PAPER III

Health status before, during and after disability pension award. The Hordaland Health Study (HUSK)

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The Hordaland Health Study (HUSK)

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Objectives

In high income countries, up to 12 percent of the working age population receive permanent disability benefits with minimal information on the consequences of this major event. We aimed to compare health status in future and past disability pensioners.

Design

We categorized disability pensioners by the temporal proximity to the disability pension award from seven years before to seven years after the award, and compared health status across these strata.

Setting

The population based Hordaland Health Study (HUSK) in Western Norway 1997-99, linked to official disability benefits registries.

Participants

Participants (N=18 581) in the population based Hordaland Health Study (HUSK) in Western Norway 1997-99

Main outcome measure

Physical conditions, somatic and mental symptoms and impairment

Results

Disability pensioners (n=1 087) reported more physical conditions, somatic and mental symptoms, and more impairment than the remaining sample (n=17 494), throughout the strata from seven years before to seven years after disability pension award. The average number of physical conditions was similar across all groups defined by temporal proximity to disability pension award, but more medication prescription was reported after the award. However, we found a significant non linear increasing trend in symptoms and impairment in the groups closer to the award, with a subsequent decrease afterwards. For most measures, the level of health problems was equal in the strata 3-7 years before compared to 3-7 years after award.

Conclusion

When comparing the strata defined by distance to the event of disability pension award, we found an increase of report of symptoms and impairment up to award of disability pension,

with a subsequent decline to pre-award levels. The design precludes any firm conclusions as to what causes the observed results, but candidate explanations include temporary health deteriorating effects from the disability pensioning process, beneficial effects of being removed from harmful work conditions and recovery after increasing health problems leading up to disability pension award.

BACKGROUND

In most countries with an established welfare system, between five and 12 per cent of the working age population have long-term disability benefits as their main source of income.[1] Despite improvements in most health indictors, the proportion of the population receiving disability benefits is increasing,[1] and it is argued that there now is a mismatch between disability benefit policies and current practice.[2] Many OECD countries are examining and, e.g. in the case of the UK, implementing new disability pension policies aimed at encouraging greater workforce participation. This is often framed around the observation that although the majority of disability benefits are awarded for musculo-skeletal and common mental disorders,[3 4] most people diagnosed with these conditions go to work.[1 5 6] Policy changes have been resisted by some lobby groups who suggest these may have adverse effects upon already disadvantaged individuals. However there is virtually no empirically based knowledge available on consequences of disability benefit recipience.[7-9]

Both negative and positive health effects of benefit awards are plausible. Models of stress and disease have previously focused on pathogenic wear and tear from stressor-elicited behaviour, ultimately leading to disease. The existence of lasting cognitive factors including negative anticipations, slow recovery from stressors and dwelling on past sources of stress has gained recognition.[10 11] These factors appear to be associated with health problems through inducing changes in cardiovascular, endocrine and immune systems.[10 12 13] A rise in such factors seems plausible in face of job insecurity or altering work patterns,[14] and by providing security through disability pensioning, stress and its related exposure may be reduced or removed.

There are also reasons to suggest that there may be negative effects of disability pension award on health. Transitions from work into various forms of non-employment have been observed to be associated with psychological distress.[15 16] In one cross-sectional study, benefit recipients claimed that being on benefits has impaired their sleep, reduced their subjective well-being and inflicted negative psychosocial outcomes.[17] Although most disability pensions are granted for non-fatal diseases, several longitudinal studies have found increased all-cause mortality rates among disability benefit recipients,[18] even after adjustment for long-standing illnesses.[19 20] Increased suicide rates are found among the both unemployed and disability benefit recipients, suggesting that stigma, social isolation and behavioural factors associated with being outside the work force may contribute to mortality.[21]

In contrast to the numerous people in receipt of disability benefit, the societal cost and the rhetoric, studies addressing if there are health changes (improvements or worsening) over the process of disability pension awards are remarkably scarce. Ideally, experimental methods would be the method of choice, but render ethically unfeasible in this context. A prospective case-control study with several repeated measures over more than a decade (over the process of disability pension award) could be an alternative. However, if such data were to be collected, learning effects and selective attrition would delimit causal assumptions. As a first empirical approach to elucidate possible changes in health status over the process of disability pension award, we aimed at using existing data resources to compare health status across groups of recipients in their stages before, during and after disability pension award.

METHODS

Population, data material and design

The Hordaland Health Study 1997-1999 (HUSK) was a joint epidemiological research project carried out by the National (Norwegian) Health Screening Service in collaboration with the University of Bergen. The base population included 29 400 individuals in Hordaland County in western Norway born 1953-57, aged 40-47 at the time of the data collection. Data were collected by questionnaires and clinical examinations. A total of 18 581 (8 598 men and 9 983 women) both answered the first questionnaire and came to the clinical examinations, yielding a general participation rate of 63 % (57 % for men and 70 % for women).

By using the personal identification number, the health survey was linked to official records on disability pensions covering the period of January 1992 to December 2004 from the National Insurance Administration (NIA). The disability pension scheme provides economic security, potentially given until retirement age is reached. Once granted such benefits, less than ten percent ever return to work.[22] The records are based on monthly payments, and the accuracy of the registries is well documented.[23] Dates of entry, exit and any adjustments in diagnosis, degree of coverage or type of benefit is registered and allow for precise calculations of benefit spells. After removing all who first received a disability pension more than seven years before or after participation in the health study, our sample numbered 18 251. Other economically inactive persons (e.g. unemployed) may become eligible for disability pension award at a later stage, and were therefore retained in the sample.

Assuming that recipients of disability pensions were comparable within the period from 1992-2004, we compared scores on health at different stages before and after disability pension award, conceptualized here as an exposure event. For all disability pensioners, we calculated the time interval between their award and date of participation in the health survey. We categorized them according to the corresponding positive or negative time lags: Group *7-3 before* had their health measured seven to three years before being awarded a pension. The groups *3-1 before* and *1-0 before* comprised those measured three to one and one to nil years before the award, while groups *0-1 after, 1-3 after* and *3-7 after* had their health measured the corresponding number of years after being awarded a disability pension. Between these six groups, we compared estimated means on the health variables. From health-survey invitation dates, we could also assess participation rates across the groups.

Outcome measures (variable name in *italics*)

Three aspects of health were measured: physical conditions, somatic and mental symptoms and impairment:

Physical conditions

Questions on *somatic diagnoses* were framed in the form of: "Do you have or have you had (one of the following), coronary infarction, stroke, diabetes, asthma, multiple sclerosis, chronic bronchitis, osteoporosis, or fibromyalgia." In addition, participants were asked if they had taken any medication the previous day, and if so, for which condition. From these responses, a team of physicians produced ICPC-diagnoses according to ATC-classifications,[24] and formed a continuous variable of current number of *prescribed medications.*

Mental symptoms

Anxiety and depression symptoms were assessed with the fourteen item Hospital Anxiety and Depression Scale (HADS).[25] The HADS-scores are used as continuous variables, reflecting *anxiety* and *depression* symptom load. Information on *sleep problems* in the last 30 days was self-reported on a four point Likert scale.

Somatic symptoms

Participants were also asked about frequency of seventeen common somatic symptoms in different organ systems in accordance with the ICD-10 research criteria for F45.0 Somatization disorder,[26] with ordinal scale labels of; "almost never, rarely, sometimes, often, and almost always". Responses of "almost always" were counted and accumulated in the variable *somatic symptoms*. In addition, participants were asked if they had been troubled with muscle pain and/or stiffness in muscles or joints continuously for over three months during the last year. If yes, they were asked to denote how many areas/joints were involved, reflecting *pain distribution*.

Impairment (SF12)

Impairment was measured using the self report Short Form-12.[27 28] Weighted summation provides a summary mental component score *(MCS)* and physical component score (*PCS*). The measurement has been standardized according to US norm data,[28] with a mean score of

50 (SD 10). Missing imputation was performed in accordance with a previous study on the same data material.[2]

Statistical analysis and models

To ease comparison, all these variables were transferred to Z-scores in the entire sample, where mean equals zero, and a standard deviation equals one. Across all variables, higher scores express poorer health states. To achieve this, the MCS and PCS Z-scores were multiplied with (-1).

Mean values (95 % Confidence Intervals (CI)) on the measured health variables were compared across the groups as identified by time between pensioning and health survey participation (figures 1, 2 and 3). To test significance of deviations from linearity between health and time intervals, we predicted each variable in a linear regression model, using time between benefit and health survey participation as a covariate and examined p-values after adding the time-by-time term in model 2. In a post-hoc analysis, excluding the differences immediately around the time of the award, we examined pre-post differences in direct comparisons of the groups *7-3 before* and *3-7 after* in independent sample t-tests.

Ethics

The study protocol was approved by the Regional Committee for Medical Research Ethics, Western Norway and by the Norwegian Data Inspectorate.

RESULTS

Comparison of disability pensioners to the rest of the population

From January 1992 to December 2004, 1 087 (5.9 %) of the participants were awarded a disability pension at a mean age of 44.2. Those awarded disability pensions were very slightly older, more often female, and less educated than the remaining sample (table 1, left part). The six strata of individuals awarded disability pension before and after the health screening were similar with regard to age, gender and educational level at the time of the health survey (table 1, right part).

Age at disability pension (all subgroups, defined by temporal proximity to the disability pension award, combined) varied across the strata as a consequence of the study design (p<0.001, table 1). There was also some variation in the size of the various strata included, and the participation rate (p<0.01).

Those awarded disability pension had generally poorer health than the remaining sample, both before and after disability pension award (table 2, left part). The strongest group differences were found in impairment and symptoms (z-score differences within range 0.58 and 1.43, all p<0.001), but was also found for physical conditions (range 0.40 to 0.47, both p<0.001).

Pattern of health status across the strata

The level of somatic and mental symptoms was higher in the groups closer to time of disability pension award (figure 2). This non-linear inverse U-shaped trend observable across the strata was statistically significant for all symptoms (pain distribution, somatic symptoms, anxiety symptoms, depression symptoms, and sleep problems, all p<0.01). The level of symptoms 3-7 years after was similar to 3-7 before disability pension award for all symptom scores (p>0.05) except sleep-problems which were reported half a standard deviation higher in the group 3-7 years after (p<0.001).

A non-linear trend across the strata was also found for impairment, however with a more rapid reduction apparent in the strata 0-1 year after disability pension award (p<0.001, figure 3). The level of physical impairment was however still higher 3-7 years after disability pension award compared to 3-7 years before (p<0.001, table 2).

No similar non-linear trend was found for physical conditions, neither in the case of somatic diagnoses nor prescribed medication (figure 1). There was a tendency of reporting more pathology after disability pension award, but this was only significant for prescribed medication ($p < 0.05$, table 2).

DISCUSSION

Main findings

Disability pensioners reported more physical conditions, somatic and mental symptoms, and impairment than the remaining sample, across all strata defined from seven years before to seven years after disability pension award combined. The levels of physical conditions were relatively similar across the strata defined by temporal proximity to the disability pension award, though with an increase in reported use of prescribed medication after the award. However, for symptoms and impairment, we found an inverse U-shaped trend when comparing the strata in chronological order across stages of the disability pension process, with highest levels of health problems at time of award and better reported health status afterwards. For most measures, the level of health problems was equal 3-7 years before compared to 3-7 years after the award, the exceptions being an increase in prescribed medication, more sleep problems, and more physical impairment.

Strengths and limitations

Participants had their health measured in a context separate from eventual applications of disability pension award. This should reduce the problem of instrumental and incentive-based reports of health problems. The information on benefits was collected from accurate registries of disability pension award, and misclassification is unlikely. During the study period, there was no major change in disability policy likely to alter the health profiles of disability pensioners. Changes in disability pension influx over this period has been marginal in the age group of interest in this study.[29] The health information was gathered as part of a large population based study in an area covering both urban and rural areas. Finally, the majority of the variables in the survey are measured employing widely used inventories with well documented psychometric properties.

The limitations of the study mostly apply to design issues, in particular the possibility of selection bias, as we assume that disability pensioners were comparable over this era. With the exception of age (which divergence was a resultant of the study design) the participants in the different strata did not differ significantly in terms of demographics. In general, the attrition rate was higher among those awarded disability pension during the observational period compared to the general population. Attrition rate was further elevated among those invited around the time of their disability pension award. These candidates may already have

been in frequent touch with health services, and consider the "health check-up" less useful. Health selection can however not be excluded. Both psychiatric morbidity[30] and mortality[31] is higher among non-participants in general. Combining an increased propensity to not participate if your health is poor and also if you have been awarded benefits, we risked sampling the healthier disability pensioners. This would lead us to underestimate the overall magnitude of health problems among disability pensioners compared to non-pensioners.

More importantly, participation rate also varied significantly across the strata, potentially challenging the presumption of strata comparability. To the degree that health selection was present, the higher proportion of non-responders around the time of disability pension award would in particular result in a reduce reporting of health problems in these strata (1-0, 0-1). As a result, the inverse U-shape observed across the strata might be deflated and result in an underestimation of the non-linear trends.

Interpretation

Given that the strata are comparable, there are several ways to understand the observed differences in health status across the strata, and the following explanations are not mutually exclusive:

1) Are disability pensions awarded at the peak of health problems?

Many of those yet to be awarded their pension may not have developed health problems in full when participating in the health survey. The increase in symptoms and impairment in the groups closer to the award may thus be caused by conditions with progressing severity, increasingly causing work-related disability, and the eventual pension award. At first glance, this is consistent with the repeated finding of increased mortality amongst disability pensioners.[19] [20] However, this increased mortality remains after adjusting for morbidity, indicating presence of other malign factors than physical conditions in disability pensioners. Also, many of the conditions for which disability pension are awarded (e.g mental and musculo-skeletal disorders) are chronic and fluctuant, which might reduce the relevance of this explanation. The latter is congruent with an observed degree of disassociation between the reported number of physical conditions and the level of symptoms and impairment.

Furthermore, the point at which disability pensions are awarded should by definition coincide with poor health. If the award is given at a peak during the course of illness, it is likely that as a whole, the population's experience of morbidity would lessen from this point.

However, the lack of a corresponding increase in physical conditions, as shown in figure 1, contradicts this interpretation.

2) Are the observations caused by detrimental work place factors?

Another set of explanations might be that work place factors cause health problems, and that these deteriorate health and increases symptoms until disability pension is awarded. If so, the award would then remove the individuals from these exposures, and allow health to improve. However, in the period leading up to disability pension award, most are in rehabilitation and/or on sick leave spells and already removed from harmful workplace exposure.[32]

In interrupted time series designs, abrupt shifts after an intervention indicate an effect of the intervention.[33] Although features of our study do deviate from such a design, the sudden decreased impairment (PCS and MCS) could indicate a beneficial effect of removal from a role where the individual is struggling. In addition, the observation of a more gradual decline in symptoms in the groups further after the award, is in line with an interpretation of the award having a positive effect or at least ending a period of enhanced stress.

3) Can features of the disability pension process affect health?

The observations could be seen as compatible with a general beneficial effect of the disability benefit award on health. The trend of increased health problems towards time of the award, and a subsequent lower reporting of health problems after the award could be explained as an artefact of features brought on by the disability pensioning process. Models on stress and disease, as those briefly described in the introduction, describe plausible mechanisms, given that prospects of labour market exit, financial insecurity and health problems are considered as sufficient stressors.

Several meta-studies have demonstrated that financial compensations for disease or injury and related impairment worsen outcomes or prognosis of treatment.[34-36] We cannot exclude the relevance of similar processes in relation to disability pension award. Thus, whether conscious or unconscious, symptom amplification to increase the likelihood of receiving a disability pension may explain part of the observed general increase towards the award, and the subsequent reduction.

Floderus et al. found largely negative effects of being awarded benefits, particularly in sleep quality and subjective well-being.[17] In the present study only sleep problems and physical impairment are reported as higher compared to a corresponding number of years before being awarded a disability pension. Leaving work and entering the benefit system may

covertly decrease daily levels of activity, possibly accounting for the long term poorer physical health related quality of life score.

Implications

Across observations seven years before to seven years after award of disability pension, recipients report much poorer health than the remaining participants from this 40-47 year old population. This underlines the chronicity of health problems in this group. As discussed above, design limitations preclude any conclusions regarding causality. However, if the observations are a result of the disability pension process, they are relevant for policy. First, in terms of doctors' efforts to apply certification criteria, it is hard to imagine how temporary changes possibly caused by the award process itself can be separated and subtracted from work impairment attributable to the underlying medical problem. Further, the potential positive effects of rehabilitation delivered up towards the time of the award might be countered by this negative trajectory.

Finally, there is currently a shift away from permanent benefits, and towards temporary benefits with scheduled evaluations at fixed intervals.[6] If the process induces insecurity that potentially translates into reduced health status, this policy change may have unintended negative effects on subjects' health by repeatedly exposing people to the stressors and loss of health associated with the process. Evaluations of work capacity must be contextualized such that improvements in work capacity can be identified without the by-product of increasing health problems, whatever the underlying cause.

Competing interest statement

All authors declare that the answer to the questions on your competing interest form are all No and therefore have nothing to declare".

Ethical approval

The study protocol was approved by the Regional Committee for Medical Research Ethics, Western Norway and by the Norwegian Data Inspectorate.

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Table 1 – Participation rate, gender, education and age compared between those with and without disability pension (DP) awards, and across strata of disability pension recipients

Variable	No Disability pension (n=17 164)	Disability pension (n=1 087)	Sig.*	7-3 years before (n=393)	3-1 years before (n=228)	1-0 years before (n=86)	0-1 years after (n=76)	1-3 years after (n=146)	3-7 years after (n=158)	Sig.*
Participation rate (%)	64.9	49.3	p<0.001	54.6	50.8	45.3	40.5	47.1	44.9	p=0.003
Female Gender (%)	52.8	67.3	p<0.001	66.2	75.0	66.3	59.2	67.1	63.9	p=0.091
Education (%)			p<0.001							p=0.322
Primary	17.6	35.9		37.7	32.5	24.4	46.1	37.0	36.7	
Secondary	46.1	44.9		42.7	44.7	55.8	39.5	48.6	43.7	
1-3 years higher	19.2	10.9		11.2	14.5	10.5	7.9	6.2	11.4	
≥ 4 years higher	17.1	8.3		8.4	8.3	9.3	6.6	8.2	8.2	
Mean age at HUSK (SD)	42.57	42.78	p<0.001	42.73	42.89	42.95	42.39	42.73	42.85	p=0.128
Mean age at DP (SD)	-	44.21	-	47.79	45.45	44.08	42.43	41.34	39.04	p<0.001

* Significance tested with t-tests for continuous measures and chi-square for categorical measures

Table 2 – Health variable z-scores compared across those with and without pension award, tests of differences 3-7 years before/ 3-7 years after and non-linearity of trends.

Variable	All participants			Within Disability Pensioners			
	No Disability Pension	Disability Pensioners	Difference*	Z-score 3-7 years before	Z-score 3-7 years after	Sig.	Test of non-linearity
Physical conditions							
Somatic Conditions	-0.03	0.50	0.47	0.37	0.60	p=0.131	p=0.555
Prescribed Medication	-0.03	0.43	0.40	0.22	0.59	p=0.046	p=0.788
Symptoms							
Pain Distribution	0.20	1.55	1.35	1.34	1.27	p=0.664	p<0.001
Somatic Symptoms	-0.06	0.94	0.88	0.45	0.66	p=0.629	p<0.001
Anxiety Symptoms	-0.04	0.62	0.58	0.51	0.58	p=0.618	p=0.047
Depression Symptoms	-0.04	0.65	0.61	0.45	0.66	p=0.124	p=0.016
Sleep Problems	-0.05	0.78	0.73	0.49	1.03	p<0.001	p=0.004
Impairment							
MCS (SF-12)	-0.04	0.66	0.62	0.51	0.73	p=0.106	p=0.444
PCS (SF-12)	-0.10	1.53	1.43	1.10	1.62	p<0.001	p<0.001

* For all variables, z-score difference between disability pensioners and rest of sample, p<0.001

Figure 1 – Variations in prescribed medication and somatic diagnoses by temporal proximity to disability pension award. Estimated means with 95 % Confidence Intervals
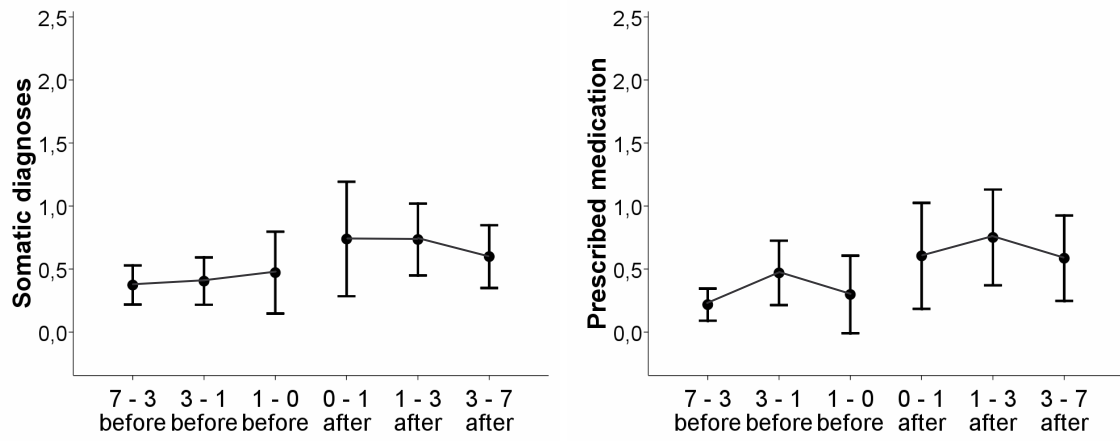
Figure 2 – Variations in symptoms by temporal proximity to disability pension award.
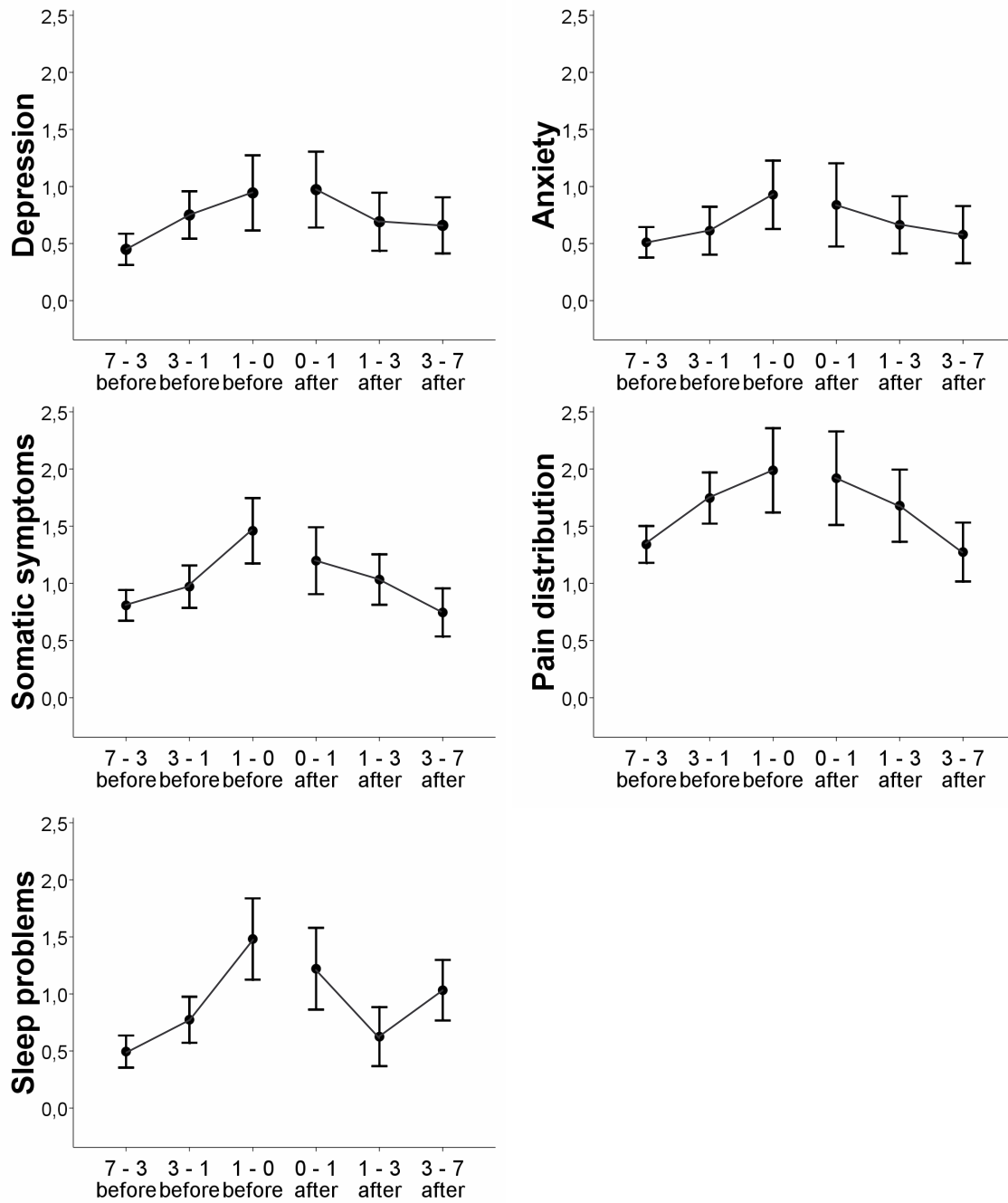Estimated means with 95 % Confidence Intervals

Figure 3 – Variations in perceived physical and mental health by temporal proximity to disability pension award. Estimated means with 95 % Confidence Intervals