



Article

Work despite poor health? A 14-year follow-up of how individual work accommodations are extending the time to retirement for workers with poor health conditions

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ABSTRACT

Given many OECD countries' efforts to extend their citizens' working years, research underscores the importance of work accommodations to maintain older workers and enable them to work despite poor health or declines in physical functions. Nevertheless, few studies have investigated the associations between poor health conditions and opportunities to accommodate work in accordance with individual needs and preferences. In this study, we differentiate between three types of poor health conditions (disease, illness, or sickness). We examine the separate effects of these health conditions as well as of possibilities for work accommodations (working hours, pace, planning), on time to retirement. Additionally, we examine the potentially joint effect of poor health and low opportunities for work accommodations. The analyses are based on a representative sample of 1143 Swedish workers from Panel Survey of Ageing and the Elderly (PSAE) with a baseline (2002/2003) age of 55–64 years. Using complementary register data on income, we followed the labor market activity of these individuals until the end of 2015. We employed Cox proportional hazard regression to estimate the time to retirement and adjusted for demographical, socio-economic, and work-related covariates. In comparison to those with good health, having disease, illness, and sickness is associated with a higher risk of earlier exit from the labor market, and the joint effect of poor health and low opportunities for work accommodations increases this risk. High influence to accommodate work while having a disease or sickness supports work participation, while these patterns of associations were not equally consistent for individuals with illness. This study highlights the importance of increasing older individuals' opportunities to make their own work accommodations, particularly in the presence of disease and sickness, and thereby combat the negative effects of poor health on time to retirement.

1. Introduction

The European workforces are aging, and a critical task for policy-makers in the last few decades has been to increase older workers' labor-market participation via monetary incentives, raising the retirement age, and blocking early exit routes (Axelrad & Mahoney, 2017). However, the efforts to lengthen individuals' working years may face challenges related to the increasing share of the population who experience poor health. In the EU, approximately 44 percent of men and women aged 55–64 state that they have a long-standing illness or health problem; 40 percent reported that their self-perceived health was fair, bad, or very bad in 2016 (Eurostat, 2019). At the same time, employment rates among 55–64-year-old adults increased substantially: from 38 percent in

2002 to 58 percent in 2018 in the EU (Eurostat, 2018, p. 33).

Given the goals of having people work longer in life, a growing share of the workforce are expected to work with chronic diseases, and researchers advocate interventions at the workplace level as critical to maintaining workers' abilities to work (Hasselhorn & Apt, 2015; Ilmarinen, 2006; Kooij, Jansen, Dijkers, & de Lange, 2014; Naegle & Walker, 2006; Truxillo, Cadiz, & Hammer, 2015; Van Rijn, Robroek, Brouwer, & Burdorf, 2014). Previous knowledge of specific workplace interventions for older workers is sparse (Truxillo et al., 2015) or has shown little effect on the length of working life (Hilsen & Midtsundstad, 2015). Consequently, employers' organizations need knowledge about the interactions between older workers' health conditions and pre-conditions to work in order to accommodate their needs. In this study,

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we investigate the time to retirement in relation to poor health (disease, illness, and sickness) and influence over work accommodations.

1.1. Individuals' influence on work accommodations

Many consider the notion that workplace accommodations are important for older workers as a central component in age-management literature, which concerns employer organizations' actions through HR policies, career development, and job design to enhance older workers' motivation and ability to work (cf. Brooke & Taylor, 2005; Eppler-Hattab, Meshoulam, & Doron, 2019; Kooij et al., 2014). Employers can stipulate and initiate these forms of age-contingent accommodations in an employees' employment contracts (e.g., level of discretion). Work accommodations may, for instance, concern work methodology and performance, scheduling, working time, work pace, and work location (Spiegelaeere, Gyes, & Hootegeem, 2016). Earlier researchers have demonstrated the moderating effect of employees' decision latitude to make work adjustments according to their health conditions, i.e., enabling older workers to work despite poor health. Hitherto, researchers have identified influence over work pace (Dellve, Fallman, & Ahlstrom, 2016), work time (Virtanen et al., 2014), and work intensity (Emberland, Nielsen, & Knardahl, 2017) as important predictors for continued working despite poor health conditions. Furthermore, researchers have linked job control with thoughts about retiring early (Elovainio et al., 2005), disability retirement (Knardahl et al., 2017; Lahelma et al., 2012; Robroek, Schuring, Croezen, Stattin, & Burdorf, 2013; Thorsen, Jensen, & Bjørner, 2016), and a literature review focus upon non-health exits from work linked job control with intention and actual retirement (Browne, Carr, Fleischmann, Xue, & Stansfeld, 2019).

1.2. Poor health and working life length

The modern view of health challenges includes a more holistic understanding of personal health and poor health is a multidimensional experience. When assessing the multifaceted aspects, one needs to consider them from, at least, objective, subjective, and contextual perspectives, i.e., the "three modes of unhealth"—disease, illness, and sickness (Boyd, 2000; Marinker, 1975; Wikman, Marklund, & Alexanderson, 2005). We can consider disease and sickness to be formalized modes of unhealth, and illness to be nonformalized. *Disease* is a pathological process that deviates from the biological norm and that involves a more objective, standardized measurement, and most often a physician diagnoses it. *Illness* is an individual's subjective, psychological process/experience of poor health (Naidoo & Wills, 2016; Wikman et al., 2005). For this article, we measured *illness* as individuals' health perceptions (self-rated-health, SRH), whereas *sickness* relates to the "external and public mode" of ill-health based on a negotiated role that an individual or society takes or gives as a result of illness or disease—for example, sick-leave (Boyd, 2000; Marinker, 1975; Wikman et al., 2005).

Poor health conditions are strongly associated with shorter lengths of individuals' working years (Siegrist, Wahrendorf, Von dem Knesebeck, Jürges, & Börsch-Supan, 2007; Van Rijn et al., 2014), and been of primary focus in literature examining the associations between health, work ability and retirement (cf. Ilmarinen, 2006). Earlier researchers have primarily concerned self-rated health or self-perceived health and found it to be an important predictor of disability retirement (Samuelsson, Ropponen, Alexanderson, & Svedberg, 2013), chronic disease (Van Rijn et al., 2014) and both disease and self-rated health (Nilsson, Hydbom, & Rylander, 2011; Pietiläinen, Laaksonen, Rahkonen, & Lahelma, 2011). Nevertheless, few have investigated the associations between poor health conditions and opportunities to accommodate work in accordance with individuals' needs and preferences. Our aim is to identify which conditions of poor health (disease, illness sickness) are associated with time to retirement and whether opportunities to accommodate work have an impact on these

relationships. We, therefore, investigated the following research questions:

- What conditions of poor health (disease, illness or sickness) are associated with time to retirement?
- What kind of work accommodations is associated with time to retirement?
- How are work accommodations having an impact on the associations between health and time to retirement?

2. Data material and methods

2.1. Design

The study-design consists of cross-sectional survey data from 2002 to 2003, and longitudinal register data between the years 2002 and 2015 (Fig. 1).

2.2. Survey and register-data

We used data from the first wave of the Panel Survey of Ageing and the Elderly (PSAE, n = 12,685), which is integrated in Statistics Sweden's annual population-based survey of living conditions (ULF) from 2002 to 2003. The PSAE is population-based, but the age category 65 + has been oversampled and recruited from a panel that was previously enrolled in the ULF survey program. We also linked register data from the Longitudinal Integration Database for Health Insurance and Labor Market Studies (LISA) through social security numbers to obtain income information. This we did to determine individuals' connection to the labor market and social security systems during the follow-up period, from 2002 to 2015.

2.3. Study population

We based the inclusion criteria on three variables at baseline: age, socioeconomic status (SES), and work-related income. The study sample consists of participants aged 55–64 years old with a work-related income above the Price Basic Amount (PBA) at baseline (excluding students, farmers, and self-employed). Statistics Sweden adjusts the PBA after developments in the Consumer Price Index annually and reflects changes in the general price level. For example, in the year 2002 the PBA was 37,900 SEK, and in the year 2015, it was 44,500 SEK (Statistics Sweden, 2019). We selected the upper age limit (64) so as to include individuals at baseline who were below the traditional retirement age of 65, and we selected the lower limit (54) to reduce the time between the baseline survey where we assessed the working conditions and health. Also, at age 54, individuals are usually established in the labor market and not on, for example, parental leave. The final study sample consists of 1143 participants.

2.4. Analysis

We calculated the descriptive statistics for demographic and work-related characteristics. We employed Cox regression, which accommodates data with right-censored cases, i.e., individuals who still work at the final point of the data collection. Due to the discrete nature of the continuous component in our models (see the dependent variable), Efron's Method was used to handle tied events, i.e., two events occurring at the same time (Box-Steffensmeier & Jones, 2004). We obtained Hazard Ratios (HRs) with 95% confidence intervals and included demographic and work-related characteristics variables in the adjusted regression models. We used the Statistical software package SAS® 9.4 with PROC PHREG (SAS Institute Inc. Cary, NC, USA) to carry out the analysis.

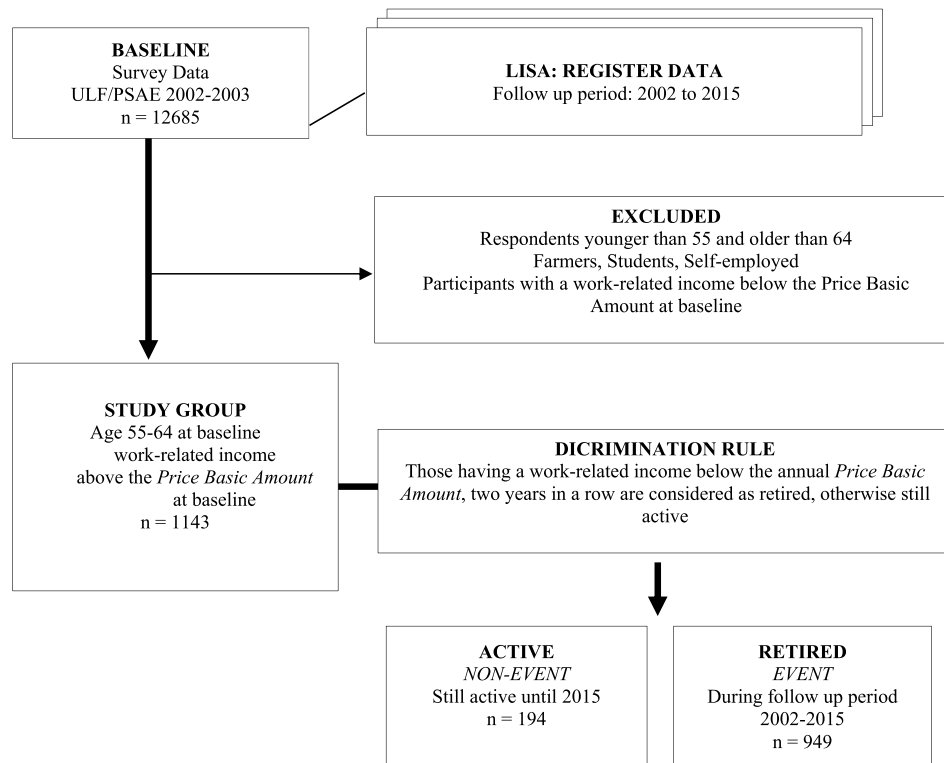


Fig. 1. Flow chart of final data set.

2.5. The dependent variable

LISA's detailed information of individuals' income and compensation sources helped us to determine whether the total annual income is from *work-related* (income from paid work, unemployment insurance, parental leave, development allowance, or activity grant) or *pension-related* (disability pension, old-age pension) sources. To discriminate individuals as "active" or "retired" on the Swedish labor market, we used annual income data between the baseline and the end of the data collection in 2015. We categorized participants as retired when they had a work-related income below the PBA for two years in a row (P. Johansson, Laun, Palme, & Stensöta, 2018). Participants failing to meet the retirement criteria during the follow-up period were categorized as active (right-censored, non-event). We used the information to construct the continuous component (years-at-risk for retirement) and the dichotomous component (retired/active) in the cox-regression models. The idea behind the dependent variable, and the way of operationalizing it, is that it primarily aims to capture whether individuals are still working or not. It is quite common that individuals continue working but at the same time receive pension benefits, often due to for example private pension agreements and the absence of earnings test in the Swedish pension system (reduction of pension benefits depending on income). When the work-related income drops below the PBA, individuals need income from other sources in order to afford their living expenses, i.e., pension-related benefits.

The continuous component of the dependent variable is discrete with a 14-year length (2002/2003 to 2015), meaning that it is possible to retire or be active at age 77 if the participants were 64 years old at baseline. From baseline in 2002 to the end of the collection in 2015, we classified 949 out of 1143 participants as retired.

2.6. Health conditions

To assess the different dimensions of poor health at baseline, we applied the trilogy concept of illness, disease, and sickness (Marinker,

1975). We assessed disease by the following survey question: Do you have any long-term disease, trouble after the accident, any disability or another frailty? (answer: yes/no). We assessed illness through a global self-rated health item (SRH): How do you assess your general health condition? (We coded answers on the five-point scale as good (very good, good) or bad (reasonably, bad, very bad)). We measured sickness by the numbers of days on sick leave in the previous 12 months as given on a five-point ordinal scale (0 days, 1–7 days, 8–24 days, 25–99 days and 100–365 days). We dichotomized sickness into two categories: good (sickness absence < 8 days/12 months) and bad (sickness absence ≥ 8 days/12 months). Since the percentages of answers were low in certain categories, we dichotomized illness and sickness to achieve even groups.

2.7. Work accommodations

From the baseline survey, we used six items pertaining to individuals' influence and freedom at work. Participants were asked to rate their level of influence in relation to (a) working hours, (b) working pace and (c) planning of work, on a scale ranging from 1 (none) to 3 (great). Subsequently, they were asked to rate their freedom to decide (a) *when* to carry out their work, (b) *how* to carry out their work and (c) *what* tasks to engage in on a scale from 1 (great) to 4 (none).

We kept all questions as single items but dichotomized them accordingly: Low Influence (no influence, some influence) and High Influence (great influence); and Low Freedom (no, little, and some freedom) and High Freedom (great freedom).

2.8. Covariates

We included in the analysis demographical information and plausible confounders such as civil status (married, single), sex (male, female), education (elementary school or less, high school, and university or higher), as well as social class position (higher, managerial, middle managerial, lower managerial, skilled manual, and unskilled manual), which analysis is based on Swedish occupational codes and categorized

similarly to (Erikson & Goldthorpe, 1992) class schema. We assessed the cohort effect for individuals born from 1938 to 1942 (aged 55–59) and from 1943 to 1947 (aged 60–64). Co-variables also concerned general work conditions such as work intensity (“How often does your work require you to work very hard?”) for which we dichotomized the responses between High (almost every day, a few times a week) and Low (a few times a month, a few times a year, never) and physical exposure (“How physically demanding is your job usually?”). We dichotomized the responses into Yes (demanding, i.e., walking, standing, lifting heavily, very strenuous) and No (not at all bodily strenuous, not directly strenuous but active). Working conditions were included to control for its link with personal health and retirement as evident in previous literature (Emberland et al., 2017; Lahelma et al., 2012). Moreover, including working conditions may also control for the role of class position on health and levels of work autonomy often advocated in neo-Weberian class analysis (Breen, 2005, pp. 31–50).

In two different questions, participants were asked to rate their (a) physical and (b) psychological Work Ability concerning the demands of their current work on a Visual Analog Scale ranging from 0 (very bad) and 10 (very good). Similar assessments of Work Ability have shown to have high validity (Ahlstrom, Grimby-Ekman, Hagberg, & Dellve, 2010), in relation to the overall Work Ability Index (Ilmarinen, 2007).

3. Results

Experiencing poor health conditions is associated with lower physical (WAS_{phy}) as well as psychological (WAS_{psy}) Work Ability Score (WAS). Additionally, overlapping poor health conditions reduces the average WAS (Diagram 1). About 12.5% of the sample experience a combination of disease, sickness, and illness at baseline (Diagram 2).

Out of the 1143 included participants, 949 retired between the baseline in 2002 and the end of the follow-up in 2015 (Table 1). The non-adjusted hazard ratios showed higher retirement among females, workers with lower socioeconomic status, and workers with higher physical workloads.

The hazard ratios of poor health showed that all dimensions (disease, illness, and sickness) were associated with an increased risk of retirement over the follow-up period (Table 2). Additional dimensions of poor health (0–3) gradually increased the risks. Beside the degree of freedom

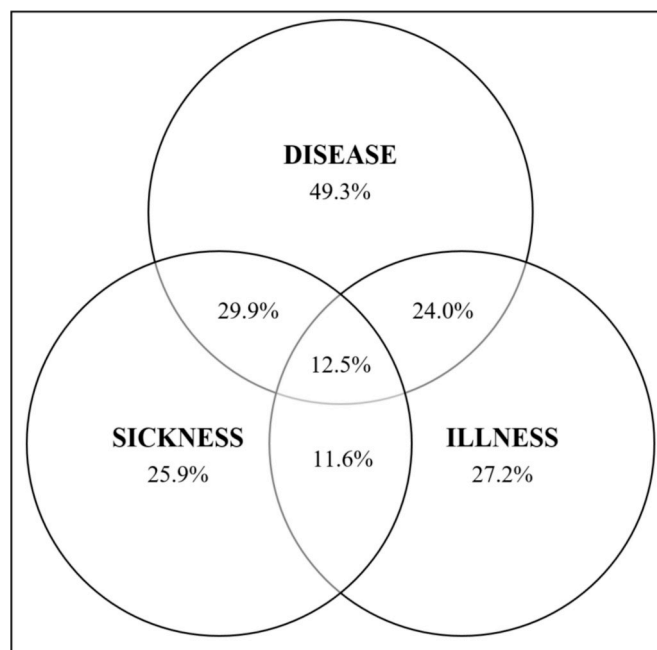


Diagram 2. The distribution of poor health conditions (%).

workers had in deciding how to carry out their work, we found no significant association between a single item of work accommodations and the risk of early retirement during the follow-up period.

In the final analysis (Table 3), we presented the crude and adjusted joint effects between health conditions and opportunities for work accommodations. We controlled the adjusted estimates for sex, cohort, socioeconomic position, civil status, education, physical work exposure, and work intensity. These analyses showed that among individuals with *disease* and *sickness*, low opportunities of work accommodation increased the risk of retirement over the follow-up period in relation to the reference category. Adjusted estimates over the follow-up period indicated an increased risk of retirement in relation to the reference category of between 24% and 50% for disease and between 28% and 54% for sickness over the follow-up period. However, among those with *illness*, the pattern was not consistent. For *illness*, high or low influence over the planning of work, working pace, and how work was carried out were associated with retirement.

4. Discussion

In line with prior studies on health and retirement (Siegrist et al., 2007; Van Rijn et al., 2014) our findings show that poor health conditions measured by disease, illness, and sickness are important predictors of early retirement. Having disease and sickness in combination with low opportunities for work accommodations at the baseline increased the risk of earlier withdrawal from the labor market over the follow-up period compared to the reference category, good health, and high influence over work accommodations. While having a disease or sickness in combination with high influence over work accommodation was not a risk. Furthermore, the results for illness were more puzzling as work accommodations seemed to be of less importance for three out of the six items. Several reasons might explain why illness diverges: Self-rated health is an unformalized subjective measure and ought to capture an individual’s perception of his or her mental and physical health, and illness tends to be more ambiguous than disease or sickness, which is often formalized and assessed through a physician, i.e. sick leave for more than five days needs a physician’s certification. Consequently, having a disease or a sickness could be more obvious to employer organizations and colleagues, which then could support work

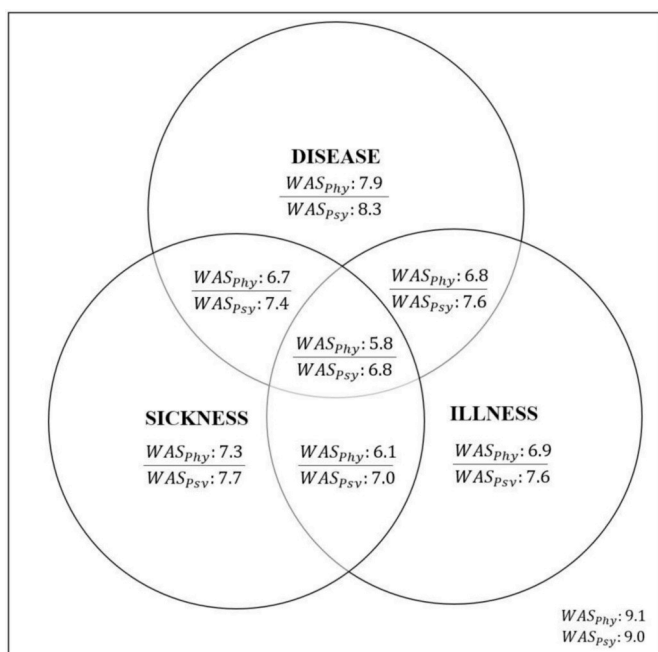


Diagram 1. Physical and psychological WAS (mean) at baseline.

Table 1

Descriptive statistics at baseline 2002/2003, by health conditions, demographic variable and risk of retirement during the follow-up period.

	Total (%)	DISEASE (n, %)		ILLNESS (n, %)		SICKNESS (n, %)		HR of retirement during the follow-up period HR (CI95%)
		Good	Poor	Good	Poor	Good	Poor	
Sociodemographic factors								
Sex								
Male	537 (46)	292 (50)	245 (44)	392 (47)	145 (47)	408 (49)	114 (39)	1.00
Female	606 (54)	288 (50)	318 (56)	439 (53)	165 (53)	420 (51)	176 (61)	1.23 (1.08–1.40)
Cohort (age)								
born 1943–1947 (55–59)	743 (65)	393 (68)	350 (62)	540 (65)	201 (65)	539 (65)	189 (65)	1.00
born 1938–1942 (60–64)	400 (35)	187 (32)	213 (38)	291 (35)	109 (35)	289 (35)	101 (35)	1.07 (0.94–1.22)
Socio-economic status								
Higher managerial	194 (17)	106 (18)	88 (16)	153 (18)	41 (13)	152 (18)	39 (13)	1.00
Middle managerial	308 (27)	155 (27)	153 (27)	233 (28)	74 (24)	227 (27)	77 (27)	1.20 (0.98–1.47)
Lower managerial	209 (18)	105 (18)	104 (18)	151 (18)	58 (19)	153 (18)	50 (17)	1.79 (1.44–2.22)
Skilled manual	169 (15)	86 (15)	83 (15)	122 (15)	47 (15)	120 (14)	44 (15)	1.41 (1.12–1.78)
Unskilled manual	263 (23)	128 (22)	135 (24)	172 (21)	90 (29)	176 (21)	80 (28)	1.51 (1.22–1.86)
Education								
Elementary school or less	251 (22)	130 (22)	121 (22)	170 (21)	80 (26)	169 (20)	73 (25)	1.00
High School	491 (43)	254 (44)	237 (42)	362 (44)	129 (42)	366 (44)	117 (40)	0.96 (0.82–1.13)
University or higher	397 (35)	194 (34)	203 (36)	297 (36)	99 (32)	293 (35)	99 (35)	0.69 (0.58–0.83)
Status								
Other	398 (35)	200 (34)	198 (35)	281 (34)	117 (38)	278 (34)	109 (38)	1.00
Married	745 (65)	380 (55)	365 (65)	550 (66)	193 (62)	550 (66)	181 (62)	0.98 (0.86–1.12)
Work-related characteristics								
Physical work exposure								
No	877 (78)	464 (82)	413 (75)	665 (81)	210 (70)	672 (81)	201 (69)	1.00
Yes	243 (22)	104 (18)	139 (25)	155 (19)	88 (30)	154 (19)	89 (31)	1.27 (1.09–1.48)
Work Intensity								
Low	813 (73)	435 (77)	378 (69)	612 (75)	199 (68)	632 (76)	180 (63)	1.00
High	300 (27)	129 (23)	171 (31)	205 (25)	95 (32)	195 (24)	105 (37)	0.98 (0.84–1.13)

Table 2

Prevalence and associations of low opportunities for work accommodation and poor Health conditions at baseline with the risk of earlier retirement during the follow-up period.

	(n)	%	HR (CI95%) Risk of retirement during the follow-up period
Low Influence at work			
Working hours (No influence, Some influence)	779	69.9	1.07 (0.93–1.23)
Work Pace (No influence, Some influence)	436	39.1	1.11 (0.97–1.27)
Planning (No influence, Some influence)	413	36.9	1.13 (0.99–1.29)
Low Freedom at work			
When (Pretty much freedom, Little freedom, No freedom)	870	77.9	1.11 (0.95–1.30)
How (Pretty much freedom, Little freedom, No freedom)	639	57.2	1.27 (1.12–1.45)
What (Pretty much freedom, Little freedom, No freedom)	839	75.1	1.14 (0.98–1.33)
Poor Personal Health			
Disease (long-term sickness, an accident, disability or frailness)	563	49.3	1.23 (1.08–1.40)
Illness (Average, poor or very poor)	310	27.2	1.42 (1.23–1.63)
Sickness (sickness absence \geq 8 days/12 month)	290	25.9	1.22 (1.06–1.42)
Number of Poor health indicators (Disease, illness, Sickness)			
0	466	41.8	1.00 ref
1	307	27.5	1.06 (0.90–1.24)
2	200	17.9	1.21 (1.01–1.45)
3	143	12.5	1.66 (1.36–2.03)

accommodations. While experienced illness might be vaguer and thus more difficult to communicate and thus to receive the right accommodations. These circumstances might explain the earlier retirement. We did not find any underlying confounding variable explaining the different results for illness in comparison to disease and sickness.

This study's contribution is that work accommodations are important factors contributing to the working later in life of older workers with a disease or sickness. Our results indicate a joint effect between individuals' health conditions and their influence over their work accommodations. Few previous studies have concerned various health conditions and specific work accommodations for older workers and retirement, but previous researchers have found the importance of job control (Browne et al., 2019; Knardahl et al., 2017; Lahelma et al., 2012; Robroek et al., 2013; Thorsen et al., 2016) and health (Siegrist et al., 2007; Van Rijn et al., 2014) on retirement decisions. The concept of work accommodations relates to a number of supportive conditions: first, individuals' opportunities to craft their work to fit their abilities and preferences (Tims & Bakker, 2010); and second, the employer's flexibility to adjust work to fit employees' knowledge, skills, and abilities (i.e., job redesign (Tims & Bakker, 2010) or sickness flexibility (G. Johansson & Lundberg, 2004)). These forms of accommodation are sometimes negotiated between employees and employers through idiosyncratic deals (Lai, Rousseau, & Chang, 2009). Such workplace interventions are central in research on supporting older workers in the labor market (Brooke & Taylor, 2005; Eppler-Hattab et al., 2019; Haselhorn & Apt, 2015; Kooij et al., 2014; Naegle & Walker, 2006; Truxillo et al., 2015). Also, other conditions at the workplace may influence these relationships. For example, a supportive work climate might make coworkers more inclined to accept idiosyncratic deals and work out accommodations (Putnam, Myers, & Gailliard, 2014), and support from supervisors can have a key role in encouraging health and well-being at work (Hämmig, 2017).

4.1. Practical implication

In this study, we have highlighted the interaction between an individual's health and preconditions at an organizational level, such as work accommodations. Given many OECD countries' efforts to extend working life (Axelrad & Mahoney, 2017), and European active aging policies' goals of older citizens' wellbeing (Foster & Walker, 2014), interventions at the workplace are critical (Bal, De Jong, Jansen, &

Table 3
 Hazard ratios of the risk of retirement during the follow-up period: Poor health conditions and influence over work accommodations.

	DISEASE		ILLNESS		SICKNESS	
	N	Crude HR (CI 95%)	N	Crude HR (CI 95%)	N	Crude HR (CI 95%)
Influence: Working hours						
Good Health + High Influence	179	1.00	251	1.00	267	1.00
Low Influence	387	0.97 (0.80-1.19)	567	1.05 (0.88-1.23)	557	1.03 (0.88-1.21)
Poor Health + High Influence	157	1.08 (0.85-1.37)	84	1.28 (0.98-1.68)	68	1.15 (0.86-1.55)
Low Influence	392	1.29 (1.32-1.89)	211	1.50 (1.22-1.83)	220	1.27 (1.05-1.55)
Influence: Working Pace						
Good Health + High Influence	352	1.00	515	1.00	514	1.00
Low Influence	213	1.04 (0.86-1.25)	302	1.10 (0.94-1.29)	309	1.05 (0.90-1.23)
Poor Health + High Influence	326	1.16 (0.98-1.38)	162	1.40 (1.15-1.69)	161	1.12 (0.92-1.36)
Low Influence	223	1.39 (1.16-1.66)	134	1.50 (1.22-1.85)	127	1.42 (1.15-1.75)
Influence: Planning of work						
Good Health + High Influence	369	1.00	535	1.00	531	1.00
Low Influence	198	1.03 (0.87-1.25)	285	1.09 (0.93-1.28)	294	1.07 (0.92-1.25)
Poor Health + High Influence	336	1.16 (0.98-1.37)	169	1.36 (1.14-1.64)	171	1.14 (0.94-1.38)
Low Influence	215	1.43 (1.18-1.71)	127	1.55 (1.29-1.96)	119	1.44 (1.17-1.79)
Freedom: When work is carried out						
Good Health + High Freedom	138	1.00	190	1.00	192	1.00
Low Freedom	429	1.04 (0.84-1.29)	630	1.15 (0.95-1.38)	632	1.01 (0.85-1.21)
Poor Health + High Freedom	109	1.12 (0.85-1.49)	56	1.60 (1.16-2.20)	55	0.89 (0.63-1.26)
Low Freedom	441	1.32 (1.07-1.64)	239	1.56 (1.26-1.93)	234	1.34 (1.09-1.65)
Freedom: How work is carried out						
Good Health + High Freedom	246	1.00	356	1.00	371	1.00
Low Freedom	322	1.22 (1.01-1.47)	464	1.19 (1.02-1.38)	454	1.19 (1.02-1.38)
Poor Health + High Freedom	233	1.18 (0.96-1.44)	122	1.18 (0.94-1.48)	108	1.04 (0.81-1.32)
Low Freedom	317	1.58 (1.31-1.90)	174	1.90 (1.57-2.32)	181	1.61 (1.33-1.95)
Freedom: What work is carried out						
Good Health + High Freedom	148	1.00	214	1.00	214	1.00
Low Freedom	419	1.01 (0.82-1.25)	606	1.12 (0.94-1.33)	612	1.01 (0.85-1.20)
Poor Health + High Freedom	130	1.21 (0.79-1.34)	63	1.31 (0.96-1.78)	63	0.84 (0.61-1.16)
Low Freedom	420	1.42 (1.09-1.65)	232	1.59 (1.30-1.96)	224	1.39 (1.13-1.71)
Adjusted HR ^a (CI 95%)						
Good Health + High Influence		1.00		1.00		1.00
Low Influence		0.88 (0.72-1.08)		0.96 (0.81-1.25)		0.94 (0.80-1.12)
Poor Health + High Influence		1.07 (0.85-1.37)		1.30 (0.99-1.71)		1.14 (0.84-1.54)
Low Influence		1.17 (0.95-1.43)		1.36 (1.11-1.68)		1.19 (0.97-1.46)
Good Health + High Influence		1.00		1.00		1.00
Low Influence		0.97 (0.81-1.18)		1.03 (0.88-1.22)		0.99 (0.85-1.16)
Poor Health + High Influence		1.16 (0.98-1.38)		1.37 (1.13-1.66)		1.11 (0.91-1.36)
Low Influence		1.32 (1.09-1.59)		1.44 (1.16-1.78)		1.38 (1.11-1.71)
Good Health + High Influence		1.00		1.00		1.00
Low Influence		0.92 (0.75-1.13)		0.98 (0.84-1.15)		0.96 (0.82-1.14)
Poor Health + High Influence		1.15 (0.98-1.36)		1.32 (1.09-1.59)		1.12 (0.92-1.36)
Low Influence		1.31 (1.08-1.56)		1.51 (1.22-1.88)		1.36 (1.09-1.69)
Good Health + High Freedom		1.00		1.00		1.00
Low Freedom		1.01 (0.81-1.26)		1.10 (0.91-1.33)		0.97 (0.81-1.17)
Poor Health + High Freedom		1.14 (0.86-1.51)		1.62 (1.17-2.23)		0.92 (0.65-1.31)
Low Freedom		1.28 (1.03-1.60)		1.48 (1.19-1.83)		1.28 (1.03-1.59)
Good Health + High Freedom		1.00		1.00		1.00
Low Freedom		1.15 (0.95-1.40)		1.12 (0.95-1.31)		1.13 (0.96-1.32)
Poor Health + High Freedom		1.17 (0.96-1.44)		1.14 (0.90-1.44)		1.05 (0.82-1.34)
Low Freedom		1.50 (1.24-1.81)		1.80 (1.48-2.20)		1.54 (1.26-1.88)
Good Health + High Freedom		1.00		1.00		1.00
Low Freedom		0.93 (0.75-1.15)		1.03 (0.86-1.24)		0.94 (0.79-1.12)
Poor Health + High Freedom		0.99 (0.75-1.29)		1.23 (0.90-1.69)		0.81 (0.58-1.12)
Low Freedom		1.24 (1.01-1.54)		1.48 (1.20-1.84)		1.32 (1.07-1.62)

^a HR estimates adjusted for Sex, Cohort, Socioeconomic position, Civil status, Education, Physical work exposure, Work Intensity.

Bakker, 2012; Brooke & Taylor, 2005; Kooij et al., 2014). An important task is, therefore, to identify and understand the different determinants of early labor market withdrawal. We analyzed specific work accommodations to better support practical use of the results, i.e. beyond the somewhat abstract theoretical constructs often assessed with indexes in earlier studies (Elovainio et al., 2005; Knardahl et al., 2017; Lahelma et al., 2012; Robroek et al., 2013; Thorsen et al., 2016). Thus, employers who want to extend working participation for their employees with poor health can develop opportunities for employees to have more influence over their work accommodations to meet their needs, abilities, and interests. The work accommodations that are of particular importance are working pace; planning of work; and freedom to decide when, how, and what work they carry out. However, these may not be enough to support workers with illnesses.

4.2. Methodological discussion

A strength of this study is the objective income-based classification of labor-market activity and actual retirement, which, in comparison to prior studies, often are based on an individual's intention and willingness to retire before retirement (prospective) or assessing themselves as retired or active in the labor market after retirement (retrospective) (Denton & Spencer, 2009). Income-based classification has advantages over individuals' assessment of the present and future: it is more comprehensible and unbiased, and it provides knowledge of the workers' actual active or retired status. In comparison with previous studies that have focused on risk factors for disability retirement (Knardahl et al., 2017; Lahelma et al., 2012; Robroek et al., 2013; Samuelsson et al., 2013; Thorsen et al., 2016), this study has a broader application as it allows different forms of transition from work to retirement. This is relevant since the Swedish social security reform in 2006 led to a dramatic reduction of people being approved for disability pensions and since indications show the passing of societal costs to other economic compensation arrangements or to individuals themselves (Kadefors, Nilsson, Östergren, Rylander, & Albin, 2018). The retirement definition we used in this article captures a more comprehensive transition in a situation where more Swedes are working with poor health conditions, and, continue to work while taking the pension benefits. In addition, this study's multidimensional perspective of health conditions captures a broader range of poor health among older workers and a more comprehensive understanding of health (Boyd, 2000; Marinker, 1975; Wikman et al., 2005).

Another strength is the longitudinal design with its prospective follow-up from baseline in 2002 to the end of the collection in 2015, in which 949 out of 1143 participants are now classified as retired. Since a large part of the transfers between generations takes place within the public sector in Sweden (Bengtsson & Scott, 2011), the income-based definition of retirement is probably more accurate as Swedes are dependent on financial transfers such as wages and pensions, and, to a lesser degree, dependent on hidden transfers, such as support from family and private savings.

It is important to point out that this method of separating persons as retired or active is not exact. Retirement is a complex process, and many individuals move into different income protections before they leave the labor market to take their pensions on a part- or full-time basis. Another limitation of the study is that we measured demographical and work-related characteristics at a single point in time, at the baseline survey. Respondents could have answered differently before or after receiving the survey due to, for instance, leaving their job for a new employer or occupation, or due to their health becoming worse. Rather than individuals' self-assessment of their health, doctors' examinations could provide a more comprehensive evaluation. Nevertheless, findings from this study do not depart from earlier research linking health to retirement or to the importance of job control. The inclusion criteria at baseline may include a more favorable group of workers that can work with or without poor health.

Future researchers should consider this study's findings in relation to other plausible structural factors, such as development in the labor market or adjustments in the social security system during the follow-up period between 2002 and 2015. Sweden, for instance, implemented a pension reform in 2001 to increase incentives to work longer, and the social security reform in 2006 restricted disability pensions' ability to block people's exit routes to retirement (Kadefors, Nilsson, Östergren, Rylander, & Albin, 2018). These adjustments are some of the explanations for the increase in employment rates in the last few decades in Sweden, and other European countries have been following a similar pattern of increasing employment rates (Eurostat, 2018). The associations and interactions need further examination in future studies, and the measurement of health conditions and work accommodations might, for example, capture a greater variation. We recommend a more fine-grained analysis that considers stratification for gender or socio-economic status to enhance knowledge about the transition to retirement.

5. Conclusion

We found the fact that poor health conditions in terms of disease, illness, and sickness and the absence of personal influence on work accommodations increase the risk of early retirement to be an important predictor of early retirement. Thus, combating poor health in the population and increasing opportunities for accommodations at work are important factors that could increase the likelihood of citizens' working later in life.

Ethical considerations

The Ethics Committee in the Gothenburg Region (EPN) approved the project (ref: 848-14).

Declaration of competing interest

The authors declare that they have no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmph.2019.100514>.

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