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Work-related psychosocial risk factors and risk of disability pension among employees in health and personal care: A prospective cohort study

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ABSTRACT

Background: Researchers have suggested that psychological factors at work contribute to early retirement due to disability pension in the general working population. Disability pension is a problem that shortens working careers among nursing professionals and personal care or related workers, but few researchers have focused on these occupational groups. Also, a need for studies based on measurements of specific work exposure instead of combined measures has been identified.
Objectives: The aim was to study the potential influence of work-related psychosocial risk factors on the future risk of disability pension among nursing professionals and care assistants in Sweden. Those occupational groups are compared to all other occupations in Sweden. A specific aim was to describe differences in associations to cause-specific disability, and how the results were modified by occupation categories.
Participants: A representative sample of 79,004 women and men in Sweden comprising 2,576 nursing professionals, 10,175 care assistants and 66,253 workers in other occupations.
Methods: Factors of the psychosocial work environment were obtained from questionnaire data of the Swedish Work Environment Surveys (SWES) 1993–2013. Information on cause-specific disability pension during follow-up was added from the Social Insurance Agency's database (1994–2014). We calculated Cox's proportional hazards with 95% confidence intervals.
Results: During a mean follow-up time of 11.1 years, 6.6% of nursing professionals and 9.4% of care assistants, as compared to 6.1% among all other occupations, received disability pension. Among nursing professionals and care assistants, high quantitative job demands and low social support, but not job control, were associated with future disability pension also after controlling for age, year of interview, socio demographic conditions, and physical work factors. An increase in risk was also noticeable among nursing professionals and care assistants who reported an active job in combination with low social support. An increased risk for disability pension due to mental diagnosis was found among care assistants who reported high job demands. In all other occupations, low social support was associated with an increased risk for disability pension under any condition of job strain (high strain, low strain, active, and passive jobs).
Conclusion: Based on the results we conclude that high quantitative job demands and poor social support are predictors of future disability pension.

What is already known about the topic?

- We know that psychosocial factors at work contribute to disability retirement
- Loss of nursing staff due to ill-health and disability pension adds to the already serious staff shortage in health care

What this paper adds

- High job demands and low social support are associated with subsequent disability pension among nursing professionals and care assistants

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- High social support acts as a buffer to the adverse health effects of active and high strain jobs

1. Introduction

In the Nordic welfare states, as well as elsewhere, there is a discussion of the necessity of a prolonged working life (SOU, 2014). While a prolongation of working life is seen as important among all occupations, it is of particular importance in health and care related occupations. Staff shortages in these occupations are already serious and are expected to rise due to the aging of the workforce in conjunction with increasing health care needs and demands in the aging population, but also due and a low interest in training (Statistics Sweden, 2014) and loss of nurses, nursing assistants and health care workers from ill-health, early retirement and disability pension. Staff shortage has been shown to have serious adverse effects on patient health and has been shown to increase patient mortality (Ball, 2017).

In Denmark, nursing and social staff are among the occupational groups with the largest proportion of long-term sick leave (Lund et al., 2007); i.e., a strong predictor of disability retirement (Salonen et al., 2018). In 2014, health and care personnel was the occupational group with the highest proportion of sickness absence in Sweden (Lidwall, 2015). In 2015, as many as 17% of employees working in care-related occupations in Sweden reported not being able to work until ordinary retirement age (Arbetsmiljöverket [Work Environment Authority], 2016). While many researchers have investigated health and care personnel as a single occupational group, they incorporate differing occupations with distinct and very varying working conditions. Predictors of early retirement in distinct groups of nursing staff, which not only vary regarding their work features, but also in terms of health, have seldom been investigated. The Swedish Government reported in 2007 that among women and men above the age of 50, disability pension is more common among care assistants than among other occupations, but not among registered nurses, who received disability pension less often than the mean (SOU, 2011).

Previous researchers have identified a broad range of different psychosocial working conditions possibly contributing to disability pension in general working populations (Knardahl et al., 2017; Lahelma et al., 2012). While many different factors constitute the psychosocial work environment, it is often investigated in terms of the demand-control model (Karasek and Theorell, 1990). Based on this model, it is assumed that jobs characterized by a combination of high psychological demands and low control are likely to provoke work-related psychosocial stress, while high demands combined with high control are less harmful (Fransson et al., 2012). High psychological demands in the workplace are measured in terms of having to work very hard or very fast, and/or experiencing conflicting expectations. Job control, also called decision latitude, refers to the degree of decision-making authority (for example, having an influence on what to do and how to do the work) and skill discretion (for example, the use of personal skills on the job). Further combined with social support, a measure of iso-strain is formed, where support from colleagues and supervisor may reduce the negative effects of high demands and low control (Johnson and Hall, 1988).

In a recent meta-analytic review, Knardahl et al. (2017) found moderate evidence for the role of low control and for the combination of high demands and low control, i.e., high strain, as predictors for disability pension. However, only very limited evidence was found that job demands predict disability pension (Knardahl et al., 2017). Beneficial effects of social support have also been suggested. Sterud (2013) found a distinct increase in risk for disability pension among those who reported low levels of supportive leadership and Dellve et al. (2003) found strong effects of poor organizational support on risk of future disability pension in a study of home-care workers. Furthermore, Eriksen et al. (2004) found that perceived lack of support from supervisors increased the risk of disabling low back pain among nurses' aides. Still, due to differences in measures and study design as well as contradicting results, clear conclusions cannot not be drawn. Jensen et al. (2012) found no relationship between job strain and disability pension; a finding that might be explained by the fact that several health factors were controlled for.

Previously, researchers have repeatedly examined job demands and job control in combination, often by applying the Job Content Questionnaire (Karasek et al., 1998), an instrument that include time pressure, amount of work, and role conflicts (i.e. conflicts between demands and resources, conflicting requests) in the dimension of job demands. These different types of demands, covering both quantitative and qualitative demands, may produce different effects on health (Knardahl et al., 2017). Knardahl et al. (2017) suggested that these studies may underestimate effects if only one of the factors measured in combination contribute to disability pension. Nevertheless, potential separate effects of these dimensions have rarely been investigated. In order to be able to direct interventions and prevention, improved knowledge of which exposure factors specifically predict disability pension is needed (Knardahl et al., 2017).

Here, we examine single and combined measures of psychosocial work conditions in association with subsequent disability pension in two separate groups of health care workers, i.e., nursing professionals and care assistants. To investigate the relative importance of the psychosocial work factors, we made comparisons with all other occupations.

The aim of the current study was to examine how psychosocial working conditions separately and in combination affect the future risk of disability pension among nurses and health care workers. Specifically, we aimed to study how specific features of job control and demands influence risk of disability pension. We further want to investigate the influence of social support in these associations.

2. Methods

2.1. Study design and participants

Data were obtained from the Swedish Work Environment Surveys, conducted every second year since 1989 by Statistics Sweden on behalf of the Swedish Work Environment Authority (Arbetsmiljöverket [Work Environment Authority], 2016). Participants in the Swedish Work Environment Survey are sampled from the Labor Force Survey conducted by Statistics Sweden. Persons who are asked to respond to the Labor Force Survey are randomly drawn from the entire Swedish population, while stratified for county, sex, citizenship and inferred employment status. Respondents are first contacted by telephone, from which a random sub sample of gainfully employed 16–64 years of age is selected, who then receive self-completion questionnaires. The current study is based on data from 80 740 working men and women who participated in any Swedish Work Environment Survey between 1993 and 2013. The annual response rates varied between 89% and 66%.

Men and women who had obtained disability pension prior to being interviewed or in the year of interview (n = 1 736) were excluded from the study. Thus, the analytic sample consisted of 79 004 individuals. Table 1 shows the characteristics of the study group. The study was approved by the regional ethical committee in Stockholm.

2.2. Measurements

2.2.1. Outcome variables

Data on disability pension was obtained through linkage to the Swedish Social Insurance Agency's database Micro Data for

Table 1
Description of the study group according to sex, age, occupation at interview (1993–2013) and without and with disability pension (1994–2014).

	Total number				No disability pension				Disability pension			
	Men		Women		Men		Women		Men		Women	
	n	%	n	%	n	%	n	%	n	%	n	%
Total (n = 79,004)												
Age at interview (years)												
16–29	4450	*12*	5191	*12*	4402	*12*	5058	*13*	48	*3*	133	*4*
30–39	9019	*24*	9711	*23*	8827	*25*	9256	*24*	192	*11*	455	*14*
40–49	10483	*28*	12159	*29*	9959	*28*	11026	*29*	524	*29*	1133	*34*
50–64	13149	*35*	14842	*35*	12085	*34*	13195	*34*	1064	*58*	1647	*49*
All ages	*37101*		*41903*		*35273*		*38535*		*1828*		*3368*	
Occupation												
All other occupations	36058	*97*	30195	*72*	34276	*97*	27915	*72*	1782	*97*	2280	*68*
Nursing professionals	194	*1*	2382	*6*	188	*1*	2216	*6*	6	*0*	166	*5*
Care assistants[d]	849	*2*	9326	*22*	809	*2*	8404	*22*	40	*2*	922	*27*
DP diagnosis												
Musculoskeletal[a]									661	*36*	1490	*44*
Mental[b]									305	*17*	799	*24*
All other diagnoses[c]									831	*45*	1021	*30*
Unspecified diagnosis[d]									31	*2*	58	*2*
All DP 1994–2014									*1828*		*3368*	

[a] Musculoskeletal DP-diagnosis (ICD-10, M00-M99, granted 1994–2014).
[b] Mental DP-diagnoses (ICD-10, F00-M99, granted 1994–2014).
[c] All other DP-diagnoses (ICD-10, A–E, G–L, N–Z), granted 1994–2014).
[d] Unspecified DP-diagnoses granted 1994–2014).

Analysis of Social Insurance (1994–2014). This database provides virtually complete data on reimbursements related to disability pension, and the linkage was successful for all participants in this study. In Sweden, employees aged 19–64 can apply for disability pension if the work capacity is long-term or permanently reduced. It covers up to 64% of lost income and can be given 100%, 75%, 50%, or 25% of regular working hours. Here, no distinction was made concerning full-time or part time disability pension. We obtained information on the dates of all granted disability pensions between 1st of January of the year following the survey and December 31st 2014, irrespective of participants' employment status at follow-up.

2.2.2. Exposure variables

Data about *psychosocial working conditions* were obtained from the Swedish Work Environment Surveys (Arbetsmiljöverket [Work Environment Authority], 2016). Aspects of working conditions that were included in the study covered job control and job demands, social support, threats and violence, sexual harassment and close contact with ill people. Additionally, a combined measure of iso-strain was constructed. All response scales were dichotomized closest to the upper quartile to indicate the most adverse conditions (see below and Table 3).

Following previous work by Magnusson Hanson and collaborators (Magnusson Hanson et al., 2008), job control and demands were measured by a number of items which served as proxy indicators of the demand-control model as formulated by Karasek and collaborators (Karasek and Theorell, 1990; Magnusson Hanson et al., 2008).

2.2.3. Job control

Job control was measured by four items (three questions and one statement) covering aspects of work pace and work content:

- 'Do you have the opportunity to determine your work pace?'
- 'Are you able to determine when various working duties are to be carried out (for example, by choosing to work a bit faster on some days and taking it easier on other days)?'
- 'Do you participate in decisions on the arrangement of your work (e.g. what is to be done, how to do it or who will work with you)?'
- 'Have too little influence at work.'

The response scale of the first item was: Nearly all the time, about $^{3}/_{4}$ of the time, half the time, about $^{1}/_{4}$ of the time (coded as yes), about 1/10 of the time, no, not at all (coded as no). The response scale on the second item were: Always, mostly, mostly not (coded as yes), no, not at all (coded as no). The response scale on the third item were: Always, mostly (coded as yes), mostly not, no, not at all (coded as no). The response scale on the fourth item was: Too little influence (1, 2; coded as yes) neither nor (3), too much influence (4, 5; coded as no).

Job demands were covered by the following four items (three questions and one statement):

- 'Is your work so stressful that you do not have time to talk or even think about something other than work? '
- 'Does the work require your full attention and concentration?'
- 'Do you have so much work that you must miss lunch, work late or take work home?'
- 'Have far too much to do at work.'

The first two items had six response options: Nearly all the time, about $^{3}/_{4}$ of the time, half the time, about $^{1}/_{4}$ of the time, about 1/10 of the time, no, not at all. Those who reported experiencing the 'item' nearly all the time or about $^{3}/_{4}$ of time were coded as 'yes'. The third item was answered on a five options scale: Every day, a couple days per week (1 day of 2) (coded as yes), one day per week (1 day of 5), a couple days per month (1 day of 10), not at all/rarely in the last 3 months (coded as no). Those who experienced the characteristic in question at least one day per week (1 day of 5) were coded as 'yes'. The response scale to the fourth question covered the following options: Far too much to do (1; coded as yes), much to do (2) neither nor (3), far too little to do (4, 5; coded as no).

As previous researchers have found diverging effects of work control and demands on disability pension, a summa index of control and demands, respectively, was calculated. It ranged from

zero to four (sum of the four exposure variables, respectively, which were dichotomized closest to the upper quartile to indicate the most adverse conditions). Thus, effects of job control and demands could be analyzed separately.

2.2.4. Social support

Two items covered possibilities to receive support and encouragement from supervisors or fellow workers: 'Are you able to get support and encouragement from supervisors/colleagues, when work feels difficult? 'Responses were given on a four-point scale ('always', 'mostly', 'mostly not', 'never') and dichotomized into 'yes' (always, mostly) and no (mostly not, never).

2.2.5. Iso-strain

A two dimensional combination of the demands and control variables resulted in four stress categories according to the Karasek-Theorell model (Johnson and Hall, 1988) (i.e., high strain jobs, defined as low control, high demands; passive jobs, defined as low control, low demands; active jobs, defined as high control, high demands; and low strain jobs, defined as high control, low demands). By combining these four categories with social support, a variable indicating 'iso-strain' was derived; i.e., 'high strain jobs' in combination with high/low social support, *'passive jobs' in combination with high/low social support, 'active jobs' in combination with high/low social support,* and 'low strain jobs' in combination with high/low social support.

2.2.6. Other psychosocial working conditions

Other *psychosocial working conditions* covered exposure to violence or threats of violence in work ('Are you exposed to violence or threats of violence in your work?'), sexual harassments in the workplace ('Are you subjected to sexual harassment in your workplace from other persons (e.g. customers, patients, clients, passengers, students)?'), and close contact with severely ill people or people with severe problems ('Do you sometimes come in close contact through your work with severely ill people or people with severe problems?').

The first two items were answered on a 7-point response scale: 'not at all in the last 12 months' (coded as no), 'a few times in the last 12 months', 'a few times in the last 3 months', a couple days per month (1 day of 10)', 'one day per week (1 day of 5), a couple days per week (1 day of 2) and 'every day' (coded as yes). The last item was answered on a 5-point response scale reaching from 'Every day', 'a couple days per week (1 day of 2)', 'one day per week (1 day of 5)' (coded as yes), and 'a couple days per month (1 day of 10)', to 'not at all in the last 3 months' (coded as no).

2.2.7. Classification of occupation

Occupations in the present study were grouped according to the 1996 Swedish Standard Classification of Occupations, (SSYK96): nursing and midwifery professionals and nursing associate professionals (SSYK 223 and 323; n = 2 576), and personal care and related workers (SSYK 513; n = 10 175) (www.scb.se, Swedish Standard Classification of Occupations). The two first occupational categories consist of specialized and non-specialized registered nurses with a university degree working in hospitals and other health care organizations and constitute the group called "Nursing professionals". Personal care and related workers include assistant nurses, hospital ward assistants and home based personal care workers and assistants in child care. The educational demands in these occupations are generally secondary school level. This second occupational group is named "Care assistants".

2.3. Potential confounders

Sex, age at interview in categories (16–29, 30–39, 40–49, and 50–64 years), *education* (< 9 years, 10–12 years, >12 years of education), *country of birth* (born in Sweden vs. foreign born), number of years in current occupation (1–4, 5–9, 10–19, 20–29, >30 years), and *sector of employment* (public sector, comprising government or local authority regional councils vs. private sector) were selected as potential confounders. They were all obtained from the Longitudinal Integration Database for Health Insurance and Labour Market Studies. As psychosocial risks on disability pension may be affected by physical work exposure, it is also reasonable to control for effects of these. We used strenuous work postures (bent or twist repeatedly) to rule out possible confounding effects of the physical work environment.

2.4. Statistical analyses

Descriptive statistics by disability group and of the total study population included sex, age and occupation at interview. Cox proportional hazard ratio (HR) with 95% confidence intervals (CI) were used to study the associations between psychosocial work exposures and disability pension.

Participants in any of the Swedish Work Environment Surveys from 1993 to 2013 were consecutively added to the cohort, and the follow-up period for each sub-cohort started the year after the interview (January 1, 1994–2013). The follow-up period for the participants ended with disability pension, statuary retirement age (i.e., 65 years), emigration, death or December 31, 2014, whichever came first.

The statistical analyses were conducted in three steps. First, occupation, socio demographic conditions (sex, age, education, country of birth), years in current occupation, sector of employment, and physical work exposure (i.e., strenuous work posture) were related to the risk of disability pension, using univariate (one by one, adjusting for age in one-year intervals and year of interview) and multivariate analyses. Secondly, analyses were stratified on occupation and categorized into three groups: "nursing professionals", "care assistants" and a category comprising "all other occupations", and psychosocial work exposures were related to risk of disability pension, adjusting for a) age at interview and year of interview, plus b) sex, education, country of birth, sector of employment, and strenuous work posture. Thirdly, disability pension with mental diagnoses and with musculoskeletal diagnoses were studied separately according to the multivariate procedure describe above. Finally, a sensitivity analysis was conducted in which heavy lifting (heavy physical work) was additionally added a as potential confounder.

All analyses were run in SAS, version 9.4., statistical software (SAS Institute, Inc., Cary, North Carolina) using the PHREG procedure.

3. Results

Table 1 provides information on sex, age, and occupation at interview, stratified in participants with and without disability pension. As can be calculated from Table 1, nursing staff accounted for 16.1% of the sample, with predominantly women. More women (8%) than men (5%) qualified for disability pension, and the proportion of participants who received disability pension increased with increasing age. During the follow-up time of in average 11.1 (SD 6.6) years, 6.7% (172 of 2576 individuals) of all nursing professionals received disability pensions, which is comparable to 6.1% among all other occupations (4062 of 66,253 individuals). The proportion was higher among care assistants (9.4%): 962 of 10,175 individuals. Musculoskeletal and mental diagnoses accounted together for about 60% of all disability pensions.

Table 2 provides the results for sociodemographic and work background variables in relation to disability pension. Univariate

Table 2
Occupation, socio demographic variables (sex, age, education, country of birth), years in current occupation, sector of employment, and strenuous work postures variables related to prevalence and risk of DP[a] 1994–2014. Individuals interviewed 1993–2013 (n = 79 004).

	Disability pension [Univariate]				Disability pension [Multivariate]		
Exposure	P[b]	HR[c]	CI		HR[d]	CI	
Occupation							
All other occupations	84	1			1		
Nursing professionals	3	**1.21**	1.04	1.41	1.17	0.99	1.38
Care assistants[e]	13	**1.76**	1.64	1.89	**1.32**	1.21	1.44
Sex							
Men	54	1			1		
Women	46	**1.73**	1.64	1.82	**1.51**	1.42	1.62
Age at interview (years)							
16-29	12	1[f]			1[f]		
30-39	24	**2.18**	1.90	2.50	**1.79**	1.49	2.15
40-49	29	**4.62**	4.08	5.23	**3.88**	3.26	4.61
50-64	36	**7.38**	6.53	8.34	**6.00**	5.04	7.15
Education							
Tertiary	38	1			1		
Secondary	46	**1.28**	1.20	1.37	**1.15**	1.06	1.24
Primary	17	**1.64**	1.53	1.76	**1.53**	1.40	1.67
Country of birth							
Sweden	93	1			1		
Other country	7	**1.51**	1.40	1.64	**1.40**	1.27	1.54
Years in current occupation[e]							
1-4 years	19	1[f]			1[f]		
5-9	20	**1.19**	1.08	1.31	1.02	0.91	1.13
10-19	28	**1.61**	1.48	1.75	0.99	0.90	1.09
20-29 years	19	**2.03**	1.86	2.21	0.95	0.86	1.06
>30 years	14	**2.38**	2.17	2.62	0.97	0.86	1.09
Sector of employment							
Private	62	1			1		
Public	39	**1.30**	1.23	1.37	**1.20**	1.12	1.28
Strenuous work postures							
Bent or twist repeatedly							
No (<1 day of 2)	77	1			1		
Yes (Every day)	23	**1.77**	1.68	1.87	**1.58**	1.49	1.68

[a] All incident cases of DP, including unspecified DP-diagnoses (n = 5 196).
[b] Prevalence (P) of the exposure category.
[c] Hazard ratio (HR) of disability pension with 95% confidence interval (CI), adjusted for age (continuous variable) and year of interview. Significant figures are shown in bold ($p < 0.05$).
[d] Hazard ratio (HR) of disability pension with 95% confidence interval (CI), adjusted for age (category variable) and year of interview, sex, education, country of birth, sector of employment, and strenuous work postures (bent or twist repeatedly).
[e] Including nursing assistants, home care assistants, and child care assistants.
[f] Not adjusted for age (continuous variable).

analyses showed that risk for disability pension was significantly increased among nursing professionals and care assistants. Being a woman, being older, having a lower education, being born outside Sweden, having worked more years in the current occupation, working in the public sector, and often working in strenuous positions were also related to an increased risk for disability pension. Mutual adjustment resulted in somewhat attenuated hazard ratios (HRs). The risk of receiving disability pension was no longer increased among nursing professionals and those with more years in the current occupation.

Table 3 provides proportions of exposure and related HRs for disability pension according to psychosocial work characteristics and social support. A higher proportion of nursing professionals as compared to all other occupations experienced exposure to all the measured aspects indicating low job control and high job demands, and among care assistants a relatively higher proportion reported low job control. The proportions of those experiencing high job demands were similar among care assistants and all other occupations, except for 'attention/concentration', where the proportion was considerably increased among care assistants. With regards to social support, a similar proportion of nursing professionals and of those working in other occupations received low or no social support from colleagues as compared to all other occupations. However, a higher proportion among both nursing professionals and care assistants as compared to all other occupations reported threats of violence, and sexual harassment. Also, a very high proportion of nursing professionals and care assistants reported close contact with ill people.

Exposure to low social support, threats of violence, sexual harassment, and close contact with ill people were related to an increased risk for disability pension among all other occupations, also after control for possible confounders. For nursing professionals and care assistants, receiving little or no support and encouragement from superiors and from fellow workers, respectively, was related to an increased risk for disability pension, although, among nursing professionals, the result for support from supervisors after controlling for possible confounders.

Regarding "threats of violence", "sexual harassment", and "close contact with severely ill people", an increased risk for disability pension was observed among all occupational groups before adjusting for possible confounders. After control for confounders, "threats of violence" remained statistically significantly associated with disability pension among all other occupations and care assistants, as did "sexual harassment" and "close contact with severely ill people" among all other occupations.

Results in regard to exposure to an overall measure of job demands, job control, and social support (i.e., iso-strain) and related risk to disability pension are provided in Table 4. Among all other occupations, after controlling for confounders, any combination of job demands and job control together with low social support was related to an increased risk for disability pension, as was also an active job together with high social support. Among nursing professionals, only having an active job while perceiving low social support was associated with an increased risk for disability pension. The same combination as well as a combination of high job strain together with low social support was related to disability pension among care assistants when controlling for confounders.

Finally, Table 5 provides information how the iso-strain measure was associated to disability pension due to cause specific disability, i.e., mental diagnoses and musculoskeletal diagnosis. Among all other occupations and care assistants, high job demands and low social support were related to an increased risk for disability pension with a mental diagnosis. Only among all other occupations, exposure to low job control was related to an increased risk for disability pension with a mental diagnosis. Risk for disability pension with a musculoskeletal diagnosis was increased only among those working in other occupations experiencing low job control and low social support, respectively.

Using sensitivity analyses, we found that heavy lifting was associated with disability pension. However, including heavy lifting as a potential confounder in the final model did not change the results to any considerably extent.

4. Discussion

In this study we investigated the role of psychosocial work characteristics in later being granted disability pension among nursing professionals and care assistants as compared to all other occupations. Before controlling for a number of possible confounders, we found several aspects of job demands, but not job control, to be associated to an increased risk for disability pension among care professionals and care assistants. This is in contrast to findings based on a meta-analytic review (Knardahl et al., 2017) of the contribution from psychological and other factors on risk of disability pension. In that review, the investigators found moderate

Table 3
Hazard ratios (HR) for disability pension (DP)[a] 1994–2014 according to psychosocial work exposures. Individuals interviewed 1993–2013 (n = 79 004).

	All other occupations (N = 66 253)						Nursing professionals (N = 2 576)						Care assistants[d] (N = 10 175)					
Exposure	P[b]	n[c]	HR[d]	HR[e]	CI	CI	P[b]	n[c]	HR[d]	HR[e]	CI	CI	P[b]	n[c]	HR[d]	HR[e]	CI	CI
Job Control																		
Determine work pace																		
No (< 1/10 of time)	21	1065	**1.55**	**1.30**	1.21	1.40	39	67	1.16	1.12	0.82	1.55	37	360	1.11	1.08	0.94	1.23
Determine working duties																		
No (no, not at all)	15	821	**1.47**	**1.19**	1.10	1.29	34	52	0.99	0.94	0.67	1.32	34	332	1.11	1.08	0.94	1.23
Participate in decision																		
No (< mostly not)	24	1151	**1.32**	**1.08**	1.00	1.16	31	57	1.29	1.27	0.92	1.76	29	261	1.07	1.07	0.92	1.24
Influence																		
Yes (too little influence)	26	1199	**1.28**	**1.19**	1.11	1.28	31	61	1.34	1.27	0.92	1.76	30	302	**1.15**	1.13	0.99	1.30
Job Demands																		
Stressfull – no time to think																		
Yes (>3/4 of time	22	1133	**1.41**	**1.32**	1.23	1.42	31	58	**1.18**	1.08	0.78	1.50	21	222	**1.26**	**1.23**	1.06	1.44
Attention/concentration																		
Yes (>3/4 of time	45	2157	**1.27**	**1.13**	1.06	1.21	58	99	1.11	1.00	0.73	1.36	54	525	**1.17**	1.10	0.96	1.26
Much work - miss lunch etc																		
Yes (> 1 day of 2)	21	830	1.00	**1.13**	1.04	1.22	28	59	**1.50**	**1.44**	1.04	1.98	12	137	**1.44**	**1.39**	1.15	1.68
Far too much to do at work																		
Yes (far too much)	19	862	**1.27**	**1.24**	1.15	1.34	21	57	**2.00**	**1.77**	1.28	2.47	18	232	**1.42**	**1.33**	1.14	1.56
Social Support																		
From supervisors																		
Mostly not – never	36	1619	**1.19**	**1.26**	1.18	1.35	36	77	**1.46**	**1.44**	1.05	1.96	30	268	1.10	1.11	0.96	1.29
From collegues																		
Mostly not – never	18	847	**1.11**	**1.20**	1.11	1.30	9	29	**1.62**	**1.65**	1.09	2.50	8	85	**1.31**	**1.32**	1.04	1.66
Threats of violence[f]																		
A few times – every day	10	329	**1.36**	**1.31**	1.16	1.47	38	54	**1.42**	1.38	0.97	1.97	38	271	1.21	**1.24**	1.06	1.45
Sexual harassment other[f]																		
A few times – every day	2	61	**1.58**	**1.34**	1.03	1.75	10	10	1.14	1.05	0.53	2.07	11	69	1.17	1.18	0.91	1.52
Close contact with ill people																		
One day per week – every day	18	876	**1.41**	**1.38**	1.27	1.49	92	157	1.35	1.37	0.78	2.42	71	672	1.12	1.10	0.96	1.28

[a] All incident cases of DP, including unspecified DP-diagnoses (n = 5 196).
[b] Prevalence (P) of the exposure categories (%).
[c] Number of cases (n).
[d] Hazard ratio (HR) of disability pension with 95% confidence interval (CI), adjusted for age (continuous variable) and year of interview. Significant figures are shown in bold (p < 0.05).
[e] Hazard ratio (HR) of disability pension with 95% confidence interval (CI), adjusted for age and year of interview, sex, education, country of birth, sector of employment, and strenuous work postures (bent or twist repeatedly).
[f] Including nursing assistants, home care assistants, and child care assistants.

Table 4
Hazard ratios (HR) for disability pension (DP) 1994–2014 according to exposure to iso-strain. Individuals interviewed 1993–2013 (n = 79 004).

	All other occupations (N = 66 253)						Nursing professionals (N = 2 576)						Care assistants[d] (N = 10 175)					
Exposure	P[b]	n[c]	HR[d]	HR[e]	CI		P[b]	n[c]	HR[d]	HR[e]	CI		P[b]	n[c]	HR[d]	HR[e]	CI	
Low strain/High support	38	1147	1				28	34	1				37	302	1			
Low strain/Low support	19	655	1.04	**1.14**	1.03	1.26	12	23	1.42	1.42	0.83	2.41	12	87	1.09	1.10	0.86	1.40
Passive job/High support	7	304	1.34	1.13	0.99	1.28	12	15	1.15	1.08	0.59	1.99	15	128	1.07	1.07	0.87	1.32
Passive job/Low support	7	315	1.48	**1.35**	1.19	1.53	9	15	1.37	1.29	0.70	2.38	10	75	1.19	1.19	0.92	1.53
Active job/High support	10	371	1.12	1.12	0.99	1.26	12	15	0.97	0.83	0.45	1.56	8	85	**1.32**	1.24	0.97	1.59
Active job/Low support	9	349	1.08	**1.19**	1.05	1.35	8	22	2.14	**1.88**	1.08	3.26	4	48	**1.55**	**1.58**	1.16	2.15
High strain/High support	3	147	**1.66**	**1.31**	1.10	1.56	9	15	1.81	1.51	0.80	2.83	7	68	**1.39**	1.29	0.98	1.69
High strain/Low support	6	359	**2.27**	**1.92**	1.70	2.18	10	19	**1.90**	1.73	0.98	3.04	7	72	**1.69**	**1.58**	1.21	2.06

[a]All incident cases of DP, including unspecified DP-diagnoses (n = 5 196).
[f]Including nursing assistants, home care assistants, and child care assistants.
[g]number may differ from values due to missing value.
[b] Prevalence (P) of the exposure categories (%).
[c] Number of cases (n).
[d] Hazard ratio (HR) of disability pension with 95% confidence interval (CI), adjusted for age and year of interview. Significant figures are shown in bold (p < 0.05).
[e] Hazard ratio (HR) of disability pension with 95% confidence interval (CI), adjusted for age and year of interview, sex, education, country of birth, sector of employment, and strenuous work postures (bent or twist repeatedly).

evidence for job control alone, as well as for a combined measure of job demands and control (i.e., job strain), but found only very limited evidence for job demands.

One explanation for our diverging results may lie in the fact that we focused on nursing and care staff, while previous studies mostly were based on general mixed working populations. Indeed, researchers have observed considerable differences concerning early exit between different labor market sectors and occupations (Haukenes et al., 2011; Krokstad et al., 2002), and questions on aspects of work may be understood differently in the diverging work contexts. As work in caring occupations is highly controlled by patient needs, the measures of job control may not sufficiently

Table 5
Psychosocial work exposure job demands, control, social support and risk of disability pension with musculoskeletal and mental diagnoses respectively[a] 1994–2014. Individuals interviewed 1993–2013 (n = 79,004). Multivariate analyses.

	All other occupations (N = 66 253)					Nursing professionals (N = 2 576)					Care assistants[e] (N = 10 175)				
Psychosocial exposure index	P[b]	n[c]	HR[d]	CI		P[b]	n[c]	HR[d]	CI		P[b]	n[c]	HR[d]	CI	
Mental diagnoses															
Job demands															
Low demands	71	509	1			62	33	1			74	126	1		
High demands	29	322	**1.35**	1.17	1.55	38	21	0.98	0.58	1.67	26	62	**1.52**	1.12	2.07
Job control															
High control	77	573	1			60	30	1			61	106	1		
Low control	23	263	**1.41**	1.22	1.64	40	25	1.38	0.82	2.32	39	82	1.28	0.96	1.71
Social support															
High support	59	417	1			61	27	1			67	119	1		
Low support	41	415	**1.49**	1.30	1.71	39	27	1.49	0.89	2.48	33	71	**1.35**	1.01	1.81
Musculoskeletal diagnoses															
Job demands															
Low demands	71	1067	1			62	30	1			74	319	1		
High demands	29	481	1.10	0.99	1.23	38	25	1.11	0.65	1.88	26	135	1.20	0.98	1.48
Job control															
High control	77	1033	1			60	36	1			61	285	1		
Low control	23	525	**1.26**	1.13	1.41	40	21	1.01	0.59	1.72	39	181	1.07	0.89	1.29
Social support															
High support	59	862	1			61	29	1			67	341	1		
Low support	41	695	**1.17**	1.05	1.29	39	27	1.35	0.81	2.25	33	136	1.07	0.87	1.31

[a] Incident cases of DP-diagnoses, mental diagnoses (n = 1 104), musculoskeletal diagnoses (n = 2 151).
[b] Prevalence (P) of the exposure categories (%).
[c] Number of cases (n).
[d] Hazard ratio (HR) of disability pension with 95% confidence interval (CI), adjusted for age and year of interview, sex, education, country of birth, sector of employment, and strenuous work postures (bent or twist repeatedly).
[e] Including nursing assistants, home care assistants, and child care assistants.

cover some of the most important aspects of control in caring occupations. Other aspects covered by nursing specific questionnaires (e.g., the PES-NWI) (Aiken et al., 2012), such as opportunities to participate in policy decisions or involvement in internal governance of the hospital or the ward, may be better fitted to detect nursing specific aspects of control. Work-time control is another aspect of work control that has been related to a decreased risk of disability pension (Vahtera et al., 2010), but which could not be included in our study. Nursing staff often have low control over working times, and we could previously show that satisfaction with schedule flexibility is related to nurses' intentions to leave the occupation (Leineweber et al., 2016). However, our study covered a number of aspects of job demands that might fit well with the nursing staff's experiences. Especially having far too much to do and having to miss out lunch were found to increase disability among both nursing professionals and care assistants.

Another important aspect of the psychosocial work environment regards social support, especially support from the supervisor was related to a considerably increased risk of disability pension among nursing professionals (and also among all other occupations). These results are supported by earlier researchers who found low supervisor support to increase the risk of subsequent disability pension (Canivet et al., 2013; Sinokki et al., 2010). One explanation behind the particularly strong association between low social support and disability pension found among nursing professionals may be that they often work in teams, and when the team is not seen as supportive, it causes strong psychosocial tensions. Also, especially nursing professionals often work in situations that require difficult decisions in relation to individual patients and in relation to priorities between patients. Here, back-up from the supervisor might be of special importance. The importance of social support is also underlined in the findings presented in Table 4. Among all other occupations, all dimensions of job strain, i.e. low strain, passive, active, and high strain work, were related to an increased risk of disability pension when low social support was experienced. Only those experiencing high job strain showed an increased risk for disability pension independent of social support. Also among nursing professionals and care assistants, active and high strain work was related to disability pension when low social support was experienced.

While the negative aspects of low social support have received considerable attention (e.g. Canivet et al., 2013; Sinokki et al., 2010), the buffering effects of good social support are less well-studied, and clear conclusions are hampered by varying definitions of social support. Still, there is some evidence that good social support might buffer against early retirement. For instance, in a recent review Browne et al. (2018) found moderate evidence for the view that social support promotes later retirement. To summarize, social support seems to be an important buffer to adverse effects of the psychosocial work environment and may counteract disability pension.

Interestingly, cause-specific analyses revealed that among care assistants, psychosocial work factors were associated with disability pension due to mental diagnosis, but not due to musculoskeletal diagnosis. This is contrary to one meta-analysis in which Bernal et al. (2015) found associations between job strain and incident musculoskeletal disorder in nurses and nurses aids (Bernal et al., 2015). However, in their study the presence of a number of less serious conditions such as pain, complaints, problems, and discomforts during the past 12 months were investigated, but not disability pension given on those grounds. Indeed, disability pension is rather seldom granted on the grounds of musculoskeletal disorders (Försäkringskassan [Swedish Social Insurance Agency], 2017). Furthermore, the majority of studies in this meta-analysis were cross-sectional and thus reverse causation could not be ruled out. In contrast, our study suggests area-specific association between exposure and disability at least among care assistants. We found associations between psychosocial work exposure and mental but not musculoskeletal disorder. In another study, we could show that factors from the physical work environment were related to disability pension due to musculoskeletal diagnosis among care assistants, but less so due to mental diagnosis (Gustafsson et al., work in progress). Associations may look different in other occupational groups. Indeed, among all

other occupations we found associations between factors from the psychosocial work environment to disability pension due to mental as well as due to musculoskeletal disorder. Further studies are needed to investigate area-specific and general risks to cause specific disability pension.

Furthermore, there is a need for more studies on specific occupations. Findings about one occupation cannot always be generalized to other occupations (Knardahl et al., 2017). In our study, the proportion of nursing professionals and, to a lesser extent, also of care assistants reporting a poor psychosocial work environment was higher than among all other occupations. Still, an increased risk of disability pension due to psychosocial work exposure was found mostly among all other occupations. Thus, 92% of nursing professionals and 71% of care assistants experienced frequent close contact with ill people, but only 18% among all other occupations. Still, we found an association between close contact with ill people and disability pension only among all other occupations. There are several possible explanations for this. First, the number of people included in analyses differed quite considerably. Thus, the possibility to detect any association between work exposure and disability pension was higher in all other occupations than among nursing professionals and care assistants. Secondly, questions might be interpreted differently in occupations with different work environments. Third, it might be that certain features of the work environment are less harmful in certain occupations as compared to others. Certain exposures are expected in some occupations but not in others, and appropriate training may reduce risk when exposed to certain risk factors. Indeed, having contact with ill people is more or less part of caring occupations and a known fact when deciding to work with care of people. Also, during their education, nursing staff learn how to cope with having close contact with ill people and how to use medical equipment. Thus, lifelong training to handle features from the work environment could be one possible measure to decrease work disability.

Also exposure to threats of violence and sexual harassment from persons other than colleagues and managers were much pronounced among nursing staff and related to an increased risk in disability pension. These numbers support complaints from the Swedish Association of Health Professionals which have repeatedly protested against the increasing violence in the workplace. Indeed, violent behavior in the workplace is considered to be a major occupational hazard (Rippon, 2000), and research indicates that the risk is among the highest in nursing occupation (Lanctôt and Guay, 2014). In our study 38% of nursing professionals experienced threats of violence, and 10% reported frequent sexual harassment from other persons. This number agrees well with numbers reported by Spector et al. (2014). In this review, 35% of European nurses reported physical violence and 16% reported to have experienced sexual harassment.

4.1. Strengths and limitations

Previous studies on psychosocial work exposure and disability pension included predominantly general working populations. Very few researchers have investigated nursing staff specifically (Friis et al., 2008, 2007; Jensen et al., 2012). By analyzing two groups of nursing staff separately, we could investigate possible differences in the strength of the association between those groups and as compared to all other occupations. Exploring risk factors in a uniform population has the advantage that the results are less dependent on residual confounding, e.g. from underlying socio-economic factors that are known to be a strong predictor of disability (Jensen et al., 2012). Using register data to define disability retirement minimized possible common method bias. Also, due to the prospective design of our study, risk of reverse causation is limited. Despite these strengths of our study, we have to consider some limitations. It might be possible that other, unmeasured (psychosocial) exposures have influenced risk of disability pension, e.g. poor leadership or effort-reward imbalance. Furthermore, work environment was measured only once, and changes in occupation or workplace could not be taken into account. This might be of particular importance where the time between measure of work environment and disability pension is long. Indeed, the relatively long follow-up time may have weakened the association between psychosocial work characteristics and disability. However, all analyses were controlled for baseline year, and follow-up time did not differ between occupational groups. Differences in sample size may, at least to some extent, explain differences between occupational groups. Nearly all studied exposures were related to an increased risk for disability pension for all other occupations, while fewer significant results were found for nursing professionals and care assistants. Indeed, the large sample size of those in all other occupations might have led to statistically significant results when contributions were only small.

4.2. Conclusion

We found that aspect of job demands and poor social support from colleagues were associated with an increased risk of disability pension among nursing professionals and care assistants. Also, having an active job but perceiving poor social support increased the risk for disability pension among nursing professionals and care assistants. Social support may to be a crucial factor for a healthy and stable work force in health care.

Contributors

All authors met the criteria for authorship. Gustafsson, Marklund, Aronsson and Leineweber formulated the study design. Gustafsson wrote a first draft, later Leineweber led writing of successive drafts of the paper. Gustafsson carried out the statistical analyses and contributed to the writing of the manuscript. All authors contributed to interpretation of the results, commenting and revising the text, had full access to all of the data in the study and can take responsibility for the integrity of the data and the accuracy of the data analysis. All authors approved of the final version.

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Ethics approval

The study was approved by the regional research ethics committee in 2015 Stockholm, Sweden (Dnr: 2015/2203-31/5).

Conflicts of interest

None declared.

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