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Do positive psychosocial work factors protect against two-year incidence of long-term sickness absence among employees with and without depressive symptoms? A prospective study

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Running head: Positive psychosocial factors and long-term sickness absence

Fehmidah Munir<sup>1</sup>, Hermann Burr<sup>2</sup>, Jørgen Vinsløv Hansen<sup>2</sup>, Reiner Rugulies<sup>2</sup>, Karina Nielsen<sup>2</sup>

<sup>1</sup>Work and Health Research Centre

School of Sports, Exercises and Health Sciences

Loughborough University

Loughborough

Leicestershire LE11 3TU

U.K.

<sup>2</sup>National Research Centre for the Working Environment

Lersø Parkallé 105

2100 Copenhagen

Denmark

Corresponding author: Fehmidah Munir, Work and Health Research Centre, School of Sports, Exercises and Health Sciences, Loughborough University, Loughborough, Leicestershire LE11 3TU, U.K. Email: [f.munir@lboro.ac.uk](mailto:f.munir@lboro.ac.uk). Tel: +44 (0)1509 228228 Fax:+44 (0)1509 226301

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## **ABSTRACT**

**Objective:** This study sought to examine the influence of protective work factors on long-term sickness absence among employees reporting different levels of depressive symptoms in a representative sample of the Danish workforce.

**Methods:** Questionnaire data was collected from a random sample of members of the Danish workforce aged 18-64 using data from two surveys with baselines in 2000 and 2005. From the year 2000 baseline questionnaires from 5510 employees (2790 male and 2720 female) were included and from the 2005 baseline, 8393 employees (3931 male and 4462 female). Baseline data were collected on depressive symptoms, leadership, colleague support and decision latitude. Information on two-year incidence of sickness absence was derived from an official register.

**Results:** Stratified analyses on depressive symptoms scores (none, moderate and severe) indicate that quality of leadership was associated with reduced sickness absence to a somewhat stronger degree for those with moderate depressive symptoms (adjusted HR 0.88, 95% CI 0.78 to 0.98) than for those without depressive symptoms, and high decision latitude was associated with reduced sickness absence to a somewhat larger degree for those without depressive symptoms (adjusted HR 0.91, 95% CI 0.85 to 0.97) than for those with depressive symptoms. However, quality of leadership and decision latitude did not interact significantly with depressive symptom status.

**Conclusions:** Quality of leadership may protect against long-term sick leave to a certain degree in those with moderate depressive symptoms. Possible interactions between psychosocial working conditions and depression status should be investigated in larger populations.

Word Count: 245

Depression is one of the main causes of sickness absence and work disability in Western countries,[1] and evidence suggests that poor working conditions might contribute to both depression[2-8] and sick leave.[9-16] For example, it has been shown that psychosocial work factors such as lack of quality of leadership,[13] low decision latitude,[14, 15] high work demands[11] and low social support[11, 14] are related to increased long-term sick leave. Psychosocial risk factors such as high psychological demands, low job control and low social support at work have also been prospectively associated with risk of depression. [2, 3] Moreover, some studies have demonstrated that risk of depression is increased by effort-reward imbalance,[17] job insecurity[5] and poor leadership quality[18]. Furthermore, severe depressive symptoms are reported as risk factor for long-term sick leave,[19] and disability pensioning[20]and a recent study has shown high job strain and low job control to be directly related to long-term sick leave among those with depression.[12]

Relatively little is known about the effects of positive psychosocial work factors on depressive symptoms and absence. The notion ‘positive psychosocial factors’ is an approach to examining psychosocial work factors in a more positively orientated way which allows for more focused theory building and application of positive traits, behaviours and work characteristics towards mental ‘wellness’. [21, 22] It could be argued that positive psychosocial factors are a reversal of the negative ones however, it is unlikely that the same mechanisms that underlie employee ill-health also represent employee health and well-being.[23] Evidence for this comes from studies that have demonstrated that positive psychosocial factors can make a unique contribution to explaining variance in employee health outcomes over and above negative ones.[23] Thus, there is now an increasing, albeit slow, shift towards considering the influence of positive work factors on mental wellness”. [23, 24] Researchers now advocate it is important to identify the protective or positive

work factors that can influence sickness absence and poor health, so that they can be targeted as potential interventions. [25]

To our knowledge, no studies have investigated if certain positive aspects of the psychosocial environment, such as good leadership quality, high social support and high decision latitude, protect against long-term sick leave with individuals with different levels of depression (e.g. moderate versus high). In recent years there has been an increasing understanding of the impact managers play in ensuring employee health and well-being. Good leadership quality has been found to be related to increased psychological well-being and decreased sickness absence.[26] A recent study found that leaders that employ a visionary and supportive leadership style may reduce depressive symptoms in their employees.[27] Both line manager and co-worker support has also been linked to reduced risk for depressive symptoms[2] and protective against psychiatric sickness absence.[28] High levels of decision latitude are also reported to be protective of mental health.[4]. Warr[29] argued that individuals react differently to psychosocial work factors based on their existing levels of mental health. It may be that employees with moderate to high levels of depression may react differently to protective work factors, which may in turn, affect their absence behaviours differently. Therefore the aim of our study is to examine the interactive effects of baseline leadership quality, social support and decision latitude on one hand and ‘none’, ‘moderate’ and ‘severe’ depressive symptoms on the other on subsequent long-term sick leave. More specifically, we predicted that individuals with depressive symptoms will have a reduced risk for long-term sick leave if they experience good social support from colleagues, good leadership quality and high decision latitude.

## **METHODS**

### **Study population**

This study is based on an analysis of the DWECS/DREAM-database, which is a merger between the Danish Work Environment Cohort Study (DWECS) and the Danish Register of Marginalisation (DREAM). DREAM contains weekly information on granted sickness absence compensation for all citizens in Denmark. DWECS features two random samples of people from the working population aged 18-64 years living in Denmark, in 2000 10,719 people and in 2005 18,430 people, of which 8,070 people in 2000 (75%) and 11,457 in 2005 (62%) participated. Of these 5,603 (year 2000 baseline) and 8,622 (2005) were employees. There was an overlap of 3,142 persons who were included at both baselines. These cohorts were followed up in the DREAM register in the periods from 1 January 2001 to 31 December 2002 and from 1 January 2006 to 31 December 2007 respectively, in order to identify individuals who had been on full-time long-term sick leave. Observations with missing values on any of the variables included in the analyses (298 and 715 in 2000 and 2005 respectively), were excluded. Further, in the week prior to baseline 93 and 229 individuals respectively, were registered to be on sick leave. Therefore, the basis of the analyses in this paper is 5212 and 7678 observations (with an overlap of 2730 individuals) respectively, of the Danish workforce. They were followed in DREAM for 2 years.

### **Ethical considerations**

Questionnaire research in Denmark does not require approval by ethic committees and thus approval was not sought (Den Centrale Videnskabetiske komité, see <http://www.cvk.im.dk/cvk/site.aspx?p=119> for details). However, the study was approved by the Danish Data Protection Agency and followed the regulations for data storage and protection (Datatilsynet, see <http://www.datatilsynet.dk/english> for details). Also, before completing the

questionnaire, participants received information about the study and it was made clear that participation was voluntary.

### **Long term sickness absence**

Long term sickness absence was defined as sickness spells of at least 3 weeks in the DREAM database from January 1 2001 to December 31 2002 and January 1 2006 to December 31 2007.[30]

Individuals were identified for inclusion from their first spell of long-term sickness absence.

Sickness absence compensation is given to the employee after a fixed period of sickness absence (e.g. before April 2007: > two weeks; since June 2007: > three weeks) where the employer applies for a refund from the state. In this study, only those employees who have received sickness absence compensation have been included.

### **Independent Variables**

Sex and age were extracted from the register in October 2000 and October 2005. All other variables collected in 2000 and 2005 were from responses to postal questionnaires or telephone interviews on the respondents' home phone. In the following description, all scales had values from 0 to 4.

### **Depressive symptoms**

Depressive symptoms were measured by means of the five-item Mental Health Inventory (MHI-5 or MH5), a subscale of the Short Form SF-36 questionnaire. [31] The MHI-5 is used for measuring general mental health and depression,[19] and is considered to be appropriate for measuring severe depressive symptoms.[31, 32] Cronbach's alpha of the scale was 0.80, inter item correlations were 0.38-0.59. The responses to the individual items were summed and transformed into scores ranging from 0 to 4, with higher scores indicating more depressive symptoms. Cut-off points were chosen



depending on data collection method (telephone interview/postal questionnaire) as it has been shown that data collection method affects response patterns.[33] Depressive symptoms scale was stratified into three categories using cut-off points for moderate and severe depressive symptoms based on previous studies[32, 34]:\_None (telephone interview 4.00->3.36; questionnaire: 4.00->3.04), moderate (telephone interview: 3.36->2.08; questionnaire: 3.04->1.92), severe (telephone interview: 2.08-0; questionnaire: 1.92-0)).

### **Quality of leadership**

Quality of leadership was measured by means of the following questions from the Copenhagen Psychosocial Questionnaire (COPSOQ)[35]: ‘To what extent would you say that your immediate superior’ – ‘makes sure that the individual member of staff has good development opportunities?’, ‘gives high priority to job satisfaction?’, ‘is good at work planning?’, ‘is good at solving conflicts?’ with the response options (and values for the scale): ‘To a very large extent’ (4), ‘To a large extent’ (3), ‘Somewhat’ (2), ‘To a small extent’ (1), ‘To a very small extent’ (0) and were combined into a scale with values from 0 to 4. Chronbach’s alpha of the scale was 0.88, inter item correlations were 0.57-0.69.

### **Social support from colleagues**

Social support from colleagues was measured by means of two COPSOQ[35] questions ‘How often do you get help and support from your colleagues?’, ‘How often are your colleagues willing to listen to your work related problems?’ – with the response options (and values for the scale): ‘Always’ (4), ‘Often’ (3), ‘Sometimes’ (2), ‘Seldom’ (1), ‘Never/hardly ever’ (0). Chronbach’s alpha was 0.84, inter item correlation was 0.72.

### **Decision latitude**

Decision latitude was calculated as a mean of the four COPSOQ[35] items ‘Do you have a large degree of influence concerning your work?’, ‘Do you have a say in choosing with whom you work?’, ‘Can you influence the amount of work assigned to you?’, ‘Do you have any influence on WHAT you do at work?’ – with the response options (and values for the scale): ‘Always’ (4), ‘Often’ (3), ‘Sometimes’ (2), ‘Seldom’ (1), ‘Never/hardly ever’ (0). Cronbach’s alpha of the scale was 0.79, inter item correlations were 0.44-0.56.

### **Occupational physical activity**

Occupational physical activity was measured by one item ‘How would you describe your physical activity at your main job?’ with the response options (and values for the scale): ‘Mostly sedentary work that does not require strenuous physical activity’ (0), ‘Mostly work while standing or walking but does not require strenuous physical activity’ (1 1/3), ‘Work while standing or walking with some lifting and carrying’ (2 2/3) and ‘Heavy or fast moving work that is physically strenuous’ (4).

### **Statistical analysis**

Cox regression analysis was carried out with time to first incidence of long-term sickness absence as the dependent variable. Those who retired, entered an early retirement pension scheme, emigrated or died during the two-year period were censored at the time of the event. This was the case for 415 observations. Due to the overlap of persons included in both the 2000 and the 2005 baseline, a frailty term was added to the Cox regression model to account for correlation between observations on the same individual.

First, a regression analyses was carried out to examine the association between the three psychosocial work factors and long-term sickness absence for the entire study sample regardless of

depressive symptoms. Second, an analysis examining the interactions between depressive symptoms and each of the psychosocial work factors was carried out. Third, analyses stratified by depressive symptoms (none, moderate and severe) were carried out in order to examine the associations between protective work factors and sickness absence by level of depressive symptoms. In all analyses, gender, age, occupational physical activity status and data collection method (e.g. questionnaire or interview) were controlled for. All analyses were conducted using the statistical programming language R.[36]

## **RESULTS**

Table 1 presents the characteristics of the participants by sickness absence and by depressive status. Respondents without depressive symptoms reported higher levels of three positive work factors (quality of leadership, social support and decision latitude) than their counterparts with depressive symptoms. Table 2 reports the association between each psychosocial factor and long-term sickness absence for the entire study sample. Increased quality of leadership and decision latitude were both associated with reduced long-term sick leave.

The p-values for testing the interaction between the psychosocial work factors and depressive symptoms are presented in the last column in Table 3. None of the three psychosocial work factors interacted with depressive symptoms status. For our final set of analyses, Table 3 also shows the associations between each of these work factors and long-term sickness absence divided by employees reporting no, moderate and severe depressive symptoms. For those with moderate depressive symptoms (n = 2849) increased quality of leadership is associated with reduced sickness absence. High decision latitude is associated with reduced sickness absence for employees with no

depressive symptoms (n = 9725). However, none of the three psychosocial factors interacted with depressive symptoms status.

## **DISCUSSION**

The findings from this prospective study show that there is a significantly increased beneficial effect of quality of leadership among those with moderate depressive symptoms; and a non-significant tendency among those with severe depressive symptoms. In contrast, decision latitude seemed only beneficial among those without depressive symptoms. However, the study did not find any significant interactions between depressive symptom status on the one hand, and quality of leadership, social support or decision latitude on the other hand. This suggests that the risks (or benefits) for these psychosocial factors in the three strata are not significantly different from each other and that there may be common characteristics across the three groups. This requires further exploration.

The findings indicate that leadership quality plays an important role. Note, that in the present study, leadership quality is measured by means of four items, dealing with the nearest leaders' ability (1) to solve conflicts, (2) to plan work, (3) to prioritize well-being and to (4) ensure development opportunities. It seems reasonable to expect that a leader who structures an employee's working environment may help vulnerable employees to stay at work by influencing their perceptions of work and/or level of stress and health they experience.[37] Our findings indicate that quality of leadership may not influence healthy workers in reducing their long-term sickness absence. For those with depressive symptoms, quality of leadership has some influence, but we do not know the mechanism by which quality of leadership influences sickness absence for those employees: i.e. by influencing employees' behaviours related to sickness absence or by influencing their health which subsequently influences sickness absence. There is some evidence for the latter suggestion in that a

transformational leadership style has been found to reduce depressive symptoms.[27] It may be that through raising job satisfaction, ensuring work is planned well and resolving arising conflicts, these leadership qualities influence both health and sickness absence in some way. Further prospective studies are required to examine these hypotheses.

The quality of leadership results reflect the findings reported in other studies that report good quality leadership is associated with a decreased risk of sickness absence[26] as well as those that report low leadership quality to be a risk factor for long-term sickness absence.[14] By stratifying depressive symptoms our study has shown how quality of leadership makes a significant difference to sickness absence for those reporting moderate depressive symptoms. This significance was not found for those reporting either no depressive symptoms or severe symptoms. To our knowledge, this is the first study testing the relationship between *positive* work factors and depressive symptoms in this way.

Contradictory to other studies,[15, 28] this study does not find that high co-worker support protected against subsequent long-term sickness absence in our sample. However, our results are in line with a recent study,[12] that also found no association between social support and sickness absence related to depressive symptoms, indicating that other positive psychosocial work factors may be more important.[15, 38] The finding that these two kinds of support predict an outcome differently has also been shown in a study with depression as outcome, where lack of supervisor support predicted depressive symptoms, but not lack of co-worker support.[39]

We found that high decision latitude is a protective factor against long-term sickness absence among those who do not report depressive symptoms. To our knowledge, only one other study

examined decision latitude and reported low job control as a risk factor for long-term sickness absence in those with depression,[12] a finding that supports the studies on low decision latitude and sickness absence in the general workforce [10, 12, 40] as well as the literature on the association between low decision latitude and depression.[2] However, this is not the case and it might be that employees need some personal resources to exploit the benefits of decision latitude, personal resources which are not at hand when being moderately depressed.[41 42]

This study has a number of strengths. First, its longitudinal nature of the study strengthens the validity of the results. Second, the use of official registers to obtain sickness absence data means that our sickness absence data are more reliable and accurate than self-report data. [30] Third, the study uses representative sample of the Danish workforce which makes the study findings generalizable. However, there are a number of limitations which must be considered when interpreting the results. First, depressive symptoms are assessed by a questionnaire or by telephone interview and not by diagnostic interview. It has been found that using the cut-off point for severe depression as done in this paper, one finds that 50% are cases with depression.[43] Future studies should incorporate better data on depression such as more detailed self-reported data or clinical diagnoses.[44] Second, recognizing that other factors can contribute toward long-term sickness absence, we included a number of control variables in our study (age, gender, occupational physical activity). However, other socio-demographic, individual and work-related factors associated with long-term sickness absence were not controlled for.[45, 46, 47] Therefore, our findings should be interpreted with caution. Third, as the present study is based on a representative working population, the group of people with moderate as well as severe depressive symptoms was relatively small. Therefore, there was not sufficient statistical power to detect possible interactions in these strata. However, the effect size was larger in the latter group than for those with moderate

depression, suggesting a confounded P value. There is now a strong discouragement in the reporting of confounded P values with more emphasis on the precision of the estimate such as reporting a confidence interval level around the estimate of effect.[48] It could be argued that the groups with moderate and severe depressive symptoms should be combined in the stratified analysis. However, the ‘severe’ category is considered to be a good proxy for clinical depression [31, 32]. If we collapsed the two groups, it would not be possible to detect patterns of association in psychosocial work characteristics in these two different groups. For example, establishing a sub-clinical group with the label ‘moderate’ allows us to test whether sub-optimal states of mental health might interact with the work environment differently to severe depressive symptoms.

To conclude, the study findings might suggest that quality of leadership can protect against long-term sick leave among those with depressive symptoms and that decision authority can protect against long-term sick among those without depressive symptoms. It may be that leadership quality facilitates a structured environment thus limiting the use of personal resources for those employees with depressive symptoms. Our results seem to indicate the importance of closely monitoring depressive symptoms among workers in order to adjust the working conditions to fit their needs. It would appear that workers with depressive symptoms are particularly at risk for sickness absence if their managers are not supportive and if they are in a poorly structured environment. Monitoring depressive symptoms may help managers and organizations to target ‘at risk’ groups. Furthermore, our results indicate that clinicians need to pay heed to the protective qualities of the working environment of sickness absence among workers with depressive symptoms. Finally, policy makers should promote risk assessments which include the monitoring of depressive symptoms and support workplace adjustments to fit the needs of at risk groups. Future research should examine more

closely how different positive work factors affect severity of depressive symptoms in populations with more people with depressive symptoms.

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## References

- [1] Hensing G, Wahlström R. Sickness absence and psychiatric disorders. *Scand J Public Health* 2004; 32: 152-163.
  
- [2] Netterstrom B, Conrad N, Bech P, Fink P, Olsen O, Rugulies R et al. The relation between work-related psychosocial factors and the development of depression. *Epidemiol Rev* 2008; 30:118-132.
  
- [3] Bonde JP. Psychosocial factors at work and risk of depression: a systematic review of the epidemiological evidence. *Occup Environ Med* 2008; 65: 438-45.
  
- [4] Stansfeld SA, Fuhrer R, Shipley MJ, et al. Work characteristics predict psychiatric disorder: prospective results from the Whitehall II study. *Occup Environ Med* 1999; 56: 302–307
  
- [5] Rugulies R, Bultmann U, Aust B, et al. Psychosocial work environment and incidence of severe depressive symptoms: prospective findings from a 5-year follow-up of the Danish Work Environment Cohort study. *Am J Epidemiol* 2006; 163: 877-887.
  
- [6] Wang J. Work stress as a risk factor for major depressive episode(s). *Psychol Med* 2005; 35: 865-871.
  
- [7] Niedhammer I, Goldberg M, Leclerc A et al. Psychosocial factors at work and subsequent depressive symptoms in the Gazel cohort. *Scand J Work Environ Health* 1998; 24: 197-205.

- [8] Magnusson Hansson LL, Theorell T, Bech P et al. Psychosocial working conditions and depressive symptoms among Swedish employees. *Int Arch Occup Environ Health* 2009; 82: 951-960.
- [9] Labriola M. Conceptual framework of sickness absence and return to work, focusing on both the individual and the contextual level. *Work* 2008; 30: 377-87.
- [10] Voss M, Floderus B, Diderichsen F. Physical, psychosocial, and organisational factors relative to sickness absence: a study based on Sweden Post. *Occup Environ Med* 2001; 58: 178-184.
- [11] Nielsen ML, Rugulies R, Christensen KB, et al. Psychosocial work environment predictors of short and long spells of registered sickness absence during a 2-year follow up. *J Occup Environ Med* 2006; 48: 591-598.
- [12] Clumeck N, Kempnaers C, Godin I et al. Working conditions predict incidence of long-term spells of sick leave due to depression: results from the Belstress I prospective study. *J Epidemiol Community Health* 2009; 63: 286-292.
- [13] Lund T, Labriola M, Christensen KB, et al. J Psychosocial work environment exposures as risk factors for long-term sickness absence among Danish employees: results from DWECS/DREAM. *Occup Environ Med* 2005; 47: 1141-1147.

- [14] Väänänen A, Toppinen-Tanner S, Kalimo R, et al. Job characteristics, physical and psychological symptoms, and social support as antecedents of sickness absence among men and women in the private industrial sector. *Soc Sci Med* 2003; 57: 807-824.
- [15] Labriola M, Lund T, Burr H. Prospective study of physical and psychosocial risk factors for sickness absence. *Occup Med* 2006; 56: 469-74
- [16] Munch-Hansen T, Wieclaw J, Agerbo E et al. Global measure of satisfaction with psychosocial work conditions versus measures of specific aspects of psychosocial work conditions in explaining sickness absence. *BMC Public Health* 2008 8:270.
- [17] Kivimaki M, Vahtera J, Elovainio M et al . Effort-reward imbalance, procedural injustice and relational injustice as psychosocial predictors of health: complementary or redundant models? *Occup Environ Med* 2007; 64:659-665.
- [18] Ylipaavalniemi J, Kivimaki M, Elovainio M et al. Psychosocial work characteristics and incidence of newly diagnosed depression: a prospective cohort study of three different models. *Soc Sci Med* 2005; 61: 111-122.
- [19] Bultmann U, Rugulies R, Lund T. Depressive symptoms and the risk of long-term sickness absence: A prospective study among 4747 employees in Denmark. *Soc Psychiatry Psychiatr Epidemiol* 2006; 41: 875-880.

- [20] Bultmann U, Christensen CB, Burr H et al. Severe depressive symptoms as predictor of disability pension: a 10-year follow-up study in Denmark. *Eur J Public Health* 2008;18: 232-234.
- [21] Walsh JP, Weber K, Margolis JD. Social issues in management: our lost cause found. *Manage* 2003; 29: 859-881.
- [22] Luthans F, Youssef CM. Emerging positive organizational behaviour. *J Manage* 2007; 33: 321-349.
- [23] Schaufeli WB, Bakker AB. Job demands, job resources, and their relationship with burnout and engagement: a multi-sample study. *J Org Behav* 2004; 25: 293-315.
- [24] Bakker AB, Schaufeli WB. Positive organizational behavior: Engaged employees in flourishing organizations. *J Org Behav* 2008; 29: 147-154.
- [25] Wynne-Jones G, Vamava A, Buck R et al. Examination of the work organization assessment questionnaire in public sector workers. *J Occup Environ Med* 2009; 51: 586-593.
- [26] Vahtera J, Kivimäki M, Pentti J et al. Effect of change in the psychosocial work environment on sickness absence: a seven year follow-up of initially healthy employees. *J Epidemiol Community Health* 2000; 54: 484-493.

- [27] Munir F, Nielsen K, Cameiro IG. Transformational leadership and depressive symptoms: A prospective study. *J Affect Disord* 2010; 120: 235-239.
- [28] Stansfeld SA, Rael EGS, Head J, et al. Social support and psychiatric sickness absence: a prospective study of British Civil Servants. *Psychol Med* 1997; 27: 35-48.
- [29] Warr, P. A conceptual framework for the study of work and mental health. *Work Stress* 1994; 8:84-97.
- [30] Hjollund NH, Larsen FB, Andersen JH. Register-based follow-up of social benefits and other transfer payments: accuracy and degree of completeness in a Danish interdepartmental administrative database compared with a population-based survey. *Scand J Public Health*. 2007; 35: 497-502.
- [31] Rumpf HJ, Meyer C, Hapke U et al. Screening for mental health: validity of the MHI-5 using DSM-IV Axis I psychiatric disorders as a gold standard. *Psychiatry Res* 2001; 105: 243-253.
- [32] Strand BH, Dalgard OS, Tambs K et al. Measuring the mental health status of the Norwegian population: a comparison of the instruments SCL-25, SCL-10, SCL-5 and MHI-5 (SF-36), *Nord J Psychiatry* 57: 113-118.
- [33] Feveile H, Olsen O, Høgh A. A randomized trial of mailed questionnaires versus telephone interviews: response patterns in a survey. *BMC Med Res Methodol*. 2007; 26:27.

- [34] Holmes WC. A short, psychiatric, case-finding measure for HIV seropositive outpatients: performance characteristics of the 5-item mental health subscale of the SF-20 in a male, seropositive sample. *Med Care* 1998;36:237–43.
- [35] Kristensen TS, Hannerz H, Hogh A et al. The Copenhagen Psychosocial Questionnaire--a tool for the assessment and improvement of the psychosocial work environment. *Scand J Work Environ Health* 2005; 31: 438-449.
- [36] R Development Core Team. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. 2008. URL <http://www.r-project.org/> (accessed July 2009).
- [37] Nyberg A, Westerlund H, Magnusson Hanson LL, et al. Managerial leadership is associated with self-reported sickness absence and sickness presenteeism among Swedish men and women. *Scand J Public Health* 2008; 36: 803-811.
- [38] Xie JL, Johns G. Interactive effects of absence culture salience and group cohesiveness: A multi-level and cross-level analysis of work absenteeism in the Chinese context. *J Occup Org Psych* 2000; 73: 31-52.
- [39] Rugulies R, Bültmann U, Aust B, Burr H. Psychosocial work environment and incidence of severe depressive symptoms: prospective findings from a 5-year follow-up of the Danish work environment cohort study. *Am J Epidemiol*. 2006 May 15;163(10):877-87.).

- [40] Andrea H, Beurskens AJHM, Metsemakers JFM, et al. Health problems and psychosocial work environment as predictors of long term sickness absence in employees who visited the occupational physician and/or general practitioner in relation to work: a prospective study. *Occup Environ Med* 2003; 60: 295-300.
- [41] Vahtera J, Pentti J, Uutela A. The effect of objective job demands on registered sickness absence spells: Do personal, social and job-related resources act as moderators? *Work Stress* 1996; 10: 286-308.
- [42] Mitchie S. Causes and management of stress at work. *Occup Environ Med* 2002; 59: 67-72.
- [43] Berwick DM, Murphy JM, Goldman PA, et al. Performance of a five-item mental health screening test. *Med Care* 1991; 29:169–176.
- [44] Bonde JP. Psychosocial factors at work and risk of depression: a systematic review of the epidemiological evidence. *Occup Environ Med* 2008; 65: 438-45.
- [45] Ala-Mursula L, Vahtera J, Linna A et al. Employee worktime control moderates the effects of job strain and effort-reward imbalance in sickness absence: the 10-town study. *J Epidemiol Community Health*, 2005; 59: 851-857.

[46] Kivimäki M, Vahtera J, Thomson L, et al. Psychosocial factors predicting employee sickness absence during economic decline. *J Appl Psychol* 1997; 82: 858-872.

[47] Kivimaki M, Vahtera J, Pennti J et al. Factors underlying the effect of organizational downsizing on health of employees: longitudinal cohort study. *BMJ* 2000; 320: 971-975.

[48] Lang JM, Rotham KJ, Cann I. That confounded P-Value. *Epidemiology* 1998; 9: 7-8.



**Table 1:** Baseline characteristics of participants

	Overall sample (n =12,890)		No depressive symptoms (n = 9,725)		Moderate depressive symptoms (n = 2,849)		Severe depressive symptoms (n = 316)		P value
	N	(%)	N	(%)	N	(%)	N	(%)	
Gender									
Male	6288	(48.8)	4978	(51.2)	1187	(41.7)	123	(38.9)	<0.0001
Female	6602	(51.2)	4747	(48.8)	1662	(58.3)	193	(61.1)	<0.0001
LTSA*	1740	(13.5)	1216	(12.5)	440	(15.4)	84	(26.6)	<0.0001
	Mean	(sd)	Mean	(sd)	Mean	(sd)	Mean	(sd)	
Age	40.7	(11.3)	40.9	(11.3)	39.9	(11.1)	39.9	(11.1)	=0.0001
Qual. of leadership	2.30	(0.88)	2.38	(0.85)	2.06	(0.87)	1.76	(1.03)	<0.0001
Social support	2.99	(0.87)	3.06	(0.84)	2.79	(0.91)	2.54	(1.06)	<0.0001
Decision latitude	2.03	(1.03)	2.09	(1.03)	1.87	(0.98)	1.45	(1.01)	<0.0001

\*Long-term sickness absence

**Table 2** Cox's regression of associations between protective psychosocial work factors and 2 year incidence of long-term sickness absence ( $\Rightarrow$ 3 weeks) in Danish employees in 2000 and 2005 workforce (n = 12,890)

	HR (95% confidence intervals)
Quality of leadership	0.91 (0.85 to 0.97)*
Social Support <sup>†</sup>	0.98 (0.92 to 1.04)
Decision Latitude	0.92 (0.87 to 0.97)*

Adjusted for age, gender, occupational physical activity and data collection method (questionnaire or interview). Person-id included as frailty, \*p<.05.

**Table 3:** Adjusted hazard ratios (95% confidence intervals) between protective psychosocial work factors and long-term sickness absence for depressive symptoms

	No depressive symptoms (n = 9725)	Moderate depressive symptoms (n = 2849)	Severe depressive symptoms (n = 316)	P value for interaction with depressive symptom status
	Adjusted HR (95% CI)	Adjusted HR (95% CI)	Adjusted HR (95% CI)	
Qual. of leadership	0.96 (0.89 to 1.03)	0.88 (0.78 to 0.98)*	0.85 (0.67 to 1.07)	0.40
Social support	0.98 (0.91 to 1.06)	1.02 (0.91 to 1.14)	1.07 (0.86 to 1.33)	0.57
Decision latitude	0.91 (0.85 to 0.97)*	0.98 (0.88 to 1.08)	1.03 (0.81 to 1.30)	0.32

Adjusted for gender, age, occupational physical activity, survey method. Person-id included as frailty.

\*p <.05.