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Labour market trajectories after part-time sickness absence: a nationwide cohort study from Finland

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ABSTRACT

Objectives The use of part-time sickness absence (pSA) enables return to part-time work from full sickness absence. However, subsequent labour market outcomes of pSA users depend on various individual and work-related characteristics. We investigated labour market paths of private and public sector employees after having a pSA spell. Moreover, we examined individual and work-related factors associated with following them.

Design Longitudinal register-based cohort study.

Setting Finnish employed population.

Participants 9896 receivers of partial sickness allowance aged 45–56 in the years 2010–2014.

Outcome We constructed labour market trajectories based on the proportion of time spent in various labour market statuses measured over 3 years after the end of the pSA spell using multiresponse trajectory analysis. We then examined how different individual and work-related factors were associated with assignment to the different trajectory groups using logistic regression analyses.

Results The majority of the pSA users followed paths where work participation was consistently elevated (Sustained Work group, 40.4%), or only slightly reduced (Slightly Reduced Work group, 31.6%). Moreover, more than 1/10th of the users followed a path where receiving partial work disability benefits became predominant (Partial Work Disability group, 12.5%). The rest followed paths where other non-employment (Other Non-Employed group, 7.8%) or full work disability (Full Work Disability group, 7.7%) became the prevailing status. Lower educational level and income predicted assignment to all other groups than the Sustained Work group. Additional predictors were identified, yet these differed between the trajectory groups.

Conclusions The majority of the pSA users maintained a connection to working life, yet weaker working life paths were also identified. The paths were determined by various individual and work-related factors that can help health professionals and employers to better target support measures particularly towards individuals whose connection to working life is at risk to weaken after the use of pSA.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The large register-based dataset was representative of Finnish part-time sickness absence users and did not suffer from missing information due to non-response or attrition.
⇒ The 3-year follow-up time enabled us to capture long-term patterns of labour market participation after the use of part-time sickness absence.
⇒ The data included comprehensive information on employment and the use of social security benefits for the basis of determining various labour market statuses.
⇒ By using job exposure matrix, we did not capture variation in the working conditions between individuals holding the same occupational title.
⇒ We did not use specific diagnoses but main diagnostic groups, within which there may be heterogeneity among the cases.

INTRODUCTION

Through the last decades, Finland and other Nordic countries as well as some countries in continental Europe have strongly promoted part-time work during sickness absence (SA) in order to fasten return to work and to increase work participation.[1 2] Consequently, the proportion of part-time SA (pSA) of all compensated SA, including also full SA (fSA), has been increasing, being around 8% in Finland in 2021.[3]

Most previous studies suggest that pSA or graded return to work instead of fSA reduces the duration of SA, enhances return to work and increases overall work participation,[4–10] yet some studies have not found such effects.[11 12] Moreover, labour market outcomes after pSA may depend on various individual and work-related characteristics. More favourable labour market outcomes after pSA or graded return to work have been reported, for example, among persons with mental disorders than musculoskeletal diseases[5 7 13] and among private than public sector employees,[7] while the influence of some other factors such as physical and psychosocial occupational exposures and other disease groups remains unclear.

Moreover, following pSA, there is a large number of possible transitions, that is, transitional paths between different labour market statuses such as work, partial and full work disability, and unemployment. Return to work or exit from the labour market may, therefore, often be multinatured and multiphased processes rather than consisting of single events. Even though previous studies have examined average participation in different labour market statuses over time after the use of pSA (eg,[7]), only little is known of the potentially heterogeneous paths and factors associated with following them.

A more comprehensive investigation of labour market trajectories after the use of pSA would provide important insight into the factors associated with labour market participation after returning to part-time work from SA. Moreover, information on factors associated with following certain paths can help to better target work-promoting interventions and utilising the remaining work capacity.

Using Finnish register data and multiple response trajectory analyses, we investigated typical labour market paths of 45–56 years old employees over a 3-year period after having a pSA spell. In addition, we examined individual and work-related factors associated with being assigned to particular trajectory groups after the use of pSA.

MATERIAL AND METHODS

Data sources

As the base data, we used a nationally representative 70% random sample of the working age population living in Finland on the last day of year 2007. Register-based longitudinal information was available for this sample until the end of October 2017. The data included information on episodes of employment, unemployment, earnings-related pensions and vocational rehabilitation within the earnings-related pension scheme obtained from the Finnish Centre for Pensions, on episodes of compensated SA, national pensions, and vocational and other rehabilitation obtained from the Finnish Social Insurance Institution, and on sociodemographic and work-related factors obtained from the FOLK data of Statistics Finland. Data from these three register holders were linked on the basis of social security numbers of the participants, pseudonymised for analyses. Due to the inclusion of sensitive data, such as SAs with medical diagnoses, our sample size was limited to 70% of the total population.

Study design

In Finland, compensation for SA by the Social Insurance Institution has a waiting period of 10 weekdays (including Saturday) that is typically paid by the employer. At the time of our study, the waiting period was always spent on fSA, while part-time work during the waiting period became an available option from the beginning of 2023. After the waiting period, the Social Insurance Institution of Finland starts to pay sickness allowance, which we refer to as compensated SA. This study only covers information on compensated SA periods. During compensated SA, pSA is a voluntary option for persons who are eligible for continuing fSA, if based on medical assessment they can work without harm to their health and part-time work can be arranged by their employer. Partial sickness allowance is 50% of full allowance, and the employee returns to working 40%–60% of the time while receiving it. In Finland, pSA is typically preceded by a compensated fSA period.[7 14] The maximum length of pSA was 72 weekdays until 2013 and 120 weekdays since 2014 (after the time of our study this was changed to 150 weekdays from the beginning of 2023).

We carried out a register-based study of private and public sector employees who had a pSA spell due to any medical reason starting after the beginning of January 2010 and ending by October 2014 (hereafter called index spells) and who turned 45–56 years old during the year the index spell ended. This recruitment period was set due to a legislative change on 1 January 2010 that enabled the use of pSA immediately after the waiting period of 10 weekdays and our data being available until the end of October 2017, thereby allowing the follow-up of labour market participation for each study person over a full 3-year period after the last day of the index spell. We chose the first pSA spell of an individual occurring during the recruitment period. The spells were interpreted as one if there were no more than 30 days between them. A large proportion (46%) of these pSA spells lasted 60–90 days. The final study population consisted of 9896 individuals.

Labour market statuses

We used information on episodes of employment and of receiving social security benefits to calculate the proportion of time spent in different daily measured labour market statuses within every 3 months over the 3-year follow-up (36 months) period after the index pSA spell, resulting in 12 follow-up periods. The statuses were (1) work (without receiving work disability, unemployment or pension benefits), (2) partial work disability (pSA, temporary or permanent partial disability retirement), (3) full work disability (fSA, temporary or permanent full disability retirement, vocational and other rehabilitation) and (4) other (mainly unemployment, but including also other type of being outside the work force or being deceased). The proportions of time spent in more specific statuses are presented in online supplemental table 1.

Covariates

We included individual and work-related factors as covariates, that is, background characteristics that are known to be associated with work (dis)ability or unemployment, including age,[15–19] gender,[15–20] socioeconomic status,[16 18 19] that is, education (tertiary, secondary, primary) and income (taxable income containing annual earnings and social security benefits), employment sector[15] (private, public), physical heaviness of work[16 17 21] (proportion exposed), job control[19 22 23] (mean score),

as well as diagnostic group[16 24] and calendar year of the index pSA spell.

Age at the year the index spell ended was examined in groups 45–50 and 51–56 years. The employment sector was based on the sector of pension-insured employment at the beginning of the index spell. Education and occupation were measured at the end and income during the year preceding the start year of the index spell.

Information on occupation was used for defining the occupational exposures. If occupation could not be defined for the year preceding the index pSA spell, the information was derived from the 4 years prior to that. Occupational exposures, that is, physical heaviness of work and job control, were then estimated using gender-specific job exposure matrices (JEM), which were developed earlier based on a large population survey and are described in more detail in previous studies.[25 26] We chose to examine these two exposures as previous studies have provided consistent evidence on the associations of physical workload and job control with work participation.[27–29] The JEM for physical heaviness of work and job control have also shown good validity.[25 26] The JEM information was linked to occupational codes in the register data using a classification by Statistics Finland (Classification of Occupations 2010), based on the International Standard Classification of Occupations (ISCO-88).

The medical reason for the index pSA spell was classified according to the International Classification of Diseases, 10th Revision (ICD-10). We examined the following disease groups: (1) diseases of the musculoskeletal system and connective tissue (M00–M99), (2) mental, behavioural and neurodevelopmental disorders (F00–F99), (3) diseases of the nervous system (G00–G99), (4) diseases of the circulatory system (I00–I99), (5) neoplasms (C00–D49), (6) injury, poisoning and certain other consequences of external causes (S00–T88) and (7) other diseases.

Statistical analyses

We constructed labour market trajectories based on the proportion of time spent in the four different labour market statuses measured within every 3 months over the 3 years after the end of the index pSA spell using multiresponse trajectory analysis .[30]

The best fitting number of latent subgroups and their shape were determined in terms of model fitting based on the Bayesian information criterion. The normal distribution was used as the underlying statistical model.

We then examined how the different covariates were associated with assignment to the different trajectory groups including group membership as dummy outcomes in logistic regression analyses. We assessed age-adjusted and gender-adjusted models as well as models mutually adjusting for all covariates. The results are presented as OR and their 95% CIs.

Stata V.15.1 (StataCorp) was used in all analyses.

Table 1 Distribution of background characteristics among the study population of part-time sickness absence (pSA) users

	%	N
Age		
45–50	45.1	4461
51–56	54.9	5435
Gender		
Men	23.9	2364
Women	76.1	7534
Education		
Tertiary	38.2	3777
Secondary	49.9	4937
Primary	11.9	1182
Income (€/year)		
>60 000	5.3	523
30 001–60 000	53.3	5274
≤30 000	41.4	4101
Employment sector		
Private	53.9	5338
Public	46.1	4558
Physically heavy work		
<40% exposed	68.7	6794
≥40% exposed	31.3	3102
Job control score		
>median (high)	51.0	5050
≤median (low)	49.0	4846
Disease group		
Musculoskeletal	45.4	4495
Mental	27.1	2682
Nervous	4.0	397
Circulatory	4.4	431
Neoplasms	6.1	599
Injuries	8.3	821
Other	4.7	471
Start year of pSA		
2010	14.9	1470
2011	18.3	1810
2012	22.4	2230
2013	26.3	2600
2014	18.1	1788
Total	100.0	9896

RESULTS

Almost 55% of the study population of the pSA users belonged to the older age group 51–56 years and over 76% were women. Approximately 45% had a musculoskeletal disease and almost one-third had a mental disorder as the reason for their pSA spell. Further characteristics of the study population are presented in table 1.

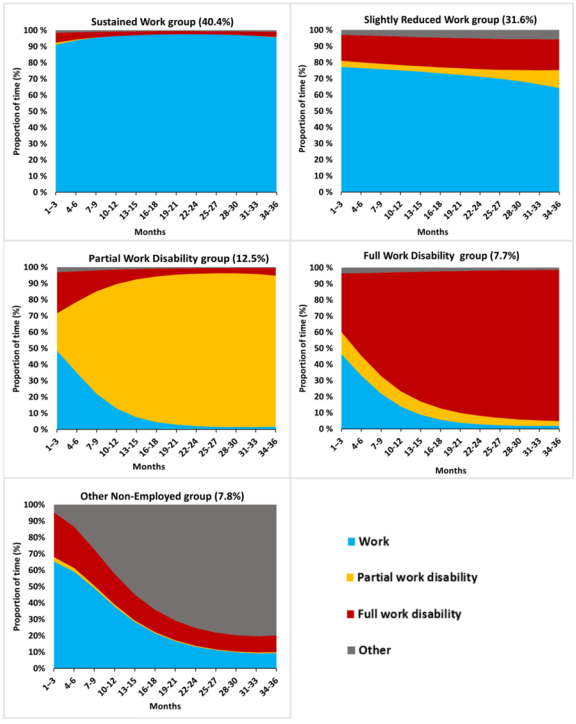

Figure 1 Empirically derived groups of labour market trajectories during the period of 3 years after the use of part-time sickness absence.

Trajectory groups

Five labour market trajectory groups were identified (figure 1). In the largest group (40.4%), the proportion of time spent working was at a high level throughout the 3 year follow-up (Sustained Work group). In the second largest group (31.6%), the proportion of time spent working was at a high level but slightly declined during the follow-up and was replaced mostly by an increase in the time spent with partial work disability (Slightly Reduced Work group). In the third largest (12.5%) group, the proportion of time spent working was at a medium level, then strongly declined and was replaced particularly by an increase in the time spent with partial work disability (Partial Work Disability group). In a smaller group (7.7%), the proportion of time spent working was at a medium level, then strongly declined and was replaced particularly by an increase in the time spent with full work disability (Full Work Disability group). Finally, in another smaller group (7.8%), the proportion of time spent working was at a relatively high level, then steadily declined and was largely replaced by an increase in the time spent in other labour market statuses (Other Non-Employed group).

Predictors of assignment to the trajectory groups

Assignment to the largest group with the best attachment to work, that is, to the Sustained Work group, was predicted by younger age (45–50 years), male gender, having tertiary education, annual income more than €60 000, an occupation where the exposure to physically heavy work or low job control was less likely and the pSA was due to a neoplasm or injury (table 2). After mutual adjustment, assignment to this group was predicted also by having pSA due to a circulatory disease, whereas the associations of gender and job control disappeared (table 3).

The remaining four trajectory groups had two common predictors: having less than tertiary education and annual income less than €30 000, although the association with educational level generally weakened after mutual adjustment.

Moreover, after mutual adjustment, assignment to the Slightly Reduced Work group was predicted by female gender, public sector employment and having an occupation where exposure to physically heavy work was more likely. Assignment to the Partial Work Disability work group was predicted by older age and public sector employment, while on the contrary, assignment to the Other Non-Employed group was predicted by younger age and private sector employment. Finally, assignment to the Full Work Disability group was predicted by older age, male gender and having pSA due to a nervous disease.

DISCUSSION

Using nationally representative data on pSA users aged 45–56 years who had returned to part-time work from fSA, we identified five typical labour market participation trajectories over a subsequent 3-year follow-up period over the years 2010–2017. To our knowledge, this is the first study to provide information on latent trajectories of labour market participation after the use of pSA.

In this study, the majority of the pSA users followed paths where work participation was constantly at a high level or only slightly reduced after the pSA spell. These favourable outcomes in terms of work attachment are in accordance with previous studies showing that the use of pSA instead of fSA has overall positive effects on later work participation.[4–10] Returning to part-time work with the use of pSA may facilitate later return to full work duties, improve labour market attachment, and have positive health effects. Even though generally the evidence of the effect of work on health is somewhat limited, work participation has been reported to have several beneficial effects on mental[31] and physical health[32] as well as on general well-being.[33]

Moreover, over 1/10th of the pSA users followed a path where receiving partial disability benefits became common. Since those having partial work disability typically work at least part of the time, this outcome can be considered as successful with regard to work attachment, at least when return to full work duties is not possible. For example, in year 2021, approximately 80% of partial disability pensioners in Finland were partially at work.[34] Also, previous studies[7 10 35 36] have shown that the use of pSA often initiates a more long-term partial work disability path, during which the individuals continue to participate partially in the labour market.

Table 2 Age-adjusted and gender-adjusted predictors of being assigned to different groups of labour market trajectories after the use of part-time sickness absence

	Sustained Work	Slightly Reduced work	Partial Work Disability	Other Non-Employed	Full Work Disability
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age					
45–50	1.00	1.00	1.00	1.00	1.00
51–56	0.77	0.92	2.37	0.77	1.18
	(0.71 to 0.83)	(0.85 to 1.01)	(2.08 to 2.70)	(0.67 to 0.90)	(1.01 to 1.37)
Gender					
Men	1.00	1.00	1.00	1.00	1.00
Women	0.89	1.34	1.24	0.69	0.71
	(0.81 to 0.98)	(1.21 to 1.49)	(1.07 to 1.43)	(0.59 to 0.81)	(0.61 to 0.84)
Education					
Tertiary	1.00	1.00	1.00	1.00	1.00
Secondary	0.61	1.30	1.36	1.28	1.26
	(0.56 to 0.66)	(1.18 to 1.42)	(1.19 to 1.55)	(1.09 to 1.51)	(1.07 to 1.49)
Primary	0.53	1.43	1.13	1.74	1.31
	(0.46 to 0.61)	(1.24 to 1.65)	(0.92 to 1.39)	(1.38 to 2.18)	(1.03 to 1.67)
Income (€/year)					
>60 000	1.00	1.00	1.00	1.00	1.00
30 001–60 000	0.62	1.46	1.21	1.23	1.32
	(0.52 to 0.75)	(1.18 to 1.80)	(0.85 to 1.62)	(0.85 to 1.79)	(0.90 to 1.94)
<30 000	0.37	1.57	1.94	1.72	1.88
	(0.31 to 0.45)	(1.27 to 1.95)	(1.41 to 2.68)	(1.18 to 2.50)	(1.27 to 2.77)
Employment sector					
Private	1.00	1.00	1.00	1.00	1.00
Public	0.95	1.07	1.91	0.31	1.07
	(0.87 to 1.03)	(0.98 to 1.17)	(1.67 to 2.17)	(0.26 to 0.37)	(0.92 to 1.26)
Physically heavy work					
<40% exposed	1.00	1.00	1.00	1.00	1.00
≥40% exposed	0.66	1.32	1.23	1.09	1.13
	(0.60 to 0.72)	(1.20 to 1.44)	(1.09 to 1.40)	(0.93 to 1.27)	(0.97 to 1.32)
Job control score					
>median (high)	1.00	1.00	1.00	1.00	1.00
≤median (low)	0.72	1.18	1.10	1.30	1.19
	(0.67 to 0.79)	(1.08 to 1.29)	(0.97 to 1.24)	(1.12 to 1.51)	(1.02 to 1.38)
Disease group (dummies)					
Musculoskeletal	0.74	1.38	1.15	0.94	0.89
	(0.68 to 0.80)	(1.27 to 1.51)	(1.02 to 1.30)	(0.81 to 1.09)	(0.76 to 1.03)
Mental	1.08	0.85	0.91	1.15	1.24
	(0.99 to 1.19)	(0.77 to 0.93)	(0.79 to 1.04)	(0.98 to 1.35)	(1.06 to 1.46)
Nervous	0.68	0.92	1.57	1.19	1.58
	(0.55 to 0.84)	(0.74 to 1.14)	(1.20 to 2.05)	(0.84 to 1.69)	(1.15 to 2.17)
Circulatory	1.18	0.75	1.46	0.66	1.01
	(0.97 to 1.43)	(0.60 to 0.93)	(1.12 to 1.91)	(0.43 to 0.99)	(0.71 to 1.43)
Neoplasms	1.62	0.60	0.55	1.30	1.27
	(1.37 to 1.91)	(0.49 to 0.73)	(0.41 to 0.75)	(0.98 to 1.73)	(0.95 to 1.70)
Injuries	1.90	0.84	0.49	0.77	0.45
	(1.65 to 2.20)	(0.71 to 0.98)	(0.37 to 0.65)	(0.57 to 1.03	(0.32 to 0.65)

Models are further adjusted for the start year of part-time sickness absence.

Table 3 Mutually adjusted predictors of being assigned to different groups of labour market trajectories after the use of part-time sickness absence

	Sustained Work	Slightly Reduced Work	Partial Work Disability	Other Non-Employed	Full Work Disability
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age					
45–50	1.00	1.00	1.00	1.00	1.00
51–56	0.79	0.89	2.31	0.82	1.18
	(0.72 to 0.86)	(0.81 to 0.97)	(2.02 to 2.64)	(0.71 to 0.96)	(1.01 to 1.38)
Gender					
Men	1.00	1.00	1.00	1.00	1.00
Women	0.97	1.33	0.91	0.88	0.62
	(0.87 to 1.08)	(1.19 to 1.49)	(0.77 to 1.07)	(0.73 to 1.05)	(0.52 to 0.75)
Education					
Tertiary	1.00	1.00	1.00	1.00	1.00
Secondary	0.76	1.15	1.19	1.14	1.17
	(0.68 to 0.84)	(1.04 to 1.29)	(1.02 to 1.40)	(0.94 to 1.38)	(0.97 to 1.42)
Primary	0.68	1.27	1.07	1.31	1.22
	(0.58 to 0.79)	(1.09 to 1.49)	(0.85 to 1.35)	(1.01 to 1.70)	(0.93 to 1.60)
Income (€/year)					
>60 000	1.00	1.00	1.00	1.00	1.00
30 001–60 000	0.76	1.23	1.01	1.14	1.26
	(0.63 to 0.92)	(0.98 to 1.53)	(0.72 to 1.41)	(0.94 to 1.38)	(0.85 to 1.88)
<30 000	0.53	1.17	1.45	2.24	1.69
	(0.43 to 0.66)	(0.92 to 1.48)	(1.02 to 2.05)	(1.49 to 3.37)	(1.11 to 1.60)
Employment sector					
Private	1.00	1.00	1.00	1.00	1.00
Public	0.93	1.12	1.91	0.29	1.06
	(0.85 to 1.02)	(1.02 to 1.23)	(1.67 to 2.05)	(0.24 to 0.34)	(0.90 to 1.25)
Physically heavy work					
<40% exposed	1.00	1.00	1.00	1.00	1.00
≥40% exposed	0.85	1.17	1.02	0.98	1.00
	(0.76 to 0.94)	(1.06 to 1.23)	(0.88 to 1.18)	(0.82 to 1.18)	(0.84 to 1.19)
Job control score					
>median (high)	1.00	1.00	1.00	1.00	1.00
≤median (low)	0.95	1.04	1.07	0.86	1.09
	(0.87 to 1.06)	(0.94 to 1.15)	(0.93 to 1.23)	(0.73 to 1.03)	(0.92 to 1.30)
Disease group (dummies)					
Musculoskeletal	1.04	1.07	0.87	0.87	1.01
	(0.87 to 1.24)	(0.89 to 1.28)	(0.67 to 1.12)	(0.63 to 1.21)	(0.72 to 1.42)
Mental	1.11	0.86	0.76	1.25	1.39
	(0.93 to 1.33)	(0.71 to 1.04)	(0.58 to 0.99)	(0.89 to 1.74)	(0.98 to 1.96)
Nervous	0.81	0.84	1.24	1.16	1.72
	(0.62 to 1.07)	(0.64 to 1.10)	(0.87 to 1.77)	(0.73 to 1.85)	(1.10 to 2.68)
Circulatory	1.35	0.70	1.22	0.66	1.14
	(1.04 to 1.74)	(0.53 to 0.92)	(0.85 to 1.73)	(0.40 to 1.10)	(0.71 to 1.82)
Neoplasms	1.69	0.59	0.49	1.26	1.48
	(1.34 to 2.13)	(0.46 to 0.76)	(0.34 to 0.72)	(0.84 to 1.90)	(0.97 to 2.24)
Injuries	2.13	0.77	0.44	0.68	0.53
	(1.73 to 2.63)	(0.62 to 0.96)	(0.31 to 0.63)	(0.46 to 1.02)	(0.34 to 0.85)

Models are further adjusted for the start year of part-time sickness absence.

The remaining persons, slightly over 15% of the pSA users, followed paths where work attachment substantially weakened, which was attributable to the increased time spent in other non-employment or full work disability. For these people, initial part-time return to work while being sick does not appear to be sufficient to ensure sustained work participation in the long term. Additional interventions improving their employability, health and work ability may therefore be needed.

Predictors of labour market paths after pSA

In this study, we found several individual and work-related characteristics that may help health professionals, employers and human resource personnel to anticipate and influence labour market outcomes after pSA. Those who were younger, had higher education and higher income more often followed the labour market path most attached to work after pSA. These characteristics are likely to be associated with better work ability or employment opportunities more generally.

Some gender differences were also observed. We found that men were more likely to follow a labour market path where working was replaced by full work disability, whereas women were more likely to follow a path where work participation only slightly reduced. Men may be employed in types of work where modifying tasks is more difficult, and therefore, returning to work is more challenging. Moreover, previous studies have shown that men have fewer contacts with healthcare services[37 38] and lower SA rates[20 39] than women. This may indicate that men have poorer or delayed access to treatment or that men are less eager to report their disabilities to healthcare professionals. Hence, when men take SA, it may be at a later and more severe stage of work disability compared with women, resulting in less favourable labour market outcomes also after the use of pSA.

Working in the private sector compared with the public sector was particularly strongly associated with following the path where working was replaced by other non-employment, which was typically unemployment. This may be related to the fact that employment careers are less secure in the private than the public sector. On the contrary, working in the public sector was strongly associated with following the path where work was replaced by partial work disability. This can be due to system-based reasons. In the private sector, the definition of incapacity for work due to illness is based on the possibility of doing any type of work that a person can be expected to perform, considering his or her background such as education, age and work history. In the public sector, the incapacity for work is more narrowly defined on the based on professional criteria, only considering the person's performance in their own work. It appears that in the public sector all attempts are made to keep the person in his/her occupation at least part time, thereby encouraging the partial work disability path. There are also differences between the sectors in determining the disability pension payments of large employers. Contrary to the private sector, in the public sector partial disability pensions do not directly affect the determination of the disability pension contributions, which can encourage their use. Consequently, the risk of partial disability retirement has been shown to be higher in the public sector than in the private sector.[40] Moreover, previous studies have found that partial disability retirement is more common in larger than in smaller workplaces,[41 42] which may indicate that it is easier to provide part-time work in larger working units. This may partly explain the differences in the use of partial disability retirement across sectors, as work units in the public sector are usually larger compared with those in the private sector.

Musculoskeletal and mental disorders were the most common reasons for the use of pSA. According to our findings, those suffering from these diseases, however, did not follow any distinct labour market path. Instead, several smaller disease groups were associated with a specific labour market path. Those with an injury, circulatory disease or neoplasm were more likely to follow a path that was best attached to work after the use of pSA than those with other diagnoses. For these diseases, effective treatment is often provided and work ability can be fully restored. Instead, those with nervous diseases were much more likely to follow a full work disability path than those with the other diagnoses. It may be that the chronic and progressive nature of several nervous diseases leads to a long-term work disability. However, the treatments for diseases constantly develop, and labour market outcomes may thereby improve in the future.

Occupational exposures appeared to influence the outcomes to a limited extent especially once all background factors were controlled for. Those having an occupation where physically heavy work is less common were more likely to follow the labour market path that was best attached to work. Returning to full work duties after pSA and staying at work might be easier for those working in physically lighter occupations. Several studies have documented the negative impact of physically heavy work on health, work ability and the risk of SA and early retirement.[43–47] However, in this study, having a physically heavy occupation was associated with following a path where working only slightly reduced, but not for example, with a path where the connection to working life was lost due to full work disability.

High job control had only a weak association with the labour market path best attached to work, which disappeared after all other background factors were accounted for. Although previous studies have found associations of high job control with retention in paid employment and having less SA,[48–50] it appears based on our findings to have less influence on further labour market outcomes among pSA users who have already developed a disease causing the work disability.

These limited associations between occupational exposures and labour market outcomes after the use of pSA may partly be attributable to the circumstance that reduced work time during pSA is by itself a measure to

reduce exposure to harmful physical and psychosocial conditions at work. Users of pSA are a selected group of sick-listed employees who were willing to return to part-time work and for whom this could be arranged by their employer.

Strengths and limitations

The strengths of our study include rich nationally representative register data that do not suffer from non-response or attrition during the follow-up. The 3-year follow-up time enabled us to capture long-term patterns of labour market participation after the use of pSA. Moreover, the data included detailed information on employment and the use of social security benefits for the basis of determining various labour market statuses.

Some limitations should be considered when interpreting the results. The use of JEM can be seen as both a strength and a limitation. JEM-based exposure estimates are not prone to recall bias or other types of information bias. Furthermore, JEM is a useful tool for exposure assessment in register-based studies with no individual-level information on occupational exposures. However, the limitations of the JEM should not be neglected. Earlier studies have reported that job titles could explain on average about 30% (range 5%–55%) of the variance in individual self-reported exposures,[51–53] yet the value varies across different exposures. By definition, a JEM assigns the same exposure estimates to all workers within the same occupation. However, within the same occupation, exposures might vary within worker (over time variation) and between workers (variation in tasks, activities and work processes). By neglecting within occupation variation, exposure assessment by JEM induces a non-differential misclassification bias,[54] which will attenuate the observed associations between an exposure and outcome towards null.[55] The performance of the JEM will also be reduced when the variation of an exposure within the occupation is larger than between the different occupations. The JEMs that were used in our analyses have shown a good accuracy, especially for job control and physical exposures[25 26] and a good predictive validity for various health-related outcomes.[56–59]

However, by using the JEM, we did not capture variation in the working conditions between individuals holding the same occupational title and likely underestimated the associations between exposures and our outcome of interest. This may partly explain the limited contribution of occupational exposures to our findings. Another study limitation is that we did not use specific diagnoses but main diagnostic groups, within which there may be heterogeneity among the cases. Importantly, the distribution of diseases has changed after the time of our study, with mental disorders being now the largest disease group among pSA users in Finland.[60]

CONCLUSIONS

The majority of the pSA users maintain a connection to working life after their pSA spell at least via partial work participation. The labour market paths after pSA are diverse and associated with various individual and work-related factors that can help, for example, health professionals and employers to anticipate and influence future labour market outcomes. Further studies are needed to investigate, for example, how labour market paths after the use of pSA differ between genders, how part-time working solutions could be better used in the private sector and how to support work participation among those with reduced work ability due to neurological diseases. Moreover, future studies should focus on investigating how individual-level differences and changes in working conditions contribute to work participation after pSA.

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REFERENCES

1 Kausto J, Miranda H, Martimo K-P, *et al*. Partial sick leave--review of its use, effects and feasibility in the Nordic countries. *Scand J Work Environ Health* 2008;34:239–49.
2 Leoni T. Graded work, the activation of sick-listed workers and employer participation in continental Europe. *Soc Policy Soc* 2022;21:385–404.
3 Kela. Table 49. sickness allowance: periods and days of payment, 2005-2021. In: *Statistical Yearbook of the Social Insurance Institution 2021*. 2022. Available: https://helda.helsinki.fi/handle/10138/352874 [accessed 27 Mar 2023].
4 Markussen S, Mykletun A, Røed K. The case for presenteeism — evidence from Norway's sickness insurance program. *J Public Econ* 2012;96:959–72.
5 Kausto J, Viikari-Juntura E, Virta LJ, *et al*. Effectiveness of new legislation on partial sickness benefit on work participation: a quasi-experiment in Finland. *BMJ Open* 2014;4:e006685.
6 Bethge M. Effects of graded return-to-work: a propensity-score-matched analysis. *Scand J Work Environ Health* 2016;42:273–9.
7 Viikari-Juntura E, Virta LJ, Kausto J, *et al*. Legislative change enabling use of early part-time sick leave enhanced return to work and work participation in Finland. *Scand J Work Environ Health* 2017;43:447–56.
8 Hernæs Ø. Activation against absenteeism - evidence from a sickness insurance reform in Norway. *J Health Econ* 2018;62:60–8.
9 Maas ET, Koehoorn M, McLeod CB. Does gradually returning to work improve time to sustainable work after a work-acquired musculoskeletal disorder in British Columbia, Canada? A matched cohort effectiveness study. *Occup Environ Med* 2021;78:715–23.
10 Hartikainen E, Solovieva S, Viikari-Juntura E, *et al*. Working life expectancy and working years lost among users of part- and full-time sickness absence in Finland. *Scand J Work Environ Health* 2023;49:23–32.
11 Høgelund J, Holm A, Eplov LF. The effect of part-time sick leave for employees with mental disorders. *J Ment Health Policy Econ* 2012;15:157–70.
12 Bosman LC, Twisk JWR, Geraedts AS, *et al*. Effect of partial sick leave on sick leave duration in employees with musculoskeletal disorders. *J Occup Rehabil* 2020;30:203–10.
13 Schneider U, Linder R, Verheyen F. Long-term sick leave and the impact of a graded return-to-work program: evidence from Germany. *Eur J Health Econ* 2016;17:629–43.
14 Leinonen T, Solovieva S, Blomgren J, *et al*. Osatyökyvyttömyysetuuksien Käyttö Yksityisen JA Julkisen Sektorin Palkansaajilla Vuosina 2007–2017 [the use of partial work disability benefits among private and public sector wage earners in 2007–2017]. *Työpoliittinen Aikakauskirja [Finnish Labour Review]* 2020:38–55.
15 Løkke A, Eskildsen JK, Wendelboe Jensen T. Absenteeism in the Nordic countries. *Empl* 2006;29:16–29.
16 Cancelliere C, Donovan J, Stochkendahl MJ, *et al*. Factors affecting return to work after injury or illness: best evidence synthesis of systematic reviews. *Chiropr Man Therap* 2016;24:32.
17 Hansson T, Jensen I. Swedish council on technology assessment in health care (SBU). Chapter 6. sickness absence due to back and neck disorders. *Scand J Public Health Suppl* 2004;63:109–51.
18 Fisker J, Hjorthøj C, Hellström L, *et al*. Predictors of return to work for people on sick leave with common mental disorders: a systematic review and meta-analysis. *Int Arch Occup Environ Health* 2022;95:1–13.
19 Gragnano A, Negrini A, Miglioretti M, *et al*. Common psychosocial factors predicting return to work after common mental disorders, cardiovascular diseases, and cancers: a review of reviews supporting a cross-disease approach. *J Occup Rehabil* 2018;28:215–31.
20 Mastekaasa A, Melsom AM. Occupational segregation and gender differences in sickness absence:evidence from 17 European countries. *Eur Sociol Rev* 2014;30:582–94.
21 Steenstra IA, Munhall C, Irvin E, *et al*. Systematic review of prognostic factors for return to work in workers with sub acute and chronic low back pain. *J Occup Rehabil* 2017;27:369–81.
22 Duchaine CS, Aubé K, Gilbert-Ouimet M, *et al*. Psychosocial stressors at work and the risk of sickness absence due to a diagnosed mental disorder: a systematic review and meta-analysis. *JAMA Psychiatry* 2020;77:842–51.
23 Knardahl S, Johannessen HA, Sterud T, *et al*. The contribution from psychological, social, and organizational work factors to risk of disability retirement: a systematic review with meta-analyses. *BMC Public Health* 2017;17:176.
24 van Rijn RM, Robroek SJW, Brouwer S, *et al*. Influence of poor health on exit from paid employment: a systematic review. *Occup Environ Med* 2014;71:295–301.
25 Solovieva S, Pehkonen I, Kausto J, *et al*. Development and validation of a job exposure matrix for physical risk factors in low back pain. *PLoS One* 2012;7:e48680.
26 Solovieva S, Pensola T, Kausto J, *et al*. Evaluation of the validity of job exposure matrix for psychosocial factors at work. *PLoS One* 2014;9:e108987.
27 Allebeck P, Mastekaasa A. Swedish council on technology assessment in health care. Chapter 5 risk factors for sick leave-general studies. *Scand J Public Health Suppl* 2004;63:49–108.
28 Biswas A, Harbin S, Irvin E, *et al*. Differences between men and women in their risk of work injury and disability: a systematic review. *Am J Ind Med* 2022;65:576–88.
29 Pedersen J, Bjorner JB, Andersen LL. Physical work demands and expected labor market affiliation (ELMA): prospective cohort with register-follow-up among 46 169 employees. *Scand J Work Environ Health* 2022;48:641–50.
30 Nagin DS, Jones BL, Passos VL, *et al*. Group-based multi-trajectory modeling. *Stat Methods Med Res* 2018;27:2015–23.
31 van der Noordt M, IJzelenberg H, Droomers M, *et al*. Health effects of employment: a systematic review of prospective studies. *Occup Environ Med* 2014;71:730–6.
32 Hergenrather KC, Zeglin RJ, McGuire-Kuletz M, *et al*. Employment as a social determinant of health: a systematic review of longitudinal studies exploring the relationship between employment status and physical health. *Rehabil Res Policy Educ* 2015;29:2–26.
33 Waddell G, Burton AK. *Is work good for your health and well-being?* London: The Stationery Office, 2006.
34 KannistoJ. Eläkkeellä ja työssä.Tilasto Eläkeläisten Työnteosta Vuosina 2007–2021. [Retired and working. Statistics on the employment of pensioners in the years 2007–2021]. In: *Eläketurvakeskuksen Tilastoja*. 2022. Available: https://urn.fi/URN:NBN:fi-fe2022121471506 [accessed 12 Mar 2023].
35 Kausto J, Virta L, Luukkonen R, *et al*. Associations between partial sickness benefit and disability pensions: initial findings of a Finnish nationwide register study. *BMC Public Health* 2010;10:361.
36 Kausto J, Solovieva S, Virta LJ, *et al*. Partial sick leave associated with disability pension: propensity score approach in a register-based cohort study. *BMJ Open* 2012;2:e001752.
37 Wang Y, Hunt K, Nazareth I, *et al*. Do men consult less than women? An analysis of routinely collected UK general practice data. *BMJ Open* 2013;3:e003320.
38 Osika Friberg I, Krantz G, Määttä S, *et al*. Sex differences in health care consumption in Sweden: a register-based cross-sectional study. *Scand J Public Health* 2016;44:264–73.
39 Leinonen T, Viikari-Juntura E, Husgafvel-Pursiainen K, *et al*. Labour market segregation and gender differences in sickness absence: trends in 2005-2013 in Finland. *Ann Work Expo Health* 2018;62:438–49.
40 Polvinen A, Laaksonen M. Contribution of age, gender and occupational group to the higher risk of disability retirement among Finnish public sector employees. *Scand J Public Health* 2023.
41 Polvinen A. Työkyvyttömyyseläkkeelle Siirtymisen Erot Kunta-Alan JA Yksityisen Sektorin Palkansaajilla[Differences in disability retirement between municipal and private sector employees]. *Knt* 2021;44:10–23.
42 Laaksonen M, Rantala J, Liukko J, *et al*. Company-level determinants of disability retirement: a Multilevel study of Finnish private sector workplaces. *Eur J Public Health* 2019;29:1062–8.
43 Karpansalo M, Manninen P, Lakka TA, *et al*. Physical workload and risk of early retirement: prospective population-based study among middle-aged men. *J Occup Environ Med* 2002;44:930–9.
44 van den Berg TIJ, Elders LAM, de Zwart BCH, *et al*. The effects of work-related and individual factors on the work ability index: a systematic review. *Occup Environ Med* 2009;66:211–20.
45 Laaksonen M, Pitkäniemi J, Rahkonen O, *et al*. Work arrangements, physical working conditions, and psychosocial working conditions as risk factors for sickness absence: bayesian analysis of prospective data. *Ann Epidemiol* 2010;20:332–8.
46 Andersen LL, Fallentin N, Thorsen SV, *et al*. Physical workload and risk of long-term sickness absence in the general working population and among blue-collar workers: prospective cohort study with register follow-up. *Occup Environ Med* 2016;73:246–53.
47 Mänty M, Kouvonen A, Nordquist H, *et al*. Physical working conditions and subsequent sickness absence: a record linkage follow-up study among 19-39-year-old municipal employees. *Int Arch Occup Environ Health* 2022;95:489–97.
48 Falkstedt D, Hemmingsson T, Albin M, *et al*. Disability pensions related to heavy physical workload: a cohort study of middle-aged and older workers in Sweden. *Int Arch Occup Environ Health* 2021;94:1851–61.

49 Aronsson G, Hagberg J, Björklund C, *et al*. Health and motivation as mediators of the effects of job demands, job control, job support, and role conflicts at work and home on sickness presenteeism and absenteeism. *Int Arch Occup Environ Health* 2021;94:409–18.
50 Farrants K, Norberg J, Framke E, *et al*. Job demands and job control and future labor market situation: an 11-year prospective study of 2.2 million employees. *J Occup Environ Med* 2020;62:403–11.
51 Schwartz JE, Pieper CF, Karasek RA. A procedure for linking psychosocial job characteristics data to health surveys. *Am J Public Health* 1988;78:904–9.
52 Raittila S, Rahkonen O, Lahelma E, *et al*. Occupational class differences in trajectories of working conditions in women. *IJERPH* 2017;14:790.
53 Evanoff BA, Yung M, Buckner-Petty S, *et al*. The CONSTANCES job exposure matrix based on self-reported exposure to physical risk factors: development and evaluation. *Occup Environ Med* 2019;76:398–406.
54 Tielemans E, Heederik D, Burdorf A, *et al*. Assessment of occupational exposures in a general population: comparison of different methods. *Occup Environ Med* 1999;56:145–51.
55 Armstrong BG. Effect of measurement error on epidemiological studies of environmental and occupational exposures. *Occup Environ Med* 1998;55:651–6.
56 Sirén M, Viikari-Juntura E, Arokoski J, *et al*. Physical and psychosocial work exposures as risk factors for disability retirement due to a shoulder lesion. *Occup Environ Med* 2019;76:793–800.
57 Mikkola TM, von Bonsdorff MB, Salonen MK, *et al*. Physical heaviness of work and sitting at work as predictors of mortality: a 26-year follow-up of the Helsinki birth cohort study. *BMJ Open* 2019;9:e026280.
58 Kontio T, Viikari-Juntura E, Solovieva S. To what extent do education and physical work load factors explain occupational differences in disability retirement due to knee OA? A nationwide register-based study in Finland. *BMJ Open* 2019;8.
59 Leinonen T, Solovieva S, Husgafvel-Pursiainen K, *et al*. Do individual and work-related factors differentiate work participation trajectories before and after vocational rehabilitation? *PLoS One* 2019;14:e0212498.
60 Kela. Table 61. partial sickness allowances by diagnosis, 2021. In: *Statistical Yearbook of the Social Insurance Institution 2021*. 2022. Available: https://helda.helsinki.fi/handle/10138/352874 [accessed 27 Mar 2023].

Supplementary table 1. The proportion of time spent (%) in different labour market statuses during the three-year follow-up period

	Months	1–3	4–6	7–9	10–12	13–15	16–18	19–21	22–24	25–27	28–30	31–33	34–36
	Work	78.57	74.71	72.91	71.05	69.98	68.36	66.45	65.28	64.67	63.56	62.17	61.57
Partial work disability	Part-time sickness absence	0.98	1.25	0.64	0.50	0.47	0.59	0.70	0.85	0.94	1.06	1.07	1.16
	Partial temporary disability retirement	2.86	4.76	5.73	6.42	6.25	5.87	5.64	5.31	4.80	4.48	4.30	4.04
	Partial permanent disability retirement	1.58	2.66	3.51	4.27	5.05	5.94	6.76	7.42	8.10	8.79	9.22	9.75
Full work disability	Full-time sickness absence	12.27	11.09	9.55	8.11	6.87	6.65	6.79	6.79	6.50	6.57	6.88	6.46
	Full temporary disability retirement	1.07	1.59	2.20	2.94	3.53	3.78	3.85	3.84	3.84	3.79	3.83	3.87
	Full permanent disability retirement	0.08	0.20	0.39	0.64	0.96	1.30	1.58	1..82	2.15	2.57	3.03	3.45
	Vocational and other rehabilitation	1.63	1.92	2.02	1.98	1.98	1.82	1.86	1.90	1.80	1.84	1.83	1.76
Other	Unemployment	0.55	1.15	2.03	2.77	3.51	4.16	4.76	5.14	5.40	5.50	5.70	5.86
	Other outside the work force	0.37	0.58	0.78	0.95	0.89	0.93	0.96	0.93	0.99	0.97	1.03	1.00
	Dead	0.03	0.10	0.23	0.38	0.50	0.58	0.66	0.74	0.80	0.87	0.96	1.08
	Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00