Although this finding concerns only a limited group, it has important implications. If early retirement per se has a general negative effect on survival, then this would also have been detected in this group of early retirees. Since this was not the case, such a general effect is unlikely to exist.

The key difference between our study and others is that, by using a large and relatively homogeneous sample, we were able to control for several confounders that seriously affect subsequent mortality. The most obvious confounder here concerns health selection effects, which have not been sufficiently controlled for in several studies in the field. The present study controlled for this in two steps. First, by selecting only cases of musculoskeletal diagnoses, we excluded disability pensioners with diagnoses medically associated with increased mortality. Second, by adjusting for hospitalization at the time for disability pension decision, we controlled for the possibility of additional health selection. Although hospitalization does not discriminate by type of illness, it is not only likely, but, according to our results, obvious that the potential effects of underlying diseases have been sufficiently controlled for.

Assessing the potential influence of leaving the labour market in early years required further adjustments. By studying a single industry, the influence of occupational healthy-worker effects and exposure to hazardous work environments was minimized, although not entirely controlled for. By studying a selected generational cohort, we controlled for medical, health, and lifestyle developments as well as changes in work environments. By adjusting for partial versus fulltime retirement and for retirement age, we also controlled for the possible positive effects of having a job.

Taken together, these control measures help make a strong case for analysing whether early retirement per se affects subsequent health, and our main finding is that it apparently does not. The

study has demonstrated that the difference in survival between the group of carefully selected disability pensioners and those who worked until statutory retirement was nil or nearly nil. Initially observed differences in survival were shaped almost entirely by health at time of retirement. Viewed from a social policy perspective, this finding is in line with the basic objective of disability benefit programmes.

However, the present study also has some important limitations. First, we studied only mortality, which, though a robust measure of health, tells us little about actual quality of life and general health conditions. The use of other outcome variables could well have resulted in different conclusions.

Second, this study concerns construction workers born from 1920 to 1932, and this has several important implications. First, virtually all occupations in the construction industry are physically demanding. Therefore, health problems associated with physical exertion, such as musculoskeletal diagnoses, likely have a substantial impact on the capacity to perform normal work tasks. In this industry, it might be less difficult to decide whether an injury actually and seriously affects work ability, meaning that inclusion errors might be less prevalent than in other industries. The exposure to physical strain and hazardous work environments often connected to such work may reduce the positive health effects of participating in organized work. It is therefore likely that construction workers perceive disability pensions as an adequate response and a relief in relation to such diagnoses. Given these limitations, it is important to note that we well may have come to a different conclusion if we had followed people in a different industry. Given the continuous technical development and improvements in most work areas, it is also possible that our conclusion might even have been slightly different for different cohorts of construction workers.

This study concerns Swedish male construction workers with musculoskeletal diagnoses, which limits the possibility of generalizing the results. Whether early retirement due to disability has negative or positive effects in other settings, in other socioeconomic groups, for women, or in different combinations of diagnoses and previous work, remain questions for future research. However, our results clearly indicate the necessity of controlling for impaired health among disability pensioners when comparing their health outcomes with those of people healthy enough to work.

This study leads to four important conclusions: (i) There is no evidence of mortality differences depending on timing of retirement per se. (ii) Taking construction workers diagnosed with musculoskeletal disorders as an example, the Swedish disability pension system seems to be operating as intended, since the programme obviously captures those who suffer the most from poor health. (iii) Assessing the impact of social security programmes such as disability benefits requires robust measures to control for health selection effects. (iv) In line with up-to-date social gerontology research on post-retirement health, indicating large subgroup variation, more studies covering other occupational groups are needed to improve the knowledge of the performance of disability pension benefits in general.

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