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Empirical Article

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Are trajectories of self-rated health and physical working capacity during the retirement transition predicted by work-related factors and social class?

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Abstract

We aimed to identify short and long-term trajectories of self-rated health (SRH) and physical working capacity during the retirement transition, and investigate whether work-related factors and social class predict belonging to these trajectories. We used the representative, biennial Swedish Longitudinal Occupational Survey of Health (SLOSH) 2006–2018. We applied group-based trajectory modeling with B-spline smoothers to model trajectories of SRH (n = 2,183) and physical working capacity (n = 2,152) during the retirement transition. Multinomial logistic regression analyses were conducted to investigate trajectory belonging by work-related factors and social class. There was a small "honeymoon effect" in SRH for the total sample. We found four trajectories of SRH and five of physical working capacity. The large majority sustained excellent or good SRH and physical working capacity throughout the study period. Almost 6% had *Fairly poor* SRH and physical working capacity starting from years before retirement, which remained throughout the study period. High job demands, low job control, adverse physical working conditions, and being in manual occupation increased the likelihood of belonging to the trajectory groups *Deteriorating* or *Fairly poor* when compared with the *Excellent* trajectory group for both SRH and physical working capacity. Our findings suggest that for most people health status is already established some years' preretirement and maintained for years after retirement, except a short improvement in SRH in accordance with a honeymoon effect. In order to improve health and employability, interventions focusing on working environment should be aimed at younger and midlife employees as well as older workers.

Keywords: retirement, socioeconomic differences, job control, job demand, longitudinal study, Sweden, B-spline group-based trajectory models (BGBTM)

Introduction

In light of the rising costs associated with aging populations, governments are making efforts to extend working lives (OECD, 2019). The success of these efforts depends upon multiple factors (Silverstein, 2008), among the most important being health (Lindeboom, 2012; Roberts et al., 2010; van Rijn et al., 2014) and perceived working capacity of the working population (Ilmarinen & Tuomi, 2004; Sell et al., 2009; Tuomi et al., 2001). Already today, a considerable share of people work after reaching statutory retirement age (Beehr & Bennett, 2015; Sacco et al., 2022) and the demand for this may increase, emphasizing the importance of maintaining good health, and working capacity among older workers. Both low working capacity and poor self-rated health (SRH) have consistently been found to predict sick leave, disability pension, early retirement, unemployment, and economic inactivity (Alavinia et al., 2009; Boissonneault & De Beer, 2018; Ilmarinen & Tuomi, 2004; Jääskeläinen et al., 2016; Schuring et al., 2007; Sell et al., 2009; Virtanen et al., 2017). Alongside the push for a prolonged working life, it is important to monitor both short and long-term individual differences in SRH and working capacity development over the retirement transition, specifically for different phases of the retirement adaptation. In this study, we use nationally representative biennial data to investigate how health and working capacity change both over a short and a longer period of time surrounding retirement and the role of working factors and social class.

Retirement is a huge life transition and health may change with the time since retirement. Five phases have been identified to describe life after retirement: honeymoon, disenchantment, reorientation, stability, and termination (Atchley 1976, 1980). The *honeymoon* phase represents initial euphoric reaction to

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retirement and an uplift in health and well-being due to relief from work-related stressors;—the *disenchantment phase* when the novelty of retirement and work relief has settled and people start to face new problems in their everyday lives where health and well-being fall back;—the *reorientation phase* where people learn to cope with current opportunities and demands; and finally—the *stability* and *termination phases* due to age-related changes, loss of independence, and health decline (Atchley, 1976, 1980). In this study we have 11 years of follow-up after retirement, thus we focus on the first three phases as it is unlikely that we capture stability and termination phases within the timeframe.

There is heterogeneity in health changes after retirement and whether and to what extent people experience the above-mentioned phases. This may be due to socioeconomic status and life circumstances over the life course. According to life-course models, advantages and disadvantages accumulate over the duration of our life exposing us to different kinds of risks and benefits at different points in life (Dannefer, 2003; Kuh et al., 2014). These accumulated (dis)advantages influence the timing of retirement (Virtanen et al., 2022) and health development both during working life and after retirement (Halleröd et al., 2013). With regards to working life, adverse working conditions are predominant in manual occupations compared with nonmanual occupations, and adverse working conditions have been found to contribute to a decline in health (Nilsen et al., 2017; Ravesteijn et al., 2013). By theorizing how disadvantages accumulate over time, this perspective also highlights who may experience the honeymoon phase and the subsequent phases of retirement, the level of health, and how health develops before, during, and after retirement.

Research has acknowledged that there may be considerable heterogeneity in health development after retirement (e.g., Åhlin et al., 2018; Eyjólfsdóttir et al., 2019; Nyberg et al., 2019). In line with accumulation of (dis)advantages, earlier studies suggest that the interplay between retirement and health varies depending on factors such as socioeconomic status and working conditions (Schaap et al., 2018). Lower-educated workers have a greater risk of high physical demands and poorer psychosocial working environment, which in turn is associated with poorer psychological and physical working capacity among older workers (Centre for Occupational and Environmental Medicine, 2020), and with poorer SRH after labor market exit (De Breij et al., 2019). Low social class increases the risk of shorter working life expectancy (Robroek et al., 2020; Schram et al., 2021) and receiving disability benefits (Johansson et al., 2012; Leinonen et al., 2012). Studies have shown that the greater the physical demands at work, the greater the decline in working capacity among active employees (Centre for Occupational and Environmental Medicine, 2020; Ilmarinen et al., 1997).

Average trends and individual differences in SRH and working capacity over the retirement transition

Previous findings show inconsistent results on the association between retirement and subsequent health (Eyjólfsdóttir et al., 2019; Schaap et al., 2018; van der Heide et al., 2013). For example, Westerlund et al. (2009), using a male-dominant sample (79%) of employees at the French national gas and electricity company, showed that retirement provided an immediate positive upturn in SRH for people with poor working environment and health complaints (honeymoon effect). On the other hand, Stenholm et al. (2020), using a female-dominated sample (82%) of Finnish public sector employees, found that the majority maintained their SRH during the retirement transition. Stenholm et al. (2020) also identified a group at risk of health decline after retirement; namely, individuals of lower social class, in physically strenuous jobs, and with job strain. They also identified a group experiencing the honeymoon effect (a positive upturn in SRH after retirement), this group was more likely to be female and in higher social class compared with those who maintained suboptimal SRH through the retirement transition. Leimer and van Ewijk (2022) using multiple waves of the cross-national European SHARE data and instrumental variable approach, found no evidence for a honeymoon phase on SRH, depression, cognition, mobility limitations, and grip strength. Further examination of subgroups, showed that manual workers had a temporary health decline directly after retirement across this broad range of outcomes, indicating a rough adjustment to retirement and an inverse honeymoon phase lasting for three years after retirement, before returning to better health. Indeed, studies have found that people with unsuccessful adjustment to retirement are at a higher risk for poor physical and mental outcome within two years after retirement (e.g., Zhan et al., 2023). In the long-term, Leimer and van Ewijk (2022) found that retirement led to stable, persistent health-preserving effects for all, regardless of sex, occupation-based socioeconomic status, or working conditions. The inconsistency in findings in the above-mentioned studies might be explained by different statistical methods, study designs, study populations, welfare regime, and pension regulations, and time since retirement and the outcome measure, but also in the existence of individual variations between unobserved subgroups. Supplementary Table S1 shows the theories applied, empirical evidence related to retirement, our hypothesis, and our hypothesized health trajectories before, during, and after retirement.

Evidence for the development of SRH and physical working capacity over the transition to retirement in Sweden is still lacking. In addition, previous work has focused solely on *old-age retirees* and did not include people who retire through disability benefits or partial retirement (Åhlin et al., 2020; Jokela et al., 2010; Leimer & van Ewijk, 2022; Mänty et al., 2016; Nyberg et al., 2019; Stenholm et al., 2020). A relatively large proportion of people leave the labor market through disability benefits and are likely to follow a different health trajectory than those who leave through old-age pension. Moreover, many studies have used samples drawn from specific industries or employment sectors. Including a representative sample and different pathways out of the labor force, e.g., disability benefits or early pension, has been called for in the literature (Mänty et al., 2016; Schaap et al., 2018; Stenholm et al., 2020). Employing a nationally representative sample goes beyond previous studies as the possibility to generalize is larger, which is especially important given the focus on socioeconomic and work-related factors that contribute to heterogeneity in health development. Given the long follow-up in present study, it is important to have an accurate representation of the all segments of society.

In the present study, we identify short and long-term trajectories of *SRH* and *physical working capacity* during the retirement transition and investigate whether work-related factors, such as job demands and job control, and social class predict these trajectories. The use of the nationally

representative SLOSH data, with measurements of health 11 years preceding and following retirement, enables us to examine different phases of retirement, and to monitor long-term health trajectories surrounding the retirement transition. We include different routes out of the labor market, and apply a method accounting for individual differences to identify initial changes and long-term trajectories of SRH and physical working capacity over the retirement transition.

We ask two research questions:

First, can we identify a honeymoon phase after the retirement transition for SRH and physical working capacity (short-term trajectory), and are specific groups more likely to experience the honeymoon phase?

Hypothesis 1a: Corroborating the honeymoon phase, we expect to see an improvement in SRH and physical working capacity in the year following retirement.

Hypothesis 1b: According to accumulation of disadvantages, we expect the most improvements during the honeymoon phase to be for those with poor working conditions and low social class (i.e., a relief from detrimental work stressors).

Second, what long-term trajectories of SRH and physical working capacity can be identified surrounding the retirement transition, and, do work-related factors and social class predict belonging to these trajectories?

Hypothesis 2a: Overall, we expect to find SRH and physical working capacity to return to initial levels after the honeymoon phase, with slight worsening over time.

Hypothesis 2b: In line with the accumulation of disadvantages, the detrimental effects of poor working environment and low social class will lead to poor SRH and physical working capacity trajectories during the whole period.

Materials and methods

Data source and study population

We used data from the Swedish Longitudinal Occupational Survey of Health (SLOSH), a longitudinal survey of working life and health initiated in 2006 (Magnusson Hanson et al., 2018). SLOSH is nationally representative of the Swedish working population. SLOSH conducts biennial follow-ups via postal questionnaires in two versions: one for those gainfully employed at least 30% of full time in the past three months, and another for those who were less than 30% in gainful employment in the past three months. The present study uses seven SLOSH waves (2006, 2008, 2010, 2012, 2014, 2016, and 2018) with overall response rates between 48% and 65%. Data are available upon reasonable request. This includes application to ethical committee.

Of the initial sample of 40,877 respondents across the two questionnaires, we included respondents with a retirement transition after the age of 50 and had at least four measurements, resulting in a sample of 2,183 for the trajectory analysis of SRH, and 2,151 for physical working capacity. For the multinomial analysis, we excluded individuals with incomplete cases of covariates, resulting in a sample of 1,795 for SRH and 1,768 for physical working capacity, see flowchart Figure 1. Sensitivity analysis of the excluded individuals showed no differences in the characteristics of the sample (Supplementary Tables S2 and S3).

Health outcomes

SRH is generally considered a good summary of the overall health of an individual, and is a powerful predictor of future morbidity and mortality (DeSalvo et al., 2006; Jylhä, 2009). *SRH* was assessed by asking participants to rate their general state of health on a five-point Likert scale (1 = very good, 2 = fairly good, 3 = neither good nor bad, 4 = fairly poor, 5 = very poor). *Physical working capacity* derives from the Work Ability Index (WAI), an index that was developed to identify people at risk of leaving work early. The index, and this particular single item, have been found to predict work disability, retirement, and mortality (Ilmarinen & Tuomi, 2004). *Physical working capacity* was assessed by asking "How would you rate your work capacity concerning physical demands?" with response alternatives on the same five-point Likert scale as for SRH. Both items were identical through all data waves, and the variables were treated as continuous in the trajectory analysis. The correlations for each outcome at each data wave, and the sample sizes at each wave for each outcome, can be found in Supplementary Tables S4 and S5.

Retirement

Those who were less than 30% in gainful employment in the past three months were asked: "Which of the following best describes your current circumstances?" Individuals who answered either "Retired," "Sickness or activity compensation (formerly called disability or early pension, or sickness pension)," or "Other pension (e.g., contractual pension)" were defined as retired. In Sweden, disability programs are closely linked to the old-age pension system, as recipients of disability benefits often not return to the labor market but are transferred directly to the guarantee, or old-age, pension at age 65. Since we aimed to capture the time point when people leave the labor market and do not return, we chose to include disability pension in the definition of retirement (Eyjólfsdóttir et al., 2021). Due to the biennial nature of the survey, it was not possible to know if a respondent had retired very recently or had been retired for one or two years. We therefore subtracted one year for all respondents.

Key independent variables

Information from the last questionnaire preceding retirement was used to measure all key independent variables and additional control variables, which according to the theory of accumulation of disadvantages should predict health and working capacity over the retirement transition, and thus, trajectory group belonging. *Social class* follows the official Swedish socio-economic classification (Andersson et al., 1981), which in many ways corresponds to the Erikson-Goldthorpe (EGP) social class scheme (Erikson & Goldthorpe, 1992). It includes unskilled manual workers; skilled manual workers; lower nonmanuals; intermediate nonmanuals; upper nonmanuals and people with academic occupations; and finally, self-employed and farmers. *Adverse physical working conditions* were measured with three items forming a continuous variable ranging from 1 to 18: "Does your work sometimes involve physical labor, that is, you physically exert yourself more than you would when walking and standing and moving around in a normal way?," "Do you have to lift at least 15 kg several times a day?," and "Is your work such that you have to get into bent, twisted, or otherwise unsuitable positions?." Response alternatives ranged

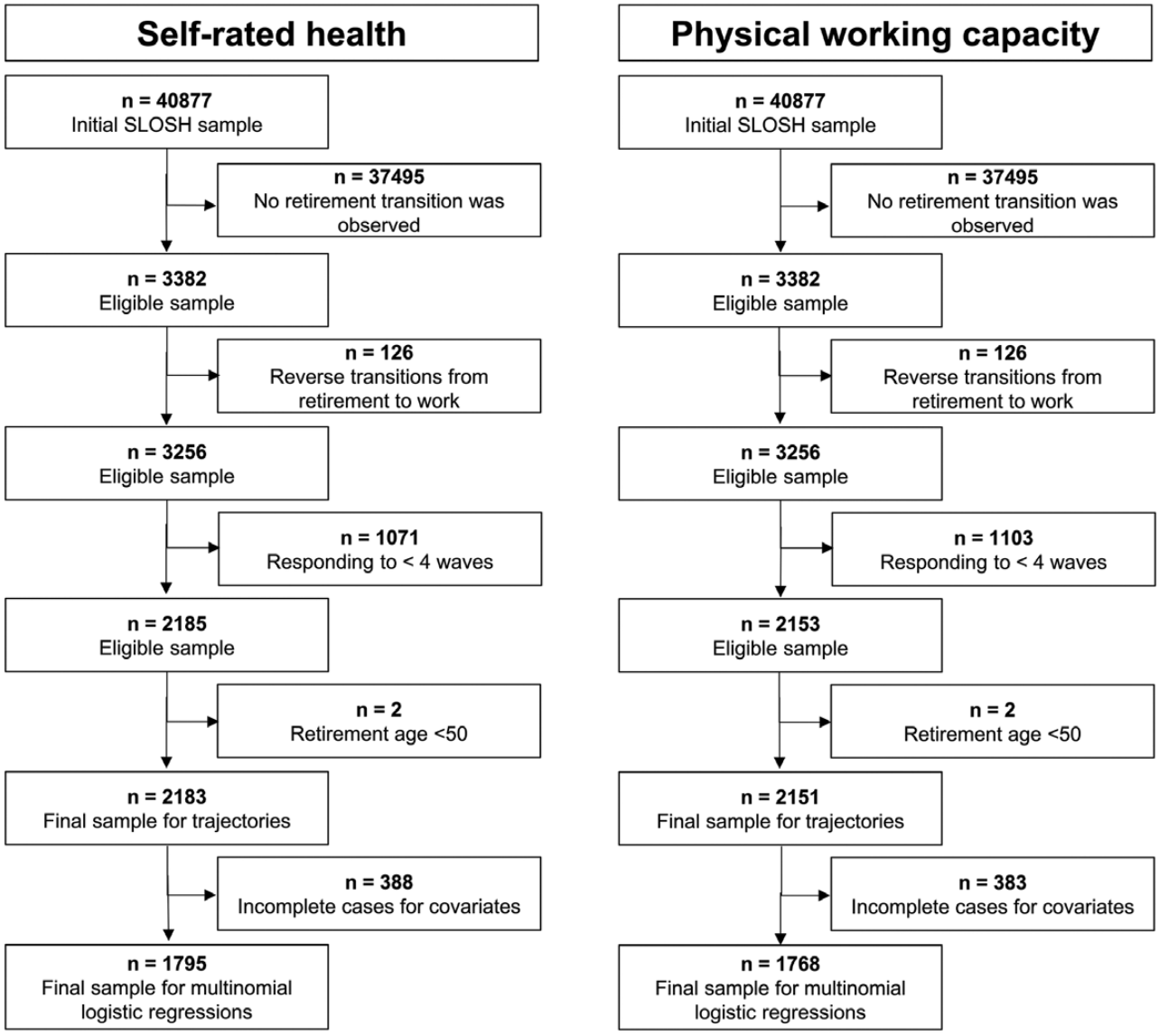

Figure 1. Flowchart describing selection of participants in the study for SRH (left side) and physical working capacity (right side).

from 1 = nearly all the time, to 6 = no, not at all. The variable was reversed for analysis so that higher scores indicated greater severity. The Cronbach's alpha for *adverse physical working conditions* was 0.69 to 070, which is around the conventionally expected level of 0.70, indicating a satisfactory internal consistency. To assess psychosocial working condition we use high job demands and low job control (Karasek, 1979). *High job demands* were measured with four items: "Do you have to work at a very fast pace?," "Does your work demand too much effort?," "Does your work often involve conflicting demands?," and "Do you have enough time to do everything that is required of you?." The first three items were reversed before combining. *Low job control* was measured with five items: "Do you have the possibility of learning new things through your work?," "Does your work demand a high level of skill or expertise?," "Does your work require creativity?," "Do you have a choice in deciding how you do your work?," and "Do you have a choice in deciding what you do at work?." All items were reversed before combining. Response alternatives for all items concerning job control and job demands ranged from "Yes, often" to "No, hardly ever/never" on a four-point scale (Chungkham et al., 2013). Higher values signify higher job demands and lower job control. The Cronbach's alpha for job demands was between 0.75 and 0.79 in both samples, and between 0.72 and 0.75 for job resources, indicating a satisfactory internal consistency. *Type of work exit* was self-reported in the first nonworking questionnaire after retirement/work exit and categorized as old age pension, disability pension, and other types of work exit (e.g., contractual pension). All work-related indicators and social class were treated as time-invariant variables. A detailed description of the control variables; gender, physical exercise, working part time, civil status, and age at retirement is available in Supplementary Text S1.

Statistical analysis

Most previous research on health surrounding retirement either does not account for individual differences but rather assumes that all individuals follow the same developmental trajectory, or when considering the existence of distinct trajectories they have obtained these through polynomial

group-based trajectory models (Åhlin et al., 2020; Nagin & Odgers, 2010; Stenholm et al., 2020). However, recent work has highlighted that polynomial group-based trajectory models can generate patterns unsupported by the data, due to the limitations of the polynomial curves and have proposed the use of B-spline group-based trajectory models (BGBTM) (Francis et al., 2016; Peristera et al., 2020, 2022), which are also used in the current study. More specifically in the latter approach, the trajectories are specified by B-splines instead of polynomial functions of time. This means that, the time period under study is divided up into segments, which meet each other at "knots." Different cubic polynomial functions are estimated for each segment and these are connected together at the knots, to create a "spline" function. The number of knots used affects also the flexibility of the smoothing function, with a greater number of knots resulting in more flexible smoothing function (Francis et al., 2016). Further details on the advantages of B-splines when examining developmental changes can be found in a study by Francis et al. (2016), and more specifically when studying the transition to retirement (Peristera et al., 2020, 2022).

To determine the optimal number of trajectory groups we followed the procedure suggested by Francis et al. (2016) and fitted a sequence of B-spline models, from one to six trajectory groups and one knot to six knots (also represented as degree of freedom df = number of knots + 3). The number of knots controls how close the estimated trajectories will be to observed ones, with higher number allowing higher fidelity. The fit of various models was compared using the Bayesian Information Criterion (BIC) (Nagin, 2005; Nagin & Odgers, 2010), with lower values indicating better model fitting, as well as entropy (index of classification accuracy, with values closer to one indicating better precision) and average posterior probabilities of assignment (APPA; preferably >0.7). In the case that non-minimum BIC criterion was found, we considered a model with lower BIC (and thus more groups) inferior than a model with less groups if a trajectory group contained <5% of the sample, if values of entropy and APPA declined or when the model with more groups could not capture new distinctive patterns of the data for the models with more groups (Nagin, 2005). The two outcome variables are continuous and the estimation of trajectories is therefore accomplished using the censored normal model (CNORM). See a detailed description of the decision for the best model fit in Supplementary Text S2 and Supplementary Tables S6–S8.

In order to examine whether work-related factors or social class predicted probability of belonging of the identified trajectories, we used a multinomial logit model. In all models, the B-spline functions were treated as time-varying covariates. Odds ratios (OR) and 95% confidence intervals (CI) were reported. We tested the influence of predictive variables on trajectory group belonging first in a bivariate model, then in a fully adjusted model with all predictive variables and control variables. Analyses were conducted in the SAS software (version 9.4; copyright SAS Institute Inc.) using the PROC TRANSREG procedure to obtain the B-splines and the PROC TRAJ procedure (Jones et al., 2001) for the trajectory models.

Results

Sample characteristics

The sample characteristics for SRH are presented in Table 1, and for physical working capacity in Table 2. Overall, the distribution of characteristics for the two samples is very similar. More than half are women in both samples, about 63% work full time before retirement, and nearly two out of 10 retired before reaching age 64. About 30% are manual workers, and more than half are in intermediate or upper nonmanual occupations, which corresponds to the distribution in the Swedish population (Ahrne et al., 2018).

SRH and physical working capacity across retirement transition

Examining the average scores for SRH and physical working capacity during the transition to retirement shows that they remain rather stable over time, especially SRH (Figure 2). On a scale from 1 to 5, where 1 indicates excellent, the mean SRH in the year before retirement was 1.97 [standard deviation (SD) 0.77]. SRH was the best the year after retirement (mean 1.91; SD 0.77), a small statistically significant improvement by 3% ($p = .0139$, employing a paired two-tailed *t*-test) from the year prior to retirement, revealing a small *honeymoon effect* for the overall sample, and confirming *Hypothesis 1a*. Physical working capacity, on the same scale of 1–5, was best the year before retirement (mean 2.0; SD 0.88) and worsened by 1.5% the year after retirement, in disagreement with the theoretically proposed *honeymoon effect*. Thus we find support for *Hypothesis 1a* for SRH but not for physical working capacity. Our *Hypothesis 2a* was that SRH and physical working capacity would return to initial levels (the year prior to retirement) after the honeymoon phase with slight worsening over time. Fitting a mixed model, we find overall statistically significant ($p < .0001$) support for this hypothesis for SRH, where Dunnett's multiple comparisons test shows a significant honeymoon phase, and no significant difference between the mean values of SRH in the year prior to retirement (Year −1) and three and five years after retirement, and finally, a significant worsening of SRH seven and nine years after retirement (Supplementary Table S9). Using the same test for physical working capacity, we find an overall significant support for *Hypothesis 2a* ($p < .0001$) with statistically significant worsening working capacity over time, but without a honeymoon phase (Supplementary Table S10).

Trajectories of SRH

We selected a four-trajectory model for SRH, after a careful evaluation of the fit of the B-spline trajectory models (see Supplementary Text S2 and Tables S6–S8 in Supplementary File). The four trajectories are presented in Figure 3 and labeled "Excellent," "Good," "Deteriorating," and "Fairly poor" SRH. The large majority of the sample sustained Excellent (26%) or Good (54%) SRH throughout the entire period. Fifteen percent belonged to the Deteriorating SRH trajectory, which showed some improvement in SRH leading up to retirement and over the retirement transition and then worsening again starting one year after retirement. Finally, 5.6% had Fairly poor SRH throughout the transition to retirement, with a slow but steady decline after retirement after a short stagnation during the retirement transition. Overall, we identify no sudden change in SRH during/after the transition to retirement.

The distribution of the SRH trajectory group characteristics is presented in Table 1. The Fairly poor SRH group included a larger proportion of men, and people who had poorer physical working conditions, were in manual occupations, had held part-time jobs, retired before age 64, or with disability

Table 1. Characteristics of the s*elf-rated health* sample and of the self-rated health trajectory groups in the SLOSH study, 2006–2018. (%)

	Total sample	Trajectory groups			
		Excellent	Good	Deteriorating	Fairly poor
N (%)	2,183	559 (25.6%)	1,175 (53.8%)	328 (15.0%)	121 (5.6%)
Gender					
Men	45.9	44.5	44.0	53.7	49.6
Women	54.1	55.5	56.0	46.3	50.4
Social class					
Upper nonmanuals	20.0	22.4	19.5	17.5	20.7
Intermediate nonmanuals	32.1	34.0	32.1	32.0	23.4
Lower nonmanuals	15.1	15.8	15.9	12.5	10.8
Skilled manual workers	16.2	14.2	16.7	17.5	18.0
Unskilled manual workers	14.9	11.8	14.3	18.2	25.2
Self-employed and farmers	1.7	1.8	1.5	2.3	1.8
Job demands (range 1–4). Mean (SD)	2.5 (0.57)	2.4 (0.55)	2.5 (0.55)	2.6 (0.64)	2.6 (0.57)
Job control (1–4). Mean (SD)	1.7 (0.45)	1.6 (0.43)	1.7 (0.46)	1.7 (0.45)	1.7 (0.47)
Physical working environment (1–18). Mean (SD)	6.0 (4.04)	5.4 (3.61)	6.0 (4.06)	6.6 (4.42)	6.9 (4.3)
Type of work exit					
Old-age pension	73.9	75.3	74.1	73.5	66.9
Disability pension	1.6	0.7	1.3	1.8	7.5
Other type of exit	24.5	24	24.6	24.7	25.6
Age at retirement					
≥64	80.8	82.6	80.6	80.8	74.4
<64	19.2	17.4	19.4	19.2	25.6
Part time					
Full time	63.1	68.2	63.1	58.4	52.5
Part time	35.6	30.5	35.9	40.3	44.1
Not employed (e.g., farmer)	1.3	1.3	1.0	1.3	3.4
Civil status					
Unmarried	27.6	25.5	25.5	31.9	47.0
Married/cohabiting	72.4	74.5	74.5	68.1	53.0
Exercise					
No	56.4	40.7	59.0	68.8	71.2
Yes, regularly	43.6	59.3	41.0	31.2	28.8

Note. SD = standard deviation.

pension, and did not participate in regular exercise when compared with the other trajectory groups.

Trajectories of physical working capacity

When estimating the best model fit for the trajectories of physical working capacity, we followed the same strategy as for SRH (see Supplementary Text S2 and Supplementary Tables S6–S8), and selected a five-trajectory model. The estimated trajectories are presented in Figure 4 and labeled "Excellent," "Good," "In between," "Deteriorating," and "Fairly poor" physical working capacity. Majority of the sample sustained Excellent (27%) or Good (46%) physical working capacity throughout the follow-up time. A total of 14% had a trajectory of worsening working capacity before retirement with a slight improvement surrounding retirement but then worsening again. We call this trajectory "In between," as the changes are not substantial, and the level corresponds to the response option "Neither good nor bad." Almost 7.6% saw a Deterioration in physical working capacity beginning at retirement, after an improvement leading up to retirement. Finally, 5.6% had Fairly poor physical working capacity throughout the period, with a steady decline starting as early as seven years before retirement.

The distribution of the characteristics of the physical working capacity trajectory groups are presented in Table 2. In the groups Deteriorating and Fairly poor, there were larger proportions of women, unskilled manual workers, part-time workers, unmarried people, and people who did not exercise regularly.

Predicting trajectory group belonging

Trajectories of self-rated health

Table 3 shows the odds of belonging to the Good, Deteriorating, and Fairly poor SRH trajectory groups when using the trajectory Excellent SRH as reference category. Bivariate associations (Model 1) show that having high job demands, low job control, and adverse physical working conditions increase the likelihood of belonging to all these

Table 2. Characteristics of the *physical working capacity* sample and of the physical working capacity trajectory groups in the SLOSH study, 2006–2018. (%)

	Total sample	Trajectory groups				
		Excellent	Good	In between	Deteriorating	Fairly poor
N (%)	2,151	579 (26.9)	984 (45.8)	305 (14.2)	163 (7.6)	120 (5.6)
Gender						
Men	46.2	43.0	47.6	49.8	46.6	40.8
Women	53.8	57.0	52.4	50.2	53.4	59.2
Social class						
Upper nonmanuals	20.1	21.1	20.2	16.9	23.9	17.1
Intermediate nonmanuals	32.1	35.2	30.4	34.1	26.5	34.2
Lower nonmanuals	14.9	13.9	16.5	13.7	11.6	17.1
Skilled manual workers	16.3	15.4	17.2	17.6	14.2	12.6
Unskilled manual workers	14.8	12.6	14.4	16.5	21.3	16.2
Self-employed and farmers	1.8	1.9	1.3	2.3	2.6	2.7
Job demands (range 1–4). Mean (SD)	2.5 (0.57)	2.4 (0.56)	2.5 (0.55)	2.5 (0.58)	2.6 (0.59)	2.5 (0.61)
Job control (1–4). Mean (SD)	1.7 (0.45)	1.6 (0.43)	1.7 (0.46)	1.7 (0.46)	1.7 (0.44)	1.7 (0.46)
Physical working environment (1–18). Mean (SD)	6.0 (4.03)	5.6 (3.90)	6.1 (4.11)	5.9 (3.78)	7.0 (4.52)	5.4 (3.67)
Type of work exit						
Old-age pension	73.9	72.4	76.0	72.1	71.8	70.8
Disability pension	1.5	0.7	0.9	1.3	5.5	5.8
Other type of exit	24.6	26.9	23.1	26.6	22.7	23.3
Age at retirement						
≥64	81.0	80.0	83.3	79.0	74.9	78.3
<64	19.0	20.0	16.7	21.0	25.2	21.7
Part time						
Full time	63.2	66.3	63.8	60.7	59.4	53.9
Part time	35.6	33.0	34.8	38.0	38.8	43.5
Not employed (e.g., farmer)	1.3	0.7	1.3	1.4	1.9	2.6
Civil status						
Unmarried	27.8	26.3	25.7	29.6	36.8	36.3
Married/cohabiting	72.2	73.7	74.3	71.4	63.2	63.7
Exercise						
No	56.4	40.1	57.8	71.9	67.1	70.0
Yes, regularly	43.6	59.9	42.2	28.1	32.9	30.0

Note. SD = standard deviation.

trajectory groups when compared with the Excellent SRH group. Unskilled manual workers have almost twofold-increased odds of belonging to the Deteriorating group, and almost threefold the odds of belonging to the Fairly poor group compared with the Excellent group and upper nonmanuals. In the fully adjusted model (Model 2), having high job demands increased the odds of belonging to Good (OR 1.33, 95% CI 1.04–1.71), Deteriorating (OR 2.46, 95% CI 1.74–3.49), and Fairly poor (OR 2.56, 95% CI 1.55–4.23) groups as compared with the Excellent SRH group. In support of *Hypothesis 2b*, we find a pattern of having low socioeconomic status and demanding working environment and being in the Fairly poor group through the whole period, even though only high job demands reach statistical significance.

Trajectories of physical working capacity

Table 4 shows the odds of belonging to the Good, In between, Deteriorating, and Fairly poor physical working capacity trajectory groups when using the group Excellent working capacity as reference category. Bivariate associations (Model 1) show that low job control was significantly associated with all trajectories of physical working capacity compared with the Excellent group. High job demands, being an unskilled manual worker, and having adverse physical working conditions increased the odds of belonging to the Deteriorating group when compared with the Excellent group. In the fully adjusted analysis (Model 2), having high job demands (OR 1.95, 95% CI 1.27–2.98) or exiting work through disability pension (OR 5.74, 95% CI 1.45–22.75) was associated with belonging to the Deteriorating group, and to the Fairly poor (job demands OR 1.91, 95% CI 1.18–3.09, and disability pension OR 8.25, 95% CI 1.92–35.43) when compared with the Excellent working capacity group (supporting *Hypothesis 2b*). Furthermore, low job control (OR 1.66, 95% CI 1.04–2.67) and being a skilled manual worker (OR 3.00, 95% CI 1.33–6.8) increased the odds of belonging to the In between group, which is the only group showing honeymoon effects followed by stagnation and worsening of physical working capacity, in support of

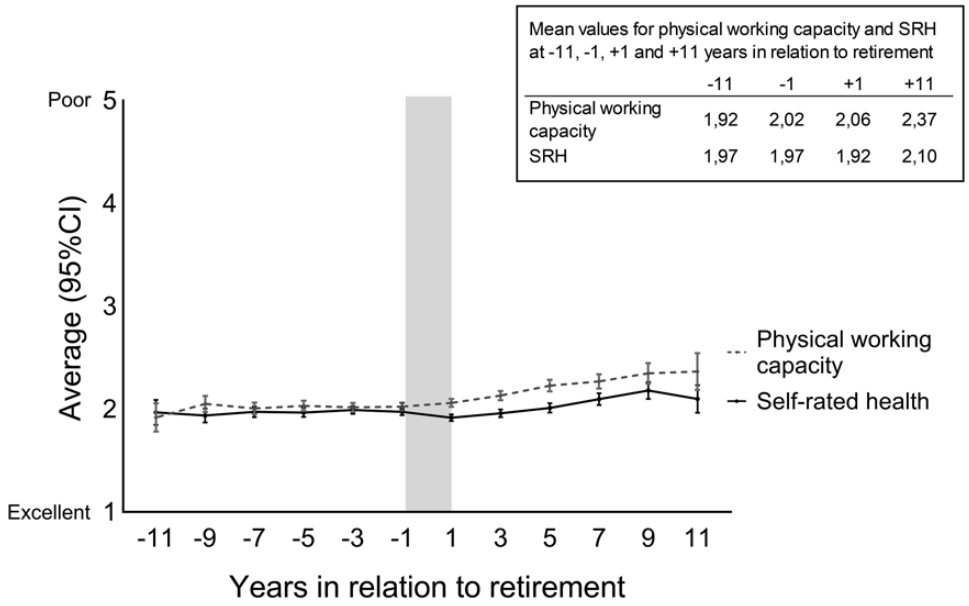

Figure 2. Average of the two outcomes 11 years before and after retirement among SLOSH participants 2006–2018 on a 5-point Likert scale. Higher values indicate poorer outcome. Black line represents self-rated health (n = 2,183). Gray dotted line represents physical working capacity (n = 2,151). Gray area indicates time when retirement has taken place. The Table within the Figure shows the average values of the two outcomes at −11, −1, +1, and +11 years in relation to retirement.

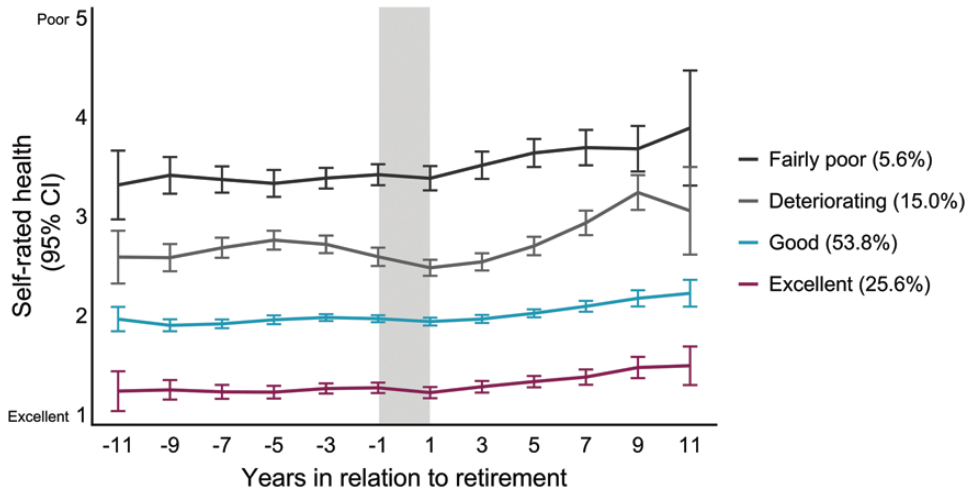

Figure 3. Trajectories with 95% confidence intervals of self-rated health up to 11 years before and after retirement (n = 2,183). Gray area indicates time when retirement has taken place. Higher values indicate worse SRH.

Hypothesis 1b. The likelihood of belonging to the Fairly poor group was higher for those having lower social class and poorer working environment, with only high job demands reaching statistical significance.

These findings are somewhat in line with the accumulation of disadvantages and supporting *Hypothesis 2b*; the detrimental effects of poor working environment and low social class led poor SRH and physical working capacity trajectories before, during, and after retirement.

Discussion

Using a representative sample of the Swedish working population, we followed women and men up to 11 years before and after the transition to retirement and identified four distinct trajectories of SHR and five of physical working capacity. The trajectories indicate that most people maintain their preretirement health after retirement, while a small group experiences a deterioration after retirement. Overall, poor psychosocial working conditions increased the likelihood of belonging to a trajectory group that had less than excellent health or working capacity during the transition to retirement.

Our study confirms previous results showing that the large majority of people maintain good SRH (Leimer & van Ewijk, 2022; Stenholm et al., 2020; Westerlund et al., 2009) and good working capacity (Feldt et al., 2009) through the transition to retirement. Moreover, like Stenholm et al. (2020) and Leimer and van Ewijk (2022), we identified a group of people characterized by poor psychosocial working conditions and lower social class who experienced a deterioration in

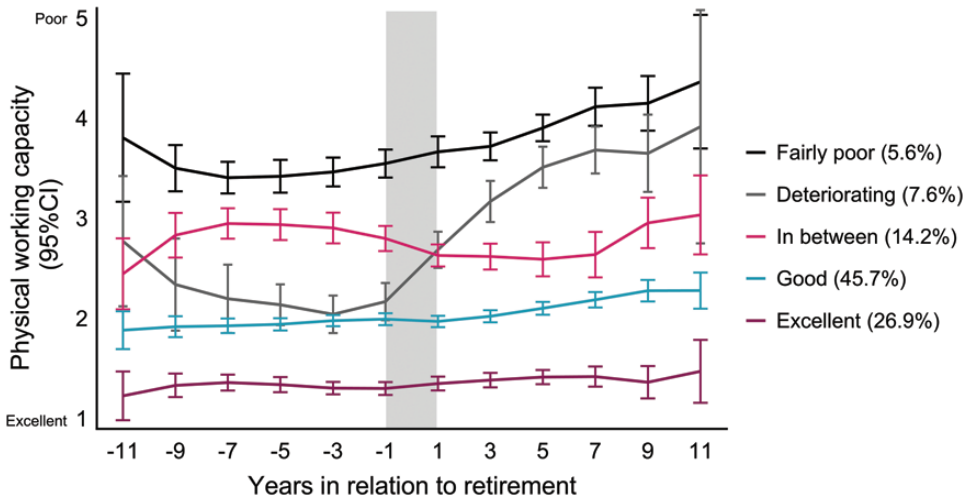

Figure 4. Trajectories with 95% confidence intervals of physical working capacity up to 11 years before and after retirement (n = 2,151). Gray area indicates time when retirement has taken place. Higher values indicate worse physical working capacity.

health after retirement. Within the deteriorating trajectories identified in the present study, only about 20%–25% retired at age 63 or earlier. This might indicate that 8 out of 10 in this trajectory group were "stuck" on the labor market, e.g., for financial reasons, and their health could possibly have benefitted from retiring earlier.

We find a trajectory group for the physical working capacity that is not found for SRH, namely the In between group. This trajectory group showed worsening working capacity before retirement with a slight improvement surrounding retirement but then worsening again. This group is characterized by an equal share of men and women and the lowest share of people that exercise regularly, and group membership was predicted by low job control, adverse physical working environment, and being a skilled manual worker. Almost 50% of the in between physical working capacity group were in the good SRH trajectory group, and 37% were in the deteriorating SRH trajectory group (see Supplementary Table S11 for cross-tabulation of the trajectory groups), indicating that the two outcomes are not measuring the same dimensions of health. Indeed, studies have shown that SRH is a multidimensional and subject to cultural and circumstantial influences and may reflect both physical and mental aspects of health (Idler & Cartwright, 2018; Manderbacka, 1998; Singh-Manoux et al., 2006).

We find some evidence for a very small honeymoon effect (*Hypothesis 1a*) for SRH in the mean values for the whole sample, but we do not find that people with accumulated disadvantages have a stronger honeymoon effect than more privileged groups (*Hypothesis 1b*), with the exception of the In between group for physical working capacity. We find that factors related to poor working environment increase the odds of less favorable health trajectories, supporting *Hypothesis 2b* about the accumulation of disadvantages. Poor psychosocial work factors have been found to be associated with a deterioration in SRH over a five-year period already in middle age (Burr et al., 2017). For both SRH and physical working capacity, we identify a group of people who already had fairly poor health some years before retirement, with no improvement after leaving the labor force. This indicates that in order to increase sustained employability it might not be sufficient to focus on improving the work environment for older employees, as perceived health and working ability might already have reached low levels at this point (Ilmarinen et al., 1997; Söderbacka et al., 2020).

High job demands increased the odds of belonging to the less favorable health trajectories compared with the Excellent trajectory groups. Having high job demands indicates that the employee has to rush at work, is under high expectations of effort, and often has conflicting demands. Previous research suggests that high job demands in midlife are associated with impaired mobility prior to retirement (Hansen et al., 2014), and poor physical functioning in old age (Nilsen et al., 2017). Having low job control indicates that one has time constraints, low decision authority, and low intellectual stimuli. We find low job control to increase the likelihood of belonging to less favorable health trajectories, a finding supporting Feldt et al. (2009) where those who belonged to a trajectory of consistently poor work ability had the lowest job control. One explanation is that people with high job demands, low job control, and physical workload experience fatigue and stress to a greater extent than those without. Being in an occupation under these conditions for a long period of time could lead to a cumulative effect that may increase the risk of poor health (McEwen & Stellar, 1993), which in turn highlights the importance of good working conditions for health and prolonged working life. This is consistent with findings from Finland showing that improved or consistently high job control may prolong working lives at retirement age (Virtanen et al., 2022).

We found some indications of social class differences. Manual workers had higher odds of being in the Deteriorating or Fairly poor trajectories for both outcomes, but the associations were not statistically significant in models also including psychosocial and physical work factors. However, the effect sizes are large, suggesting a difference between social classes in trajectory group belonging, as well as an overlap in the properties of social class and work-related factors. A recent review found that work factors explained about one-third of the social class differences in SRH (Dieker et al., 2019). If this is indeed the case, then preventive interventions at work before midlife might have potential to not only improve individual health status, but also reduce socioeconomic health inequalities (Van Der Beek & Kunst, 2019).

Table 3. Associations between social class and working characteristics, and the *self-rated health* trajectories, presented as odds ratios (OR) and 95% confidence intervals (CI). The trajectory group Excellent SRH is reference category. *N* = 1,795.

	Good (*N* = 957)		Deteriorating (*N* = 276)		Fairly poor (*N* = 100)	
	Model 1[a] OR (95% CI)	Model 2[b] OR (95% CI)	Model 1[a] OR (95% CI)	Model 2[b] OR (95% CI)	Model 1[a] OR (95% CI)	Model 2[b] OR (95% CI)
Social class						
Upper nonmanuals	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Intermediate nonmanuals	0.90 (0.69, 1.17)	1.04 (0.73, 1.48)	0.89 (0.62, 1.27)	1.07 (0.65, 1.76)	0.59 (0.34, 1.03)	0.72 (0.35, 1.47)
Low nonmanuals	1.03 (0.73, 1.46)	1.11 (0.71, 1.72)	0.76 (0.46, 1.26)	1.12 (0.59, 2.11)	0.71 (0.34, 1.48)	0.90 (0.36, 2.25)
Skilled manual workers	1.25 (0.87, 1.80)	1.22 (0.73, 2.04)	1.37 (0.86, 2.17)	1.27 (0.63, 2.57)	1.37 (0.73, 2.57)	1.43 (0.55, 3.72)
Unskilled manual workers	1.40 (0.95, 2.06)	1.18 (0.69, 2.04)	**1.76 (1.09, 2.84)**	1.45 (0.71, 2.97)	**2.75 (1.53, 4.95)**	1.97 (0.77, 5.06)
Self-employed & farmers	0.67 (0.25, 1.78)	0.82 (0.29, 2.34)	N/A	N/A	N/A	N/A
High job demands[c]	**1.28 (1.02, 1.61)**	**1.33 (1.04, 1.71)**	**2.20 (1.59, 3.04)**	**2.46 (1.74, 3.49)**	**2.27 (1.43, 3.62)**	**2.56 (1.55, 4.23)**
Low job control[c]	**1.78 (1.33, 2.39)**	**1.69 (1.24, 2.32)**	**1.53 (1.03, 2.25)**	1.40 (0.91, 2.14)	**1.93 (1.14, 3.28)**	1.41 (0.77, 2.60)
Adverse physical working environment[d]	**1.04 (1.00, 1.08)**	1.02 (0.97, 1.06)	**1.08 (1.04, 1.13)**	1.04 (0.98, 1.10)	**1.07 (1.01, 1.14)**	0.98 (0.90, 1.06)
Type of work exit						
Old-age pension	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Disability pension	4.08 (0.56, 29.7)	4.12 (0.47, 36.1)	4.75 (0.58, 38.55)	4.37 (0.46, 41.52)	**21.43 (2.96, 155.2)**	**15.74 (1.72, 143.8)**
Other type of exit	1.13 (0.84, 1.52)	1.14 (0.82, 1.59)	1.16 (0.78, 1.72)	1.04 (0.66, 1.64)	1.41 (0.83, 2.39)	1.41 (0.75, 2.63)

[a]Model 1: Bivariate associations of predictive variables: social class, job demands, job control, and physical working environment.
[b]Model 2: Fully adjusted for key independent variables and gender, civil status, part time, exercise, and retirement age.
[c]Continuous variable, on a scale ranging from 1 to 4.
[d]Continuous variable, on a scale ranging from 1 to 18.
Note. N/A: Not available.
Bold indicates statistically significant at $p < .05$.

Table 4. Associations between social class and working characteristics, and the *physical working capacity* trajectories, presented as odds ratios (OR) and 95% confidence intervals (CI). The trajectory group excellent physical working capacity is reference category. *N* = 1,768.

	Good (*N* = 802)		In between (*N* = 244)		Deteriorating (*N* = 143)		Fairly poor (*N* = 98)	
	Model 1[a] OR (95% CI)	Model 2[b] OR (95% CI)	Model 1[a] OR (95% CI)	Model 2[b] OR (95% CI)	Model 1[a] OR (95% CI)	Model 2[b] OR (95% CI)	Model 1[a] OR (95% CI)	Model 2[b] OR (95% CI)
Social class								
Upper nonmanuals	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Intermediate nonmanuals	0.77 (0.56, 1.04)	0.96 (0.64, 1.44)	1.00 (0.66, 1.51)	1.51 (0.83, 2.74)	**0.58 (0.37, 0.92)**	**0.53 (0.30, 0.97)**	0.79 (0.49, 1.29)	1.04 (0.51, 2.13)
Low nonmanuals	1.32 (0.87, 2.00)	1.44 (0.86, 2.40)	0.80 (0.42, 1.56)	1.20 (0.54, 2.66)	0.96 (0.51, 1.80)	0.81 (0.38, 1.73)	1.46 (0.79, 2.69)	1.81 (0.77, 4.24)
Skilled manual workers	1.28 (0.86, 1.93)	1.24 (0.69, 2.22)	1.60 (0.96, 2.66)	**3.00 (1.33, 6.80)**	0.92 (0.48, 1.78)	0.51 (0.21, 1.26)	1.01 (0.53, 1.95)	1.60 (0.59, 4.39)
Unskilled manual workers	1.32 (0.85, 2.05)	1.18 (0.64, 2.17)	1.22 (0.64, 2.33)	*2.11 (0.88, 5.09)*	**2.26 (1.36, 3.78)**	0.93 (0.41, 2.08)	1.66 (0.89, 3.08)	1.74 (0.65, 4.62)
Self-employed and farmers	0.80 (0.26, 2.52)	0.76 (0.24, 2.38)	N/A	N/A	N/A	N/A	N/A	N/A
High job demands[c]	1.11 (0.85, 1.44)	1.22 (0.92, 1.61)	1.23 (0.85, 1.77)	1.37 (0.94, 2.01)	**1.82 (1.26, 2.64)**	**1.95 (1.27, 2.98)**	1.51 (0.98, 2.32)	**1.91 (1.18, 3.09)**
Low job control[c]	**1.40 (1.00, 1.97)**	1.33 (0.92, 1.90)	**1.77 (1.16, 2.69)**	**1.66 (1.04, 2.67)**	**1.85 (1.17, 2.92)**	*1.59 (0.96, 2.62)*	**1.87 (1.12, 3.11)**	*1.70 (0.97, 2.97)*
Adverse physical working environment[d]	1.03 (0.99, 1.08)	1.02 (0.97, 1.07)	1.00 (0.95, 1.06)	**0.92 (0.85, 0.99)**	**1.07 (1.02, 1.12)**	1.05 (0.98, 1.12)	1.00 (0.94, 1.06)	0.95 (0.87, 1.03)
Type of work exit								
Old-age pension	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Disability pension	0.51 (0.03, 8.26)	0.88 (0.17, 4.60)	0.66 (0.13, 3.28)	0.16 (0.03, 1.00)	**4.20 (1.32, 13.35)**	**5.74 (1.45, 22.75)**	**5.75 (1.61, 20.51)**	**8.25 (1.92, 35.43)**
Other type of exit	0.77 (0.57, 1.04)	0.84 (0.57, 1.24)	1.08 (0.72, 1.6)	1.07 (0.65, 1.76)	1.08 (0.55, 1.33)	0.83 (0.47, 1.48)	0.80 (0.5, 1.29)	0.96 (0.51, 1.79)

[a]Model 1: Bivariate associations of predictive variables: social class, job demands, job control, and physical working environment.
[b]Model 2: Fully adjusted for key independent variables and gender, civil status, part time, exercise, and retirement age.
[c]Continuous variable, on a scale ranging from 1 to 4.
[d]Continuous variable, on a scale ranging from 1 to 18.
Note. N/A: Not available.
Bold indicates statistically significant at $p < .05$. *Italics* indicates statistically significant at $p < .10$.

We observed people during a major change in their daily routine and life. It is known that a shift in the way individuals evaluate their health occurs as an adaptation mechanism in the event of disruption of routines (Spuling et al., 2017). Compared with younger age groups, older age groups base their SRH less on physical health and functional status, and more on psychological and lifestyle factors (Leinonen et al., 1998; Spuling et al., 2015). One could hypothesize that the perceived level of physical working capacity also changes after leaving the labor market, because of the declining importance of working capacity for fulfilling occupational demands. This response shift could explain the stable trajectories of SRH and physical working capacity over time, and especially after retirement.

Strengths

A strength of the present study is the large and well characterized, representative data with biennial follow-ups for up to 11 years before and after retirement. Most previous retirement trajectory studies are based on, e.g., certain occupational sectors (Feldt et al., 2009; Vahtera et al., 2009; Westerlund et al., 2009), certain sectors of the labor force (Stenholm et al., 2020), or certain geographical areas (Mänty et al., 2016). In this study, we use a representative sample of the Swedish working population. The inclusion of all segments of society is extremely important in a study focused on social determinants of health because of inequalities in health and mortality. The longitudinal design allowed us to examine the association between preretirement factors and changes in SRH and physical working capacity during the retirement process many years before and after retirement. Additionally, we include different pathways out of the labor market, as has been called for (Mänty et al., 2016; Schaap et al., 2018; Stenholm et al., 2020), but the small sample size for these groups limits us from separately interpret their health trajectory over the transition from the labor market. A further novelty is the method we employ, the B-splines group trajectory model, which has certain advantages over the polynomial group trajectory model and regression-based methods such as generalized estimating equation. By using a data-driven approach that accounts for individual characteristics, we were able to detect distinct health trajectory groups during and after retirement.

Limitations

Several limitations should be noted. The nonresponse in SLOSH and exclusion criteria applied in the present study might limit the generalizability of results. As in most other studies, nonresponse is not at random: the nonparticipants in SLOSH are more likely to be male, younger, unmarried, have a lower level of education, and be born outside of Sweden (Magnusson Hanson et al., 2018). This increases the risk of healthy-worker selection and decreases generalizability. By including different exit pathways from the labor market, we try to limit this bias. Unfortunately, due to sample size restrictions, we were not able to analyze health trajectories separately by exit pathways. A sensitivity analysis of the exclusion because of internal missing values in the present study showed only one difference: those in the analytical sample were less likely to exercise regularly compared with those who were excluded (Supplementary Table S3). The study used Swedish data, but Sweden has a generous welfare and social support systems, long life expectancy, and relatively healthy population, which can limit the generalization to other countries. The study design is an accumulated trajectory class model, with the first observations made 11 years before retirement and the last 11 years after retirement. Individuals contribute to the trajectories with at least four measurements across the seven waves. The individual follow-up time is minimum 8 years and a maximum of 14 years. All participants made a transition to retirement, with at least one measurement before and after retirement. The correlation between the outcome variables at each measurement, along with the number of individuals contributing to each correlation, can be found in Supplementary Tables S4 and S5. The correlations between the outcomes at each wave are high, but there are few individuals contributing with data at the first and the last waves of the data collection that make a retirement transition, as is reflected in the large confidence intervals in Figures 3 and 4. Furthermore, despite the longitudinal design and many observations of health, we cannot establish causality. People with poorer health could be more likely to perceive their work environment more negatively compared with individuals with better health. Thus, the association between poor work environment and poor health might be inflated. In the current study, we do not run analysis separately by gender, but considering the gender-segregated labor market and gender differences in reported health (Anxo et al., 2014), this may be a future research direction. Finally, our assessment of working ability/capacity is limited, as the full WAI (Ilmarinen, 2009) was not available in the SLOSH dataset. Instead, we used one item regarding the capacity to meet physical demands at work, as used before by Centre for Occupational and Environmental Medicine (2020), but this item has previously been found to reliably predict work disability, retirement, and mortality (Ilmarinen & Tuomi, 2004).

Concluding remarks

Our findings suggest that SRH and physical working capacity remain stable from some years prior and up to retirement, and the large majority of people maintain their preretirement level of health during and after the transition to retirement. We find a small honeymoon effect for SRH on average for the whole sample. However, a group characterized by poor working environment, saw a deterioration in health following retirement. We also found a group that might not have the health capacity to delay retirement to the extent that current and future policy reforms suggest. Therefore, it is important to note the heterogeneity in health trajectories depending on occupational and social factors, and future pension reforms should be more nuanced toward physically or psychosocially demanding occupations. The evidence so far suggests that those who have a better working environment, higher education, and higher social class are in a better position to prolong their working life (Andersen et al., 2020). Our results suggest that preventive measures focusing on both physical and psychosocial working environment should already be put in place in midlife in order to improve health and increase sustained employability. This could further lead to reduced socioeconomic inequalities and postpone the need of care, and thus decrease pressure on the health and social care systems (Van Der Beek & Kunst, 2019).

Supplementary material

Supplementary material is available online at *Work, Aging, and Retirement*.

Author contributions

Harpa Eyjolfsdottir (Conceptualization, Methodology, Project administration, Visualization, Writing—original draft, Writing—review & editing), Paraskevi Peristera (Conceptualization, Formal analysis, Methodology, Writing—original draft, Writing—review & editing), Neda Agahi (Conceptualization, Funding acquisition, Supervision, Writing—original draft, Writing—review & editing), Johan Fritzell (Conceptualization, Funding acquisition, Supervision, Writing—original draft, Writing—review & editing), Hugo Westerlund (Conceptualization, Data curation, Writing—original draft, Writing—review & editing), and Carin Lennartsson (Conceptualization, Funding acquisition, Supervision, Writing—original draft, Writing—review & editing)

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Conflict of interest: None declared.

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