Labour Market Status at Ages 50–64 and All-Cause Mortality at Ages 65–70: A Longitudinal Study from Finland

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Abstract

Individuals' labour market status and health are known to be highly correlated. To investigate this association beyond prime working ages, we study how all-cause mortality at ages 65–70 relates to different labour market positions at ages 50–64. The data stem from random samples of the Finnish population, which make it possible to follow 33,000 individuals in the period 1987–2011. Hazard models are estimated to quantify the associations. For both men and women, disability pensioners have a hazard of dying at age 65+ that is approximately twice that of persons who were employed, and this ratio still exceeds 1.5 when socioeconomic and demographic variables are included. Also male unemployment, but not female, is associated with an elevated mortality risk, but this interrelation depends greatly on socioeconomic position.

Keywords: Labour market position, disability pension, mortality, retirement, Finland

Introduction

Finland is one of the countries with the highest life expectancy in the world. In 2016, it was 78.4 years for men and 84.1 years for women. At age 65, the remaining life expectancy of men was 18.0 years and 21.6 years of women (Statistics Finland 2017). Since it is expected to rise further, it is important to prepare the pension system for the upcoming challenges and project future survival. The literature has largely focused on the question of how retirement age influences survival and whether or not prolonged working might be beneficial. So far, the evidence on the relationship between retirement and survival is mixed and far from conclusive. One concern is the nature of many of the data sources used, having small sample sizes and/or attrition problems, while relatively few studies have utilised large-scale and high-quality data from population registers with long follow-up periods. Many studies have, therefore, not analysed the universe of various labour market positions prior to retirement. Another issue is that, due to data availability and the more fragmented working careers of women, previous research has mainly focused on men.

Finland has been scarcely mapped out in terms of how labour market status in the late working ages relates to mortality. At the same time, the country is well equipped for doing such analyses. Its pension system is largely comparable to other European countries, it has a comprehensive population register that enables longitudinal analyses with a long follow-up period, and it is possible to use large-scale data with detailed information on individuals' labour market position, mortality, and various socioeconomic and demographic characteristics. In addition, the strong integration of women in the Finnish labour market allows for analyses of both sexes. Thus, in a Nordic and European context, Finland is highly useful for analysing the interrelation between labour market position in the later ages of working life and subsequent mortality. The aim with this paper is to relate people's labour market position at ages 50–64 to their all-cause mortality at ages 65–70, using register-based data that cover the period 1987–2011.

Previous research on the interrelation between labour market status and health

People who are employed have consistently been found to be healthier than their non-employed peers (Herbig, Dragano and Angerer 2013; Kühntopf and Tivig 2012; Litwin 2007; Martikainen and Valkonen 1996; Schmitz 2011). This interrelation should not, however, be interpreted as causal, but more likely related to a "healthy worker survivor effect" (Arrighi and Hertz-Piccioto 1994; Kühntopf and Tivig 2012). This would mean that there is a selective drop in the less healthy individuals on the labour market, leaving the group of employed people increasingly selected for good health at higher ages (Brockmann, Müller and Helmert 2009; Litwin and Tur-Sinai 2015).

The most obvious mechanism for clearing the labour market of less healthy indi-

viduals is via disability pension. Although disability pension is usually granted for non-fatal conditions (Leinonen et al. 2014; Wallmann et al. 2006), the survival of disability pensioners across Europe is worse than that of any other group (Brockmann et al. 2009; Kalwij, Alessie and Knoef 2013; Polvinen et al. 2015; Quaade et al. 2002; Wallmann et al. 2006). The excess mortality is higher the earlier in life disability pension is granted and decreases somewhat in magnitude the later it is granted (Wallmann et al. 2006). To some degree, this is due to eligibility for other labour market withdrawal schemes, which become available in higher ages and do not require the rigid testing methods disability pensioners are subject to (Hakola 2000; Hietaniemi and Ritola 2007; Kühntopf and Tivig 2012).

Another mechanism to clear the labour market of less healthy individuals works via unemployment, since less healthy people are more likely to become unemployed. The relationship between health and unemployment is nevertheless hard to disentangle in terms of cause and consequence, as also the loss of unemployment may cause health deterioration (Herbig et al. 2013; Martikainen and Valkonen 1996; Schmitz 2011; Virtanen, Janlert and Hammarström 2013). While it is possible to regain employment, the employment probability tends to decrease with age. This is partially due to the existence of schemes for older unemployed persons to retire at an earlier age. They serve to relieve pressure from the labour market, but can also be exploited by companies to reduce staff (Coe and Lindeboom 2008; Radl 2007).

Analysing the association between old-age retirement and health is complex. According to analyses based on the ELSA survey in the UK, retirement causes health to deteriorate (Behncke 2012). However, the choice of methods seems crucial for inference. Among men in the Health and Retirement Study in the US, health deteriorates after retirement when using standard OLS regressions, while this relationship disappears when instrumental variable methods are applied (Coe and Lindeboom 2008). In Austria, involuntary retirement has been found to have a negative impact on the health of men, while voluntary retirement does not influence health (Kuhn, Wuellrich and Zweimüller 2010). On the other hand, there is also evidence for a health preserving effect of retirement. Research from Germany (Brockmann et al. 2009) has found a negative health selection into retirement. At the same time, there is also evidence for a health preserving effect of retirement, with a gain in survival that is of rather short-term nature and higher among those who retire early. Exploiting a temporary change in legislation in Sweden, it has been found that retirement has a health preserving effect among men who voluntarily retire early, and especially in the first decade of retirement (Hallberg, Johansson and Josephson 2014).

As for the actual age of retirement, most evidence points toward a low correlation between the age of leaving the labour market and survival past retirement. Recent research from Norway (Farner Rogne and Syse 2018), which has used a multitude of different methods and models to explore the effects of a legislation change in retirement, finds no interrelation between retirement age and subsequent survival. In Sweden, there seem to be no differences in survival after retirement by retirement scheme, with the

exception of lower survival among disability pensioners (Wallmann et al. 2006). In Denmark, all labour market groups display mortality close to that of the working population, the exception being disability pensioners, whose mortality is well above the average (Quaade et al. 2002). In the Netherlands, survival after age 65 is independent of labour market status at age 58, with the exception of disability pension (Kalwij et al. 2013). In the US, survival past age 65 of Shell Oil's US employees was lower only among those who retired before age 56, while those who retired at age 60 had no survival differences from those who retire at the statutory retirement age of 65 (Tsai et al. 2005). In Israel, differences in survival by retirement age are entirely attributed to socioeconomic differences (Litwin 2007).

Labour market status and mortality are both related to socioeconomic factors (Quaade et al. 2002; Polvinen et al. 2015; Virtanen et al. 2013; Wallmann et al. 2006). At the same time, it is possible that especially manual workers can benefit from early labour market withdrawal. The social-status differences throughout working life level out in retirement, which means a relative gain in status for lower class retirees (Radl 2007). Furthermore, these people are relieved of physically more demanding work, higher workplace hazards and, thus, experience a stronger reduction of work-related stress (Brockmann et al. 2009). In correspondence, the health preserving effects of voluntary early retirement among Swedes is stronger among those with low education (Hallberg et al. 2014). However, losing the social integration of the workplace has been claimed to make people in the lower social classes more vulnerable, since they have less resources to avoid social isolation (Hallberg et al. 2014: Kuhn et al. 2010; Martikainen and Valkonen 1996).

The interrelation between labour market status and survival has a clear gender component. Women are less influenced by withdrawal from the labour market (Brockmann et al. 2009; Kuhn et al. 2010; Kühntopf and Tivig 2012; Litwin 2007; Martikainen and Valkonen 1996). However, analyses of German women suggest that they do not exhibit the health preserving effect of early retirement that is present for men, regardless if they leave the labour market voluntarily or involuntarily (Brockmann et al. 2009). In the Netherlands, female retirement health is more determined by socioeconomic circumstances than by the women's actual labour market status (Kalwij et al. 2013). In both Germany and Sweden, there seems to be a "healthy worker survivor effect" for both men and women, although it is weaker for women (Brockmann et al. 2009; Kühntopf and Tivig 2012; Wallmann et al. 2006). At least in societies with more conservative expectations of gender roles, this may reflect that women have the role of a homemaker to fall back on when losing the attachment to the labour market. This argument is supported also by the virtual absence of any health effect in women after the loss of employment in Germany and Austria (Kuhn et al. 2010; Kühntopf and Tivig 2012). Furthermore, it is likely that women leave the labour market early for reasons not related to employment or health, but to coordinate entry into retirement with their male partner, who is usually a few years older (Radl 2007). Additionally, across Europe, women in their 50s and 60s are the main caregivers for both their grandchildren and

elderly relatives (Leitner 2003). Especially elderly care is associated with very early retirement and considerable health deterioration on the side of the caregiver (Brockmann et al. 2009; Schulz and Beach 1999).

The situation in Sweden provides a high degree of comparability to the Finnish case and, while women are affected to some degree by their labour market status, they are less affected by it than men (Wallmann et al. 2006). Finland has a higher degree of gender equality than most other European countries. These circumstances result in high female labour market attachment (Laitinen-Kuikka and Tuominen 2003), a low prevalence of housewives even in previous generations (Gornick 1999; Vinni and Hakama 1980), and a high availability of formal care arrangements (Simonen 2003). The likelihood of Finnish women dropping of the labour market for family reasons should therefore be comparably low.

The Finnish pension system and its implications

The Finnish pension system underwent a major reform in 2005. Although this means that the legislation changed within our study period 1987–2011, the changes were gradual enough to allow for classifications encompassing both the time before and after reform.

Before the 2005 reform, the statutory retirement age was 65 and the final amount of pensions was based on the average of all earnings in the ten years prior to retirement. The maximum amount of pension was 60 percent of the highest annual earnings of the working career (Hietaniemi and Ritola 2007; Laitinen-Kuikka and Tuominen 2003). In 2005, a flexible retirement age spanning the ages 63–68 was introduced and the amount of the pension was changed to be based on the individual's entire employment history. Additionally, early old age retirement can be drawn from age 62, but will result in a permanent deduction of -0.6 percent per month retired before reaching age 63. Retiring past age 68 yields a permanent increase of +0.4 percent per month retired past age 68 (Hietaniemi and Ritola 2007). While this legislative change allows for continued employment past age 65, the group doing so is small and does not skew our results as to be reported here.

When physical or mental conditions restrict a person's working capacity, people aged 16–64 may become eligible for disability pension. If the working capacity is deemed to be impaired by at least 60 percent for the duration of at least a year, full disability pension is granted. Partial disability pension is granted when the working capacity is limited by at least 40 percent for the duration of at least one year. Disability pension can be granted for a fixed period of time or indefinitely (Ministry of Social Affairs and Health 2007).

Individual early retirement was a type of early retirement that was open to older employees with a long work history. The health testing for individual early retirement required less strict health testing than for disability pension (Hietaniemi and Ritola

2007). The maximum age was 64 after which the recipient would receive statutory old age pension (Hakola 2000). Individual early retirement pension was available to people born before 1948 (Hietaniemi and Ritola 2007). After the 2005 pension reform, this pension was abolished, but the birth cohorts we study were all born before 1948. We classify people receiving individual early retirement as disability pensioners, as this pension is dependent on an objectively tested deteriorated state of health.

While unemployment is not a permanent state, re-employment becomes increasingly unlikely as age increases (Baumann 2016; OECD 2016). In order to relieve the labour market of older long-term unemployed, an unemployed person aged 60 was able to apply for unemployment pension. This resulted in permanent withdrawal from the labour market if the person had been unemployed for at least 500 days, but had been employed for five years in the preceding 15 years, and could not be reassigned to another job. The scheme was only open to people born before 1950 (Hietaniemi and Ritola 2007). We classify people with unemployment pension as being unemployed.

Part-time pension serves as a possibility for an older employee to ask their employer for a 35–70 percent reduction of working hours, with a corresponding reduction in earnings. If granted, the state pays 50 percent of the difference between the reduced income and the previous income of full-time income (Hietaniemi and Ritola 2007). The minimum age for part-time pension was set at age 60 when it was first introduced in 1987, and subsequently lowered to 58 in 1994. In the period 1998–2001, the minimum age was experimentally set to 56. The part-time pension scheme was abolished in 2017, and replaced with a partial early old-age pension scheme (Takala and Väänänen 2016). For the study period in this paper, it was possible to enter part-time pension at the age of 56, although the minimum age was set at 58 for the most time.

Based on the above description and previous research findings, we expect people who were employed before retirement to have the lowest mortality risk at age 65+, and disability pensioners to have the highest mortality risk. While there is no clear evidence for elevated mortality among the unemployed, the general selection of the less healthy into that group, and the deleterious effects of unemployment, are supposed to result in lower survival past age 65. It is not evident how being a statutory pensioner before age 65, or part-time pensioner, should be associated with mortality at age 65+. These pensions may promote health if work stress is reduced, but they may also be reflective of reduced work capacity, increased family responsibilities, such as caring for relatives (Takala and Väänänen 2016), or intentions to meeting staff reduction policies of employers (Coe and Lindeboom 2008). Persons who we cannot classify as employed, unemployed, or retired constitute a residual category, referred to as “otherwise outside the labour market”. Since female labour market participation is high in Finland, the prevalence of homemakers is limited (Gornick 1999; Simonen 2003). The major part of people in this category are therefore presumably in precarious situations and should consequently have a relatively high mortality risk at age 65+.

Although Finnish women are far more integrated into the labour market than women in countries with a more conservative structure, there are sex differences in labour market

attachment also in Finland. Mortality age 65+ should consequently be affected by previous labour market position for women as well, but not to the same extent as for men.

Data and methods

The data, used with permission TK-53-768-12, are based on Statistics Finland's longitudinal employment statistics files (known as Työssäkäyntitilaston pitkittäistiedosto). They contain annual records for 1987–2011, representing individuals residing in Finland in any of these years, and allow for individual follow-up during this period. They consist of a five percent sample of the general residential population in Finland, and a 20 percent sample of the Finnish citizens registered as Swedish speaking. In the analyses, we use normalized weights (the inverse of the inclusion probability) to account for the different sampling proportions. The array of annual, individual information includes a comprehensive list of demographic, socioeconomic and labour market related variables, as well as information about the year of death. Thus, the data are well suited for analyses of post-retirement mortality in relation to the labour market status in late working life.

We have restricted the data to people who were age 50 at entry into the observation window, lived in Finland at every single year in ages 50–65, and did not die before age 65. Age is measured at the end of a calendar year. Under study are people born 1937–1946, who are under the risk of dying in ages 65–70. Process time is consequently age, which starts at 65 and ends at right-censoring at age 70, or at death if that is before age 71. All information regarding ages 50–64 refers to the labour market status and the covariates only. The data contain in total 33,486 individuals, 138,542 person years, and 1,966 deaths.

In focus of our analyses are mortality hazards in ages 65–70 as related to labour market status at ages 50–64. We estimate Cox regression models separately for men and women. All analyses are carried out with StataSE 14.

Labour market status is derived from several, annually available labour market variables issued by Statistics Finland. According to the main activity during the last week of the year, we define employed people as those who are in employment during the last week of the year. This group includes employees as well as self-employed people. Statutory pensioners are defined based on the same variable. If a person received any amount of part-time pension during a calendar year, he or she is classified as a part-time pensioner. As unemployed counts any person who is unemployed during the last week of a calendar year or has received any amount of unemployment benefit or unemployment pension during a given year. Anyone who has received any amount of disability or early pension during a given year is counted as a disability pensioner. Since it is possible to be in different labour market states during one calendar year, each state overwrites the previously mentioned one in order to reflect the presumed ascending association with mortality. Persons in situations not defined by any of these states are classified as "otherwise outside the labour market".

The control variables used are birth cohort, family situation, education, homeownership, income, mother tongue, industry of work, and area of residence. Birth cohort is categorised into three groups, consisting of people born 1937–1939, 1940–1942, and 1943–1946. Family situation is measured at age 65 and separates between people who live alone, those who live with a partner, and all others. Education refers to the highest education ever attained and is classified into primary, secondary, and tertiary level. Homeownership refers to whether the person, at age 65, lives in a household that owns its accommodation, which is an important socioeconomic indicator in Finland. Even after controlling for other sociodemographic factors, Finns who live in owned dwellings have substantially lower mortality rates than others (Laaksonen et al. 2008). Income is measured at age 65, and refers to taxable income, which in the present context primarily refers to pension and capital income. We divide income into quartiles not distinguishing by sex. Mother tongue distinguishes the two native groups of Finnish speakers (92 percent of the total population) and Swedish speakers (5.5 percent), and exclude all others, who predominantly are foreign-born immigrants. Swedish speakers are locally concentrated and have a distinctively lower mortality risk than Finnish speakers (Saarela and Finnäs 2006). Industry of work refers to the situation at age 50, or later if the person was not employed then. It distinguishes the categories "Agriculture, hunting, forestry, fishing", "Manufacturing, construction", "Trade, hotels, restaurants", "Transport, communications", "Financial intermediation, insurance, business", "Public and other services", and "Others". The latter category consists of people who cannot be classified into any of the other categories. Only a handful of persons were economically inactive during the entire period in ages 50–64. Area of residence is measured at age 65 and distinguishes people who live in the Helsinki metropolitan region, rest of Uusimaa in Southern Finland, Southwestern Finland, Eastern Finland, Western Finland, and Northern Finland. Table 1 provides a description of the data.

We use single one-year age categories to observe labour market status in ages 50–64. This approach allows for a sufficiently flexible consideration of changes in labour market status over age, and considers the notable change (reduction) of the study population over age in Subsample 3 (described below). Most importantly, this approach facilitates an investigation of how the association between labour market status and subsequent mortality may change as retirement age approaches.

The data are utilised in three ways. First, and referred to as Subsample 1, we estimate the mortality hazard in ages 65–70 according to the labour market status at each age category in ages 50–64. This approach implies that we consistently have 66,199 person years under risk for men and 72,343 years under risk for women, representing 16,247 and 17,239 individuals, respectively (Figure 1). Second, and referred to as Subsample 2, we narrow down the data to people who were working at age 50. In this subsample, there are 51,119 person years under risk for men and 55,356 years under risk for women, representing 12,185 and 12,851 individuals, respectively (Figure 2). This subsample is slightly positively health selected as compared to Subsample 1, as less healthy

Table 1: *Variable distribution by sex and subsample*

	Men				Women			
	Subsample 1		Subsample 2		Subsample 1		Subsample 2	
	N	%	N	%	N	%	N	%
Persons	16,247		12,185		17,239		12,851	
Person years	66,199		51,119		72,239		55,356	
Mortality								
Dead at the end of follow-up	1,873	11.5	1,179	9.7	955	5.5	608	4.7
Deaths per 100,000 person years	2,829		2,306		1,322		1,098	
Birth cohort								
1937–40	4,318	26.6	3,572	29.3	4,771	27.7	3,770	29.3
1941–43	6,005	37.0	4,388	36.0	6,290	36.5	4,745	36.9
1944–46	5,924	36.5	4,225	34.7	6,178	35.8	4,336	33.7
Family situation at age 65								
Living alone	3,261	20.1	1,991	16.3	5,349	31.0	3,875	30.2
Living with partner	12,110	74.5	9,733	79.9	10,916	63.3	8,365	65.1
Other	876	5.4	461	3.8	974	5.7	611	4.8
Education								
Primary	7,570	46.6	5,381	44.2	8,257	47.9	5,751	44.8
Secondary	4,295	26.4	3,075	25.2	4,977	28.9	3,645	28.4
Tertiary	4,382	27.0	3,729	30.6	4,005	23.2	3,455	26.9
Homeownership at age 65								
No	2,960	18.2	1,663	13.7	3,191	18.5	1,991	15.5
Yes	13,287	81.8	10,522	86.4	14,048	81.5	10,860	84.5
Income at age 65 in quartiles								
1	2,558	15.7	1,221	9.9	5,620	32.6	3,196	24.9
2	3,524	21.7	2,399	19.7	4,682	27.2	3,632	28.26
3	4,443	27.4	3,515	28.9	3,978	23.1	3,396	26.43
4	5,722	35.2	5,060	41.5	2,959	17.2	2,627	20.44
Mother tongue								
Finnish	12,674	78.0	9,221	75.7	13,761	79.8	10,069	78.4
Swedish	3,573	22.0	2,964	24.3	3,478	20.2	2,782	21.7
Industry of work at age 50								
Agriculture, hunting, forestry, fishing	1,549	9.5	1,452	11.9	1,264	7.3	1,216	9.5
Manufacturing, construction	5,008	30.8	4,512	37.0	2,238	13.0	1,961	15.3
Trade, hotels, restaurants	1,552	9.6	1,473	12.1	2,240	13.0	2,048	15.9
Transport, communications	1,427	8.8	1,352	11.1	582	3.4	544	4.2
Financial intermediation, insurance, business	1,207	7.4	1,136	9.3	1,581	9.2	1,482	11.5
Public and other services	2,161	13.3	2,005	16.5	5,900	34.2	5,370	41.8
Other	3,343	20.6	255	2.1	3,434	19.9	230	1.8
Region of residence at age 65								
Helsinki metropolitan region	4,463	27.5	3,528	29.0	4,994	29.0	4,054	31.6
Southern Finland	2,028	12.5	1,524	12.5	2,175	12.6	1,579	12.3
Southwestern Finland	2,490	15.3	1,946	16.0	2,538	14.7	1,923	15.0
Eastern Finland	1,661	10.2	1,101	9.0	1,790	10.4	1,229	9.6
Western Finland	3,976	24.5	3,026	24.8	4,110	23.8	2,959	23.0
Northern Finland	1,629	10.0	1,060	8.7	1,632	9.5	1,107	8.6

individuals tend to be crowded out of the labour market with increasing intensity when retirement age approaches. This selection is reflected also in the variables' distributions (see Table 1). Lastly, in Subsample 3, we restrict the data further, to individuals who have been continuously working until the previous age. The model for age 51 is consequently the same as for Subsample 2, while the data at age 52 consist only of people who had been continuously employed until age 51. People still in the data at age 53 were continuously employed until age 52, and so on. With this approach, the data size naturally diminishes over age groups studied (Figure 3). People remaining employed can be assumed increasingly positively health selected, while the estimates are reflective of how the mere transition from employment to each other state relate to mortality at age 65+. Here we only distinguish employment, unemployment, disability pension, and all others. For the sake of simplicity, we do not show the distribution of the control variables for this sample as they change in every age, but they are available on request."

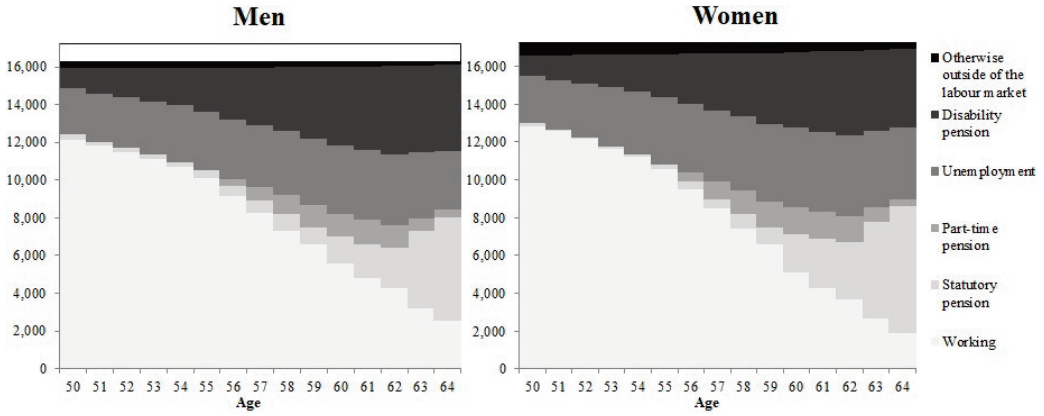

Figure 1: *Distribution of labour market position by age, all men and women (Subsample 1)*

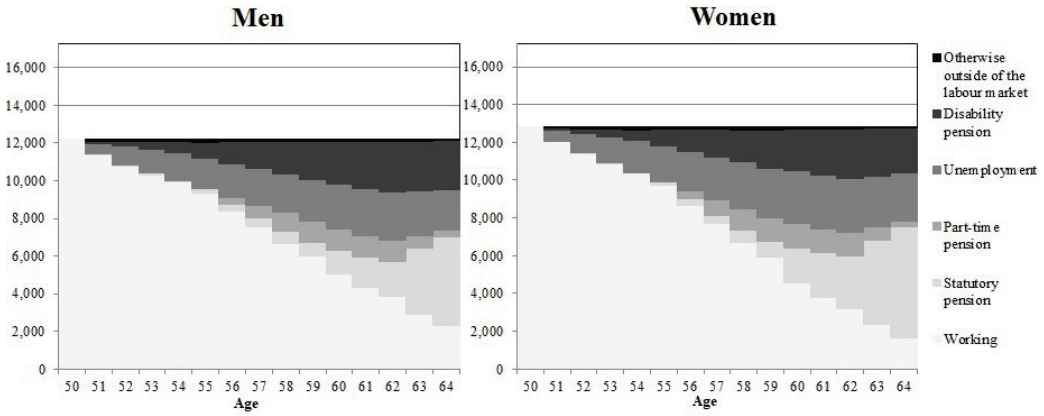

Figure 2: *Distribution of labour market position by age, men and women who were employed at age 50 (Subsample 2)*

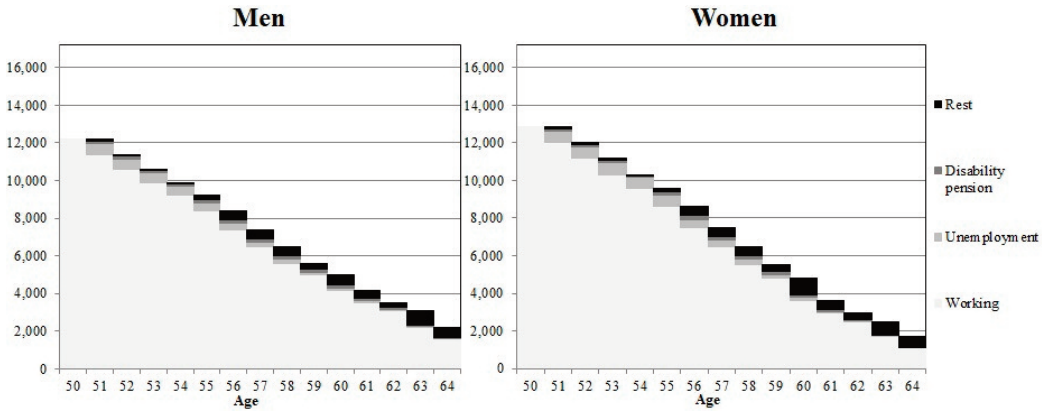

Figure 3: *Distribution of labour market position by age, men and women who were continuously in employment until previous age (Subsample 3)*

Thus, in the analyses, the hazard of dying at ages 65–70 is determined by the labour market status in each single one-year category at ages 50–64. The reference group consists of persons who were employed at the same age. Values above one indicate a higher mortality risk, while values below one indicate a lower risk of dying, depending on the labour market status at the age in question.

In the results reported, we present unadjusted estimates as well as estimates from models that include all the control variables. To facilitate the exposition, and since the estimates for the effects of the control variables were as expected and in line with previous research, we report only statistically significant estimates related to labour market status. Complete results of all the regressions are available upon request.

Results

Among men, the mortality risk at ages 65–70 was found to be highly dependent on previous labour market position (Figure 4A). The excess risk associated with non-employment positions was fairly stable in ages 50–59, and increased from age 60. The two statuses that, at any age, were linked to higher mortality were unemployment and disability pension. Men who were disability pensioners had the highest mortality risk as compared to men who were working at the same age, with a hazard ratio (HR) of somewhat less than three during their 50s and rising towards 3.5 toward age 64. For unemployed men, the HR rose from a roughly 1.75 throughout their 50s to about 2.0 toward age 64. There was an elevated mortality risk for 50-year old statutory pensioners, which should not be overinterpreted, as the group is small and constitutes a group with rather specific retirement schemes. However, retiring early was associated with a slightly el-

evated mortality risk, as can be seen among statutory pensioners from age 62 onwards. Having been otherwise outside the labour market was associated with elevated mortality only for those who have been in this position in their 50s, and their level of excess mortality fluctuated between that of unemployed men and that of disability pensioners. The only group with a significantly lower death risk were those who were part-time pensioners at age 56, with a HR of 0.27.

When controlling for socioeconomic and demographic variables, most of the excess mortality disappeared, and only past age 60, there were significant differences with the same rising trend as in the previous model (Figure 4B). The only labour market group to show increased mortality risks in every single age were former disability pensioners, yet on a much lower level. For men in their 50s, the HR was approximately 1.5 as compared to employed men, and it rose to about 2.25 at age 64. Inclusion of the control variables reduced the elevated mortality associated with unemployment to ages 61–64, and with a magnitude comparable to that of statutory pension. The latter risk was rather independent of socioeconomic factors, and the HR at age 64 remained at 1.45. The elevated mortality risk of men who were otherwise outside the labour market disappeared when control variables were included, while the attenuated mortality risk of part-time pensioners at age 56 remained.

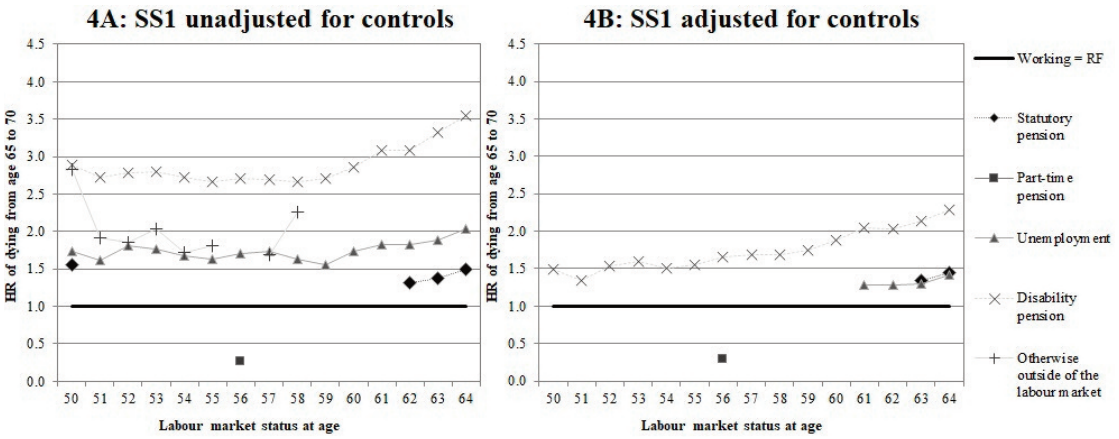

Figure 4: *Subsample 1: Hazard ratios for mortality in ages 65–70 by labour market position of all men. Only estimates significant at the 5% level shown.*

Restricting the analyses to men who had been employed at age 50, showed a pattern that was largely comparable to that of all men, but with a reduced level of excess mortality (Figure 5A). Disability pensioners had a raised mortality risk from age 52 onward, with the HR being around 2 throughout the 50s and rising up to 3 toward age 64. Becoming unemployed after having been employed at age 50 was associated with a lower

and less consistent excess mortality risk, but the rising gradient from age 60 onward remained almost unchanged. Male statutory pensioners had a higher death risk at ages 63 and 64, at the same relative level as in Subsample 1. The death risk of part-time pensioners aged 56 remained unchanged and small, while men who were otherwise outside the labour market at ages 59 and 62 had even lower relative mortality.

When the control variables were included (Figure 5B), the estimates changed in a way that was largely comparable to that depicted in Subsample 1. The mortality risk of disability pensioners was reduced roughly to the same extent as in Subsample 1. The control variables explained most of the excess death risk associated with unemployment. The low death risk of part-time pensioners at age 56 remained unchanged, while the attenuated mortality risk associated with having been outside the labour market even increased when we adjusted for the control variables.

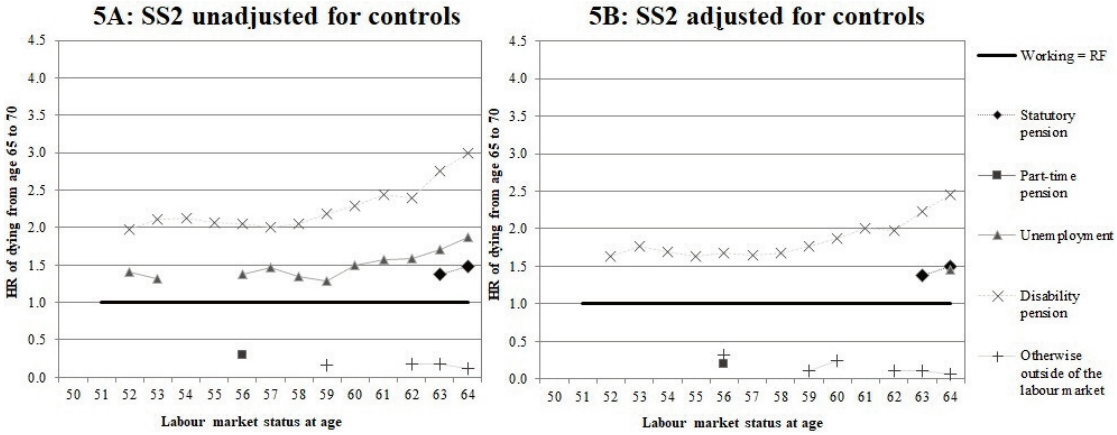

Figure 5: *Subsample2: Hazard ratios for mortality in ages 65–70 by labour market position of men who were employed at age 50. Only estimates significant at the 5% level shown.*

Observing the mere transition from employment (Figure 6A) revealed a notably different picture than shown above. Few estimates were statistically significant, since the number of deaths and the number of people who remained continuously employed were rather small, despite the overall large dataset used. Changing the significance level to $p<0.10$ did not alter these conclusions. In addition, the differences between the unadjusted results (Figure 6A) and the adjusted results (Figure 6B) were rather small. Becoming a disability pensioner was associated with a HR between 2 and 2.5 as compared to men who remained employed. This was not the case for every single age group, but more or less consistent up to the early 60s. This association was mitigated by the control variables, but the HR remained high at approximately 2.0. Becoming unemployed was

found to be associated to higher mortality, but when controlling for socioeconomic and demographic variables, there remained a difference only at ages 56 and 63. The attenuated mortality of persons who leave the labour market at age 56 for other reasons than unemployment or disability pension was likely driven by the lower mortality of part-time pensioners that could be observed earlier.

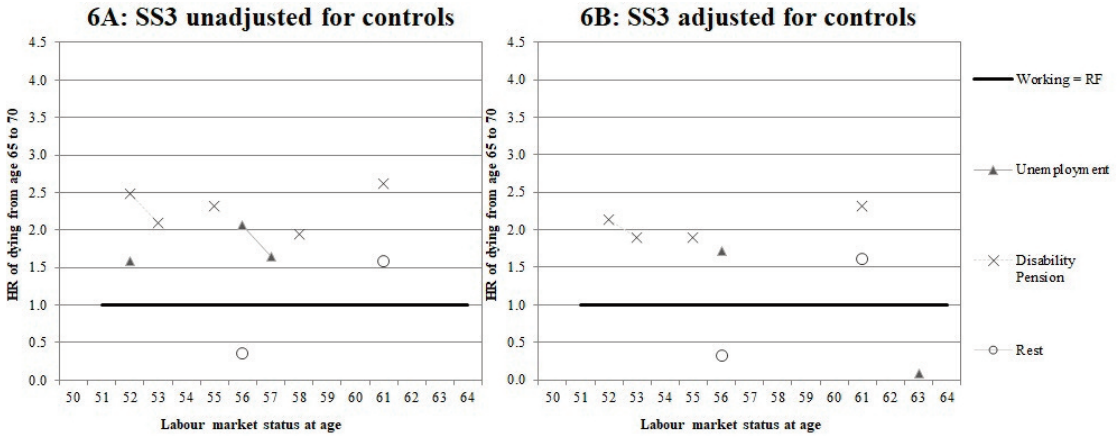

Figure 6: *Subsample 3: Hazard ratios for mortality in ages 65–70 by labour market position of men who were continuously in employment. Only estimates significant at the 5% level shown.*

For women, the results were somewhat different from those for men. Most of the mortality variation by labour market position among women occurred in their 50s, instead of at ages 60+ (Figure 7A). Like for men, disability pensioners had the highest mortality risk, with HRs of 2.5–3.5 as compared to employed women at the same age. The pattern also showed a falling trend from age 50 to 63 and a spike at age 64. For women, unemployment in the early 50s was associated with only a slightly elevated mortality risk, with the HR fluctuating around 2.0. Being a statutory pensioner or otherwise outside the labour market in the mid-50s were also associated with higher mortality as compared to being employed. Unlike for men, the death risk of women who received part-time pension was at no age different from that of employed women.

When socioeconomic and demographic variables were controlled for (Figure 7B), the only remaining labour market position with a consistent effect on female mortality was disability pension. The control variables mitigated this association, but the HR was rather stable, below 2.0, with a smaller spike of 2.3 at age 64.

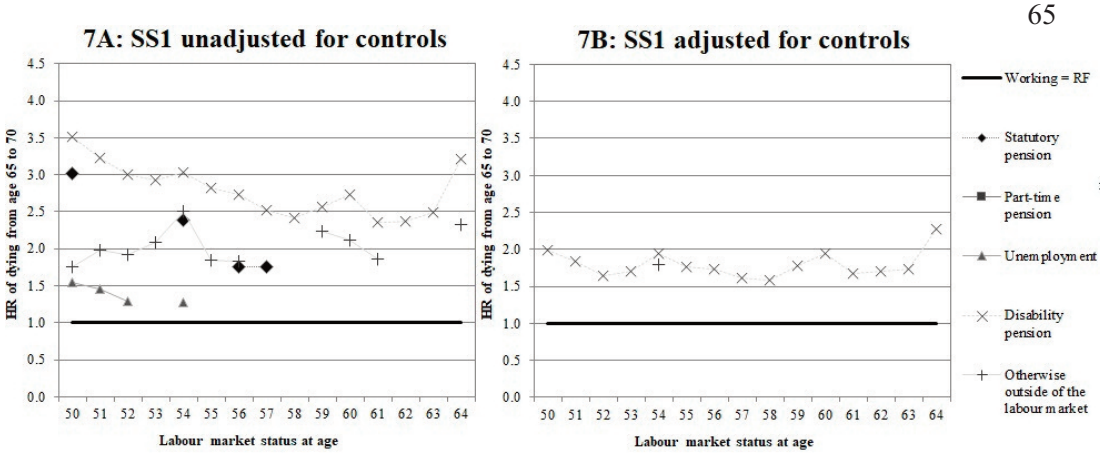

Figure 7: *Subsample 1: Hazard ratios for mortality in ages 65–70 by labour market position of all women. Only estimates significant at the 5% level shown.*

Restricting the data to women who were in employment at age 50 (Figure 8A) resulted in a pattern that differed from that for men. It was rather similar to that for all women with the control variables included. Disability pensioners were the only group who had an evidently elevated mortality risk. These estimates were statistically significant only from age 55 onward, and the HR was consistently in the area 1.5–2.0. The only other groups with an elevated mortality risk were statutory pensioners at the ages 54 and 56, and those who had been otherwise outside the labour market at ages 53 and 54. Inclusion of the control variables (Figure 8B) resulted in only minor changes. The excess mortality of disability pensioners encompassed the same ages 55+, and was slightly lower as compared with the unadjusted estimates. The only other groups with significantly higher relative mortality were statutory pensioners at ages 54 and 56, and those who were otherwise outside the labour market at ages 54 and 59.

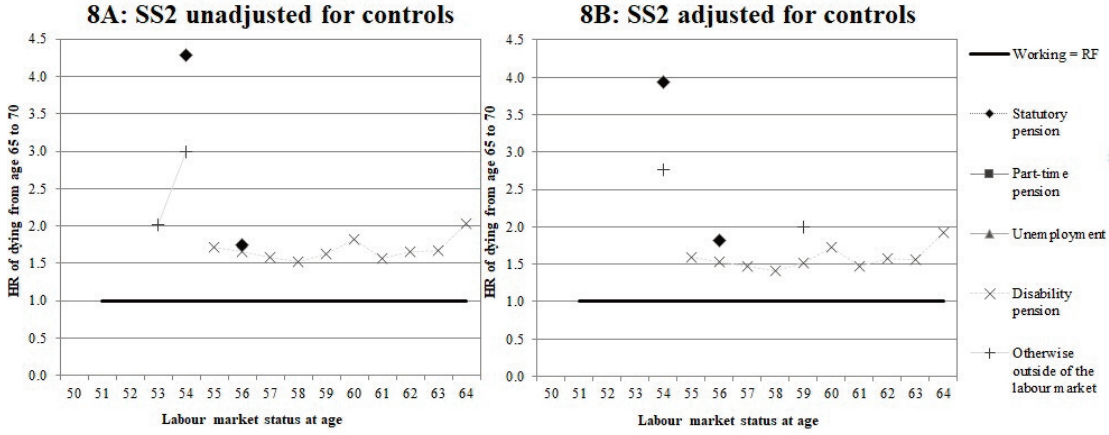

Figure 8: *Subsample2: Hazard ratios for mortality in ages 65–70 by labour market position of women who were employed at age 50. Only estimates significant at the 5% level shown.*

Like for men, there were few significant estimates related to shifting from employment (Figures 9A and 9B), and changing the significance level to $p<0.10$ did not alter these conclusions. Becoming a disability pensioner and otherwise moving outside the labour market were associated with elevated mortality at some specific ages, while becoming unemployed was to some extent associated with attenuated female mortality.

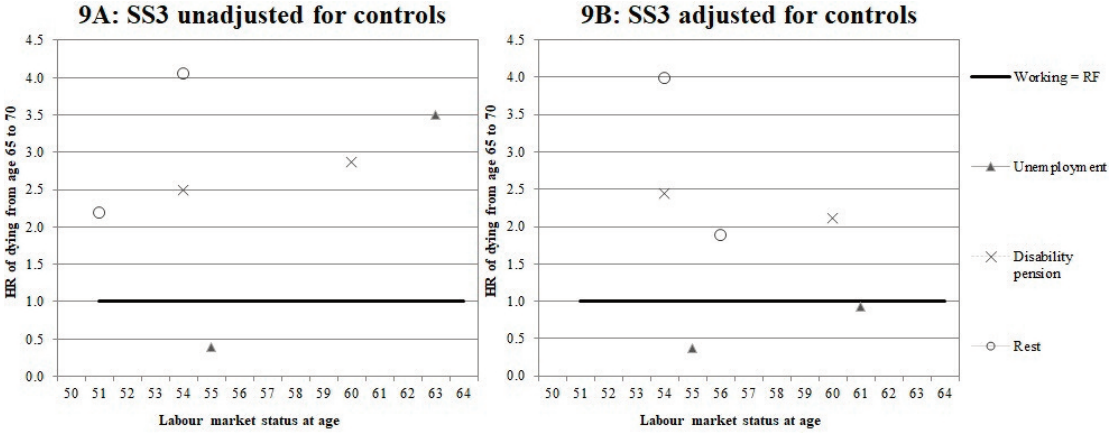

Figure 9: *Subsample 3: Hazard ratios for mortality in ages 65–70 by labour market position of women who were continuously in employment. Only estimates significant at the 5% level shown.*

Discussion

A main strength of the study design of this paper was the use of data from the Finnish population register. It delivered near-perfect data with no loss during follow-up, unless a person emigrates, which was not common and did not affect the results. The data allowed us to study several labour market states. Because of the high labour market attachment of women in Finland, it was also possible to examine the association between female labour market status and mortality in a meaningful way. The long follow-up time enabled us to relate the labour market status a reasonably long time prior to the statutory retirement age to mortality at ages 65–70.

Investigating the association between single one-year categories in ages 50–64 with mortality in ages 65–70 had the advantage of not only showing the association at specific ages, but it revealed also how the association may change as the retirement age approaches. With this profile found to be rather stable across the ages for women, and throughout the 50s for men, we can conclude that projections can be made reasonably accurately even with indicators for single one-year categories. However, it needs to be stressed that, due to the nature of data and the means of analysis, we have assessed associations only, and cannot make causal statements.

We found that the only labour market group to show persistent elevated mortality were former disability pensioners. For women, no other labour market position was distinctly associated with a mortality risk that differed from employed women. Among men, being unemployed in the late working career, and retiring just before age 65, was also associated with decreased survival. As compared with employed individuals, the hazard of dying was more than twice higher for disability pensioners for every single one-year age category from 50 to 64. Even though this association was heavily mitigated by socioeconomic and demographic factors, the mortality risk was significantly elevated. We expected that the excess mortality of disability pensioners would somewhat decrease with age, as the mortality risk of disability pensioners was found to decrease the later in life disability pension was granted (Wallmann et al. 2006). However, we found that the elevated mortality risk of women stayed quite flat throughout ages 50–64, while for men the elevated risk was flat throughout their 50s and even tended to rise thereafter. These patterns suggest that disability pension in Finland continues to be the labour market position that health impaired people are assigned to all the way through statutory retirement.

Furthermore, we expected reduced survival also among previously unemployed persons, because of presumed worsened health status associated with unemployment (Martikainen and Valkonen 1996; Virtanen et al. 2013). While we found such elevated mortality among men, it seemed to reflect low status position, as the association disappeared when the control variables were included.

The relationship between survival and retirement is not clear according to previous research. We did not either find any evident association for women, but men who retired one or two years before age 65 seemed to have a slightly higher mortality risk than men who continued to be employed. This elevated risk was largely independent of socioeconomic and demographic variables, which suggests negative health selection into retirement, and is in line with previous research (Brockmann et al. 2009). Part of the reason why the relationship between retirement and mortality is not easy to grasp seems to be that voluntary retirement is health beneficial, while involuntary retirement is harmful to health (Brockmann et al. 2009; Hallberg et al. 2014; Kuhn et al. 2010). With our analyses, we could not ascertain the voluntariness of the retirement decision.

What we found, however, is some weak evidence for a beneficial effect of reducing working hours, in the attenuated death risk of men who were part time pensioners at age 56. But as the age limit for part-time pension was that low only during a three-year period, the group can be assumed strongly selected. On the other hand, the attenuated mortality risk of part-time pensioners was present also in other ages studied, albeit most of the estimates were not statistically significant. These patterns hint that either the healthiest men may choose this option, or that shortened working hours may reduce stress, and that the social inclusion of the work place may have a health preserving effect in men. In correspondence, worsened health at work and a wish to have more leisure time are in surveys mentioned as reasons to become part time pensioner (Takala and Väänänen 2016). We cannot find similar associations for women, which corroborates previous research (Brockmann et al. 2009).

Evidence for a reduced survival among individuals who do not fit into any of the positions discussed above was less pronounced than expected, and any elevation in the mortality risk was largely dependent on socioeconomic and demographic characteristics. Thus, being outside the labour market without a pension generally seemed to reflect a deprived situation.

Even though Finland is a country characterised by a high degree of gender equality and high female labour market participation, the gender differences we found are marked. Each labour market position that reflects non-employment was associated with elevated mortality in men, while only disability pension was associated in a similar important manner for women. Socioeconomic characteristics attributed to most of the mortality variation by labour market position in women. This confirms the view that the female health gradient across labour market groups is higher in countries with less conservative societal structures (Kuhn et al. 2010; Kühntopf and Tivig 2012). Another finding of ours that seems to mirror this argument is the erratically raised mortality risk of women in their 50s, who were in statutory pension or otherwise outside of the labour market after having been working at age 50. This might resemble the reduced well-being of women who leave the labour market very early in order to care for relatives (Brockmann et al. 2009; Schulz and Beach 1999).

As an indicator for future survival of women, employment at age 50 is a comparable predictor to socioeconomic position, while for men, socioeconomic characteristics played a much more prevalent role. These findings add evidence to the notion of a social health gradient in men, since working-class men in particular are more likely to have physically straining jobs, and they also have less favourable health behaviours as compared to working-class women (Brockmann et al. 2009; Kuhn et al. 2010; Virtanen et al. 2013).

We also found some evidence for a "healthy worker survivor effect" in men (Arrighi and Hertz-Piccioto 1994; Kühntopf and Tivig 2012), i.e., an increasing health selection of those remaining active in the labour market. Despite controlling for socioeconomic and demographic variables, the excess mortality of men in disability pension, unemployment, and statutory old age pension, was elevated after age 60. This may reflect that those not working are in increasingly poor health, or that those who remain working are increasingly positively health selected, which skews the effect size of those not working upwards (Brockmann et al. 2009; Litwin and Tur-Sinai 2015).

In summary, our results are well within the findings of other European countries. Even though Finland is a gender equal country, the association of labour market status and subsequent survival corresponds to results based on countries with more conservative societal structures. Among men, there is a strong socioeconomic component in the selection into specific labour market positions. The picture that emerges for women is that their retirement survival is less dependent of previous labour market position. For women, only previous disability pensioners show a consistently elevated mortality risk that is similar to that of men, and which is likely driven by the same mechanisms for both sexes. For men, we also find some weak evidence for health preserving effects

from reduced working hours and from leaving the labour market entirely. While far from unambiguous, these findings add to the notion that it is not the decision to remain in the labour market that causes people to be healthy, but instead that it is the people remaining in the labour market who are the fittest.

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