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Impact of depressive symptoms on worklife expectancy: a longitudinal study on Danish employees

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ABSTRACT

Objective Depressive symptoms are associated with sickness absence, work disability and unemployment, but little is known about worklife expectancy (WLE). This study investigates the impact of depressive symptoms on the WLE of a large sample of Danish employees.

Methods We used occupational health survey data of 11 967 Danish employees from 2010 and linked them with register data on salary and transfer payments from 2010 to 2015. Depressive symptoms were self-reported using the Major Depression Inventory. We used multistate data and a life table approach with Cox proportional hazard modelling to estimate the WLE of employees, expressed by time in work, unemployment and sickness absence. Separate analyses were conducted for sex and employees with a voluntary early retirement pension scheme. Using age as time axis, we used inverse probability weights to account for differences in educational level, sector, body mass index, smoking habits and loss of employment during sickness absence.

Results The WLE of employees reporting depressive symptoms was shorter compared with those not reporting depressive symptoms; that is, the expected time in unemployment and sickness absence was longer, while the expected time in work was shorter. The shorter WLE was most pronounced in women; for example, a 40-year-old woman with depressive symptoms can expect 3.3 years less in work, 0.8 years more in unemployment and 0.7 years more in sickness absence. Employees with a voluntary early retirement pension scheme showed an even lower WLE.

Conclusions Our study showed a meaningful impact of depressive symptoms on the WLE of Danish employees using a multistate framework.

INTRODUCTION

Mental disorders are the leading cause of disease burden worldwide[1] and affect individuals, families, workplaces and society. Recently, the European Working Conditions Survey showed that up to 17% of the general working population reported scores indicative of depression.[2] Work and health surveillance data in Denmark showed that more and more employees report depressive symptoms, from 8.5% in 2012 to 9.0% in 2014, 10.9% in 2016, and 11.0% in 2018, respectively.[3] Depressive symptoms are associated with unemployment and with substantial work impairment in terms of lost workdays and reduced productivity.[4–10]

Key messages

What is already known about this subject?
► Depressive symptoms have a negative impact on social and work functioning, productivity, and labour market affiliation.
► Worklife expectancy is a useful measure to inform preventive policies and practices.

What are the new findings?
► Our study, applying a multistate framework with a life course perspective, showed that depressive symptoms have a significant impact on worklife expectancy.
► Employees reporting depressive symptoms spend less time in work and more time in sickness absence and unemployment compared with employees not reporting depressive symptoms.
► The worklife expectancy of employees with an early retirement pension scheme and depressive symptoms is shorter compared with those without this pension scheme.

How might this impact on policy or clinical practice in the foreseeable future?
► Our findings underline the need for effective policies and interventions to prevent depressive symptoms in the working population to add more healthy and productive years to the working life.

With an onset early in life, mental health problems are associated with a disproportionally high burden of disease among young people and may have devastating effects on the whole life course.[11 12] Therefore, means to promote mental health and well-being of people of all ages are becoming increasingly important to maintain a high labour market participation.[13 14]

Despite the negative impact of depressive symptoms on labour market affiliation and work participation, it is today not clear to what extent depressive symptoms impact the worklife expectancy (WLE), a measure crucial to set priorities for preventive policies and practices. WLE is an estimation of the expected time within the labour market until retirement. Since the 1970s, WLE has gained
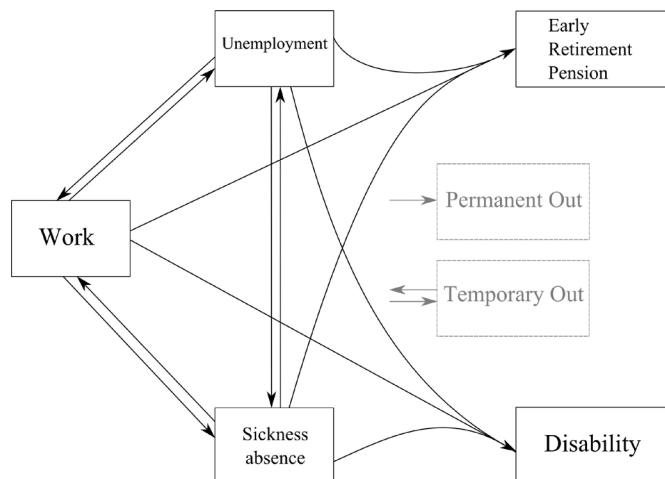
Figure 1 The multistate model with the seven states: work, sickness absence, unemployment, disability retirement pension (disability), early retirement pension scheme, temporary exclusion from the labour market (temporary out) and permanent exclusion from the labour market (permanent out). The eight transitions of primary interest are represented by non-interrupted arrows (Pedersen and Bjorner[20]).

increasing attention as models based on multistate models and transition probabilities have been developed.[15–22]

In the present study on the impact of depressive symptoms on WLE, the concept of WLE was expanded to capture next to the labour market state, 'work' and also 'unemployment' and 'sickness absence' before retirement, as recently proposed by Pedersen and Bjorner.[20] The expansion of the WLE concept corresponds with the flexible Danish labour market and allows more detailed analyses of transitions between labour market states among employees with depressive symptoms. Hence, the aims of this study were to investigate the impact of depressive symptoms on the WLE of occupationally active male and female employees. As the Danish system offers a voluntary and very common early retirement pension (ERP) scheme, which may affect the WLE of employees with depressive symptoms, separate analyses were conducted for employees with the voluntary ERP scheme.

METHODS
Jurisdictional context: the Danish labour market
The Danish labour market is characterised by a flexicurity system with high labour market participation rates (71% for women and 75% for men),[23] low formal employment protection, generous and accessible social benefits, and a high turnover of the workforce.[24] The official retirement age in Denmark is currently 65 years, but the system also allows earlier retirement. Possibilities of early retirement concern 'disability retirement pension', which is accessible for all, gradual retirement with labour market affiliation on special terms (eg, flex-job), and voluntary 'early retirement pension'. The voluntary ERP scheme is an insurance and saving scheme. Employees pay a part of their salary for 30 years to be able to retire as early as 5 years before the official retirement age.

Study design
This longitudinal study uses data on depressive symptoms from the Danish Work Environment Cohort Study (DWECS).[25] DWECS data on depressive symptoms are linked with register

data on labour market affiliation in 2010–2015 from the Labour Market Accountant Register (LMAR) by Statistics Denmark.

The DWECS started in 1990 and had repeated waves every fifth year until 2010. Each wave contains a representative sample of the Danish population aged 18–59 years.[25] For the present study, we used DWECS data from 2010, including a total of 14 453 respondents (48% response).[26] Of the respondents, 11 967 (83%) answered the questions on depressive symptoms.

LMAR contains information on all Danish citizens with a labour market affiliation from 2008 onwards. LMAR contains daily salary payments and daily payments of all major social benefits on an individual level. The Personal Income Register was used to identify respondents who had joined the voluntary ERP scheme (n=4205 respondents, 35%). Information on mortality was retrieved from the Danish Death Register.

Depressive symptoms
Depressive symptoms in 2010 were measured once with the 12-item Major Depression Inventory (MDI), with scores ranging between 0 and 50.[27 28] The MDI has been validated in both the general population and among patients in the clinical setting.[27 29 30] In the present study, an MDI score of ≥21 was used to identify employees with a depressive symptom level, indicative of mild depression.[31 32]

Labour market affiliation
Labour market affiliation was measured by seven labour market states based on the longitudinal registrations of the LMAR register: work, unemployment, sickness absence, disability retirement pension, ERP, temporary out of the labour market and permanently out of the labour market. The *work* state reflects the periods when a person receives salary payments and no other major social benefit. The *unemployment* state concerns the periods when a person receives any type of social benefit for unemployment, given the condition that the person is available for work. The *sickness absence* state reflects the periods when a person is long-term sick-listed and receives sickness absence benefits (defined as >21 consecutive days before 2012 and >30 days after 2012). The *disability retirement pension* state concerns the time after a person had been awarded disability pension because he/she is not able to work, for example, due to a chronic illness. The *ERP* state is at hand when an ERP scheme member voluntarily retires. The *temporary out of the labour market* state concerns periods of maternity leave, education and emigration, and also periods without registration of any income. The *permanently out of the labour* market state concerns the time when a person receives any type of old-age pension (except for ERP) and death.

Covariates
Baseline information on educational level (basic school, high school, vocational school, short and medium higher education, bachelor's and long higher education) and sector (manufacturing, construction, graphical, transport and wholesale, commerce, service, agriculture, caretaking and health, education and research, finance and public offices and administration, and private offices and administration) was obtained from Statistics Denmark in 2010. Additional baseline information on body mass index (BMI) (underweight: BMI <18.5; normal: BMI between 18.5 and 24.9; overweight: BMI between 25.0 and 29.9; and obesity: BMI >29.9) and smoking (smoker, non-smoker) was derived from DWECS 2010. In addition, information from
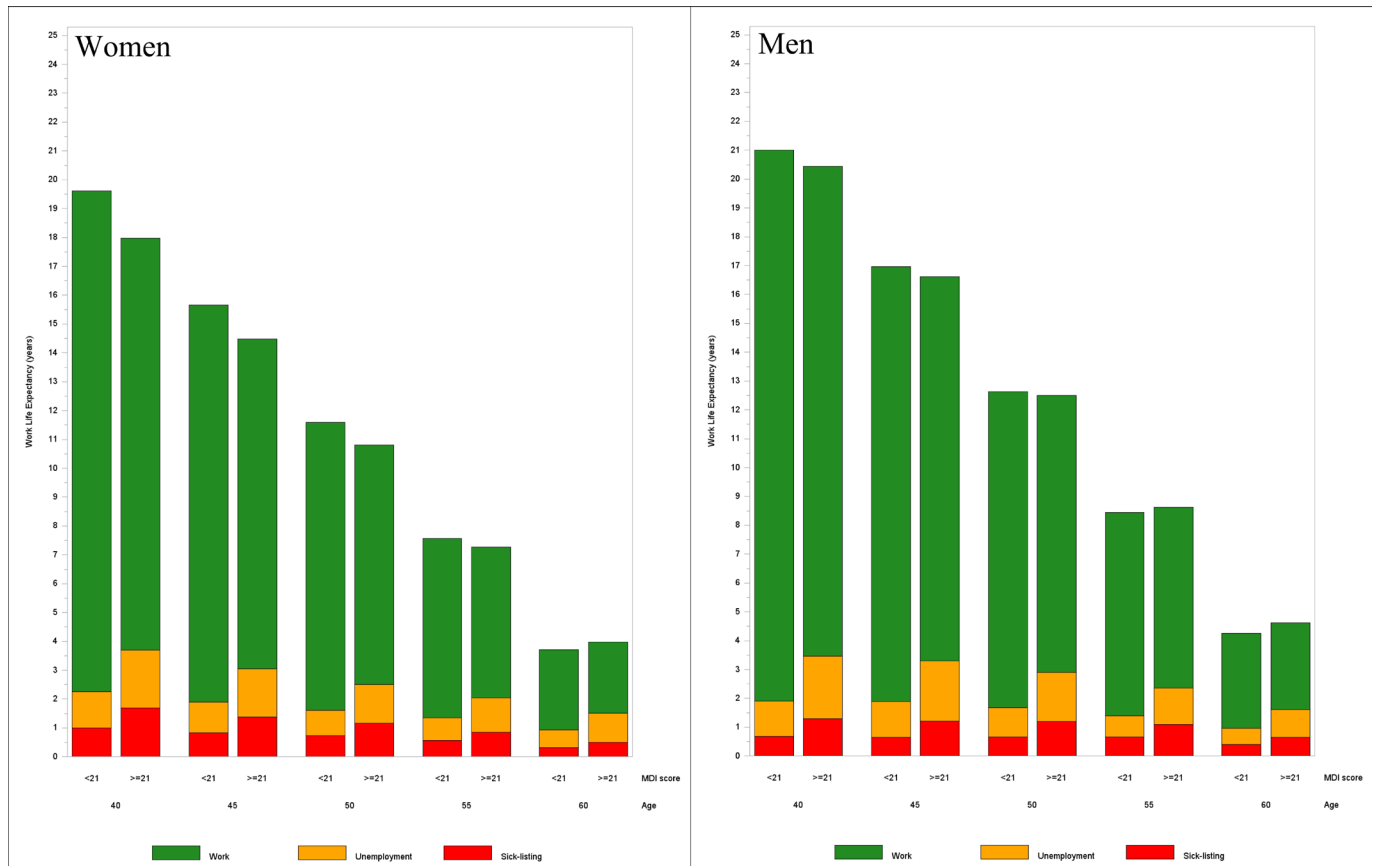
Figure 2 Worklife expectancy in years for employees without ERP scheme, by depressive symptom level (MDI ≥21), sex and age. ERP, early retirement pension; MDI, Major Depression Inventory.

LMAR was used for a repeated adjustment of the employment status during periods of sickness absence only.

Statistical analyses

Multistate modelling was used to analyse the transition probabilities for the labour market affiliation model using age as the underlying time axis, going from 18 to 65 years in steps of hundredths. The work, unemployment, sickness absence and temporary out of the labour market states were considered *recurrent states*, that is, several and repeated transitions from or to these states are possible. The disability retirement pension state, the ERP state and the permanently out of the labour market state were all considered *absorbing states*, as it is not possible to go back to the recurrent states when a transition to one of these states has occurred. A person enters the model by left truncation at the age of answering the DWECS survey and exits the model by right censoring, which happens when the follow-up period ends or the person turns 65 years.

Figure 1 shows the multistate model with boxes illustrating the labour market states and arrows showing the possible transitions. The temporary out of the labour market state and the permanently out of the labour market state are included to ensure independent censuring, as the probability of, for example, leave due to education, receiving old-age pension and even death may not be independent of the level of depressive symptoms. Therefore, these transitions cannot be considered as censuring.

To investigate the WLE by depressive symptom level, we followed the procedure introduced by Pedersen and Bjorner.[20] The initial analyses included only employees without the ERP scheme (n=7762). Additionally, the analyses were repeated among employees with the ERP scheme (n=4205) (see online supplementary material figure and tables).

All analyses included stabilised inverse probability weights for an even distribution of the covariates. The weights were estimated for each data record using the dichotomous depressive symptom level as the dependent variable in a logistic regression. For each one-hundredth of age, we estimated a matrix, containing the instantaneous hazard of all 18 transitions and the 7 instantaneous state occupation probabilities. This was done for each group of ERP, sex and for those with an MDI score below 21. We used the Chapman-Kolmogorov equation and the instantaneous hazard matrixes to gain the transitions specific baseline hazards and the state occupation probabilities. We estimated the expected state duration as the area under the state occupation probability curves until 65 years of age, with different initial ages of 40–60 years by 5-year intervals. The analysis so far corresponds to using a multistate life table approach.

We used a Cox regression on the long format multistate data with the dichotomous depressive symptom level as the only variable and a reference value of below 21 on the MDI. We included the stabilised weighting and performed a separate Cox regression by ERP status and sex. We then used the estimates from the Cox regression to adjust the respective instantaneous hazard matrixes of the individuals with an MDI score below 21. After this, we repeated the rest of the above-specified procedure to gain the expected state duration of individuals with an MDI score equal to or above 21. The 95% confidence limits were calculated using the Greenwood variance. In the Cox regression, the transitions towards the absorbing states were collapsed into one transition to secure a high number of events.

Table 1 Characteristics of employees without the ERP scheme (n=7762)

	Women	Men
	n (%)	n (%)
Total (n)	4051	3711
Age group (years)		
18–29	1072 (26.5)	843 (22.7)
30–39	1184 (29.2)	972 (26.2)
40–49	1251 (30.9)	1198 (32.3)
50–59	472 (11.7)	614 (16.5)
60–64	72 (1.8)	84 (2.3)
Highest educational level		
Basic school	577 (14.2)	625 (16.8)
High school	561 (13.8)	384 (10.3)
Vocational school	1144 (28.2)	1296 (34.9)
Short and medium higher education	1056 (26.1)	694 (18.7)
Bachelor's and long higher education	636 (15.7)	647 (17.4)
Not available	77 (1.9)	65 (1.8)
Sector		
Manufacturing	236 (5.8)	460 (12.4)
Constructions	19 (0.5)	170 (4.6)
Graphic	21 (0.5)	30 (0.8)
Transport and wholesale	170 (4.2)	335 (9)
Trade	161 (4)	77 (2.1)
Service trade	140 (3.5)	209 (5.6)
Agriculture	10 (0.2)	40 (1.1)
Social security and health	972 (24)	205 (5.5)
Education and research	280 (6.9)	211 (5.7)
Finance, public offices and administration	291 (7.2)	215 (5.8)
Private offices and administration	187 (4.6)	194 (5.2)
Not available	1564 (38.6)	1565 (42.2)
BMI		
Obesity (BMI >29.9)	477 (11.8)	464 (12.5)
Overweight (BMI between 25.0 and 29.9)	947 (23.4)	1457 (39.3)
Normal (BMI between 18.5 and 24.9)	2413 (59.6)	1711 (46.1)
Underweight (BMI <18.5)	131 (3.2)	28 (0.8)
Not available	83 (2)	51 (1.4)
Smoking		
Smoker	915 (22.6)	961 (25.9)
Non-smoker	3083 (76.1)	2706 (72.9)
Not available	53 (1.3)	44 (1.2)
Depression by MDI score		
Depression (MDI ≥21)	913 (22.5)	600 (16.2)
No depression (MDI <21)	3138 (77.5)	3111 (83.8)

BMI, body mass index; ERP, early retirement pension; MDI, Major Depression Inventory.

The final estimates express the average expected time in work, unemployment and sickness absence. The time sum will always be lower than the absolute difference between the selected age and the official old-age pension age because of different (working) life courses, including, for example, periods of temporary labour market leave for education, receiving disability pension and early deaths. As the WLE of employees aged 18–39 years is more uncertain compared with older employees, reflecting a looser labour market affiliation with several periods of maternity leave and education, we only show the WLE of employees older than 40 years (figure 2 and online supplementary figure 1), although all ages were included in the matrix estimations and the Cox regression analyses. The use of inverse probability weights implies that for a comparison of the WLE between groups, an identical distribution of the listed covariates is assumed.

All analyses were conducted with SAS V.9.4 software using PROC PHREG and custom-made coding.

RESULTS
Baseline characteristics
Table 1 shows the baseline characteristics of 7762 employees without the ERP scheme. The average age of the study population is 39 (SD 11) years, with slightly more women than men (52% vs 48%). The majority of employees finished vocational education. Most women worked in the social security and health sector, while most men worked in manufacturing. Women more often reported depressive symptoms than men (23% vs 16%).

Online supplementary table 1 shows the baseline characteristics of 4205 employees with the ERP scheme. The average age of these employees is 52 (SD 8) years, and 57% were men. Again, the majority of employees finished vocational education and are employed in social security and health (39% women) or manufacturing (17% men). Women more often reported depressive symptoms than men (17% vs 11%).

Depressive symptoms and WLE
Figure 2 shows the sex-specific WLE for the 7762 employees without the ERP scheme, expressed as time in work, unemployment and sickness absence (in years). The WLE is shown by depressive symptom level for age 40–60 years. Table 2 shows the corresponding WLE estimates.

The WLE results in table 2 show that, for example, a 40-year-old man without depressive symptoms has a total WLE of 21.6 years, of which 19.9 years were in work, 1.3 years in unemployment and 0.7 year in sickness absence. For a woman of the same age with depressive symptoms, the WLE is 2.3 years shorter in work (12%), while the time in unemployment and sickness absence is 0.9 years (69%) and 0.6 year (53%) longer, respectively. Overall, the WLE is on average 5% shorter for women and 1% shorter for men reporting depressive symptoms. When looking at the separate labour market states, women and men with depressive symptoms showed an average shorter time in *work* of 16% and 13%, respectively. The expected time in *unemployment* was 60% longer for women and 66% longer for men with depressive symptoms, and the expected time in *sickness absence* was 58% longer for women and 72% longer for men, respectively. The shorter expected time in *work* is significant, when comparing the confidence limits of women with and without depressive symptoms for the age of 40 years. For other ages and sex, the confidence limits in table 2 show no significant differences in the expected time in *work*, *unemployment* and *sickness absence*. Overall, the results show a stable tendency of shorter time in work, longer time in unemployment and longer time in sickness absence for all analysed age groups.

Online supplementary figure 1 shows the results for employees with the ERP scheme. The results in online supplementary table 2 show that, for example, a 40-year-old woman with depressive symptoms can expect 4.7 years less in work than a 40-year-old woman without depressive symptoms, and 0.2 more years of unemployment and 0.4 more years of sickness absence. Similarly, a 40-year-old man can expect 5 years less in work, 0.2 years more in unemployment and 0.4 more in sickness absence. The average decrease in time in work is 21% for both women and men. The average increased time in unemployment is 23% for women and 18% for men, and the average increased time in sickness absence is 59% for women and 79% for men, respectively. The decrease in expected time in *work* is statistically significant, when comparing the CI for employees with

Table 2 WLE in years of employees without the ERP scheme, by depressive symptom level (MDI ≥21), sex and age

Sex	Age	MDI score	Work (95% CL)	Diff (%)	Unemployment (95% CL)	Diff (%)	Sick (95% CL)	Diff (%)
Female	40	<21	17.9 (16.5–19.2)	−18.4	1.3 (0.5–2.1)	61.5	1.0 (0.3–1.8)	70.0
		≥21	14.6 (13.1–16.1)		2.1 (0.9–3.2)		1.7 (0.7–2.8)	
	45	<21	14.3 (13.1–15.5)	−17.5	1.1 (0.4–1.8)	54.5	0.9 (0.2–1.5)	55.6
		≥21	11.8 (10.5–13.1)		1.7 (0.7–2.8)		1.4 (0.5–2.3)	
	50	<21	10.5 (9.5–11.5)	−17.1	0.9 (0.3–1.6)	55.6	0.8 (0.2–1.4)	50.0
		≥21	8.7 (7.5–9.8)		1.4 (0.5–2.3)		1.2 (0.4–2.1)	
	55	<21	6.7 (5.9–7.5)	−16.4	0.8 (0.2–1.4)	62.5	0.6 (0.1–1.1)	50.0
		≥21	5.6 (4.7–6.5)		1.3 (0.4–2.1)		0.9 (0.2–1.6)	
	60	<21	3.3 (2.7–3.8)	−12.1	0.6 (0.1–1.1)	66.7	0.3 (-0.1–0.8)	66.7
		≥21	2.9 (2.3–3.5)		1.0 (0.3–1.8)		0.5 (-0.1–1.2)	
Male	40	<21	19.6 (18.5–20.7)	−11.7	1.3 (0.5–2.0)	69.2	0.7 (0.1–1.3)	85.7
		≥21	17.3 (15.9–18.7)		2.2 (1.1–3.4)		1.3 (0.4–2.3)	
	45	<21	15.6 (14.6–16.5)	−12.8	1.3 (0.5–2.1)	69.2	0.7 (0.1–1.3)	71.4
		≥21	13.6 (12.4–14.8)		2.2 (1.1–3.3)		1.2 (0.3–2.2)	
	50	<21	11.5 (10.6–12.3)	−13.9	1.1 (0.4–1.7)	63.6	0.7 (0.1–1.3)	71.4
		≥21	9.9 (8.9–11.0)		1.8 (0.9–2.7)		1.2 (0.3–2.1)	
	55	<21	7.6 (6.9–8.2)	−13.2	0.8 (0.2–1.3)	62.5	0.7 (0.2–1.2)	57.1
		≥21	6.6 (5.8–7.4)		1.3 (0.6–2.1)		1.1 (0.4–1.9)	
	60	<21	3.8 (3.3–4.2)	−13.2	0.6 (0.2–1.0)	66.7	0.4 (0.0–0.8)	75.0
		≥21	3.3 (2.8–3.9)		1.0 (0.4–1.6)		0.7 (0.1–1.2)	

CL, confidence limits; Diff, per cent difference in WLE between MDI scores by sex and age; ERP, early retirement pension; MDI, Major Depression Inventory; WLE, worklife expectancy.

and without depressive symptoms, for all age groups and sexes. For the expected time in *unemployment* and *sickness absence*, no significant differences were found for employees with and without depressive symptoms or for male and female employees.

Table 3 shows the results of the respective Cox regression on the long formatted multistate data. The results show that women with depressive symptoms have a significantly higher risk of having a transition from work to sickness absence and unemployment, and more than a threefold risk of a transition from work/unemployment/sick to disability, when compared with a woman without depressive symptoms. Women additionally have a significantly lower probability of a transition from sickness absence to work (32%) and from unemployment to work (25%). The results show that men with depressive symptoms also have a significantly higher risk of a transition from work to sick (70%) and unemployment (50%), and more than a fivefold risk of a transition to disability pension, when compared with men without depressive symptoms. The results additionally show that men have less probability of transitioning from unemployment to work (29%).

The results in online supplementary table 3 for women and men with the ERP scheme were similar to those for employees without the ERP scheme (table 3). Online supplementary table 3 shows that women and men with depressive symptoms have almost a twofold probability of early retirement by the ERP scheme when compared with women and men without depressive symptoms.

DISCUSSION

The present study is, to the best of our knowledge, the first to examine the impact of depressive symptoms on WLE. Most previous studies have investigated the impact of depressive symptoms on sickness absence and unemployment separately, without a multistate framework or a life course perspective.

Our study showed that depressive symptoms may have a life-long impact on labour market affiliation. A 40-year-old man

reporting depressive symptoms without ERP will spend approximately 2 years less in work before retirement compared with a man not reporting depressive symptoms. In women, the corresponding difference in time less in work is 3 years. In addition to lost time in work, our study showed that a 40-year-old employee reporting depressive symptoms will on average receive 1.5 more years of unemployment and sickness absence benefits compared with an employee not reporting depressive symptoms.

The study also provided suggestive evidence that employees in the Danish ERP scheme and reporting depressive symptoms will retire even earlier; that is, a 40-year-old man or woman will spend 5 years less in work compared with employees without ERP. The receipt of unemployment and sickness absence benefits is 0.6 years in those with ERP, compared with 1.5 years in those without ERP, indicating that employees may use the ERP scheme to avoid unemployment and long-term sickness absence benefits.

While our findings are in concordance with previous studies on mental health problems and associated sickness absence and unemployment,[33–36] we demonstrated for the first time how many years of active labour market participation are lost when reporting depressive symptoms. Likewise, we also showed for the first time how many years of the worklife employees reporting depressive symptoms are expected to be in unemployment and/or sickness absence.

Our study further showed that employees reporting depressive symptoms have less time in work, and more time in unemployment and sickness absence, for both men and women. The labour market affiliation of men and women is different in most countries; for example, men retire at an older age than women, and women have more sickness absence than men.[37] Our study indicates that depressive symptoms partly may explain the sex difference in labour market affiliation, as women more often report depressive symptoms than men. The findings additionally suggest a slight difference between younger men and women reporting depressive symptoms, with even less time in work for the women than the men.

Table 3 Estimates of the Cox proportional hazard model for employees without the ERP scheme

Transition	MDI score	Women HR (95% CL)	Men HR (95% CL)
Work to sick	<21	1.59 (1.04–2.45)*	1.70 (1.10–2.65)*
	≥21	1.00 (–)	1.00 (–)
Work to unemployment	<21	1.36 (1.05–1.77)*	1.50 (1.10–2.03)*
	≥21	1.00 (–)	1.00 (–)
Work to TO	<21	1.15 (1.01–1.30)*	1.15 (0.97–1.36)
	≥21	1.00 (–)	1.00 (–)
Work/sick/unemployment/TO to disability	<21	3.65 (2.26–5.88)*	5.28 (2.92–9.54)*
	≥21	1.00 (–)	1.00 (–)
Work/sick/unemployment/TO to PO	<21	0.90 (0.49–1.66)	0.82 (0.36–1.88)
	≥21	1.00 (–)	1.00 (–)
Sick to work	<21	0.68 (0.49–0.93)*	0.71 (0.49–1.01)
	≥21	1.00 (–)	1.00 (–)
Sick to unemployment	<21	1.20 (0.88–1.64)	1.03 (0.61–1.74)
	≥21	1.00 (–)	1.00 (–)
Sick to TO	<21	1.33 (0.98–1.81)	0.72 (0.46–1.14)
	≥21	1.00 (–)	1.00 (–)
Unemployment to work	<21	0.75 (0.60–0.92)*	0.71 (0.54–0.95)*
	≥21	1.00 (–)	1.00 (–)
Unemployment to sick	<21	1.12 (0.82–1.53)	0.97 (0.59–1.61)
	≥21	1.00 (–)	1.00 (–)
Unemployment to TO	<21	0.70 (0.59–0.83)*	0.58 (0.47–0.71)*
	≥21	1.00 (–)	1.00 (–)
TO to work	<21	1.00 (0.87–1.15)	1.09 (0.88–1.34)
	≥21	1.00 (–)	1.00 (–)
TO to sick	<21	2.23 (1.45–3.41)*	0.98 (0.56–1.72)
	≥21	1.00 (–)	1.00 (–)
TO to unemployment	<21	1.31 (1.07–1.60)*	1.17 (0.88–1.55)
	≥21	1.00 (–)	1.00 (–)

*5% significant.
CL, confidence limits; ERP, early retirement scheme; MDI, Major Depression Inventory; PO, permanently out; TO, temporary out.

Strengths and limitations

Our study has several strengths. The multistate approach is unique as it includes permanent and multiple recurring labour market states over a period of 5 years among a large sample of Danish employees.[26] This allowed us to examine time-varying effects, while adjusting for several important potential confounders. The study also has limitations. Depressive symptoms are only measured at baseline. For a more realistic approach, multiple individual measurements of depressive symptoms during follow-up should be taken into account. Moreover, depressive symptoms were self-reported, but showed a clear association with the prospectively collected information about labour market affiliation, that is, less time in work. Furthermore, we cannot rule out that other unknown causes or unmeasured constructs may impact labour market affiliation, for example, the presence of supportive family members or the inclusiveness of the particular workplace. Information on chronic diseases, comorbid with depressive symptoms, or recent life events may also have improved our estimates. Although our study is based on a relatively large sample of Danish employees and includes several covariates, the results should be repeated on larger sample sizes and in another jurisdictional context.

Even though the WLE estimates are prognostic in nature, they cannot be related to significant changes in the labour market which did not also happen during the follow-up period. Additionally, the prognostic nature is based on the theoretical assumption that by cumulating the behaviour of certain employees with the same profile and of different ages, one can create a profile-specific behavioural pattern that represents all ages.

Several covariates, for example, smoking and BMI, may act as confounders and/or mediators of depressive symptoms and may have influenced the results. Assuming that, for example, a high BMI leads to depressive symptoms, then a part of the WLE effect caused by depressive symptoms may be removed by using a weighted sample also based on BMI.

Our findings on the significant impact of depressive symptoms on WLE are relevant for both public and occupational health professionals and policymakers as the level of depressive symptoms in the general working population in Europe is high and increasing.[2] The time lost in productive work and the increased time in unemployment and sickness absence for employees with depressive symptoms underline the need for integrating a life course perspective to work and health research and practice.[38] A recent systematic review and meta-analysis identified three randomised controlled trials examining the effectiveness of psychological and educational interventions for the prevention of depression at the workplace with moderate effect, but low quality of evidence.[39]

CONCLUSION

The findings showed that the WLE was shorter for women and for men reporting depressive symptoms. The time in work was shorter, while the time in unemployment and sickness absence was longer. Moreover, employees with an ERP scheme spend less time in unemployment and sickness absence. The findings underline the need for effective workplace interventions for preventing and/or reducing depressive symptoms in the working population to maintaining employees' mental health during the entire working life.

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