

BMJ Open Disability pension due to common mental disorders and subsequent suicidal behaviour: a population-based prospective cohort study

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ABSTRACT

Objective: Adverse health outcomes, including suicide, in individuals on disability pension (DP) due to mental diagnoses have been reported. However, scientific knowledge on possible risk factors for suicidal behaviour (suicide attempt and suicide) in this group, such as age, gender, underlying DP diagnoses, comorbidity and DP duration and grade, is surprisingly sparse. This study aimed to investigate associations of different measures (main and secondary diagnoses, duration and grade) of DP due to common mental disorders (CMD) with subsequent suicidal behaviour, considering gender and age differences.

Design: Population-based prospective cohort study based on Swedish nationwide registers.

Methods: A cohort of 46 515 individuals aged 19–64 years on DP due to CMD throughout 2005 was followed-up for 5 years. In relation to different measures of DP, univariate and multivariate HRs and 95% CIs for suicidal behaviour were estimated by Cox regression. All analyses were stratified by gender and age.

Results: During 2006–2010, 1036 (2.2%) individuals attempted and 207 (0.5%) completed suicide. Multivariate analyses showed that a main DP diagnosis of ‘stress-related mental disorders’ was associated with a lower risk of subsequent suicidal behaviour than ‘depressive disorders’ (HR range 0.4–0.7). Substance abuse or personality disorders as a secondary DP diagnosis predicted suicide attempt in all subgroups (HR range 1.4–2.3) and suicide in women and younger individuals (HR range 2.6–3.3). Full-time DP was associated with a higher risk of suicide attempt compared with part-time DP in women and both age groups (HR range 1.4–1.7).

Conclusions: Depressive disorders as the main DP diagnosis and substance abuse or personality disorders as the secondary DP diagnosis were risk markers for subsequent suicidal behaviour in individuals on DP due to CMD. Particular attention should be paid to younger individuals on DP due to anxiety disorders because of the higher suicide risk.

BACKGROUND

Disability pension (DP) is a major public health issue in many European countries^{1 2}

Strengths and limitations of this study

- This population-based, prospective cohort study used data of high quality.
- The study did not suffer from any loss to follow-up.
- Considered diagnoses were not self-reported, but derived from administrative registers and provided by physicians.
- Some analyses were based on only a few suicide cases.
- We considered suicide attempts that led to inpatient care, thus the results are mainly valid for suicide attempts of greater medical severity.

and increasingly so regarding mental DP diagnoses.^{1 3–5} In Sweden in 2012, mental diagnoses accounted for 40% of the DPs granted to individuals aged 30–64 years and for 84% among those aged 19–29 years.³ The majority of the mental DP diagnoses are common mental disorders (CMD)—that is, depressive, anxiety or stress-related mental disorders.^{1 6} These are diagnoses for which treatment and rehabilitation measures are available, and inactivity—for example, in terms of long-term or permanent exclusion from work due to DP—may have adverse effects.⁷ DP itself may imply alteration of health behaviour (eg, regarding alcohol and tobacco use, exercise, diet) or social isolation.⁸ This can be due to lack of ties to the labour market and eventually lack of the potential positive effects of paid work, including social contacts with colleagues, prospects of career and income progression, a sense of purpose, or even daily routines and structures.⁹ It is possible that individuals who have been on DP for a shorter period might experience fewer adverse effects of being excluded from the labour market than individuals on DP for a longer time.¹⁰ Similarly,

part-time DP might be more protective concerning such adverse health or social outcomes than full-time DP.^{11 12}

Adverse health outcomes, including suicide, among 'disability pensioners', especially those granted a DP early in adult life because of mental diagnoses, have been shown previously.^{8 13} However, to date little is known about specific risk factors related to eventual worse outcomes in individuals on DP,⁸ such as suicide attempt or suicide. Suicidal behaviour can be considered the most extreme consequence of mental disorders, particularly depressive disorders or depression comorbid with anxiety.^{14–16} Patients with a depressive disorder have a higher risk of subsequent suicidal behaviour in the case of comorbidity with another mental or a somatic disorder, than patients with depressive disorders without such comorbidity.^{17–19} To date, knowledge is lacking regarding associations between DP due to different diagnoses with and without comorbidity with regard to subsequent suicidal behaviour.

There are well-documented gender and age differences with regard to both DP and suicidal behaviour.^{13 14 20} However, there is a lack of studies investigating if gender and age are associated with suicidal behaviour among recipients of DP due to CMD, and across different measures of DP (such as main diagnosis, secondary diagnosis, duration and grade). Previous studies have found that sociodemographic factors, such as educational level, family situation, country of birth, and type of area of residence, are associated with morbidity (defined as previous suicide attempt or in- or out-patient care due to mental diagnoses) and subsequent suicidal behaviour.^{14 17 21–24} In addition, excess mortality including suicide among DP recipients due to mental diagnoses compared with the general population not on DP has been reported.^{25–27} Therefore, it is relevant to take account of sociodemographic factors and health factors in analyses of the association between DP and subsequent suicidal behaviour.

Aim

This study aimed to examine (1) how different measures of DP (main diagnosis, secondary diagnosis, duration and grade) were associated with subsequent suicidal behaviour (suicide attempt and suicide) in individuals on DP due to CMD and (2) possible differences in these associations with regard to gender and age.

METHODS AND MATERIALS

Design

A nationwide population-based prospective cohort study based on Swedish register data was conducted. The cohort comprised all individuals aged 19–64 years, living in Sweden on 31 December 2004, who were on full- or part-time DP due to CMD throughout 2005 (n=48 803). Individuals treated as inpatients or with specialised outpatient healthcare on the schizophrenic spectrum or with bipolar disorders or having this as a secondary DP diagnosis in 2001–2005 (n=1886) and people receiving

old-age pension during 2005 (n=402) were excluded. The final cohort therefore included 46 515 individuals. They were followed-up for 5 years (2006–2010).

Annual data covering 2001–2010 were obtained from the following four nationwide registers: (1) longitudinal integration database for health insurance and labour market studies (LISA) held by Statistics Sweden, including sociodemographic information on gender, age, educational level, type of area of residence, country of birth, family situation; (2) two registers held by the National Board of Health and Welfare, namely (i) National Patient Register including information on date and diagnosis of inpatient and specialised outpatient care and (ii) Cause of Death Register with data on date and cause of death; (3) micro-data for analyses of social insurance (MiDAS) with information on the date, diagnoses (the main and secondary DP diagnoses), duration and grade of DP from the National Social Insurance Agency. Data from these registers were linked at individual level using the unique personal identification number of all residents in Sweden.

The DP system in Sweden

All residents in Sweden aged 19–64 years who, because of disease or injury, have a long-lasting or permanent reduction in their work capacity can be granted a temporary or permanent DP from the Social Insurance Agency for 25%, 50%, 75%, or 100% of ordinary working hours.³ Since 2003, individuals aged 19–29 years can also be granted a temporary DP if health reasons lead to failure to complete compulsory or upper secondary school in due time.³ DP amounts to 65% of lost income, up to a certain level. For those with no previous income, there is a minimum sum.

Risk factors

Main and secondary DP diagnoses

All information on DP diagnoses was based on the corresponding codes of the International Classification of Diseases, V.10 (ICD-10).²⁸ Information on the main and secondary DP diagnoses was available from MiDAS.

Main DP diagnoses were categorised as: 'depressive disorders' including 'depressive episode' (F32) and 'recurrent depressive disorder' (F33); 'anxiety disorders' comprising 'phobic anxiety disorder' (F40); 'other anxiety disorder' (F41); 'obsessive-compulsive disorder' (F42); and 'stress-related mental disorders' including 'reaction to severe stress, adjustment disorders, acute stress reaction and post-traumatic stress disorder' (F43).^{29 30}

Secondary diagnoses were categorised as: 'no secondary diagnosis'; 'substance abuse disorders' (F10–F19); 'personality disorders' (F60–F69); 'other mental disorders' (F00–F99 except F10–F19, F60–F69); 'musculoskeletal disorders' (M00–M99); and 'other somatic disorders' (all diagnoses except M00–M99 and F00–F99).

The excluded bipolar and schizophrenic spectrum disorders included the following ICD-10 codes: F20–F29 and F31.

Duration

DP duration was calculated by subtracting the start date of DP from the end date of exposure (31 December 2005) in gross days. Thereafter, the days were converted into years and were categorised as '1 year', '2–3 years' or '≥4 years'.

Grade

Grade of DP, in 2005, was categorised as full-time (100%) or part-time (25%, 50% or 75%).

Confounders

All sociodemographic characteristics were measured at baseline (31 December 2004): age, gender, educational level, family situation, country of birth, and type of area of residence. Age was dichotomised into 19–44 and 45–64 years. Educational level was categorised into three groups according to the total number of years of education at three levels: 'compulsory (0–9 years)', 'upper secondary (10–12 years)', and 'university (≥13 years)'. Family situation was coded into four groups: 'married/cohabiting with children living at home', 'married/cohabiting with no children living at home', 'single without children living at home', and 'single with children living at home'. Country of birth included 'Sweden', 'other Nordic countries', 'EU 25 (except Nordic countries)', and 'rest of the world'. Type of area of residence was divided into 'big cities', 'medium-sized cities' and 'small cities/villages'. Missing values were coded as separate categories. Healthcare factors—that is, previous suicide attempt, inpatient and specialised outpatient care due to mental diagnoses—were measured from 2001 to 2005 and were dichotomised as 'yes' and 'no'.

Outcome measures

The outcome was suicidal behaviour in terms of suicide attempt or completed suicide.

Information on suicide attempt and suicide in 2006–2010 was obtained from the inpatient-care and cause of death register, respectively. As suicides are often under-reported or reported as 'undetermined' causes,^{31 32} information on 'determined' (X60–84) and 'undetermined' (Y10–34) suicide was combined to limit under-reporting and to compensate for regional and temporal variation in ascertainment methods. A similar procedure was performed for suicide attempt. This is a common procedure in research on suicidal behaviour.³³ The combined outcome measures are hereafter called suicide attempt and suicide, respectively.

Statistical analysis

χ^2 statistics were used to test significant gender and age differences in the cohort. Univariate HRs and 95% CIs for the risk factors with regard to suicide attempt and suicide were estimated by Cox proportional hazard regression models, after confirming that the proportionate hazard assumption had been met. All individuals were followed-up from 1 January 2006 until the event

(suicide attempt; suicide), emigration, death (due to causes other than X06–84 and Y10–34, in the analyses related to suicide as an outcome), or end of follow-up (31 December 2010), whichever occurred first. The partial likelihood ratio test was used to test for possible interactions between the exposure variables (main and secondary DP diagnoses, and duration and grade of DP) and age and gender in relation to the outcome measures. Multivariate models were built with adjustment for sociodemographic and healthcare factors and mutual adjustment for all other covariates. Before the outcome measures were combined, sensitivity analyses were carried out by calculating HRs and 95% CIs for all exposure measures in relation to determined and undetermined suicide both separately and after combination. After ensuring that these estimates were comparable, we introduced the combined variable into the model. Similar tests were performed for determined and undetermined suicide attempt. All analyses were stratified by gender and age and performed using SPSS V.22.

Ethics statement

The project was evaluated and approved by the Regional Ethics Review Board of Stockholm, Sweden.

RESULTS

Of the 46 515 individuals on DP due to CMD during 2005, the majority (66.4%) were women and 70% were aged 45–64 years (table 1). Nearly half of the women (48.3%) had depressive disorders as the main DP diagnosis, while a large proportion of the men had anxiety disorders as the main DP diagnosis (31.7%). Depressive disorders as the main DP diagnosis was more common among the older individuals (51.5%), whereas anxiety disorders as the main DP diagnosis was more common among the younger ones (43.1%). The two predominant main DP diagnoses for the entire cohort were 'depressive episode' (36.8%) and 'stress-related mental disorder' (23.6%) (data not shown in table 1).

In the cohort, nearly half of the individuals did not have any secondary DP diagnosis (43.1%) (table 1). Substance abuse disorders as the secondary diagnosis was more prevalent among men and older individuals, while personality disorders were more common among women and younger individuals ($p < 0.001$). The majority of the individuals had a full-time DP (75.6%). A part-time DP was more common among women (28%) than men (17.4%) and among older (26.7%) than younger (19.2%) individuals ($p < 0.001$).

Regarding the covariates, nearly half (47%) of the study population had received upper secondary education, most lived in big or medium-sized cities (74%), and 75% were born in Sweden (data not shown in table 1). Almost half (42%) lived without a partner and without children at home.

In the cohort, 1036 (2.2%) individuals were treated as inpatients due to a suicide attempt, and 207 (0.5%)

Table 1 Descriptive statistics with regard to main and secondary disability pension (DP) diagnoses and duration and grade of DP in the cohort of 46 515 women and men, aged 19–64 years, living in Sweden on 31 December 2004, and in 2005 on DP due to common mental disorders

Characteristic	All		Women		Men		Age 19–44 years		Age 45–64 years		p Value for difference by χ^2
	N	Per cent	n	Per cent	n	Per cent	n	Per cent	n	Per cent	
Total	46 515	100	30 883	100	15 632	100	13 931	100	32 584	100	
Main DP diagnosis											
Depressive disorders	22 032	47.4	14 907	48.3	7125	45.6	5242	37.6	16 790	51.5	<0.001
Anxiety disorders	13 516	29.1	8558	27.7	4958	31.7	6007	43.1	7509	23.0	
Stress-related mental disorders	10 967	23.6	7418	24.0	3549	22.7	2682	19.3	8285	25.4	
Secondary DP diagnosis											
No secondary diagnosis	20 042	43.1	13 254	42.9	6788	43.4	5217	37.4	14 825	45.5	<0.001
Substance abuse disorders	950	2.0	378	1.2	572	3.7	344	2.5	606	1.9	
Personality disorders	2313	5.0	1294	4.2	1019	6.5	1232	8.8	1081	3.3	
Other mental disorders	12 329	26.5	8237	26.7	4092	26.2	4924	35.3	7405	22.7	
Musculoskeletal disorders	4911	10.5	3716	12.0	1195	7.6	980	7.0	3931	12.1	
Other somatic disorders	5970	12.8	4004	13.0	1966	12.6	1234	8.9	4736	14.5	
Number of years on DP in 2005											
1	5994	12.5	4168	13.5	1826	11.7	2280	16.4	3714	11.4	>0.01
2–3	20 846	44.8	14 162	45.9	6684	42.8	6726	48.3	14 120	43.3	
≥4	19 675	42.3	12 553	40.6	7122	45.6	4925	35.4	14 750	45.3	
DP grade in 2005											
Part-time	11 371	24.4	8651	28.0	2720	17.4	2671	19.2	8700	26.7	<0.001
Full-time	35 144	75.6	22 232	72.0	12 912	82.6	11 260	80.8	23 884	73.3	

committed suicide during the 5-year follow-up (2006–2010) (table 2). Women were more likely than men to attempt suicide (women, 2.4%; men, 2.0%; $p<0.01$), while a higher proportion of men completed suicide (women, 0.3%; men, 0.7%; $p<0.001$). Mean follow-up time for suicide attempt and suicide was 4.85 (SD 0.70) and 4.91 (SD 0.52) years, respectively.

Tables 2 and 3 show univariate HRs and tables 4 and 5 show multivariate HRs for suicide attempt and suicide, stratified by gender and age with regard to main and secondary DP diagnoses as well as duration and grade of DP.

In the univariate analyses, ‘anxiety disorders’ as the main diagnosis was associated with a higher risk of suicide attempt in both women and men (range of HRs 1.4–1.5) and suicide in the younger age group (HR 1.9; 95% CI 1.1 to 3.3) compared with ‘depressive disorders’ as the main diagnosis. These associations became insignificant after sociodemographic variables had been controlled for in the multivariate models, except for suicide in individuals aged 19–44 years (HR 1.7; 95% CI 1.0 to 3.0). Compared with ‘depressive disorders’, ‘stress-related mental disorders’ as the main diagnosis was associated with a lower risk of both suicide attempt and suicide (except for women and the age group 19–44 years) in both crude and multivariate adjusted models. There was a significant interaction between age and main diagnosis ($p=0.017$) regarding suicide. Individuals aged 45–64 years with a main DP diagnosis of ‘stress-related mental disorders’ had a significantly lower risk of committing suicide during the follow-up compared with individuals with ‘depressive disorders’ as the main DP diagnosis (HR 0.3; 95% CI 0.2 to 0.6). This association was not observed in younger individuals.

In the univariate models, all analysed mental secondary diagnoses were associated with a higher risk of subsequent suicide attempt, regardless of gender and age (range of HRs 1.2–7.1). These associations remained significant (range of HRs 1.3–2.3) in the multivariate models, except the association of ‘other mental disorders’ as the secondary diagnosis with subsequent suicide attempt in men and the age group 45–64 years. ‘Substance abuse disorders’ and ‘personality disorders’ as the secondary diagnosis were also associated with a higher risk of suicide (range of HRs 1.9–9.6) in women and in both age groups in the crude analyses compared with their counterparts without a secondary diagnosis. However, in the adjusted model, only ‘substance abuse disorders’ predicted suicide among women and younger individuals (range of HRs 2.6–3.3). A statistically significant interaction was found between gender and secondary diagnosis ($p=0.029$) in relation to subsequent suicide. Women with ‘substance abuse disorders’ or ‘personality disorders’ as the secondary DP diagnosis were at a higher risk of subsequent suicide compared with women without a secondary diagnosis. Such associations were not observed among men.

A DP duration of 4 years or more predicted suicide attempt in women and older individuals (range of HRs

Table 2 Univariate HRs with 95% CI for suicide attempt and suicide (in 2006–2010), in 46 515 individuals, aged 19–64 years, living in Sweden on 31 December 2004, and on disability pension (DP) due to common mental disorders in 2005, stratified by gender

Characteristic	Suicide attempt						Suicide					
	Women			Men			Women			Men		
	n	Per cent	HR (95% CI)	n	Per cent	HR (95% CI)	n	Per cent	HR (95% CI)	n	Per cent	HR (95% CI)
Main DP diagnosis												
Depressive disorders	355	34.3	1	139	13.4	1	53	25.6	1	50	24.2	1
Anxiety disorders	278	26.8	1.4 (1.2 to 1.6)	140	13.5	1.5 (1.1 to 1.8)	32	15.5	1.1 (0.7 to 1.6)	47	22.7	1.3 (0.9 to 2.0)
Stress-related mental disorders	99	9.6	0.6 (0.5 to 0.7)	25	2.4	0.4 (0.2 to 0.5)	17	8.2	0.6 (0.4 to 1.1)	8	3.9	0.3 (0.2 to 0.7)
Secondary DP diagnosis												
No secondary diagnosis	232	22.4	1	100	9.7	1	34	16.4	1	45	21.7	1
Substance abuse disorders	43	4.2	7.1 (5.1 to 9.8)	34	3.3	4.3 (2.9 to 6.3)	9	4.3	9.6 (4.6 to 20.1)	7	3.4	1.9 (0.9 to 4.3)
Personality disorders	83	8.0	3.8 (2.9 to 4.8)	39	3.8	2.7 (1.8 to 3.8)	12	5.8	3.6 (1.9 to 7.0)	9	4.4	1.3 (0.7 to 2.8)
Other mental disorders	253	24.4	1.8 (1.5 to 2.1)	95	9.2	1.6 (1.2 to 2.1)	27	13.0	1.3 (0.8 to 2.1)	29	14.0	1.1 (0.7 to 1.7)
Musculoskeletal disorders	56	5.4	0.9 (0.6 to 1.2)	10	1.0	0.6 (0.3 to 1.1)	<7	2.9	0.6 (0.3 to 1.5)	<7	2.4	0.6 (0.3 to 1.6)
Other somatic disorders	65	6.3	0.9 (0.7 to 1.2)	26	2.5	0.9 (0.6 to 1.4)	14	6.8	1.4 (0.7 to 2.5)	10	4.8	0.8 (0.4 to 1.5)
Number of years on DP in 2005												
1	100	13.7	1	42	13.8	1	13	12.7	1	14	13.3	1
2–3	308	42.1	0.9 (0.7 to 1.1)	137	45.1	0.9 (0.6 to 1.3)	46	45.1	1.0 (0.6 to 1.9)	51	48.6	1.0 (0.6 to 1.8)
≥4	324	44.3	1.1 (0.9 to 1.4)	125	41.1	0.8 (0.5 to 1.1)	43	42.2	1.1 (0.6 to 2.1)	40	38.1	0.7 (0.4 to 1.4)
DP grade in 2005												
Part-time	84	8.1	1	42	4.1	1	16	7.7	1	10	4.8	1
Full-time	648	62.8	3.1 (2.4 to 3.8)	262	25.4	1.3 (1.0 to 1.9)	86	41.6	2.1 (1.2 to 3.6)	95	45.9	2.0 (1.1 to 3.9)

Table 3 Univariate HRs with 95% CI for suicide attempt and suicide (2006–2010), in 46 515 individuals, aged 19–64 years and living in Sweden on 31 December 2004, and on disability pension (DP) due to common mental disorders in 2005, stratified by age

Characteristic	Suicide attempt						Suicide					
	Age 19–44 years			Age 45–64 years			Age 19–44 years			Age 45–64 years		
	n	Per cent	HR (95% CI)	n	Per cent	HR (95% CI)	n	Per cent	HR (95% CI)	n	Per cent	HR (95% CI)
Main DP diagnosis												
Depressive disorders	217	21.0	1	277	26.7	1	20	9.7	1	83	43.0	1
Anxiety disorders	278	26.8	1.1 (0.9 to 1.3)	140	13.5	1.1 (0.9 to 1.4)	44	21.3	1.9 (1.1 to 3.3)	35	16.9	0.9 (0.6 to 1.4)
Stress-related mental disorders	62	6.0	0.6 (0.4 to 0.7)	62	6.0	0.5 (0.3 to 0.6)	12	5.8	1.2 (0.6 to 2.4)	13	6.3	0.3 (0.2 to 0.6)
Secondary DP diagnosis												
No secondary diagnosis	140	13.5	1	192	18.5	1	20	9.7	1	59	28.5	1
Substance abuse disorders	40	3.9	4.7 (3.3 to 6.7)	37	3.6	5.0 (3.5 to 7.2)	8	3.9	6.3 (2.8 to 14.3)	8	3.9	3.5 (1.7 to 7.3)
Personality disorders	85	8.2	2.6 (2.0 to 3.5)	37	3.6	2.7 (1.9 to 3.8)	13	6.3	2.8 (1.4 to 5.6)	8	3.9	1.9 (1.0 to 3.9)
Other mental disorders	233	22.5	1.8 (1.5 to 2.2)	115	11.1	1.2 (1.0 to 1.5)	30	14.5	1.6 (0.9 to 2.7)	27	13.0	0.9 (0.6 to 1.4)
Musculoskeletal disorders	23	2.2	0.9 (0.6 to 1.4)	43	4.2	0.8 (0.6 to 1.2)	<7	1.9	1.1 (0.4 to 3.1)	7	3.4	0.5 (0.2 to 1.0)
Other somatic disorders	36	3.5	1.1 (0.8 to 1.6)	55	5.3	0.9 (0.7 to 1.2)	<7	1.0	0.4 (0.1 to 1.8)	22	10.6	1.2 (0.7 to 1.9)
Number of years on DP in 2005												
1	95	17.1	1	47	9.8	1	7	9.2	1	20	15.3	1
2–3	254	45.6	0.9 (0.7 to 1.1)	191	39.9	1.1 (0.8 to 1.5)	39	51.3	1.9 (0.9 to 4.2)	58	44.3	0.8 (0.5 to 1.3)
≥4	208	37.3	1.0 (0.8 to 1.3)	241	50.3	1.3 (1.0 to 1.8)	30	39.5	2.0 (0.9 to 4.5)	53	40.5	0.7 (0.4 to 1.1)
DP grade in 2005												
Part-time	56	5.4	1	70	6.8	1	7	3.4	1	19	9.2	1
Full-time	501	48.6	2.2 (1.6 to 2.9)	409	39.6	2.2 (1.7 to 2.8)	69	33.3	2.4 (1.1 to 5.1)	112	54.1	2.2 (1.3 to 3.6)

Table 4 Multivariate HRs with 95% CI for suicide attempt and suicide (2006–2010), in 46 515 individuals, aged 19–64 years and living in Sweden on 31 December 2004, and on disability pension (DP) due to common mental disorders in 2005, stratified by gender*

Characteristic	Suicide attempt		Suicide	
	Women HR (95% CI)	Men HR (95% CI)	Women HR (95% CI)	Men HR (95% CI)
Main DP diagnosis				
Depressive disorders	1	1	1	1
Anxiety disorders	1.0 (0.9 to 1.2)	1.0 (0.8 to 1.2)	0.9 (0.6 to 1.4)	1.3 (0.8 to 2.0)
Stress-related mental disorders	0.8 (0.6 to 1.0)	0.6 (0.4 to 0.9)	0.9 (0.5 to 1.6)	0.4 (0.2 to 0.9)
Secondary DP diagnosis				
No secondary diagnosis	1	1	1	1
Substance abuse disorders	2.1 (1.5 to 2.9)†	1.6 (1.0 to 2.4)	3.3 (1.5 to 7.1)†	0.8 (0.3 to 1.7)
Personality disorders	1.4 (1.1 to 1.8)†	1.4 (1.0 to 2.1)	1.8 (0.9 to 3.5)	0.9 (0.4 to 1.8)
Other mental disorders	1.3 (1.1 to 1.5)†	1.2 (0.9 to 1.6)	1.1 (0.6 to 1.8)	0.9 (0.6 to 1.5)
Musculoskeletal disorders	1.1 (0.8 to 1.5)	0.7 (0.4 to 1.4)	0.8 (0.3 to 2.0)	0.7 (0.3 to 1.9)
Other somatic disorders	1.1 (0.9 to 1.5)	1.0 (0.7 to 1.6)	1.6 (0.9 to 3.0)	0.8 (0.4 to 1.7)
Number of years on DP in 2005				
1	1	1	1	1
2–3	0.9 (0.7 to 1.1)	1.0 (0.7 to 1.4)	1.0 (0.5 to 1.8)	1.0 (0.6 to 1.8)
≥4	1.0 (0.8 to 1.2)	0.9 (0.6 to 1.3)	1.0 (0.5 to 1.8)	0.7 (0.4 to 1.3)
DP grade in 2005				
Part-time	1	1	1	1
Full-time	1.7 (1.4 to 2.2)†	0.9 (0.6 to 1.3)	1.5 (0.8 to 2.6)	1.7 (0.9 to 3.3)

*Adjusted for: age, educational level, family situation, country of birth, type of area of residence, previous suicide attempt, inpatient care due to mental diagnoses, specialised outpatient care due to mental diagnoses.

†Significant also with 99% CI ($p < 0.01$).

1.2–1.4) in the crude models, compared with individuals with a DP duration of 1 year. These associations were not statistically significant in the adjusted models. In the

univariate analyses, full-time DP was associated with a higher risk of suicidal behaviour in both genders and age categories (range of HRs 1.3–3.1) compared with

Table 5 Multivariate HRs with 95% CI for suicide attempt and suicide (2006–2010), in 46 515 individuals, aged 19–64 years and living in Sweden on 31 December 2004, and on disability pension (DP) due to common mental disorders in 2005, stratified by age*

Characteristic	Suicide attempt		Suicide	
	Age 19–44 years HR (95% CI)	Age 45–64 years HR (95% CI)	Age 19–44 years HR (95% CI)	Age 45–64 years HR (95% CI)
Main DP diagnosis				
Depressive disorders	1	1	1	1
Anxiety disorders	1.1 (0.9 to 1.3)	0.9 (0.8 to 1.2)	1.7 (1.0 to 3.0)	0.9 (0.6 to 1.3)
Stress-related mental disorders	0.8 (0.6 to 1.1)	0.7 (0.5 to 0.9)	1.7 (0.8 to 3.6)	0.4 (0.2 to 0.8)†
Secondary DP diagnosis				
No secondary diagnosis	1	1	1	1
Substance abuse disorders	2.3 (1.6 to 3.3)†	1.5 (1.1 to 2.2)†	2.6 (1.1 to 6.1)	1.0 (0.5 to 2.3)
Personality disorders	1.5 (1.1 to 2.0)†	1.6 (1.1 to 2.2)†	1.7 (0.8 to 3.4)	1.1 (0.5 to 2.3)
Other mental disorders	1.5 (1.2 to 1.9)†	1.0 (0.8 to 1.3)	1.3 (0.8 to 2.4)	0.8 (0.5 to 1.3)
Musculoskeletal disorders	1.1 (0.7 to 1.8)	0.9 (0.7 to 1.3)	1.7 (0.6 to 4.9)	0.6 (0.3 to 1.3)
Other somatic disorders	1.2 (0.8 to 1.8)	1.1 (0.8 to 1.4)	0.5 (0.1 to 2.1)	1.3 (0.8 to 2.2)
Number of years on DP in 2005				
1	1	1	1	1
2–3	0.8 (0.7 to 1.1)	1.0 (0.7 to 1.3)	1.8 (0.8 to 4.0)	0.7 (0.4 to 1.2)
≥4	0.9 (0.7 to 1.4)	1.0 (0.7 to 1.4)	1.7 (0.7 to 3.8)	0.6 (0.3 to 0.9)
DP grade in 2005				
Part-time	1	1	1	1
Full-time	1.4 (1.1 to 1.9)†	1.5 (1.1 to 1.9)†	1.3 (0.6 to 3.0)	1.7 (1.0 to 2.8)

*Adjusted for gender, educational level, family situation, country of birth, type of area of residence, previous suicide attempt, inpatient care due to mental diagnoses, and specialised outpatient care due to mental diagnoses.

†Significant also with 99% CI ($p < 0.01$).

individuals on part-time DP. After multivariate adjustment, these associations remained significant (range of HRs 1.4–1.7) except for suicide attempt and suicide among men, and suicide in women and younger individuals. Statistically significant interaction was observed between gender and DP grade ($p=0.001$) in relation to subsequent suicide attempt. Women on full-time DP had a higher risk of future suicide attempt than women who were on part-time DP. No such association was found for their male counterparts (table 4).

DISCUSSION

In this nationwide prospective cohort study of people on DP due to CMD, we explored the risk of suicidal behaviour related to DP diagnoses, duration and grade. Stress-related mental disorders as the main DP diagnosis was associated with a lower risk of subsequent suicidal behaviour compared with depressive disorders as the main DP diagnosis. Moreover, comorbid substance abuse disorders and personality disorders as well as full-time DP were associated with a higher risk of suicide attempt and suicide during follow-up. Some gender and age differences in these associations emerged.

To the best of our knowledge, this is the first study to investigate different measures of DP as risk factors for suicidal behaviour in individuals on DP due to CMD. The main strengths of our study are the use of high-quality population-based Swedish nationwide register data^{34 35} and the prospective cohort design with several years of follow-up. We included register data from different sources on the whole working-age population of Sweden and thereby avoided selection and recall bias. Moreover, there was no loss to follow-up and all data were register based, including physician-based diagnoses—that is, not based on self-reports. The study group was large and the statistical power was sufficient even with regard to such uncommon outcomes as suicide attempt and suicide. This study also had the opportunity to include a wide range of potential confounders such as educational level, family situation, country of birth, type of area of residence, and previous healthcare.

There are some limitations of the study. In spite of the long follow-up, there were only 207 suicides, leading to wide CIs. Another limitation is that only the main, and when given, the secondary DP diagnoses could be included. Additional diagnoses that might have been stated in the sickness certificate as contributing to patients' work incapacity were not included in the MiDAS register. Having such information might have improved the analyses; however, most studies on DP only have access to the main diagnosis. A topic of frequent discussion in this research field is the validity of DP diagnoses. There are no studies on this, so far. A study conducted in Sweden in 1991 showed high validity of sick-leave diagnoses compared with diagnoses from medical records.³⁶ In addition, DP in most cases is preceded by long-term absence due to sickness and is granted after a long process of medical evaluation and

work capacity assessment, as DP benefits are often paid for several years.³ Moreover, owing to the stigma surrounding mental diagnoses,^{37 38} the validity of mental DP diagnoses can be assumed to be good, meaning that people with a mental DP diagnosis are likely to have a mental disorder. On the other hand, this also means that some individuals with mental disorders might not have been given a mental diagnosis as the main DP diagnosis, but as a secondary diagnosis to a somatic main DP diagnosis. Thus, they would not be included in this study. This can also be seen as a strength, as our group of CMDs is more strictly defined than if secondary diagnoses were also used for inclusion, or as a limitation, as we do not know if including them would have affected the results. Further studies on these issues are required.

Moreover, the stigma of mental disorders might have led to under-reporting of some mental disorders as secondary diagnoses. The reported secondary diagnoses might therefore reflect greater medical severity. It should also be mentioned that we considered suicide attempts that led to inpatient care, thus the results are mainly valid for suicide attempts of greater medical severity. In addition, it is important to keep in mind that DP not only reflects to what extent the disease affects an individual's work capacity, but also factors at other structural levels such as possibilities and demands at the labour market, adjustment policies, attitudes, and the economic situation of a country.³⁹ Such factors may influence not only the level of DP in a country^{39 40} but also the level of suicidal behaviour,^{41 42} which thus may have affected the results of this study.

In this study, the risk of subsequent suicidal behaviour related to a main DP diagnosis of anxiety did not differ from that of a main DP diagnosis of depressive disorder, while those with stress-related mental disorders as the main DP diagnosis had a lower risk of future suicidal behaviour. This is in line with a study on diagnosis-specific sickness absence that suggested higher risk estimates for subsequent suicide among people on sickness absence due to depressive and anxiety disorders than due to stress-related mental disorders, after adjustment for sociodemographic factors.⁴³

There was a significant interaction between age and main DP diagnoses in relation to suicide. While there was a significantly lower risk of suicide in the older age group (45–64 years) with a main DP diagnosis of 'stress-related mental disorders' compared with 'depressive disorders', this association was not found in the younger individuals. On the other hand, 'anxiety disorders' as the main diagnosis were associated with a higher risk of subsequent suicide in the individuals aged 19–44 years, compared with the same age group with a main DP diagnosis of 'depressive disorders' in the multivariate analyses. One likely explanation of such findings is age differences in the association of mental disorders with suicide risk.^{14 44} Anxiety disorders often have an early onset, and younger individuals may tend to have greater impulsivity, which might contribute to suicidal behaviour.⁴⁵ Moreover, early-onset anxiety disorders leading to

DP might be more difficult to treat and probably are associated with a high degree of comorbidity. Anxiety disorders are highly comorbid with depressive or personality disorders,^{14 15 46} and also might have contributed to suicidal behaviour among these young individuals. Early detection and adequate treatment of anxiety disorders for prevention of suicidal behaviour might be of particular importance,^{15 16} especially in younger individuals. These associations warrant further investigation.

Our analyses show that having a mental secondary DP diagnosis was associated with a higher risk of suicide attempt and suicide compared with not having a secondary diagnosis. This is in line with previous research on the general population^{14 47} or individuals with a diagnosed mental disorder.^{17 18 48} Moreover, we found that substance abuse disorder was the strongest predictor of subsequent suicide attempt. These findings are consistent with previous studies showing that substance abuse is a strong risk factor for suicidal behaviour.^{19 47 49}

A significant interaction was observed between gender and substance abuse as secondary DP diagnosis in relation to subsequent suicide. Substance abuse might be less prevalent and less frequently diagnosed in women than men. Therefore, it can be hypothesised that having such a DP diagnosis might be a reflection of a severe medical condition, particularly in women, which in turn might be a reason for their higher suicide risk.^{14 19 49} It is therefore possible that health consequences of substance abuse disorders might be worse in women than men.⁵⁰ Moreover, substance abuse disorders may aggravate an existing comorbid depression, which itself is a risk factor for suicidal behaviour.^{50–53}

Personality disorder as a secondary DP diagnosis was strongly associated with a higher risk of suicide attempt compared with those who did not have any secondary DP diagnosis. Current literature suggests that personality disorder, comorbid with depression or by itself, involves a higher risk of suicide attempt.^{54 55}

Full-time DP was associated with a higher risk of suicidal behaviour compared with part-time DP. This is in line with a previous study reporting a higher risk of suicidal behaviour associated with full-time compared with part-time sickness absence.⁵⁶ Full-time DP might here be associated with a greater severity of the underlying disorder. On the other hand, full-time DP might be related to an alteration in health behaviour (regarding alcohol consumption, smoking, physical activity, diet, etc) or to social isolation,^{8 57} which might be associated with total exclusion from the labour market.⁹ More knowledge is required on such associations.⁸

Statistically significant interaction was observed between gender and DP grade: women with full-time DP had a higher risk of subsequent suicide attempt than women with part-time DP. The proportion of women on part-time DP tends to be much higher compared with men in Sweden.³ It might be anticipated that, if women are granted full-time DP, they might have a greater severity of the underlying mental disorder and therefore be

at higher risk of subsequent suicide attempt.⁵⁶ Further studies are warranted to investigate pathways to suicidal behaviour related to DP grade.

CONCLUSION

This first study of associations between measures of DP due to CMD with subsequent risk of suicidal behaviour among individuals on such DP found several such associations. In general, depressive disorders as the main DP diagnosis and substance abuse or personality disorder as the secondary DP diagnosis were risk markers for subsequent suicidal behaviour in such individuals. Some gender and age differences in these associations emerged. Approaches for intervention in this group of ‘disability pensioners’ should therefore consider the individual variation in risk factors with regard to gender and age. Particular attention should be paid to younger individuals on DP due to anxiety disorders because of the higher suicide risk.

Contributors EM-R was responsible for the core idea, and all authors contributed to the study design. SGR and EM-R carried out the data analyses and drafted the manuscripts. SGR, KA, JJ and EM-R participated in interpretation of results, critically revised the manuscript for important intellectual content, contributed to successive drafts, and agreed on the final version. All authors read and approved the final manuscript.

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