



Self-reported sickness absence and presenteeism as predictors of future disability pension: Cohort study with 11-year register follow-up

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ABSTRACT

Many healthcare workers in eldercare are pushed out of the labor market before the official retirement age due to poor health. Identification of early warnings signs is important to avoid complete loss of work ability. The aim of this study was to investigate to what degree sickness absence and presenteeism increase future risk for disability pension among eldercare workers. A total of 8952 Danish female eldercare workers responded to a survey about work environment and health. They were followed for 11 years in the Danish Register for Evaluation of Marginalization, with time-to-event analyses estimating the hazard ratios (HRs) for disability pension from sickness absence and presenteeism at baseline. Analyses were adjusted for age, education, body mass index, leisure-time physical activity, smoking, physical exertion at work, and psychosocial factors related to the work environment. During the 11-year follow-up, 11.9% participants received disability pension. For the whole cohort, the highest risk for disability pension was observed for the category of >30 days of combined sickness absence and presenteeism at baseline in the fully adjusted model (HR = 7.93 [95%CI 5.20–12.09]). Eldercare workers aged >45 years were at a higher risk for disability pension in all included categories. Sickness absence and presenteeism increased the risk of disability pension among female eldercare workers. These results suggest that organizations would benefit from identifying early warning signs among workers in the prevention of involuntary early retirement.

1. Introduction

The growing proportion of elderly workers have led to increased retirement age in national pension schemes, impacting the overall health-status of the work force. Additionally, despite overall improvements in global health and increases in life expectancy, the prevalence rate of disability pension – defined as involuntary early retirement from the labor market – remains high among many European countries, including Denmark (Danmarks Statistik, 2020; Wiener et al., 2017). Given the current situation, a better understanding of key risk factors contributing to disability pension seems warranted.

For more than two decades, the number of studies examining risk factors for disability pension has grown progressively; relevant studies such as the Finnish 10-town study, among 46,589 municipal employees, showed that periods of sickness absence extending more than three days

was a strong predictor of disability pension (Kivimäki et al., 2004). More recently, it was shown that long-term sickness absence (i.e., ≥6 months) – due to specific conditions such as musculoskeletal disorders – significantly increases the risk for disability pension in both white- and blue-collar workers; the latter exhibiting the stronger association (Helgadóttir et al., 2019). Therefore, it seems that the type of occupation is relevant in the association between sickness absence and disability pension, indicating that research should be performed on individual job groups.

Likewise, although less investigated, presenteeism has been also associated with increased risk for disability pension. For example, a study of a representative sample of 43,682 Swedish health- and social care employees found that those experiencing frequent spells of sickness absence exhibited an increased risk for disability pension, compared to those with no or lower sickness absence spells (Gustafsson et al., 2019).

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Hence, it seems quite plausible that the two risk factors combined (i.e., sickness absence and presenteeism) increase the risk of disability pension even more than it would be expected by evaluating each of them individually. Thus, sickness absence and presenteeism mutually considered could depict a better picture of the progression towards disability pension since this process might involve different long-term sickness absence episodes combined with presenteeism; likely exacerbated with ageing (Gustafsson et al., 2019; Karlsson et al., 2008). This can be explained by the increase of both severity and the number of chronic conditions derived from poor health habits and the ageing process itself, but also by a decrease in work ability (Jääskeläinen et al., 2016; Ropponen et al., 2011b, 2011a). For example, a recent study found physical and psychosocial working conditions to increase the risk of disability pension among healthy female eldercare workers from Denmark, with the greatest risk observed among older workers (Andersen et al., 2020).

Therefore, this study aims to investigate to what degree sickness absence and presenteeism considered individually as well as mutually increase risk for disability pension among eldercare workers. We hypothesized that higher sickness absence and presenteeism at baseline would be prospectively associated with an increased risk of disability pension, particularly among older eldercare workers.

2. Methods

2.1. Study design

Using a prospective cohort design with 11 years' register follow-up, baseline data were collected from late 2004 to mid-2005. Questionnaires were sent to 12,744 eldercare workers from 36 Danish municipalities of which 9949 (78%) responded. The survey included questions about socioeconomic characteristics, lifestyle, and work environment. The reporting of the present study adhered to Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement for observational studies (von Elm et al., 2008).

2.2. Study population

The present analyses include social and healthcare assistants, social and healthcare helpers, registered nurses, therapists, and other care staff with no or low educational level. Due to the low number of cases, male respondents ($N = 234$) were excluded. Additionally, workers not directly engaged in care services ($N = 1021$) were also excluded. Therefore, a total of 8952 participants were included in the study. The baseline characteristics of the included sample of Danish eldercare workers are shown in Table 1.

2.3. Ethical approval and data protection

The study was registered by the Danish Data Protection Agency. All data was de-identified and analyzed anonymously. Nevertheless, according to the Danish law, approval from ethical and scientific committees or informed consent was not required, as this is a questionnaire- and register-based study.

2.4. Predictors of disability pension

Participants were inquired about their work-related sickness absence and presenteeism, through the following questions included in the baseline questionnaire:

“How many days of sickness absence have you had during the previous 12 months?”, and “How many days have you gone to work despite being sick during the previous 12 months?”

In order to estimate the influence of sickness absence and presenteeism together, we combined the reported number of days related to the two variables and created a third variable (“sickness absence +

Table 1

Demographics, lifestyle, and work characteristics of the female eldercare workers.

	N	Percentage	Mean	Std dev
Age (years)	8731		45.4	10.0
BMI (kg/m ²)	8334		24.9	4.4
Level of leisure-time physical activity				
Low	4020	46.9		
Moderate	4149	48.5		
High	395	4.6		
Smoking				
Yes	3188	36.9		
No	5446	63.1		
Occupational education				
Supervisor	59	0.7		
Occupational therapist	196	2.3		
Physiotherapist	125	1.4		
Home care assistant	492	5.7		
Nursing home assistant	125	1.4		
Nursing assistant	27	0.3		
Service assistant	41	0.5		
Social and health care assistant	856	9.9		
Social and health care helper	3226	37.1		
Nurse assistant	1211	13.9		
Nurse	1123	12.9		
Other	835	9.6		
No education	373	4.3		
Physical exertion during work (1–7)	8376		3.9	1.2
Psychosocial work factors (0–100)				
Emotional demands	8629		46.0	18.5
Influence	8630		45.0	20.6
Role conflicts	8647		41.5	15.7
Quality of leadership	8444		56.9	21.8
Sickness absence (days last 12 months)				
0	1701	20.5		
1–7	3594	43.4		
8–30	2346	28.3		
>30	650	7.8		
Presenteeism (days last 12 months)				
0	2195	27.9		
1–7	3281	41.7		
8–30	2241	28.4		
>30	155	2.0		
Sickness absence + Presenteeism (days last 12 months)				
0	884	11.5		
1–7	2412	31.4		
8–30	3335	43.4		
>30	1053	13.7		

presenteeism”, representing the total number of days can be derived from both or one single predictor). For the purpose of our study, the responses from the variables were categorized into 0 days, 1–7 days, 8–30 days, or more than 30 days.

2.5. Disability pension

Records of disability payments were retrieved from the Danish Register for Evaluation of Marginalization (DREAM) during the 11 years' follow-up period (until mid-2016). The DREAM register is based on weekly information about sickness absence, employment, granted disability benefits, or education, among others (Hjollund et al., 2007). Only Danish residents with full or partial loss of work ability are entitled to receive disability benefits. In this study, ‘disability pension’ was defined as receiving any type of registered disability benefit, involving permanent full- or partial loss of workability. A full disability pension implies a complete dropout from the labor market. Nevertheless, there are also disability benefits attributed to partial work, and - because both constitute a significant loss of workability, ‘disability pension’ was defined as receiving any type of registered disability benefit, requiring either full or partial loss of workability. These criteria resulted in a total of 13 categories of disability benefits payment in the DREAM register,

ranging from flex- or sheltered jobs to full disability pension. The following codes from the DREAM register were used to define disability pension: The codes are hierarchical so that the higher order code dominate:

“Code: 622 Flex benefit.”

Flex benefit provides the opportunity to retire from the labor market in line with early retirement benefit. If you are employed in a flex job, or if you receive unemployment benefit, you can choose to go on flex benefit when you turn 60 years.

“Codes 740-741, 743-748: Unemployment benefit for individuals holding a flex job”.

People who are employed in a flex job cannot receive unemployment benefits. They can instead receive unemployment benefit for individuals holding a flex job.

“Codes 771, 774: Flex job”.

A flex job is an offer of work on special terms for people with permanently reduced work ability. It is possible to go on sick leave and receive sickness benefits from flex jobs.

“Codes 781 Sheltered job”.

A sheltered job with a wage subsidy is an offer to persons on disability benefit to work on special terms.

“Code 783 Full disability pension”.

Persons with significant and permanently reduced work ability may be granted a full disability pension.

When running the statistical analyses, 11 of the 13 codes came out as the final endpoint during the 11-year follow-up, with flex job being the most frequent (39.3%), followed by full disability pension (32.0%), unemployment benefit for individuals holding a flex job (25.6%), sheltered job (3%), and flex benefit (0.1%).

2.6. Confounders

The baseline questionnaire included questions regarding the following potential confounders: age, education (social and health care assistant, social and health care helper, nurse, nurse aide, therapist, none), body mass index (BMI) (kg/m²), smoking status (yes/no), leisure-time physical activity level (low, moderate, and high), physical exertion at work (7-point Borg’s rate of perceived exertion) (Borg, 1998), and psychosocial work environment using a four normalized scale (0–100) comprising the following dimensions from the Copenhagen Psychosocial Questionnaire (COPSOQ) (Pejtersen et al., 2010): 1) emotional demands, 2) influence at work, 3) role conflicts, and 4) quality of leadership. These confounders were included as they have previously been associated with the predictors, as well as with the risk of disability pension (Albertsen et al., 2007; Andersen et al., 2020; Juvani et al., 2014; Krokstad et al., 2002; Lahelma et al., 2012; Leineweber et al., 2019; Ropponen et al., 2011a).

2.7. Statistical analyses

To estimate hazard ratios (HR) and 95% confidence intervals (95% CI) of the work-related sickness absence, presenteeism, and joint sickness absence and presenteeism variables for receiving disability pension during the follow-up, the Cox proportional hazards model was used. The follow-up time comprised 11 years unless in case of death, voluntary early retirement pension, state pension, or emigration, which was censored. If any disability benefit payment was registered during any given week within the follow-up period, the survival times were non-censored and considered event times. For this purpose, the PHREG procedure of SAS 9.4 (SAS Institute, Cary, NC, USA) estimating maximum likelihood was conducted, whereas the LIFETEST procedure served to visually represent hazards through Kaplan–Meier curves.

Model 1 was adjusted for age and education, whereas Model 2 was adjusted for age, education, smoking, BMI, leisure-time physical activity, physical exertion at work, and psychosocial work factors. Based on prior research, age-stratified analyses were performed in case of

significant interaction with age (Krokstad et al., 2002). To ensure sufficient statistical power when comparing groups, the mean age of the sample was selected as the cut-off point. An alpha level of <0.05 was accepted as statistically significant.

3. Results

Table 1 displays the baseline characteristics of the eldercare workers included in the study. The mean age of the study population was 45.4 years (SD = 10.0) with a mean BMI of 24.9 kg/m² (SD = 4.4). Around one third of the participants were smokers, and the majority had low-to moderate levels of leisure-time physical activity. The average number of days for sickness absence and presenteeism during the follow-up were respectively 11.4 (SD = 23.0) and 6.6 (SD = 10.2).

During 11-year follow-up, 1035 participants (11.9%) received disability pension. Table 2 displays results for the overall sample in which Model 1 showed significant HRs for disability pension increasing from 1 to 7 days (HR = 1.76, 95%CI 1.40–2.21) to >30 days (HR = 5.90, 95%CI 4.59–7.59) regarding sickness absence. Likewise, presenteeism showed an increased risk of disability pension from HR = 1.39 (95%CI 1.14–1.69) for 1–7 days of presenteeism, to HR = 3.91 (95%CI 2.75–5.57) for >30 days of presenteeism. The addition of the two variables (sickness absence + presenteeism) showed a similar trend (from HR = 2.29 [95%CI 1.55–3.38] for 1–7 days, to HR = 7.87 [95%CI 5.37–11.54] for >30 days), although the HR values were substantially higher for each category of days than those showed for either sickness absence or presenteeism. The fully adjusted model showed similar findings.

Finally, a significant interaction existed between age and the predictors in terms of risk for disability pension (P < 0.01). Thus, we performed age-stratified analyses, which estimated HRs for those eldercare workers aged ≤45 years and > 45 years, respectively (Table 3). Both the increasing trend and the significant findings observed for HRs for categories of days for the total sample remained similar within each age subgroup. However, higher HRs were consistently found in each category of older eldercare workers in both models. Thus, the highest HR

Table 2

Hazard ratios and 95% confidence intervals for disability pension during 11-year follow-up among the different length of sickness absence, presenteeism and sickness absence + presenteeism for 12 months prior to baseline.

		N	%	Days	Model 1	Model 2
					HR (95% CI)	HR (95% CI)
All	Sickness absence	1701	20.5	0	1	1
		3594	43.4	1–7	1.76 (1.40–2.21)	1.75 (1.36–2.26)
		2346	28.3	8–30	3.04 (2.42–3.82)	3.16 (2.45–4.07)
	650	7.8	>30	5.90 (4.59–7.59)	5.72 (4.32–7.58)	
	Presenteeism	2195	27.9	0	1	1
		3281	41.7	1–7	1.39 (1.14–1.69)	1.41 (1.13–1.74)
		2241	28.4	8–30	2.54 (2.10–3.07)	2.52 (2.04–3.12)
	155	2.0	>30	3.91 (2.75–5.57)	4.15 (2.85–6.05)	
	Sickness absence + Presenteeism	884	11.5	0	1	1
2412		31.4	1–7	2.29 (1.55–3.38)	2.19 (1.43–3.36)	
3335		43.4	8–30	3.96 (2.73–5.75)	3.94 (2.61–5.94)	
1053	13.7	>30	7.87 (5.37–11.54)	7.93 (5.20–12.09)		

Model 1: Adjusted for age and education

Model 2: Adjusted for age, education, smoking, BMI, leisure-time physical activity, physical exertion at work, and psychosocial work factors (emotional demands, influence, role conflicts, quality of leadership)

Table 3

Age-stratified analyses of younger (≤ 45 years) and older (> 45 years) eldercare workers. Hazard ratios (HR) and 95% confidence intervals (CI) for disability pension during 11-year follow-up among the different length of sickness absence, presenteeism and sickness absence + presenteeism for 12 months prior to baseline.

		N	%	Days	Model 1	Model 2	
					HR (95% CI)	HR (95% CI)	
Younger ≤ 45 yrs	Sickness absence	580	15.1	0	1	1	
		1791	46.7	1–7	1.22 (0.83–1.80)	1.26 (0.81–1.95)	
		1189	31.1	8–30	2.19 (1.50–3.20)	2.46 (1.59–3.79)	
	Presenteeism	272	7.1	>30	3.10 (1.97–4.86)	3.11 (1.87–5.18)	
		835	22.5	0	1	1	
		1794	48.3	1–7	1.54 (1.10–2.16)	1.43 (0.99–2.05)	
	Sickness absence + Presenteeism	1024	27.6	8–30	2.44 (1.74–3.43)	2.15 (1.48–3.11)	
		59	1.6	>30	2.69 (1.26–5.73)	2.56 (1.19–5.54)	
		270	7.5	0	1	1	
	Older > 45 yrs	Sickness absence	1189	32.8	1–7	1.37 (0.72–2.59)	1.34 (0.66–2.73)
			1701	46.9	8–30	2.39 (1.30–4.42)	2.26 (1.14–4.47)
			464	12.8	>30	4.55 (2.41–8.60)	4.13 (2.03–8.39)
Presenteeism		1121	25.1	0	1	1	
		1803	40.4	1–7	2.04 (1.54–2.72)	2.02 (1.47–2.77)	
		1157	26.0	8–30	3.44 (2.59–4.58)	3.49 (2.54–4.78)	
Sickness absence + Presenteeism		378	8.5	>30	7.48 (5.50–10.16)	7.16 (5.09–10.06)	
		1360	32.7	0	1	1	
		1487	35.8	1–7	1.26 (0.98–1.61)	1.36 (1.03–1.78)	
Presenteeism		1217	29.2	8–30	2.53 (2.02–3.18)	2.67 (2.06–3.46)	
		96	2.3	>30	4.43 (2.97–6.62)	5.00 (3.23–7.74)	
		614	15.1	0	1	1	
Sickness absence + Presenteeism	1223	30.1	1–7	2.78 (1.70–4.54)	2.61 (1.53–4.47)		
	1634	40.3	8–30	4.74 (2.96–7.57)	4.83 (2.89–8.07)		
	589	14.5	>30	9.56 (5.93–15.42)	10.03 (5.93–16.95)		

Model 1: Adjusted for age and education

Model 2: Adjusted for age, education, smoking, BMI, leisure-time physical activity, physical exertion at work, and psychosocial work factors (emotional demands, influence, role conflicts, quality of leadership)

values were observed for the subgroup of eldercare workers aged > 45 years with higher number of combined days of sickness and presenteeism (Model 2: HR = 10.03 [95%CI 5.93–16.95]).

4. Discussion

4.1. Principal findings

The present cohort study involving a follow-up of Danish female eldercare workers for 11 years consistently showed both sickness absence and presenteeism to be reliable predictors for disability pension. The risk for disability pension increased with longer periods of sickness absence as well as presenteeism, whereas the two variables combined showed an even higher risk for disability pension. In addition, older eldercare workers also showed a higher risk for disability pension compared with their younger counterparts. These findings remained robust when adjusting for potential confounders, confirming the strength of the presented associations. This is the first study to consider the combination of sickness absence and presenteeism in order to predict risk of disability pension, indicating that this could be a more useful way to identify early signs for disability pension.

4.2. Comparison with other studies

These presented results on the association between sickness absence, presenteeism and disability pension in female eldercare workers confirms those found in previous research among the general working population (Kivimäki et al., 2004; Labriola and Lund, 2007; Lund et al., 2008; Salonen et al., 2018). Consistent with our study, sick leave is most often observed to predict disability pension among eldercare workers; particularly, the length of sickness absence (i.e. number of days), and not the number of spells, predict disability pension more accurately (Stapelfeldt et al., 2014). In fact, the risk of long-term sickness absence has been observed to increase over time since the first diagnosis of a chronic condition (Nexo et al., 2018). Likewise, the development of a number of chronic conditions (i.e. multimorbidity) during work life

seems to play a key role in the incidence of long-term sickness absence (Sundstrup et al., 2017). Similarly, since disability pension is usually preceded by long-term sickness absence spells due to chronic conditions such as musculoskeletal disorders (Ropponen et al., 2011b), both the length of absence and number of chronic conditions are likely to play a role in predicting disability pension.

Our results regarding presenteeism and risk of disability pension are also in agreement with those observed in prior research (Gustafsson et al., 2019). This consistent association could be interpreted in several ways. For example, presenteeism may be more common among some individuals experiencing pressure to work in the health care sector, which possibly increase their threshold for reporting sickness absence, leading to more serious health problems and disability pension in the long-term. The health care sector has sometimes personnel replacement difficulties and involves high physical and mental demands. In this regard, a recent a systematic review among nurses found that psychosocial working conditions, employment conditions, and conditions related to sickness insurance can contribute to the prevalence of presenteeism (Brborović et al., 2017). In addition, among the same working force, emotional exhaustion has been shown to predict presenteeism, which affected future perception of high job demands and may further increase presenteeism (Demerouti et al., 2009). Presenteeism cause more serious health problems, reducing work ability and leading to sickness absence (Skagen and Collins, 2016), which finally could result in disability pension in the long-term. Another interpretation derives from aspects such as professional norms, perceived irreplaceability, workplace policies, over-commitment to work, or negative effects on patients, identified as reasons for presenteeism in the health care sector (Hansen and Andersen, 2008; Krane et al., 2014). Specifically, among women, known factors predicting disability pension related to being a public employee and to be experiencing low job security (Albertsen et al., 2007).

Overall, estimations of sickness absence and presenteeism considered together seems to be accurate in predicting risk of disability, compared with the two predictors considered individually. This finding might partially be explained by the fact that both predictors are associated with different potential mechanisms that might increase the risk

for disability pension over time. For example, because there might be some eldercare workers more reluctant to go on sick leave, while other may go to work in spite of being sick, sickness absence by itself might not be sensitive enough to encompass all the early signs that predict disability pension, and the pathways to get there are likely to be different between predictors. Therefore, the sum of both predictors contributes to better predict the risk of disability pension in female eldercare workers since they might be adding different valid pathways to the joint prediction. It is also noteworthy that presenteeism was more strongly associated with disability pension among younger eldercare workers, whereas sickness absence was more strongly associated among the older workers. This finding could indicate that younger workers avoid going on sick leave as often as older workers, although this may have consequences for their health in the long-term. On the other hand, as multimorbidity is closely linked to age (Van den Akker et al., 1998), older workers are likely to exhibit stronger symptoms of a specific condition, a higher number of conditions, or a lower level of pain threshold, all of which likely lead to sickness absence and disability pension in the short- and long term, respectively.

4.3. Strengths and limitations

The main strength of our study is the prospective design using register follow-up. The homogeneity of the study cohort (i.e., females from the same country working in the healthcare sector) diminishes the bias from socioeconomic confounders such as occupational class or income. Further, data on disability pension were retrieved from a highly reliable register.

Nevertheless, interpretations derived from the results of this study should be made in light of several limitations. First, self-reporting of both sickness absence and presenteeism using a non-validated tool represents an inherent risk of both information and recall bias, although prior research with administrative-reported sickness absence observed similar results to those found in our study (Lund et al., 2008). Furthermore, a more detailed analysis regarding each specific type of disability might have led to different results, however, some groups would have become too small to maintain a reasonable statistical power. Second, because only female eldercare workers were included in the analyses, generalizations to other working populations should be made with caution. Also, because complete-case analyses were conducted to deal with missing values in this study, there is still the possibility of biased estimates, which might vary our results. However, given the robustness of the association, it is quite unlikely that this can significantly influence the main conclusions of the study. Last, the observational design of the research does not allow for the examination of a causal inference between predictors and outcome. However, the prospective design involving a long-term follow-up increases the likelihood of the observed associations being causal.

5. Conclusion

The results of the present study showed that the risk for disability pension among female eldercare workers increased with longer periods of self-reported sickness absence and presenteeism, with the two variables combined showing an even higher risk, particularly among the older workers. This indicates that the predictive power for disability pension is higher when accounting for multiple risk factors associated with the work environment, and organizations would likely benefit from identifying early warning signs among workers in the prevention of involuntary early retirement.

Contributors

RLB drafted the manuscript and all co-authors provided critical feedback. LLA designed the study and performed the statistical analyses, and all co-authors performed critical feedback on the design and

statistical analyses. All authors agreed on the final version of the manuscript.

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Data availability statement

The authors encourage collaboration and use of the data by other researchers. Due to the Danish data protection legislation, micro data cannot be made publicly available. Researchers interested in using the data for scientific purposes should contact Prof. Lars L. Andersen, ll.a@nfa.dk

Declaration of Competing Interest

The authors declare that there is no conflict of interest.

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