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This paper investigates whether sickness absence during participation in a subsidized re-employment program in Finland influenced future employability of long-term unemployed people. Findings suggested an increased risk of poor labor market attachment among unemployed people with sickness absence, especially among young adults with >30 days of sickness absence. Sick unemployed people may require extra support in terms of healthcare and rehabilitation.

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Sickness absence in a re-employment program as a predictor of labor market attachment among long-term unemployed individuals: A 6-year cohort study in Finland

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Objectives We examined whether sickness absence during participation in a state subsidized re-employment program among long-term unemployed people was associated with subsequent labor market attachment.

Methods We linked 18 944 long-term unemployed participants (aged 18–60 years) of a six-month subsidized re-employment program in Finland to their records of sickness absence during the program and labor market status after the program. We used the latent class growth model to identify labor market attachment trajectories over a six-year follow-up period and multinomial logistic regression to investigate the association between sickness absence and labor market attachment trajectories.

Results We identified four labor market attachment trajectories: "strengthening", (77%), "delayed" (6%), "leavers" (10%), and "non-attached" (7%). Sickness absence was associated with an increased risk of belonging to the leavers and non-attached trajectories. Having >30 days of sickness absence during the six-month re-employment program increased the risk for belonging to the future non-attached trajectory in all age groups, but in particular for those aged 30–44 [odds ratio (OR) 7.35, 95% confidence interval (CI) 4.85–11.14] and 18–29 years (OR 5.38, 95% CI 3.76–7.69). At these ages, having fewer than 30 days sickness absences was also associated with an elevated risk of belonging to the non-attached trajectory, while this risk was lower for those aged 45–60.

Conclusions Sickness absence during participation in a subsidized re-employment program increased the risk for poor labor market attachment during the subsequent six years. The risk was particularly high among younger participants with >30 days of sickness absence.

Key terms employability; employment trajectory; health; poor health; unemployment.

There is a large body of research on the effects of unemployment on health. There is also a growing number of studies suggesting improved health status among re-employed individuals compared to those who remain unemployed (1–5). Much of the concern on how to improve the re-employment prospects of unemployed people is associated with concern about how to prevent health deterioration resulting from long-term unemployment (6, 7). In attempting to address this concern, labor authorities in several European countries have instituted

active labor market policy measures such as job training, subsidized re-employment programs, and re-education courses, but the effectiveness of these measures has remained controversial (8–10). Hence policy-makers need to review and develop the current measures and seek for means that would contribute to the realization of the goal of improving re-employment.

A better understanding of the factors that constitute barriers to re-employment is crucial when planning preventive interventions aimed at promoting re-employ-

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ment. Earlier studies have identified self-perceived general poor health (11–14) and musculoskeletal pain (15) as factors that may reduce the likelihood of re-employment. Research also suggests that unemployed people with physician-diagnosed mental problems (6, 16, 17) are at greater risk of not re-entering the labor market than their counterparts with no such health problems. However, an aspect that has been less explored is the association between previous sickness absence and re-employment. Assessing sickness absence during unemployment is complex due to the lack of a concrete everyday job. Our access to the sickness absence records of unemployed people during their participation in active labor market policy measures (ALMP) affords us the possibility of addressing the knowledge gap on the role of previous sickness absence on re-employment outcomes.

Sickness absence, particularly medically certified absence, is a well-known risk marker for mortality (17, 18) as well as many chronic health problems (19). Medically certified sickness absence has also been associated with increased risk of future sickness absences (20), job termination (21, 22) and unemployment (22–24) among active employees. Therefore, sickness absence during participation in ALMP could serve as a strong proxy for poor health and as such presents an objective measure to investigate the sustainability of the re-employment intervention for persons with serious health problems.

In our earlier study (17), we identified employment trajectories of re-employed people after their participation in a state subsidized re-employment program. Our aim in the present study is to examine whether sickness absence during such programs is a predictor of subsequent labor market attachment. We hypothesize that sickness absence is associated with poor labor market attachment, and that the risk of poor attachment increases with increasing number of sickness absence days.

Methods

Design and study population

We derived our study data from the Finnish Public Sector (FPS) study, which is an ongoing prospective study of employees in ten towns and five hospital districts in Finland. The overall aim of the FPS study is to assess the work life of employees and the impact of work and work-related changes on employee health and well-being (25). The Ethics Committee of the Hospital District of Helsinki and Uusimaa approved the study.

We used the part of the FPS study that included data on originally long-term unemployed individu-

als (N=23 213) who had their first period of subsidized re-employment in the service of the ten towns in 1994–2005. Subsidized re-employment schemes are an essential component of Finland's ALMP measures. They are designed for long-term unemployed people (as a rule those unemployed for ≥ 12 months) who have problems finding a job in the regular labor market. Participation in the program is voluntary and the selection of the participants is coordinated by the municipalities in cooperation with the local employment authorities. Individuals are selected if upon assessment they are considered capable of performing a full-time job. The employment contract lasts for six months. For the purposes of this study, the sample included the individuals (N=18 944) who completed the full six months' participation in the subsidized program and excluded those who were compelled to drop out due to poor health or who discontinued the program due to finding a job in the open labor market. All participants had to be 18–60 years old at the end of the scheme. Those who moved into retirement during the six-year follow-up were excluded.

Data on labor market attachment

Starting at the end of the subsidized re-employment period, subsequent employment of each individual was followed-up for six years, which were divided into 12 six-month periods to enable analysis of the labor market attachment trajectories. Labor market attachment here refers to the number of months (0–6) as an employee or entrepreneur during each of the 12 time periods. We obtained information on the employment histories from the register of the Finnish Centre for Pensions. This register includes monthly records of all employment contracts, as well as entrepreneurship which is eligible for inclusion in the formation of the statutory earnings-related pension insurance.

Data on sickness absence

We retrieved information on sickness absence from the register of the Social Insurance Institution of Finland (KELA). This nation level register contains records of all sickness absence periods lasting >10 working days, while costs of shorter periods are covered by the employer (26). Like other employees, participants in the subsidized re-employment program were also entitled to an earnings-related sickness allowance. We categorized the total number of their sickness absence days across the six-month period as: $0 \leq 10$, $11 \text{--} 29$, and ≥ 30 sickness absence days.

Background variables

Information on gender and age (18–29, 30–44, and

45–60) was obtained from the employers' registers. Educational level (basic, vocational school, and college or university degree) was retrieved from Statistics Finland, while information on chronic diseases was retrieved from the records of the Social Insurance Institution on entitlements to special reimbursements for the costs of purchased drugs for severe and chronic diseases. The chronic disease variable was a summed score of six common diseases (heart disease, rheumatoid arthritis, asthma or chronic obstructive pulmonary disease (COPD), chronic hypertension, and severe mental problems). We categorized participants into two groups based on whether or not they had at least one of the chronic diseases mentioned. Information on calendar year in subsidized re-employment was derived from the employer's register, and calendar time was categorized as: 1994–1997, 1998–2001, and 2002–2005 in order to control for variations in unemployment and subsidized re-employment rates. We used the information on the ten towns where the participants had worked as a proxy for dichotomizing the area of residence into small towns and big towns. The small towns included Raisio, Naantali, Nokia, Valkeakoski and Virrat, while the big towns were Tampere, Turku, Oulu Vantaa and Espoo.

Statistical analysis

We used latent class growth model with zero-inflated Poisson (LCGM-ZIP) (27, 28) to identify subgroups within the population following a similar pattern of change in labor market attachment during the six-year follow-up period. We adopted an exploratory approach and estimated as many classes as possible (two through six latent class solutions) that yielded proper solutions, in the search for the optimum number of trajectory classes. We specified a quadratic growth term in each model (k number of classes), assuming that labor market attachment would decrease over time after an initial increase. We compared the models (ie, the k and $k-1$ models) using four selection criteria: (i) the Bayesian Information Criteria (BIC), where a model with lower BIC values indicated a well-fitting model (29); (ii) the Lo Mendell and Rubin Adjusted Likelihood Ratio test (LMR-LRT), where a significant P -value ($P < 0.05$) indicates that the k class fits better than the $k-1$ class model (30); (iii) the average posterior probabilities of group membership for each class, where higher values (closer to 1) suggested that the trajectories correctly classified individuals with a similar pattern of labor market attachment and discriminated between individuals with dissimilar attachment patterns (31); (iv) the practical usefulness of the trajectories. To evaluate this, we examined both the distinctiveness and the sizes (proportions) of each of the trajectory groups (28). For trajectory groups to serve a useful substantive purpose, they

should be distinguishable in terms of their shapes and other explanatory characteristics. They should also be of reasonable sizes ($\geq 5\%$) to ensure precision (27, 31).

Upon establishing the optimum number of trajectory classes, we then used multinomial logistic regression to investigate the association between sickness absence and labor market attachment trajectories. We ran both unadjusted and adjusted models, where the adjusted model included age, gender, educational level, calendar year in a subsidized re-employment program, chronic conditions, and size of town. We also examined whether age and gender acted as potential modifiers by entering an interaction term between sickness absence and each of the variables in the fully adjusted model. If the interaction term was significant ($P < 0.05$), the analysis was stratified and the stratum-specific estimates calculated. We presented the results of the regression analyses as odds ratio (OR) with their 95% confidence intervals (95% CI). We used Mplus version 7 for LCGA-ZIP and IBM SPSS Statistics for Windows version 23.0 (IBM Corp, Armonk, NY, USA) for the multinomial logistic regression.

Results

Altogether, 1172 of the 18 944 study participants had a recorded sickness absence during the six month period they were enrolled in the re-employment program. The absence lasted 11–29 days among 708 (60%) individuals, while the rest had >30 days of sickness absence. Having >30 absence days was more common in the older age group, among those with basic educational qualifications only, and in those who participated in the program between 2002–2005. Participants with chronic diseases were also more likely to have >30 days of sickness absence than those without such diseases (table 1).

On the basis of the information criteria, the four-trajectory solution discerned the different labor market attachment trajectories best over the six-year follow-up. Figure 1 illustrates the four labor market attachment trajectories. The curves are constructed based on the mean proportion of months of the attachment at each half-year period of the individuals classified into each trajectory. The strengthening trajectory ($N=14\ 577$, 77%) represented those with a relatively stable attachment throughout the follow-up time. The delayed trajectory ($N=1101$, 6%) included those whose initially weak attachment steadily improved after 36 months. In the leavers trajectory ($N=1970$, 10%), attachment declined with time, while among the non-attached ($N=1296$, 7%) the trajectory assumed a very low level throughout the follow-up period.

Table 1. Descriptive statistics of study population (N=18 944) [SA = sickness absence]

	Number of participants		SA among participants during the six-month participation in the subsidized program							
	N	%	Total SA days		0–≤10 SA days		11–29 SA days		≥30 SA days	
Age (years)			N	%	N	%	N	%	N	%
18–29	9924	52.4	554	5.6	9370	94.4	329	3.3	225	2.3
30–44	6662	35.2	469	7.0	6193	93.0	293	4.4	176	2.6
45–60	2358	12.4	149	6.3	2209	93.7	86	3.6	63	2.7
Gender										
Male	5555	29.3	313	5.6	5242	94.4	185	3.3	128	2.3
Female	13 389	70.7	859	6.4	12 530	93.6	523	3.9	336	2.5
Educational level										
Basic	5251	27.7	403	7.7	4848	92.3	245	4.7	158	3.0
Vocational school	9525	50.3	583	6.1	8942	93.9	357	3.7	226	2.4
College/university	4168	22.0	186	4.5	3982	95.5	106	2.5	80	1.9
Year in subsidized re-employment										
1994–1997	13 174	69.5	704	5.3	12 470	94.7	427	3.2	227	2.1
1998–2001	4158	21.9	324	7.8	3834	92.2	199	4.8	125	3.0
2002–2005	1612	8.5	144	8.9	1468	91.1	82	5.1	62	3.8
Chronic disease status										
No	17 377	91.7	1034	6.0	16 343	94.0	633	3.6	401	2.3
Yes	1567	8.3	138	8.8	1429	91.2	75	4.8	63	4.0
Size of town										
Small	2329	12.3	443	6.4	2191	94.1	93	4.0	45	1.9
Big	16 615	87.7	729	6.1	15 581	93.8	615	3.7	419	2.5

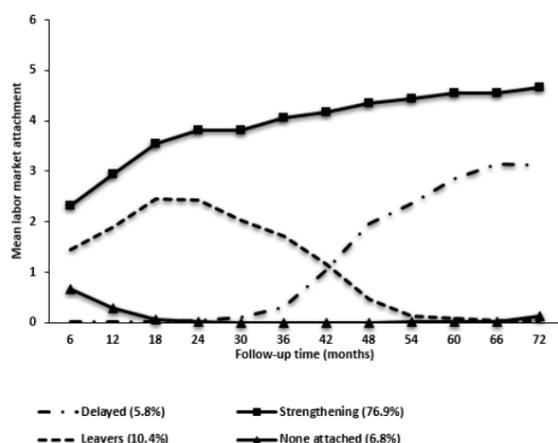
**Figure 1.** Labor market attachment trajectories of re-employed people during the six-year follow-up time (N=18 944)

Table 2 shows the associations between sickness absence and labor market attachment trajectories. After adjusting for potential confounders, participants having >30 days of sickness absence had 5.1 and 2.0 times higher odds of belonging to the "non-attached" and "leavers" trajectories respectively compared with those in the reference group. Those with 11–29 days of sickness absence also had 2.1-fold and 1.3-fold increased odds of belonging respectively to the "non-attached" and "leavers" trajectories.

Age turned out to be the only background variable that interacted significantly ($P=0.004$) with sickness absence. Table 3 presents the age-stratified associa-

tions after controlling for gender, educational level, calendar year in subsidized program, size of town, and chronic disease. Having >30 days of absence significantly increased the odds of belonging to the 'non-attached' trajectory in all age groups, but the odds were decidedly higher for participants aged 18–29 [odds ratio (OR) 5.38, 95% confidence interval (CI) 3.76–7.69] and 30–44 (OR 7.35, 95% CI 4.85–11.14) than for those aged 45–60 (OR 2.15, 95% CI 1.67–3.96). Having 11–29 days of sickness absence also increased the risk for belonging to the poor attachment trajectories for participants in age groups 30–44 and 18–29 years.

Discussion

We hypothesized that sickness absence during participation in a subsidized re-employment scheme would be associated with poor labor market attachment in the future and that the risk would increase with increasing number of days of sickness absence. The findings were consistent with these hypotheses. We also observed that age modified the association between sickness absence and labor market attachment, with younger unemployed people with sickness absence having an elevated risk for poor labor market attachment while the risk was less among older unemployed people, ie, those aged between 45 and 60 years.

Several studies, especially among long-term unemployed people (6, 15, 17), suggest that poor health

Table 2. Association between sickness absence (SA) and labor market attachment trajectories: results obtained from multinomial logistic regression with their odds ratio (OR) and their 95% confidence intervals (95% CI).

SA (days)	Trajectories of labor market attachment during the 6-year follow-up					
	Delayed vs. strengthening		Leavers vs. strengthening		Non-attached vs. strengthening	
	OR ^a	95% CI	JR ^a	95% CI	OR ^a	95% CI
Unadjusted model						
0–≤10	1.00		1.00		1.00	
11–29	1.76	1.33–2.31	1.29	1.01–1.63	2.08	1.63–2.65
≥30	2.54	1.84–3.50	1.96	1.49–2.58	4.98	3.92–6.32
Adjusted model						
0–≤10	1.00		1.00		1.00	
11–29	1.79	1.36–2.36	1.27	1.00–1.62	2.10	1.64–2.79
≥30	2.64	1.91–3.65	1.96	1.48–2.60	5.06	3.95–6.49

^aOdds ratio adjusted for age, gender, educational level, year in subsidized re-employment, size of town, and chronic diseases.

reduces the likelihood of regaining a paid job. Not only is our study in agreement with earlier studies (as indicated in the association between sickness absence and the non-attached trajectory), but our findings moreover show that poor health could also constitute a risk factor even among those who regained employment immediately after the subsidized re-employment period (as seen in the association between sickness absence and the leavers trajectory). This has an important implication in that the emphasis should not only be on getting the unemployed back to work, but also on ensuring that re-employed people maintain favorable labor market attachment over time.

Earlier studies have suggested that poor health can negatively influence the job-seeking behavior of unemployed people that in turn may result in reduced likelihood of finding paid jobs (13). It has also been suggested that employers may be reluctant to hire job seekers with a history of poor health. Given that long-term sickness absences are mostly associated with ill-health (32) mostly due to serious health conditions (19) that can interfere with everyday activities, it is plausible that these explanations may account for our findings of an association between sickness absence and poor labor market attachment among previously long-term unemployed people.

There is evidence that younger individuals tend to have fewer long-term sickness absences (33) and better chances of re-employment (11, 12). Our findings revealed that younger long-term unemployed people with >30 days of sickness absence had a higher odds for poor labor market attachment than their older counterparts. This finding is similar to that of Virtanen et al (22) in which younger temporary employees with high sickness absence were reported to be at increased risk of subsequent unemployment, whereas among older temporary employees no such

Table 3. Age-stratified association between sickness absence (SA) and labor market attachment trajectories: results obtained from multinomial logistic regression with their odds ratio (OR) and their 95% confidence intervals (95% CI)

SA (days) according to age group	Trajectories of labor market attachment during the 6-year follow-up					
	Delayed vs. strengthening		Leavers vs. strengthening		Non-attached vs. strengthening	
	OR ^a	95% CI	OR ^a	95% CI	OR ^a	95% CI
18–29 years						
0–≤10	1.00		1.00		1.00	
11–29	1.73	1.20–2.50	0.92	0.61–1.39	2.13	1.47–3.07
≥30	2.33	1.48–3.66	2.23	1.50–3.30	5.38	3.76–7.69
30–44 years						
0–≤10	1.00		1.00		1.00	
11–29	1.66	1.03–2.68	1.86	1.30–2.68	2.92	1.93–4.41
≥30	2.97	1.75–5.07	2.27	1.41–3.66	7.35	4.85–11.14
45–60 years						
0–≤10	1.00		1.00		1.00	
11–29	3.80	1.54–9.39	1.08	0.62–1.88	1.20	0.65–2.22
≥30	4.62	1.70–12.56	0.89	0.43–1.81	2.15	1.67–3.96

^aOdds ratio adjusted for gender, educational level, calendar year in subsidized re-employment, size of town, and chronic disease

association was found. Knutsson & Goine (34) stratified sickness absence diagnosis by age and found that psychiatric diseases and allergies were more prevalent among younger individuals, while cardiovascular diseases were more common among older people. That study also reported that musculoskeletal diseases increased from ages 16–44 years, and thereafter leveled off. Virtanen et al (22) suggested that these differences in the diagnoses underlying sickness absence among younger and older people may explain the age-differences in the association between sickness absence and labor market outcomes.

Schuring et al (35) found that a poor self-rated health increased the likelihood of non-re-employment among men, but had less influence among women. In our study, gender did not modify the association between sickness absence and labor market attachment. It appears that the effect of gender on labor market outcomes may be sensitive to the health indicator measured.

It is noteworthy that the 94% of the study subjects were able to work the six-month period without needing long sick leaves. The high figure may be due to health-related selection in enrolling individuals on subsidized schemes or due to poor health among those who did not complete the period (and were therefore excluded from the study sample). But on the other hand, there may have been a high "sickness presence" either due to high motivation of the participants to demonstrate their work ability or due to the liberal attitude of the employer to the sometimes relatively poor productivity of these workers. In sum, those 6% who needed longer-term sick leaves evidently had relatively severe problems in health – notably in the areas that were not covered by the chronic conditions adjusted in the analyses.

It is also noteworthy that the trajectory analysis did

not produce a group with full, ie, six-month labor market attachment: at best, in those assuming the trajectory of "strengthening attachment", the employment rate remained at the level of four months. Thus, we can conclude that subsidized re-employment leads to permanent full employment relatively seldom even if the health and work ability of the participant are optimal.

The strengths of this study include the prospective design with large sample size. The use of registry-based data both for sickness absence and labor market attachment is also a strength, as it eliminated problems relating to attrition, recall bias, and subjective interpretation of both health and employment status. A limitation of our study is the lack of data on the nature of the employment contracts of the participants during follow-up (ie, whether they had permanent or temporary jobs or whether the employment was full- or part-time), which may influence the relationship between sickness absence and employment outcomes (22). Another limitation relates to the trajectory classes, which is only an approximation of reality since individuals were assigned to their mostly likely classes according to their average posterior probability values. The inability to adjust for behavioral risk factors and other health variables aside from those covered in the reimbursement scheme could be another source of residual confounding, although, in Hultin et al's study (23), the association between sickness absence and unemployment persisted even after controlling for several health indicators. This study finding may not be extrapolated to unemployed population in general since our sample consisted of a selected group of long-term unemployed people ie, those participating in a state subsidized re-employment program. However, on average, they may be regarded as a representative sample of re-employed people in Finland given that they were pooled from ten towns in Finland with varying recruitment criteria.

In conclusion, sickness absence among long-term unemployed people participating in a state subsidized re-employment program predicted future poor employability ie, poor labor market attachment. The risk for poor labor market attachment was particularly marked for younger unemployed people. Sick unemployed people face a double burden by virtue of their health and labor market status, which is why it is important to provide them with adequate support, including health care and rehabilitation to enhance both their chances of re-employment and maintaining favorable labor market attachment in the long term.

Conflict of interest and funding

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References

- Schuring M, Mackenbach J, Voorham T, Burdorf A. The effect of re-employment on perceived health. *J Epidemiol Community Health* 2011 Jul;65(7):639–44. <http://dx.doi.org/10.1136/jech.2009.103838>.
- Carlier BE, Schuring M, Lötters FJ, Bakker B, Borgers N, Burdorf A. The influence of re-employment on quality of life and self-rated health, a longitudinal study among unemployed persons in the Netherlands. *BMC Public Health* 2013 May;13:503. <http://dx.doi.org/10.1186/1471-2458-13-503>.
- van der Noordt M, IJzelenberg H, Droomers M, Proper KI. Health effects of employment: a systematic review of prospective studies. *Occup Environ Med* 2014 Oct;71(10):730–6. <http://dx.doi.org/10.1136/oemed-2013-101891>.
- Rueda S, Chambers L, Wilson M, Mustard C, Rourke SB, Bayoumi A et al. Association of returning to work with better health in working-aged adults: a systematic review. *Am J Public Health* 2012 Mar;102(3):541–56. <http://dx.doi.org/10.2105/AJPH.2011.300401>.
- Schuring M, Robroek SJ, Burdorf A. The benefits of paid employment among persons with common mental health problems: evidence for the selection and causation mechanism. *Scand J Work Environ Health* 2017 Nov;43(6):540–9. <http://dx.doi.org/10.5271/sjweh.3675>.
- Claussen B. Health and re-employment in a five-year follow-up of long-term unemployed. *Scand J Public Health* 1999 Jun;27(2):94–100.
- Herbig B, Dragano N, Angerer P. Health in the long-term unemployed. *Dtsch Arztebl Int* 2013 Jun;110(23-24):413–9.
- Puhani PA, Steiner V. The effectiveness and efficiency of active labor market policies in Poland. *Empirica* 1997;24(3):209–31. <http://dx.doi.org/10.1023/A:1006897732006>.
- Vuori J, Vesalainen J. Labor market interventions as predictors of re-employment, job-seeking activity and psychological distress among the unemployed. *J Occup Organ Psychol* 1999;72(4):523–38. <http://dx.doi.org/10.1348/096317999166824>.
- Kluve J. The effectiveness of European active labor market programs. *Labour Econ* 2010;17(6):904–18. <http://dx.doi.org/10.1016/j.labeco.2010.02.004>.
- Schuring M, Robroek SJ, Otten FW, Arts CH, Burdorf A. The effect of ill health and socioeconomic status on labor force exit and re-employment: a prospective study with ten years follow-up in the Netherlands. *Scand J Work Environ Health* 2013 Mar;39(2):134–43. <http://dx.doi.org/10.5271/>

- sjweh.3321.
12. Lötters F, Carlier B, Bakker B, Borgers N, Schuring M, Burdorf A. The influence of perceived health on labour participation among long term unemployed. *J Occup Rehabil* 2013 Jun;23(2):300–8. <http://dx.doi.org/10.1007/s10926-012-9398-5>.
 13. Carlier BE, Schuring M, van Lenthe FJ, Burdorf A. Influence of health on job-search behavior and re-employment: the role of job-search cognitions and coping resources. *J Occup Rehabil* 2014 Dec;24(4):670–9. <http://dx.doi.org/10.1007/s10926-014-9499-4>.
 14. Svane-Petersen AC, Dencker-Larsen S. The impact of self-reported health and register-based prescription medicine purchases on re-employment chances: A prospective study. *SSM Popul Health* 2016 Aug;2:580–6. <http://dx.doi.org/10.1016/j.ssmph.2016.08.007>.
 15. Nwaru CA, Nygård CH, Virtanen P. Musculoskeletal pain and re-employment among unemployed job seekers: a three-year follow-up study. *BMC Public Health* 2016 Jul;16:531. <http://dx.doi.org/10.1186/s12889-016-3200-0>.
 16. Claussen B, Bjørndal A, Hjort PF. Health and re-employment in a two year follow up of long term unemployed. *J Epidemiol Community Health* 1993 Feb;47(1):14–8. <http://dx.doi.org/10.1136/jech.47.1.14>.
 17. Nwaru CA, Peutere L, Kivimäki M, Pentti J, Vahtera J, Virtanen PJ. Chronic diseases as predictors of labour market attachment after participation in subsidised re-employment programme: a 6-year follow-up study. *J Epidemiol Community Health* 2017 Nov;71(11):1101–6.
 18. Vahtera J, Pentti J, Kivimäki M. Sickness absence as a predictor of mortality among male and female employees. *J Epidemiol Community Health* 2004 Apr;58(4):321–6. <http://dx.doi.org/10.1136/jech.2003.011817>.
 19. Kivimäki M, Head J, Ferrie JE, Singh-Manoux A, Westerlund H, Vahtera J et al. Sickness absence as a prognostic marker for common chronic conditions: analysis of mortality in the GAZEL study. *Occup Environ Med* 2008 Dec;65(12):820–6. <http://dx.doi.org/10.1136/oem.2007.038398>.
 20. Roelen CA, Koopmans PC, Schreuder JA, Anema JR, van der Beek AJ. The history of registered sickness absence predicts future sickness absence. *Occup Med (Lond)* 2011 Mar;61(2):96–101. <http://dx.doi.org/10.1093/occmed/kqq181>.
 21. Koopmans PC, Roelen CA, Groothoff JW. Frequent and long-term absence as a risk factor for work disability and job termination among employees in the private sector. *Occup Environ Med* 2008 Jul;65(7):494–9. <http://dx.doi.org/10.1136/oem.2007.034322>.
 22. Virtanen M, Kivimäki M, Vahtera J, Elovainio M, Sund R, Virtanen P et al. Sickness absence as a risk factor for job termination, unemployment, and disability pension among temporary and permanent employees. *Occup Environ Med* 2006 Mar;63(3):212–7. <http://dx.doi.org/10.1136/oem.2005.020297>.
 23. Hultin H, Lindholm C, Möller J. Is there an association between long-term sick leave and disability pension and unemployment beyond the effect of health status?—a cohort study. *PLoS One* 2012;7(4):e35614. <http://dx.doi.org/10.1371/journal.pone.0035614>.
 24. Hesselius P. Does sickness absence increase the risk of unemployment? *J Socio-Economics* 2007;36:288–310. <http://dx.doi.org/10.1016/j.socec.2005.11.037>.
 25. Kivimäki M, Gimeno D, Ferrie JE, Batty GD, Oksanen T, Jokela M et al. Socioeconomic position, psychosocial work environment and cerebrovascular disease among women: the Finnish public sector study. *Int J Epidemiol* 2009 Oct;38(5):1265–71. <http://dx.doi.org/10.1093/ije/dyn373>.
 26. Thorsen SV, Friberg C, Lundström B, Kausto J, Örneholm K, Sundell T et al. Sickness absence in the Nordic countries. *Nordic Social Statistical Committee* 59:2015.
 27. Muthén B, Muthén LK. Integrating person-centered and variable-centered analyses: growth mixture modeling with latent trajectory classes. *Alcohol Clin Exp Res* 2000 Jun;24(6):882–91. <http://dx.doi.org/10.1111/j.1530-0277.2000.tb02070.x>.
 28. Nagin DS, Odgers CL. Group-based trajectory modeling in clinical research. *Annu Rev Clin Psychol* 2010;6:109–38. <http://dx.doi.org/10.1146/annurev.clinpsy.121208.131413>.
 29. Kreuter F, Muthén B. Analyzing criminal trajectory profiles: bridging multilevel and group-based approaches using growth mixture modeling. *J Quant Criminol* 2008;24:1–31. <http://dx.doi.org/10.1007/s10940-007-9036-0>.
 30. Nylund KL, Asparouhov T, Muthén BO. Deciding on the number of classes in latent class analysis and growth mixture modeling: a Monte Carlo simulation study. *Struct Equ Modeling* 2007;14:535–69. <http://dx.doi.org/10.1080/10705510701575396>.
 31. Andruff H, Carraro N, Thompson A, Gaudreau P, Louvet B. Latent class growth modeling: a tutorial. *Tutor Quant Methods Psychol* 2009;5:11–24. <http://dx.doi.org/10.20982/tqmp.05.1.p011>.
 32. Marmot M, Feeney A, Shipley M, North F, Syme SL. Sickness absence as a measure of health status and functioning: from the UK Whitehall II study. *J Epidemiol Community Health* 1995 Apr;49(2):124–30. <http://dx.doi.org/10.1136/jech.49.2.124>.
 33. Sumanen H, Pietiläinen O, Lahti J, Lahelma E, Rahkonen O. Sickness absence among young employees: trends from 2002 to 2013. *J Occup Health* 2015;57(5):474–81. <http://dx.doi.org/10.1539/joh.14-0236-OA>.
 34. Knutsson A, Goine H. Occupation and unemployment rates as predictors of long term sickness absence in two Swedish counties. *Soc Sci Med* 1998 Jul;47(1):25–31. [http://dx.doi.org/10.1016/S0277-9536\(97\)10139-3](http://dx.doi.org/10.1016/S0277-9536(97)10139-3).
 35. Schuring M, Burdorf L, Kunst A, Mackenbach J. The effects of ill health on entering and maintaining paid employment: evidence in European countries. *J Epidemiol Community Health* 2007 Jul;61(7):597–604. <http://dx.doi.org/10.1136/jech.2006.047456>.

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