# Job strain and depressive symptoms in men and women: a prospective study of the working population in Sweden

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## ABSTRACT

**Background** Several prospective studies have indicated increased risk of developing depressive symptoms in employees who report psychologically demanding and uncontrollable work (job strain). There are diverging findings regarding gender differences in this relationship. The aim was to analyse whether men and women differ with regard to the prospective relationship between adverse psychosocial work environment and depressive symptoms during a 2-year period.

**Method** The Swedish Longitudinal Occupational Survey of Health cohort based on representative recruitment of working men and women in Sweden was used. 2731 men and 3446 women had answered questions regarding work environment and mental health in 2008 and 2010. Psychological demands, decision authority, age and income as well as depressive symptoms in 2008 were used as predictors of depressive symptoms in 2010.

**Results** Women reported less decision authority at work and their demand level developed more unfavourably than did men's—resulting in increased job strain gap between men and women from 2008 to 2010. The relationship between demand and decision authority (and job strain) on one hand and depressive symptoms on the other hand was not statistically different in men and women.

**Conclusions** Overall, women reported higher levels of job strain than men. In Sweden, job strain was as strongly related to depressive symptoms among men as among women.

## INTRODUCTION

There is a growing literature indicating that high psychological demands and low decision latitude at work are related to increased risk of developing depression.[1 2] Since there is a higher prevalence and incidence of depression in women than men the question arises as to whether gender-related differences in psychological demands and decision latitude could contribute to the gender differences in depression. The variable 'psychological demands' corresponds mainly to work intensity. Decision latitude could be decomposed into decision authority (direct influence over work tasks) and skill discretion (influence over own skill development and in consequence thereof influence over the work process). For both components, men have typically reported better levels (higher decision authority and higher skill discretion) than women,[3–5] at least in studies of the general working population.

Since Karasek[6] published his demand control model, several gender-related studies of self-rated working conditions have been performed. These have shown that men and women in the working population mostly report similar levels of psychological demands but differ with regard to decision latitude. Other gender differences have also been reported. For instance, although psychological demands have been weakly but significantly correlated with both components of decision latitude in men, no such correlation has been observed in women in many previous studies.[4 6] A 'match' between demands and decision latitude should be expected.[3]

The Scandinavian labour market is extremely gender-segregated, horizontally and vertically. Horizontal segregation means that men and women work in different sectors with only 13% working in gender-equal sectors (defined as having 40–60% men and women).[7] While women dominate in care work, men dominate in manufacturing. Vertical segregation means that men dominate in leading positions. This gender segregated labour market means substantially different working conditions for women and men, usually to the disadvantage of women, in relation to work compensation (whether in the form of status or money), career opportunities and the presence of various ergonomic, physical and psychosocial risk factors (such as demand and control) in the workplace.

Very few prospective studies have specifically examined gender-related risk of depression associated with job strain and those published have shown conflicting results,[2 8–11] with some showing higher risk for men and others higher for women.

In the current article, the psychosocial work environment situation during the years 2008–2010 is described and also how it developed for men and women. The aim was to describe the extent to which possible gender differences were correlated with depressive symptoms in relation to the work environment. The psychosocial work environment was represented by perceived psychological demands and decision authority and by the combination of these factors.

## METHOD

### Setting

As indicated above, Sweden had a financially more turbulent period when data were collected during the spring 2010 than when it were collected in the spring 2008.

### Study population

Participants in the Swedish Longitudinal Occupational Survey of Health (SLOSH)[12] were

originally recruited from the Swedish Work Environment Survey (SWES) which is conducted biennially by Statistics Sweden (SCB) and consists of subsamples of gainfully employed people, aged 16–64 years, from the Labour Force Survey. The respondents to SWES 2003 and 2005 were invited to enrol in SLOSH 2008, for the second or first time. The data collection for the start of the current study was conducted in April–June (with a reminder in September resulting in a small addition of participants) in 2008 by SCB. A total of 18 639 individuals were mailed self-completion questionnaires. There were 11 441 (61%) respondents; 9756 of the respondents (85%) were gainfully employed (ie, responded to the questionnaire for those who worked on average 30% of full-time work or more, 12 h a week or more, during the past 3 months) and 1685 (15%) were 'not gainfully employed'.[13–16] The follow-up data collection was conducted in March–June 2010, and this time 10 078 (57%) individuals from SWES 2003 or 2005 responded. In the current study, only those who participated in 2008 and 2010 and were gainfully employed on both occasions have been included (n=6580). The proportion of men and women was 44% versus 56%. The mean age was 49 years and 80% were married or cohabiting. Women over 50 years of age and married were thus over-represented as compared to the entire population of SWES participants. There was an internal dropout between 1% and 3% for the questions included in the current study. Since non-responses do not necessarily overlap, this constitutes an additional loss of participants. Participants with internal dropout were excluded. In the end, 6177 (93%) (2731 men and 3446 women) participants were left for the prospective multivariate analyses.

### Measures

Depressive mood was assessed by means of a brief subscale of the (Hopkins) Symptom Checklist (SCL) depression scale including six items, The SCL-Core Depression (SCL-CD).[14 17 18] The items were selected based on clinical validity corresponding to the core symptoms in the Hamilton Depression Scale-D6 identified by experienced psychiatrists.[17] It has proved uni-dimensional implicating that the total score is a sufficient statistic for indicating the degree of depression severity.[14] It has also showed high correlation with other depression scales, such as the Center for Epidemiological Depression Scale (CES-D) and Major Depression Inventory.[14] It has six five-graded questions (total range 0–24). The distribution is slightly skewed. Psychological demands and decision authority were measured by means of the Swedish shortened version of the Demand-Control Questionnaire,[5 15 19] of the Job Content Questionnaire.[3 4] The demand score comprises five four-graded questions (range 5–20) and the decision authority score two four-graded questions (range 2–8). Both dimensions are close to normally distributed.

Decision latitude has originally been defined as the combination of skill discretion and decision authority. In Scandinavian countries,[15 19] the level of skill discretion has been increasing in the working situation during later decades according to national surveys. In some studies, high skill discretion could even be perceived as a psychological demand. This is not the case with decision authority which has decreased from the middle of the 1990s in our country. Therefore, we chose to focus on decision authority and not include skill discretion in the calculation of job strain. This has also been practiced in publications from the Whitehall II study.[1] Accordingly in this study job strain was constructed by means of the ratio between psychological demands and decision authority since we focused on the decision authority part of decision latitude. This job strain construction resulted in a ratio with a skewed distribution (tail to the right). Since this could give rise to overestimation of the true linear relationships the ratio was logarithmically transformed to provide a distribution as close as possible to a normal distribution. The resulting skewness was low (0.64 and 0.69 for men in 2008 and 2010 and 0.45 and 0.53 for women during the same years) indicating proximate normality of the distribution. Both demand and decision authority contributed to the logarithmised ratio (demand contributing 40–44% and decision authority 61–67%). In a ratio construction like this, the assumption of interaction between demand and decision authority is stressed. Participants with high demand and at the same time high decision authority could have the same ratio as participants with low demand and low decision authority level. The relationship between the two is determining the position and discrepancy between demand and decision authority weighs heavily.[19 20]

Economic status was represented by yearly income from work (in hundreds of Swedish crowns per year, from tax registry). Because the distribution was markedly skewed with a right-sided tail, elog transformation was used, range 0–8.23).

Age was included as a continuous variable.

All analyses were performed separately for men and women. The software was JMP10_99LT7Z_51302460_OSX_X86-64.

### Statistical methods

Gender comparisons using two-tailed unpaired t tests were made separately for all variables in 2008 and 2010. In addition, paired two-tailed t tests, 2008–2010, were made for depressive symptoms, psychological demands, decision authority and for job strain separately for men and women. The background variables age and ln income for participants in the present were normally distributed. All work environment measures for both years also showed close to normal distributions for both study years (skewness ranging from −0.68 to 0.60). The depressive symptom variable for 2008 and 2010 was slightly skewed (skewness 1.14 for 2008 and 1.19 for 2010) but was sufficiently close to normal distribution for linear regression analysis. Unadjusted linear regression coefficients were computed for the relationship between each of the variables' psychological demands, decision authority and job strain in 2008 on the one hand and depressive symptoms in 2010 on the other, separately for men and women. In the final step, these same linear regression coefficients were adjusted for age, income and depressive symptoms in 2008. Separate analyses were performed with demand and decision authority as predictors and another set of analyses with the combined measure (job strain) without its parts as predictor. Confounders were treated in the same way in the two sets of analyses.

An interaction term between gender and strain was created for the years 2008 and 2010, after centring to the means of the job strain measures by means of z transformation. In the linear regression analyses of depressive symptoms, a formal linear interaction test could, however, not be performed, since the interaction term and job strain were too highly intercorrelated (r=0.81).

Product moment correlations were computed between psychological demands and decision authority separately for men and women and for both study years. The rationale behind this is that, according to demand–control theory, increasing demands should be matched by increasing possibility for the employee to exert control over his/her work situation. A low correlation indicates a poor match and vice versa.

## RESULTS

Table 1 shows means and SDs for all variables in 2008 and 2010. For both years women had significantly lower decision authority and higher strain. In addition, women had

**Table 1** Means and SDs for the studied variables

| | Men | Women | p Value (difference) |
|---|---|---|---|
| *Means (SDs)* | | | |
| Age 2008 | 51.07 (11.33) | 49.93 (11.53) | <0.0001* |
| Age 2010 | 53.84 (11.17) | 52.29 (11.46) | <0.0001* |
| Depressive symptoms 2008 | 11.08 (4.98) | 12.03 (5.45) | <0.0001* |
| Depressive symptoms 2010 | 10.51 (4.66) | 11.88 (5.37) | <0.0001* |
| ln income 2008 | 5.74 (0.50) | 5.47 (0.49) | <0.0001* |
| ln income 2010 | 5.84 (0.52) | 5.55 (0.53) | <0.0001* |
| Demands 2008 | 13.33 (2.49) | 13.41 (2.70) | 0.129* |
| Demands 2010 | 12.80 (2.55) | 13.11 (2.77) | <0.0001* |
| Decision authority 2008 | 6.48 (1.40) | 6.17 (1.48) | <0.0001* |
| Decision authority 2010 | 6.33 (1.53) | 6.09 (1.54) | <0.0001* |
| Strain (ln demand/decision authority) 2008 | 0.73 (0.32) | 0.77 (0.36) | <0.0001* |
| Strain (ln demand/decision authority) 2010 | 0.72 (0.37) | 0.79 (0.40) | <0.0001* |
| *Depression*: Difference 2010–2008 men t=−4.24 p < 0.0001, women t=−1.61 p=0.108† | | | |
| *Demand*: Difference 2010–2008 men t=−12.65 p<0.0001, women t=−8.24 p<0.0001† | | | |
| *Decision authority*: Difference 2010–2008 men t=−6.67 p<0.0001, women t=−8.27 p<0.0001† | | | |
| *Strain*: difference 2010–2008 men t=−1.47 p=0.141, women t=2.62 p=0.009† | | | |

*Two-tailed independent sample un-paired t tests for gender differences.
†Paired two-tailed t tests for differences between study years.

significantly more demands in 2010, whereas there was no difference in 2008. Depressive symptoms and decision authority decreased significantly between 2008 and 2010 for both men and women, whereas strain increased significantly among women but not among men. The size of the gender*job strain interaction changed almost statistically significantly between 2008 and 2010 (F=3.37, df=1/6202, p=0.066, not shown in table 1).

Table 2 shows the results of the multiple linear regression in the prediction of depressive symptoms in 2010. All exposures in the unadjusted model were quite strongly and significantly related to depressive symptoms 2 years later. In the multivariate model, there was a marked reduction of the size of the regression coefficients. Most of this reduction is due to the strong effect of depressive symptoms in 2008. Still, all exposures except decision authority among women were significantly related to future symptoms. All linear regression estimates, particularly after adjustments, were numerically stronger for men than for women but there is considerable overlap in all analyses between the confidence limits for men and women. Accordingly, there are no significant differences between men and women in strength of association.

There was a negative correlation between psychological demands and decision authority for men and women, but more so in women than in men, particularly in 2010 (2008: men −0.05, women −0.13, 2010: men −0.08, women −0.18).

## DISCUSSION

Women reported higher levels of job strain and had significantly worsened job strain during the study period, whereas the corresponding change in men was non-significant. Accordingly, the working conditions were worse for women and there was an indication that this gender difference increased slightly from 2008 to 2010.

Sweden has been comparatively protected from international financial crises during recent years. During the measurement months the percentage of unemployed increased from 6% in 2008 to 8.5% in 2010. Based on the same cohort, as described elsewhere,[21 22] Swedish employees reported that their managers listened less to them in 2010 and that there was less cultural activity organised for the employees than in 2008. Accordingly, there was a worsening of working conditions during the study period. Our interpretation is that these societal changes were relatively small, however, and that there was no substantial difference in the development between men and women.

Our main finding is that the relationship between psychosocial work environment and near future change in depressive symptoms is not gender specific. This finding is in accordance with some of the few studies in the field,[1 9] while it highlights that in a Swedish context the results were more similar for men and women compared to other studies.[2 10] Some of the inconsistencies in previous research may be due to the fact that the methodology has varied across studies. In one study of the total working population,[2] the outcome was clinical depression based on a standardised interview. In another total working

**Table 2** Depressive symptoms in the Swedish working population in Swedish Longitudinal Occupational Survey of Health 2010 predicted from the situation in 2008

| | Model 1 unadjusted | | Model 2 multivariate* | |
|---|---|---|---|---|
| | B | β | B | β |
| Demands (I) | Men<br>B=0.444 (0.377 to 0.511)<br>Women<br>B=0.456 (0.393 to 0.519) | 0.237<br><br>0.229 | Men<br>B=0.170 (0.107 to 0.233)<br>Women<br>B=0.125 (0.068 to 0.182) | 0.091<br><br>0.063 |
| Decision authority (I) | Men<br>B=−0.410 (−0.533 to −0.287)<br>Women<br>B=−0.422 (−0.542 to −0.302) | −0.123<br><br>−0.116 | Men<br>B=−0.130 (−0.238 to −0.022)<br>Women<br>B=−0.068 (−0.176 to 0.040) | −0.039<br><br>−0.019 |
| ln demands/decision authority='job strain'†(II) | Men<br>B=3.147 (2.628 to 3.666)<br>Women<br>B=3.187 (2.695 to 3.679) | 0.216<br><br>0.214 | Men<br>B=1.138 (0.670 to 1.606)<br>Women<br>B=0.847 (0.410 to 1.284) | 0.078<br><br>0.057 |

Separate multiple linear regressions. B=regression coefficient, CI=95% CI for B, β=relative standardised regression coefficient.
Two separate tests with demands and decision authority as predictors in the first set (I) and job strain (without its parts) as predictor in the second set of analyses (II).
*After adjustment for age, income and depressive symptoms in 2008.
†Calculated as job strain=ln (demands/decision authority).
B=Linear regression coefficient (95% CI).

population study,[8] exposure was assessed by means of an indirect non-subjective method (job exposure matrix). Other studies have been based on cohorts that could be regarded as proxies of the general working population (for instance, government employees in the British Whitehall II and the French GAZEL).

Although the societal changes were relatively small it is important to take the macroeconomic state of Sweden during the study period into account when interpreting our findings. Workers may feel that they lose control during periods of increasing unemployment. In earlier research on young people in recession and boom, we have shown that the work environment during a financial recession seems to deteriorate more among women than among men.[23] Our finding that job strain increased particularly among women during the study period is in line with these observations. As in previous studies women reported a lower level of decision authority than men and in both genders decision authority deteriorated during follow-up. A limitation with our study is that we had no individual data on gender segregated occupations. Thus, there is a need for more research which can analyse the health consequences of the psychosocial work environment in relation to the gender-segregated labour market.

Another important weakness is that we focused only on the work situation. There is still a difference between men and women with regard to the amount of paid and unpaid work. According to a recently published study from SCB,[24] total working time is similar for Swedish men and women but women still spend a larger proportion of the time in unpaid work and vice versa. Since 1990, a slow development towards a more equal situation has been ongoing. But since men and women are still unequal from this point of view it might be possible that the homework situation could be important for the interpretation.

In the light of the previous information, it may be surprising that the demands actually decreased in our population during the study period. Although a small part of the lowered demands and the lowered depression scores during the 2 years study period could be due to the increasing age of the study population most of these changes are unexplained (for a discussion see Refs [25] and [26]).

According to demand/control theory a high-demand level should be matched by a high decision latitude. In the late 1980s psychological demands and decision authority were assessed with the same questionnaire as in the current study in the working population in Stockholm.[6 22] During that period, the correlation between psychological demands and decision authority was 0.16 for men and 0.01 for women. Since the corresponding correlations in the current study were negative for men and women, particularly so for women in 2010 ($r=-0.18$), our data point at an unfavourable development with rising psychological demands in relation to decision authority in the Swedish working population during the past two decades. It could be argued that a gender difference in reporting decision authority exists.[27–29] However, studies of men and women in exactly the same jobs (in the lower end for instance subway drivers and in the upper-end-intermediate level managers) have shown that when the job conditions are comparable, men and women report the same level of decision authority.[27 28]

There are indications from other research[30 31] that one assessment of the work environment is less optimal than at least two assessments with some time interval in between. When participants in the Whitehall II study had reported 'job iso-strain' (combination of job strain and poor social support at work) in several waves (assessments performed every second year) they were more likely to have metabolic syndrome than if they had reported job iso-strain only once before follow-up. Similarly, in the New York Cornell study of participants with blood pressure who reported job strain on two occasions had a more unfavourable development of blood pressure than did participants who reported job strain only once. Accordingly it would have been beneficial for our analyses to have repeated assessments of job strain. In line with this, we calculated the relative standard regression coefficient (β) for the log (demand/decision latitude) prediction of depressive symptom development between 2008 and 2010 using the 2008+2010 accumulated measure of job strain, adjusting for age, income and depressive symptoms at start. This increased the β-coefficient from 0.08 to 0.14 for men and from 0.06 to 0.12 for women. This points in the direction of a considerable accumulation effect that is similar for men and women. However, it should be pointed out that the work environment assessment in 2010 was performed the same year as the measurement of depressive symptoms. Therefore a 'cross-sectional effect' is possible which could inflate the size of the 'accumulated' coefficient.

### Limitations and strengths of the study

A large population sample was utilised with wide diversity in occupations. As in all longitudinal studies non-participation may constitute a problem. How small differences in age, sex and marital status influence our findings is not clear. Married and cohabiting participants have been shown in other studies,[32] to report less depressive symptoms than single men and women. It is possible that single participants could react in a different way to adverse job conditions than married people but it is unlikely that this could create a substantial methodological problem. Attrition constitutes a smaller interpretation problem in a prospective than in a cross-sectional study. It should also be pointed out that participants who became unemployed have not been included in the current study. This is likely to give an underestimation of the total effect of the work environment changes. Another important point is that we have not differentiated between participants who changed jobs and those who remained in the same jobs. Accordingly, we cannot separate effects caused by a change in job site from effects on the work environment for those who did not change employment sites. Our measures of demand and decision authority are widely accepted measures. It may be argued that psychological demands and decision authority only constitute part of the psychosocial work environment. However, these concepts are broad and they capture many aspects of the work environment.[4] The measure of depressive mood has lower coverage of symptoms than clinical diagnostic interviews and most self-reported depression scales and has accordingly been shown more unidimensional than the entire SCL depression scale and CES-D. This is an advantage when the aim is to use the scale as a measure of depression severity, and it thus seem suitable for assessment of depressive symptoms in population surveys.[18 14]

Annual income was used as an index of socioeconomic status. Since only participants working in paid work at least 12 h/week are included, participants with zero income are not part of the current study. However, women more often work part time than men do. The addition of the variable 'part-time work' to the multiple regressions had negligible effects on the results.

The analyses in the current study are performed on the total study population. It should be pointed out that there could be widely different effects of job strain on the risk of developing depressive symptoms in different occupational categories. For instance, the analysis presented in table 2 was also performed on healthcare workers. This supplementary analysis (data not

presented) showed a much stronger statistical effect of job strain on the development of depressive symptoms in this occupational category than in the general working population but the association was very similar in men and women.

Accordingly, our study shows that the higher level of depression symptoms reported by women compared to men in contemporary Sweden may be explained by worse psychosocial working conditions for women. This is important since a common hypothesis among laymen is that women are more vulnerable than men. This finding should influence policymakers.

The male/female difference could to a considerable extent be due to differences in male/female labour markets. In future research there should be more emphasis on specific occupations and on differences between male-dominated/female-dominated occupations.

## CONCLUSION

In a Swedish context, high demands and job strain were as strongly related to increased-depressive symptoms among men as among women. Low decision authority was significantly associated with increased depressive symptoms in men but not in women. The combination of high demands and low decision authority did not add value to the prediction of depressive symptom development compared to high demands only, neither in men nor in women.

### Key messages

- In a Swedish context, high demands and job strain were as strongly related to increased-depressive symptoms among men as among women.
- Low decision authority was significantly associated with increased depressive symptoms in men but not in women.

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