Gender, occupational gender segregation and sickness absence: Longitudinal evidence

Anne May Melsom

The Norwegian Tax Administration

Arne Mastekaasa

Department of Sociology and Human Geography, University of Oslo

Published in *Acta Sociologica*, DOI: 10.1177/0001699317691583

Gender, occupational gender segregation and sickness absence: Longitudinal evidence

Anne May Melsom

The Norwegian Tax Administration

Arne Mastekaasa

Department of Sociology and Human Geography, University of Oslo

Abstract

Women have much higher sickness absence rates than men. One prominent hypothesis is that this is a result of gender segregation in the labour market and the differences in employment or working conditions that follow from this. Previous studies assessing this idea give mixed results, but they do not take into account the possibility of selection effects. Long-term health differences between individuals may for instance influence both what jobs people end up in and their levels of sickness absence. In this paper we provide new evidence on employment and working conditions as a cause of gender differences in sickness absence. We use individual fixed effect models to account for selection based on stable individual characteristics. Like several previous studies we find a U-shaped relationship with high absence in both male- and female-dominated occupations. However, the fixed effect models show that this relationship is primarily caused by over-representation of absence-prone individuals in female-dominated occupations. Accounting for selection, the association between the proportion of women in the occupation and sickness absence is negative. As far as sickness absence is concerned, the gender segregation in the labour market thus seems to work to the advantage of women.

Keywords

Gender segregation, gender differences, sickness absence, occupation, working conditions

Introduction

One the most striking differences in the labour market behaviour of men and women is women's much higher rates of sickness absence from work (Patton and Johns, 2007). A recent study of 17 European countries found that women were on average 30 percent more absent than men, based on data for the 1998 to 2008 period (Mastekaasa and Melsom, 2014). Using Norwegian data, this paper examines whether this gender difference is, at least in part, due to the strong labour market segregation of men and women. Several decades of research have documented persisting and large differences in men's and women's hierarchical job positions and in the rewards associated with such positions, such as pay, career opportunities and workplace authority (see, e.g., Jarman et al., 2012; Padavic and Reskin, 2002). In a recent paper, Stier and Yaish argue that the unfavourable position of women is not limited to these dimensions, but 'that women lag behind men on most dimensions of job quality' (Stier and Yaish, 2014:225). The question raised in this paper is whether the gender difference in sickness absence can be taken to imply that women are also to a greater extent than men exposed to conditions that produce high rates of sickness absence. This is an important issue not the least from the perspective of gender equality.

A number of studies have attempted to evaluate whether the female excess in sickness absence is due to gender differences in the characteristics of the work itself or in the conditions under which it is performed. (In the following we refer to all these job characteristics collectively as *working conditions* and to the hypothesis that they account, at least partly, for the gender difference in sickness absence as the *working conditions hypothesis*.) Two types of control variable strategies have been employed. One is to control for employees' perceived working conditions. Danish, Finnish and Norwegian studies have all found that such control reduces the estimated gender difference in sickness absence, often by a third or more (Laaksonen et al., 2008; Labriola et al., 2011; Sterud, 2014). The other approach has been to control for detailed occupational codes or for both occupation and workplace, representing occupations or occupation by workplace cells with hundreds or thousands of dummy variables (Mastekaasa and Melsom, 2014; Mastekaasa and Dale-Olsen, 2000). The typical result is that such detailed control does not reduce the estimated gender difference in sickness absence, or that the difference even increases, suggesting that women are on the whole in less absence-promoting jobs than men. Thus, the empirical evidence on the importance of men's and women's working conditions is mixed.

Unfortunately, both control variable approaches suffer from a common and potentially serious methodological problem since long-term health (or other) differences between individuals may influence both what jobs they end up in and their levels of sickness absence. If so, the control and outcome variables will be spuriously correlated, and a crucial assumption for separating the direct effect of gender from the indirect effect via working conditions is violated (VanderWeele, 2015:2.3). In studies controlling for perceived working conditions, this problem may be exacerbated as more or less persistent health problems may not only increase employees' sickness absence but also their sensitivity to working conditions, which in turn will lead to more negative evaluations of these. In this paper we argue that at least part of this problem may be remedied by turning from cross-sectional data and a control variable strategy to panel data with individual fixed effects. With this approach one utilizes information on people over several years and examines to what extent their sickness absence differs depend on whether they are in more or less male-dominated or female-dominated occupations. If employment or working conditions are least satisfactory in female-dominated occupations, one would expect a positive relationship between the proportion of women in the occupation and both men's and women's sickness absence. Since only within-individual variation is employed, confounding due to stable health or other differences between individuals is eliminated. To take into account segregation not only between occupations but also between workplaces, we also do analyses with gender segregation measured for employees who are both in the same occupation and in the same establishment.

One contribution of our paper is new evidence on working conditions as an explanation of gender differences in sickness absence. Our main motivation, however, is to contribute to the broader understanding of how the gender segregated labour market affects men's and women's well-being. Needless to say, this does not mean that we consider sickness absence as a catch-all indicator of the quality of work; analyses of sickness absence may, however, be an important supplement to other streams of research, such as those that address gender differences in specific job rewards or in subjective feelings of job satisfaction.

We use longitudinal administrative data for the entire population of Norwegian employees. Up to nine annual observations (2003-2011) are available for each employee. The analyses are carried out for sickness absence in general and for the two largest diagnostic categories, musculoskeletal and psychological conditions. The latter analyses may provide some indication of whether possible hardships associated with women's and men's jobs are primarily physical or psychological.

Theory and previous research

Sickness absence

Sickness absence is obviously related to health, as evidenced for instance by relatively strong associations between long-term absences and mortality (Kivimäki et al., 2003; Vahtera et al., 2004). It nevertheless seems reasonable to regard sickness absence as a matter of both health and motivation, as suggested by Steers and Rhodes (1978) in their work attendance model. For our purposes, however, this distinction is not crucial. The main question is whether a high level of sickness absence can be more broadly regarded as a reflection of undesirable working conditions. We believe this is a reasonable assumption irrespective of whether jobs make people sick or only demotivated and dissatisfied. For simplicity we nevertheless use the terms 'healthy' and 'unhealthy' to describe occupations which are beneficial/detrimental with regards to sickness absence.

A further complication is that an occupation's or job's level of sickness absence will also be influenced by how difficult it is to perform it in the presence of a health problem. Jobs requiring considerable physical activity such as construction work or cleaning, for instance, may lead to musculoskeletal illness, but over and above that also affect the individual's ability carry out the job tasks in the presence of such illness. This will bias our results to the extent that the prevalence of problems in combining health problems and work is systematically related to the gender composition of the occupation. We are not able to take this into account in an entirely satisfactory way, but comparison of the results for absence with musculoskeletal and psychological diagnoses may throw some light on this issue. We return to this in the discussion section.

Segregation

The type of labour market segregation that has received most attention in the sociological literature is no doubt gender segregation between occupations (e.g., Rubery and Fagan, 1995; Charles and Grusky, 2004; Jarman et al., 2010). Since there may be considerable segregation even within detailed occupations, however, one might argue that segregation should instead be assessed at the level of jobs. This is the approach taken in much sociological research on gender differences in wages, with jobs operationally defined by the cross-classification of detailed occupation and establishment (occupation by establishment cells; see, e.g., the seminal paper by Petersen and Morgan, 1995). For our purposes this approach will, however, exclude a large part of the working population who are in small occupation by establishment cells. If the cell consists of only a handful of employees, an overrepresentation of men or women may well be random. We therefore consider mainly occupational segregation, but include some additional analyses with segregation defined over occupation by establishment cells to assess the robustness of the findings.

Gender and working conditions

The working conditions hypothesis assumes an indirect effect of gender on sickness absence via the working and employment conditions. This implies (1) an assumption that gender affects the working and employment conditions to which employees are exposed, and (2) that these conditions have an effect on the level of sickness absence. We consider these in turn, starting with (1).

The assumption that gender affects work and employment conditions, or more specifically that women have less satisfactory conditions than men, is in line with a range of theories of labour market discrimination. Theories of statistical discrimination state that employers have imperfect information about job applicants and therefore use (assumed or real) group characteristics as proxies for unobserved individual characteristics, such as productivity or motivation (Arrow, 1973). Employers may for instance believe that female workers have less labour attachment than men because of a higher priority for child-rearing and family responsibilities, and therefore be more reluctant to hire women. Another possibility is that employers have a general preference for male workers, so-called 'taste-based' discrimination in the terminology of Becker (1957). According to the queuing model suggested Reskin and Roos, for instance, male employers and male workers have a common interest in excluding women from male-dominated and desirable jobs (Reskin, 1991). The allocation of women to inferior jobs may also be the product of more or less unconscious cognitive processes, such as homosocial reproduction (Kanter, 1977).

Discrimination theories assume that labour market outcomes for men and women are primarily determined by the behaviour of employers, i.e., the demand side. Other theories, focussing on the behaviour of the employees, or the supply side, do not necessarily imply that women have less satisfactory working conditions than men. According to Becker's (1991) economic theory of family specialization, it is rational for the family as a whole to have one spouse specializing in market work and the other in child rearing and family/household tasks. Under the further assumption that women are generally more productive than men with regard to household work, the economic well-being of the household is maximized if women take care of such work. Thus, women are expected to choose employment conditions and jobs that facilitate the combination of household and market work, for instance by being less heavy, dangerous or demanding. More sociologically oriented discussions, emphasizing the problems women face when trying to combine care for children with employment, suggest similar predictions (Halrynjo and Lyng, 2009). Other supply side accounts start from the assumption of more fundamental and lasting preference differences between men and women. Such differences may be derived from evolutionary biology or psychology (Browne, 2011). Alternatively, not only employers but also employees may be influenced by fundamental cultural beliefs about men and women ('gender essentialism' in the terminology of Charles and Bradley,

2009) that are inculcated through socialization.

Empirical studies are inconclusive regarding the healthiness of women's and men's work. As noted above, Stier and Yaish (2014) argue that women fare less well than men on most dimensions of job quality. A recent review article provides more mixed results, concluding that women have less job security, less control in the job, lower levels of effort-reward balance and worse contractual employment conditions than men, whereas men have more physically demanding work and are more exposed to noise and lack of social support in the job (Campos-Serna et al., 2013). In a recent analysis of the second round of the European Social Survey not included in this review, Muhlau (2011) found that women reported fewer advancement opportunities, lower work complexity and autonomy and less participation and co-worker support. Women scored better than men, however, with regard to safety and 'unsocial hours', and there were no gender differences with regard to job security and work pressure. A Norwegian study by Sterud (2014) found women to score less well than men with regard to job demands, role conflict, emotional demands, monotonous work, effort-pay imbalance and sexual harassment, but better with regard to job control and possibilities for development. With regard to physical work, Sterud's study showed poorer scores for women, on about half of the measured dimensions (e.g., neck flexion), but better scores on the other half (e.g., heavy lifting).

To sum up, the literature provides some indications of better psychosocial working conditions for men than for women. The evidence is not overwhelming, however, and the reported gender differences are often small. With regard to physical working conditions, men seem to be worse off than women, but there are also studies showing no clear gender difference.

Working conditions and sickness absence

The second assumption underlying the working conditions hypothesis is that sickness absence is to a major extent influenced by various working conditions. The most influential theory in this field is probably Karasek's Demand-Control Model (Karasek and Theorell, 1990) which argues that the combination of high demands and low control produces 'high-strain' jobs that may have negative health consequences. The model has later been extended to take into account social support at work, assuming that such support may also reduce the stressful effects of psychological demands. Originally, the model was applied to mental health, but it has also been extensively employed in research on cardio-vascular disease and sickness absence.

Despite its influence, there is limited empirical support for the Demand-Control Model with regard to sickness absence. A few empirical studies attempting to test directly the hypothesis that the *combination* of low control and high demand is particularly problematic with regard to sickness absence, have often failed to support it (see reviews in Allebeck and Mastekaasa, 2004; de Lange et al., 2003). A larger number of studies use additive specifications (addressing effects of demand, control and support separately). According to a 2004 review, there does not seem to be a clear association between psychological demands or social support and sickness absence, but somewhat more convincing results with regard to control (Allebeck and Mastekaasa, 2004). This conclusion is supported by a recent French study (Lesuffleur et al., 2014), but not by a study employing data from the cross-national European Working Conditions Survey (Slany et al., 2014).

Another influential theory is Siegrist's (2009) Effort-Reward Imbalance (ERI) model. Lack of reciprocity or balance between the efforts of the employee and rewards in the form of not only money, but also esteem, career opportunities and job security is assumed to lead to stress reactions and thereby to have long-term negative health consequences. Empirical support for ERI effects on sickness absence has been found in a number of small studies and even a few large ones, including studies of public sector employees in Britain and Finland (Head et al., 2007; Ala-Mursula et al., 2005). A recent Danish population sample study, on the other hand, did not find any association between ERI and later sickness absence (Nielsen et al., 2013).

In addition to variables related specifically to the Demand-Control and ERI models, most of the studies mentioned above, as well as numerous other studies, have examined associations between other measures of psychosocial working conditions and sickness absence. A large number of studies have also included physical (including ergonomic) working conditions. A common finding is that physical working conditions seem to be more strongly associated with sickness absence than are psychosocial conditions (Laaksonen et al., 2008; Sterud, 2014).

Previous research on gender segregation and sickness absence

A few studies have examined the relationship between the gender composition of the occupation and sickness absence, generally finding that sickness absence is relatively high in both female- and male-dominated occupations, and relatively low in gender-balanced occupations (Alexanderson et al., 1994; Hensing et al., 1995; Leijon et al., 2004; Mastekaasa and Melsom, 2014). This does not, however, necessarily mean that the working conditions found in female- and male-dominated occupations are particularly unhealthy; it might also to a greater or lesser extent be due to selection of unhealthy individuals to these occupations. The existing research has not taken this possibility into account. In the present paper, however, the association between the proportion of women in the occupation and sickness absence is estimated with the use of panel data and individual fixed effects. As noted above, this means that we remove the effects of selection due to stable individual characteristics, and estimate the association between the proportion of women in the occupation and sickness absence using only variation within individuals over time.

Data and methods

Sample

We use Norwegian public administrative records that cover the entire employed population (apart from the self-employed), but limit our analyses to individuals 20-67 years of age and to the years 2003-2011. All employment relationships active on May 15 in a particular year are included. For individuals with more than one active employment relationship, the one with the highest number of weekly working hours is selected. This means that the data include one employment relationship per year and up to nine annual observations per individual.

Employers are required to report all employment relationships (including occupational codes) to the Norwegian Labour and Welfare Administration. Supplementary information on education, age, gender and children is taken from population registers available at Statistics Norway. Information on sickness absence is taken from sickness certifications that physicians are required to report to the Norwegian Labour and Welfare Administration. The certifications include diagnoses according to the International Classification of Primary Care (ICPC).[1] Information from the various registers was merged by Statistics Norway using unique personal identification numbers, which were removed from the data before they were made available for research.

The data do not include short ('self-certified') spells not requiring certification from a physician. According to the general rules in Norway one may take self-certified absence spells of maximum three days' duration up to four times a year. Certification from a physician is required for absence days above these limits. However, about 50 percent of all employees in Norway work in enterprises with extended possibility for self-certification of up to eight calendar days per absence spell. We therefore restrict our analyses to absence spells of more than eight days' duration.

Up to a ceiling, employees receive full wages during sickness. Even above the ceiling, most employees have individual or collective contracts securing full wage compensation.

Variables

Sickness absence is measured as the yearly number of physician-certified absence days. Separate measures count only days with musculoskeletal diagnoses (L in the ICPC system) and psychological diagnoses (P), respectively.

Occupational gender composition is measured for detailed seven-digit occupational codes. These codes consist of four-digit ISCO-codes plus three more digits adding even more detail.[2] The total number of occupational codes used in the main analyses is well above 6,000 (see Table 2). Gender composition is measured as the proportion of women in each of these categories. In the regression models this variable is included as dummies for the following categories: ≥.0, ≤.1; >.1, ≤.2; >.2, ≤.3; >.3, ≤.4; >.6, ≤.7; >.7, ≤.8; >.8, ≤.9; >.9, ≤1.0.[3] Gender balanced occupations (>.4, ≤.6) are used as reference. In supplementary analyses a continuous measure ranging from zero (no women) to one (all women) is also used.

Since the amount of sickness absence can be expected to increase with the length of the time interval for which it is measured, we include number of days employed as an independent variable. Norwegian sickness absence rates also depend on age and level of education and exhibit considerable variation from year to year (Markussen et al., 2011); control for these variables is therefore added. We also control for the number and age of children in the household, although most research suggest that children has little impact on sickness absence (see, e.g., Rieck and Telle, 2013). We avoid controlling for likely endogenous variables such as working hours or earnings (cf. Neal and Johnson, 1996).

Age (in years) and days employed are treated as continuous variables. *Level of education* has the following categories: Lower secondary or less, some upper secondary, full upper secondary (reference), some post-secondary, bachelor level, master level, Ph.D. level. *Year* is included as a categorical variable omitting 2005 as reference. We include dummy variables for children aged 0-6 and children aged 7-12, distinguishing in both cases between 0, 1 and 2 or more children, with 0 as reference.

Statistical methods

Since the dependent variable cannot take negative values, ordinary linear regression (OLS) is not ideal (Long 1997: Chapter 8), and Poisson regression is employed. We start with a standard Poisson model (Model 1):

$$\log(\mu_{it}) = \alpha + \boldsymbol{\beta}'\boldsymbol{G} + \gamma_1 A + \gamma_2 A^2 + \boldsymbol{\delta}'\boldsymbol{E} + \boldsymbol{\theta}'\boldsymbol{Y} + \boldsymbol{\pi}'\boldsymbol{C} + \tau D$$

μ_{it} is the expected number of absence days for individual i in year t; $\boldsymbol{G}$, $\boldsymbol{E}$, $\boldsymbol{Y}$ and $\boldsymbol{C}$ are vectors of dummies for the proportion of women in the occupation, level of education, calendar year and children, respectively; A is age and D is number of days employed; α is the intercept, γ_1, γ_2 and τ are regression coefficients and $\boldsymbol{\beta}$, $\boldsymbol{\delta}$, $\boldsymbol{\theta}$ and $\boldsymbol{\pi}$ are vectors of regression coefficients.

In Model 2 selection based on stable individual characteristics is taken into account by means of individual fixed effects, using conditional Poisson regression (Wooldridge, 2010: 18.7.4). This means that the common intercept α is replaced with a separate intercept α_i for each individual. Thus only variation between years within each individual is used to estimate the association between occupational gender composition and sickness absence.

Our dependent variables do not follow the Poisson distribution, so Huber-White robust (Model 1) or bootstrapped (Model 2) standard errors are estimated (Cameron and Miller, 2011). The standard errors also take into account that the observations are clustered within the occupational codes used to generate values for the proportion of women in the occupation variable.

Since only within-individual variation is used in the fixed effects analyses, individuals who remain in the same gender composition category in all years cannot be included in the estimation of Model 2. The source of variation in gender composition is overwhelmingly individuals changing jobs, and we include only these in the fixed effect models. Thus, non-mobile employees who experience shifts in their occupational gender composition because of a population level change in the proportions of men and women in the occupation are not included. The fixed-effect Poisson model has the additional requirement that included individuals must have at least one year with more than zero absence. To facilitate comparison of Models 1 and 2, we also estimate Model 1 for the same restricted sample, referring to this as Model 1B, in addition to analysis of the full sample (Model 1A). This is important to assess the generalizability of the findings. Very different estimates for Models 1A and 1B suggests that the underlying causal processes may also be different, whereas similar results make it more likely (but does not guarantee) that the results can be generalized to the full population.

Exclusion of individuals with zero absence is avoided with OLS estimation. All models are therefore also estimated using this method. We comment on these additional analyses in the text when appropriate, and they are available as online supplementary material.[4]

[Table 1 here]

Results

Descriptive statistics

Table 1 provides summary statistics for the full sample and for observations remaining after exclusion of individuals who do not change gender composition category, and even with the additional exclusion of those without any sickness absence during the period of observation. The level of sickness absence is obviously higher when those with zero absence in all years are excluded. The effect of excluding those without change in occupational gender composition, on the other hand, is a slight reduction in average total and musculoskeletal sickness absence. The distribution of the proportion of women variable is little affected by the sample restriction, with two exceptions: The concentration of observations of women in the most female-dominated category is markedly weaker in the restricted samples, and the same applies to the concentration of observations of men in the most male-dominated category. As far as the control variables are concerned, the differences between the full and the restricted samples are generally small (Supplementary Table S2).

[Table 2 and Figure 1 here]

Sickness absence irrespective of diagnosis

Table 2 gives regression estimates from Poisson models of the association between absence days and occupational gender composition with control variables as described above (full results with coefficients and standard errors for the control variables are given in Supplementary Table S3). Results for men are in the first three columns and results for women in the last three. The results are given as Incidence Rate Ratios (IRR), that is, as exponentiated coefficients. These can be interpreted directly as increases or decreases in the rate of sickness absence in one group relative to another. An IRR of 1 means no difference in absence while results above or below 1 indicate higher or lower absence compared with the reference group. Model 1A for men indicates, for instance, that the average number of absence days is 16.4 percent higher in occupations with less than 10 percent women than in gender-balanced occupations (40-60 percent women).

The results are also displayed in Figure 1. According to Model 1A, the relationship is approximately U-shaped for both genders with relatively high sickness absence in strongly male-dominated and female-dominated occupations and lower levels in the intermediate categories. For men, the lowest level of absence is found in occupations with 20-30 percent women (IRR=.87), and the highest level in the most strongly female-dominated occupations (IRR=1.47). For women the estimated absence level is lowest when there are 30-40 percent women and highest (IRR=1.26) in occupations with more than 90 percent women. The level of sickness absence is also relatively high in occupations with less than 10 percent women, with IRRs of 1.16 for both men and women. Model 1B is estimated using only observations that can be included in the fixed effects analyses, and is otherwise identical to Model 1A. The results are very similar.

In Model 2, which adds individual fixed effects, no clear U-shaped pattern is visible. The IRR is highest in the most male-dominated occupations (IRR=1.23 for men and 1.11 for women) and then declines almost linearly with the proportion of women in occupation, apart from the 90 to 100 percent women category, where the level of sickness absence is again somewhat higher (although not higher than in gender-balanced occupations). This is clearly inconsistent with the working conditions hypothesis, which assumes a monotonically positive association. The association between the proportion of women and sickness absence is slightly stronger for men. If the gender composition dummies are replaced with a continuous measure, the difference in the IRRs is clearly significant (t=4.69; cf. Supplementary Table S6).

[Table 3 and Figure 2 here]

Musculoskeletal diagnoses

Table 3 and Figure 2 give results for sickness absence with musculoskeletal diagnoses. In Model 1A a U-shaped association is again found, with the highest IRRs in the most male-dominated (IRR=1.47 for men and 1.26 for women) and the most female-dominated (1.53 for men and 1.33 for women) occupations. The association is similar, but somewhat weaker for observations that can also be included in the fixed effects analyses (Model 1B). In the FE analyses (Model 2), the clearly highest IRRs are found in the most male-dominated occupations (1.37 for men and 1.14 for women). The association is monotonically negative except for occupations with more than 90 percent women, where the level of sickness absence increases somewhat; for women returning to approximately the same level as in gender-balanced occupations.

Overall the results are quite similar to what was found for sickness absence irrespective of diagnosis. The FE estimates indicate that the negative effect of the proportion of women is stronger for men than for women. Analyses with a continuous variable for gender composition give a significant gender difference in the estimated effect (t=5.31; Supplementary Table S7). Thus, it seems that strongly male-dominated occupations are associated with adverse effects on physical health, and more so for men than for women.

[Table 4 and Figure 3 here]

Psychological diagnoses

Results for sickness absence with psychological diagnoses are shown in Table 4 (and Supplementary Table S5) and Figure 3. There is no trace of the U-shaped relationship found for all absences and for musculoskeletal ones. For men the cross-sectional relationship in the full sample (Model 1A) is positive with the IRR increasing from .73 in occupations with less than 10 percent women to 1.67 in occupations with more than 90 percent women. The association is positive even in the reduced sample (Model 1B), but much weaker. When controlling for selection on stable individual characteristics (Model 2), many of the IRRs are not significantly different from one. If the proportion of women in the occupation dummies are replaced with a continuous variable, however, a significant negative relationship is found (IRR=.86; Supplementary Table S8). This suggests that the working conditions found in female-dominated occupations contribute to lower sickness absence even for psychological diagnoses, but again occupations with more than 90 percent women deviate to some extent. The estimated effect of proportion female is weaker for psychological diagnoses than for musculoskeletal ones. This suggests that physical working conditions may be more important than psychosocial ones in generating the overall relationship between occupational gender composition and sickness absence.

For women there is no clear cross-sectional association between the gender composition of the occupation and sickness absence related to psychological diagnoses in either Model 1A or Model 1B. In the FE model, the estimated effect of the proportion of women in the occupation is generally negative, but again occupations with more than 90 percent women deviate slightly from this pattern. With a continuous gender composition variable (Supplementary Table S8), there is no significant gender difference (IRR is .77 for women and .86 for men).

[Figure 4 here]

Robustness checks

In order to check the robustness of the results, we replicated all analyses using OLS both on the full sample and on the reduced sample used in the Poisson regressions (Supplementary Tables S9-S14).[5] In general, the results were very similar to those presented above.

The main analyses in Table 2 (and Table S3) were also replicated on employees in the 30-59 age range, with very similar results (see Table S15). The same holds when a more detailed classification of proportion female is used (Table S16).

Finally, we estimated the main models using an alternative measure of labour market segregation, viz. the proportion of women in the occupation by establishment cell instead of in the occupation only. Graphs based on estimates for the fixed effects model are shown in Figure 4 (also see Supplementary Table S17). For comparison, corresponding graphs from the main analyses (in Figure 1) are also included. The estimated effects of moderate levels of female domination are slightly weaker with the occupation by establishment measure, and thus there are no reversals in the most female-dominated occupations.[6] These differences notwithstanding, the main finding of a negative relationship between the proportion of women and sickness absence remains.

Discussion

We argued above that the idea that women's higher sickness absence is due to more problematic working conditions implies a positive effect of the proportion of women in the occupation on sickness absence. The findings are inconsistent with this expectation, suggesting instead that high sickness absence in female-dominated occupations is mainly due to selection effects. With regard to factors affecting sickness absence, women are on average in somewhat more beneficial occupations than men, and the gender segregation in the labour market contributes to smaller gender differences in sickness absence.

As noted above, several previous studies have found that control for self-reported working conditions reduces the estimated effect of gender on sickness absence, indicating that women have on average unhealthier working conditions than men (Laaksonen et al., 2008; Labriola et al., 2011; Sterud, 2014). Control for detailed occupational categories, on the other hand, has been shown to have little effect, or to increase the estimated gender effect slightly (Mastekaasa and Melsom, 2014; Mastekaasa and Dale-Olsen, 2000). Our present findings are clearly more in line with the latter results, and suggest that women are on average in healthier occupations than men are.

Our findings may also contribute to theoretical debates on the social processes underlying occupational gender segregation. Although it is well established in previous research that female-dominated occupations are on average inferior in terms of wages and career opportunities (Jarman et al., 2012; Padavic and Reskin, 2002), the negative relationship between the proportion of women and sickness absence suggests that these occupations also have important advantages. This is consistent with theories assuming that the gender segregated labour market is at least in part driven by preference differences between men and women. One should keep in mind, however, that the estimated effect of the proportion of women is not strong. Also, our research provides no information on whether the sources of such preference differences are to be found in the structural constraints women face in other life domains (such as family life), in socialization patterns or in biological differences. Needless to say, our results also do not imply that gender discrimination in the labour market does not exist; they do indicate, however, that such discrimination cannot easily explain the total distribution of goods and bads in the gender segregated labour market.

The findings indicate that moderately female-dominated occupations are particularly favourable with regard to sickness absence, whereas this does not hold to the same extent for moderately female-dominated occupation by establishment cells. This suggests that the overrepresentation of women in some low-absence occupations is to some extent counterbalanced by a sorting of women within these occupations to less favourable establishments. A detailed analysis of this is not, however, possible within the limits of this article. At any rate the main finding of a negative relationship between the proportion of women and sickness absence remains irrespective of whether the gender composition is measured in occupations or in occupation by establishment cells.

Individual fixed effects eliminate confounding factors that are stable over time, thus removing important obstacles to causal interpretation of the findings and making it more likely that we are able to estimate the causal effect of the working conditions found in male and female-dominated occupations. We cannot rule out, however, time-varying confounding factors or even reverse causality. With regard to the former, a negative (fixed effects) relationship between proportion female and sickness absence as observed here could also arise if individuals who experience unfavourable changes in health (or who become less job motivated) move toward more male-dominated occupations (or, equivalently, if health improvements lead to moves to more female-dominated occupations). Likewise, reverse causality would imply that increased sickness absence would lead employees to change in the direction of more male-dominated occupations. Although possible, this does not seem very likely and it does not square well with the comparison of the cross-sectional and FE estimates. As discussed above, this comparison suggests a selection to female-dominated occupations of generally unhealthy or otherwise absence-prone individuals, that is, individuals with *stable* individual factors contributing to sickness absence; the reverse causality argument implies instead a selection to female-dominated occupations of individuals experiencing *improvements* in health (or other factors contributing to low sickness absence).

We noted above that sickness absence is not a straightforward measure of health. In particular, sickness absence may also reflect to a greater or lesser extent dissatisfaction and lack of motivation. Thus, our findings may not necessarily reflect that female-dominated occupations are better for the health of the employees (although we tend to favour that interpretation); they might also be better in improving employee motivation.

A potentially more serious limitation of sickness absence as an outcome variable is that it is likely to reflect to some extent occupational differences in opportunities for performing the job in the presence of minor illness or injury. Manual work may for instance be more common in strongly male-dominated occupations than in gender-balanced and female-dominated occupations, and such work is probably most problematic to perform when ill. The somewhat weaker relationship (for men) between the gender composition of the occupation and sickness absence with psychological than with musculoskeletal diagnoses could be taken as support for this interpretation. Nevertheless, even for psychological diagnoses negative effects of the proportion of women in the occupation was found. Also, a weaker impact of the proportion of women for psychological than for musculoskeletal diagnoses was not found for women.

Very similar results were obtained in the Poisson and OLS regressions. Thus, the exclusion of individuals with no sickness absence during the years of observation implied by the former does not seem to be important. The generalizability of the findings to people remaining in the same gender composition category throughout the years of observation cannot be assessed in a similarly definite way. We note, however, that as far as the analyses of total absence are concerned, the results in models without fixed effects were very similar for the restricted and the full sample. The associations estimated in these models are the net result of selection effects and of the effects of (the working conditions associated with) the proportion of women. When the net result is similar in the total and the restricted sample, it seems likely that the two types of effects producing this result are also similar. The possibility that a weaker (stronger) effect of the proportion of women among those not changing occupation is counterbalanced by a stronger (weaker) selection effect among the occupationally stable cannot, however, be definitively rejected.

The results for the full and the restricted sample were also quite similar in the analyses of absence with musculoskeletal diagnoses. Larger differences were found in the analyses of absence with psychological diagnoses, particularly for men. This suggests that further research on the sickness absence or psychological health of men in strongly female-dominated occupations may be useful.

Conclusion

The analyses above show that once selection effects are taken into account, there is a negative, although fairly weak, association between the proportion of women in the occupation and sickness absence. This suggests that on average the working conditions found in female-dominated occupations contribute to lower sickness absence (and the working conditions found in male-dominated occupations contribute to higher sickness absence). This main pattern also holds if the gender composition is measured for occupation by establishment cells instead of occupations. This suggests that gender differences in working conditions cannot explain that women have higher sickness absence than men. To the contrary, if men and women had been exposed to the same working conditions, the gender difference in sickness absence would probably have been larger.

These results diverge from studies comparing the association between gender and sickness absence with and without control for self-reported working conditions, which typically conclude that working conditions explain a non-trivial part of the gender difference in sickness absence. Our analyses suggest that these findings are due to selection effects, with unhealthy or otherwise absence-prone workers (both men and women) being clearly over-represented in female-dominated occupations.

With regard to the broader literature on gender segregation in the labour market, previous research has largely focused on negative effects on women's labour market outcomes, primarily on pay and prestige, but also on a broad range of job quality dimensions (Stier and Yaish, 2014). The present study contributes to a more nuanced picture, suggesting that the gender segregation does in fact contribute to somewhat smaller differences in sickness absence between men and women.

The main strength of the present study is the use of panel data and fixed effects estimation, which eliminates selection due to relatively stable individual differences (such as differences in health). This method does not, however, eliminate confounding due to time-varying omitted variables or reverse causality. In principle, we cannot rule out the possibility of a tendency for people with improving health or declining sickness absence to move in the direction of more female-dominated occupations. This does not seem like a credible scenario, however, as it is difficult to reconcile with the evidence we have presented of an overrepresentation of unhealthy employees in such occupations.

It should also be noted that our conclusions about the relative healthiness of female-dominated occupations apply most strongly to female-dominated occupations in general, and to a lesser extent to the most strongly female-dominated occupations. It will be useful for future research to investigate in more detail why there are so marked differences between these occupations and less strongly female-dominated (but still female-dominated) occupations.

Acknowledgements

We are grateful to the Norwegian Labour and Welfare Administration and Statistics Norway for access to data, and to Acta's reviewers for helpful comments.

Funding

Financial support from the Research Council of Norway, grants 187928, 202647 and 227117, is gratefully acknowledged.

Supplemental material

Online supplemental material is available at http://asj.sagepub.com/supplemental.

Notes

[1] http://www.who.int/classifications/icd/adaptations/icpc2/en/

[2] Statistics Norway's version of ISCO-88 is described here: http://www.ssb.no/a/publikasjoner/pdf/nos_c521/nos_c521.pdf. The three additional digits in the codes we use are documented here: http://www.ssb.no/a/yrke/yrke.csv.

[3] Examples of occupations in the various categories are given in Supplementary Table S1.

[4] Since our main explanatory variable is defined over occupations, it is particularly important to take this clustering into account (Cameron and Miller, 2011: 1.3.2). Ideally, additional clustering of annual observations within individuals should also be taken into account. We were not able to do this in the main analyses. In the OLS models two-way clustering is employed, using the method in Thompson (2011). The two-way clustered standard errors turn out to be very similar to those obtained with clustering only on occupation (typically less than five percent larger); it seems reasonable to assume that the bias in the standard errors in the Poisson analyses is also very small.

[5] To facilitate comparison, we also computed (1) predictive margins for each gender composition category and (2) ratios of these using the same reference category as in the main tables. In the supplementary tables file, these ratios are presented in Figures S1 to S3, corresponding to Figures 1 to 3 in the article, and they can be interpreted in the same way.

[6] Additional analyses (not presented) show that these differences are not due to the smaller sample in the occupation by establishment analyses; the impact of the proportion of women in the occupation is almost identical in this sample to the analyses in Table 2.

References

Ala-Mursula L, Vahtera J, Linna A, Pentti J and Kivimaki M (2005) Employee worktime control moderates the effects of job strain and effort-reward imbalance on sickness absence: the 10-town study. *Journal of Epidemiology and Community Health* 59(10): 851–857.

Alexanderson K, Leijon M, Akerlind I, Rydh H and Bjurulf P (1994) Epidemiology of sickness absence in a Swedish county in 1985, 1986 and 1987. A three year longitudinal study with focus on gender, age and occupation. *Scandinavian Journal of Social Medicine* 22(1): 27-34.

Allebeck P and Mastekaasa A (2004) Risk factors for sick leave – general studies. *Scandinavian Journal of Public Health* 32(63 suppl): 49-108.

Arrow, KJ (1973) The theory of discrimination. In: Ashenfelter, O., Rees, A. (Eds.), *Discrimination in Labor Markets*. Princeton: Princeton University Press, pp. 3–33.

Becker GS (1991) *A Treatise on the Family.* Cambridge, Mass.: Harvard University Press.

Becker, GS (1957) *The Economics of Discrimination*. University of Chicago Press, Chicago.

Browne KR (2011) Evolutionary psychology and sex differences in workplace patterns. In: Saad G (ed) *Evolutionary Psychology in the Business Sciences.* Berlin/Heidelberg: Springer-Verlag, pp. 71-94.

Cameron AC and Miller DL (2011) Robust inference with clustered data. In: Ulla A and Giles EA (eds) *Handbook of Empirical Economics and Finance.* Boca Raton: Chapman & Hall/CRC, pp. 1-28.

Campos-Serna J, Ronda-Perez E, Artazcoz L, Moen BE, Benavides FG (2013) Gender inequalities in occupational health related to the unequal distribution of working and employment conditions: a systematic review. *International Journal for Equity in Health* 12(1):57.

Charles M and Bradley K (2009) Indulging our gendered selves? Sex Segregation by field of study in 44 countries. *American Journal of Sociology* 114(4): 924-976.

Charles M and Grusky DB (2004) *Occupational Ghettos: The Worldwide Segregation of Women and Men.* Stanford, CA: Stanford University Press.

de Lange AH, Taris TW, Kompier MAJ, Houtman ILD and Bongers PM (2003) 'The Very Best of the

Millennium': longitudinal research and the Demand-Control-(Support) Model. *Journal of Occupational Health Psychology* 8(4): 282–305.

Halrynjo S and Lyng ST (2009) Preferences, constraints or schemas of devotion? Exploring Norwegian mothers' withdrawals from high-commitment careers. *British Journal of Sociology* 60(2): 321-343.

Head J, Kivimäki M, Siegrist J, Ferrie JE, Vahtera J, Shipley MJ and Marmot MG (2007) Effort-reward imbalance and relational injustice at work predict sickness absence: the Whitehall II study. *Journal of Psychosomatic Research* 63(4): 433-440.

Hensing G, Alexanderson K, Åkerlind I and Bjurulf P (1995) Sick-leave due to minor psychiatric morbidity: role of sex integration. *Social Psychiatry and Phsyciatric Epidemiology* 30(1): 39-43.

Jarman J, Blackburn RM and Racko, G (2012) The dimensions of occupational gender segregation in industrial countries. *Sociology* 46(6): 1003-1019.

Kanter, RM (1977) *Men and Women of the Corporation*. New York: Basic Books.

Karasek R and Theorell T (1990) *Healthy Work: Stress, Productivity, and the Reconstruction of Working Life*. New York: Basic Books.

Kivimäki M, Head J, Ferrie JE, Shipley MJ, Vahtera J and Marmot MG (2003) Sickness absence as a global measure of health: evidence from mortality in the Whitehall II prospective cohort study. *BMJ* 327: 364.

Laaksonen M, Martikainen P, Rahkonen O and Lahelma E (2008) Explanations for gender differences in sickness absence: Evidence from middle-aged municipal employees from Finland. *Occupational and Environmental Medicine* 65(5): 325–330.

Labriola M, Holte KA, Christensen KB, Feveile H, Alexanderson K and Lund T (2011) The attribution of work environment in explaining gender differences in long-term sickness absence: results from the prospective DREAM study. *Occupational and Environmental Medicine* 68(9):703-5.

Leijon M, Hensing G and Alexanderson K (2004) Sickness absence due to musculoskeletal diagnoses:

association with occupational gender segregation. *Scandinavian Journal of Public Health* 32(2): 94-101.

Lesuffleur T, Chastang JF, Sandret N and Niedhammer I (2014) Psychosocial factors at work and sickness absence: Results from the French national SUMER survey. *American Journal of Industrial Medicine* 57(6):695–708.

Long JS (1997) *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks: Sage.

Markussen S, Røed K, Røgeberg OJ and Gaure S (2011) The anatomy of absenteeism. *Journal of Health Economics* 30(2): 277–292.

Mastekaasa A and Dale-Olsen H (2000) Do women or men have the less healthy jobs? An analysis of gender differences in sickness absence. *European Sociological Review* 16(3): 267–286.

Mastekaasa A and Melsom AM (2014) Occupational segregation and gender differences in sickness absence: Evidence from 17 European Countries. *European Sociological Review* 30(5): 582-594.

Muhlau P (2011) Gender inequality and job quality in Europe. *Management Revue* 22(2): 114-131.

Neal DA and Johnson WR (1996) The role of premarket factors in black-white wage differences. *Journal of Political Economy* 104(5): 869-895.

Nielsen MB, Madsen IE, Bültmann U, Aust B, Burr H and Rugulies R (2013) Effort-reward imbalance at work and risk of long-term sickness absence in the Danish workforce. *Journal of Occupational and Environmental Medicine* 55(4): 454-459.

Padavic I and Reskin BF (2002) *Women and Men at Work*. Thousand Oaks: Pine Forge Press.

Patton E and Johns G (2007) Women's absenteeism in the popular press: Evidence for a gender-specific absence culture. *Human Relations* 60(11): 1579-1612.

Petersen T and Morgan L (1995) Separate and unequal: occupation-establishment sex segregation and the gender wage gap. *American Journal of Sociology,* 101(2), 329-365.

Reskin BF (1991) Labor markets as queues: A structural approach to changing occupational sex composition. In: Huber J (ed) *Micro-Macro Linkages in Sociology*. Newbury Park: Sage, pp. 170-192.

Rubery J and Fagan C (1995) Gender segregation in societal context. *Work, Employment and Society* 9: 213-40.

Rieck KME and Telle K (2013) Sick leave before, during and after pregnancy. *Acta Sociologica* 56(2): 117–37.

Siegrist J (2009) Unfair exchange and health: Social bases of stress-related diseases. *Social Theory & Health* 7(4): 305–317.

Slany C, Schütte S, Chastang JF, Parent-Thirion A, Vermeylen G and Niedhammer I (2014) Psychosocial work factors and long sickness absence in Europe. *International Journal of Occupational and Environmental Health* 20(1): 16-25

Steers RM and Rhodes SR (1978) Major influence on employee attendance: a process model. *Journal of Applied Psychology* 63(4): 391-407.

Sterud T (2014) Work-related gender differences in physician-certified sick leave: a prospective study of the general working population in Norway. *Scandinavian Journal of Work Environment and Health* 40(4): 361-369.

Stier H and Yaish M (2014) Occupational segregation and gender inequality in job quality: a multi-level approach. *Work Employment & Society* 28(2): 225-246.

Thompson SB (2011) Simple formulas for standard errors that cluster by both firm and time. *Journal of Financial Economics* 99(1): 1-10.

Vahtera J, Pentti J, and Kivimäki M (2004) Sickness absence as a predictor of mortality among male an female employees. *Journal of Epidemiology and Community Health* 58(4): 321-326.

VanderWeele TJ (2015) *Explanation in Causal Inference. Methods for Mediation and Interaction*. Oxford: Oxford University Press.

Wooldridge J (2010) *Econometric Analysis of Cross Section and Panel Data.* Cambridge: MIT Press.

Author biographies

Anne May Melsom recently received a PhD in Sociology from the University of Oslo. Her dissertation addresses how gender segregation in the labour market affects sickness absence and gender differences in sickness absence. She currently works as a senior advisor at the Norwegian Tax Administration.

Arne Mastekaasa is Professor of Sociology at the University of Oslo. His research interests are labour market behaviour, education, social mobility, and psychological well-being. Recent articles on sickness absence have appeared in ILR Review, European Societies, European Sociological Review, and European Journal of Public Health.

Table 1. Descriptive statistics for dependent and main explanatory variables

		Men			Women		
		Full sample	Variation in gender comp.	Variation in gender comp. and absence	Full sample	Variation in gender comp.	Variation in gender comp. and absence
Absence days, all diagnoses							
	Mean	13.15	11.15	18.23	21.36	19.74	24.92
	Standard dev.	40.94	36.85	45.73	49.83	46.78	51.31
Absence days, musculoskeletal							
	Mean	5.40	4.28	7.00	7.95	6.92	8.73
	Standard dev.	26.51	23.22	29.37	32.16	29.31	32.68
Absence days, psychological							
	Mean	2.10	2.15	3.51	4.14	4.13	5.22
	Standard dev.	16.79	16.70	21.24	23.04	22.61	25.29
Proportion of women (%)							
	≥.0, ≤.1	38.3	22.3	24.2	1.4	1.4	1.4
	>.1, ≤.2	16.6	18.6	18.3	3.2	3.4	3.3
	>.2, ≤.3	10.5	13.5	12.9	3.7	4.4	4.3
	>.3, ≤.4	6.1	7.5	6.9	3.5	4.0	3.7
	>.4, ≤.6	12.7	15.1	14.4	13.7	14.1	13.7
	>.6, ≤.7	4.6	7.3	7.2	9.7	12.5	12.3
	>.7, ≤.8	7.2	10.1	10.1	22.1	23.5	23.3
	>.8, ≤.9	2.6	3.8	3.9	16.7	17.9	18.2
	>.9, ≤1.0	1.5	1.9	2.1	26.0	18.8	19.9
N of individuals		1398711	581230	343158	1336152	667224	510741
N of observations		8748513	4098326	2506357	8188747	4604826	3648459

The numbers in the 'Variation in gender comp. and absence' column are for individuals with variation in total absence (all diagnoses); the number with variation in diagnosis specific absence are lower, see Tables 3 and 4.

Table 2. Selected results from Poisson regression of sickness absence on proportion women in the occupation and control variables. Exponentiated coefficients (IRR's) and standard errors. Full results as supplementary online material (Table S2).

	Men			Women		
	Model 1A	Model 1B	Model 2	Model 1A	Model 1B	Model 2
Proportion of women, >.4, ≤.6 as reference						
≥.0, ≤.1	1.164 ***	1.146 ***	1.227 ***	1.155 **	1.129 ***	1.108 ***
	(0.041)	(0.037)	(0.035)	(0.054)	(0.039)	(0.028)
>.1, ≤.2	0.928	0.957	1.075 **	0.983	0.992	1.054 *
	(0.043)	(0.033)	(0.023)	(0.037)	(0.029)	(0.022)
>.2, ≤.3	0.872 **	0.920 *	1.028	0.981	0.994	1.058 **
	(0.036)	(0.033)	(0.023)	(0.042)	(0.034)	(0.020)
>.3, ≤.4	0.936	0.951	1.031	0.974	0.994	1.027
	(0.037)	(0.031)	(0.024)	(0.038)	(0.030)	(0.020)
>.6, ≤.7	1.070	1.050	0.904 **	1.013	1.011	0.922 ***
	(0.054)	(0.043)	(0.031)	(0.036)	(0.032)	(0.021)
>.7, ≤.8	1.088	1.075	0.910 **	1.024	1.026	0.921 ***
	(0.070)	(0.045)	(0.025)	(0.037)	(0.028)	(0.021)
>.8, ≤.9	1.094	1.065	0.804 ***	1.042	1.015	0.878 **
	(0.062)	(0.058)	(0.041)	(0.045)	(0.049)	(0.040)
>.9, ≤1.0	1.466 ***	1.276 ***	0.917 *	1.259 ***	1.184 ***	1.001
	(0.093)	(0.048)	(0.038)	(0.059)	(0.042)	(0.038)
χ^2-test Prop. of women	124.94	118.05	136.31	41.67	40.93	99.63
N of occupations	8206	7782	7782	7594	7171	7171
N of individuals	1398711	343158	343158	1336152	510741	510741
N of observations	8748513	2506357	2506357	8188747	3648459	3648459

All models control for age, age squared, number of days employed during the year, year of observation, level of education, children aged 0-6 and children aged 7-12. Significance probabilities: * p<.05; ** p<.01; *** p<.001. Model 1A: Ordinary Poisson regression, full sample; Model 1B: Ordinary Poisson regression, individuals with variation in gender composition and sickness absence only; Model 2: Fixed individual effects.

Table 3. Selected results from Poisson regression of sickness absence with musculoskeletal diagnosis on proportion women in the occupation and control variables. Exponentiated coefficients (IRR's) and standard errors. Full results as supplementary online material (Table S3).

	Men			**Women**		
	Model 1A	Model 1B	Model 2	Model 1A	Model 1B	Model 2
Proportion of women, >.4, ≤.6 as reference						
≥.0, ≤.1	1.472 ***	1.259 ***	1.371 ***	1.264 **	1.166 ***	1.137 **
	(0.106)	(0.053)	(0.062)	(0.088)	(0.051)	(0.046)
>.1, ≤.2	1.022	1.011	1.118 **	0.999	1.022	1.049
	(0.094)	(0.047)	(0.044)	(0.075)	(0.045)	(0.042)
>.2, ≤.3	0.859	0.929	1.027	0.927	0.982	1.015
	(0.074)	(0.047)	(0.043)	(0.065)	(0.040)	(0.037)
>.3, ≤.4	0.913	0.959	1.047	0.942	1.019	1.019
	(0.075)	(0.041)	(0.046)	(0.071)	(0.045)	(0.031)
>.6, ≤.7	0.994	0.973	0.877 **	0.943	0.959	0.897 ***
	(0.078)	(0.042)	(0.035)	(0.057)	(0.037)	(0.025)
>.7, ≤.8	1.102	1.022	0.897 *	1.026	1.010	0.911 **
	(0.111)	(0.050)	(0.040)	(0.076)	(0.044)	(0.031)
>.8, ≤.9	1.071	0.997	0.773 **	1.065	1.016	0.872 *
	(0.117)	(0.089)	(0.066)	(0.081)	(0.076)	(0.054)
>.9, ≤1.0	1.528 ***	1.155 **	0.882	1.325 ***	1.144 ***	0.995
	(0.152)	(0.055)	(0.059)	(0.103)	(0.048)	(0.055)
χ^2-test Prop. of women	146.77	98.55	150.88	46.45	38.58	56.98
N of occupations	8206	7011	7011	7594	6502	6502
N of individuals	1398711	174138	174138	1336152	267427	267427
N of observations	8748513	1275214	1275214	8188747	1965585	1965585

See the note to Table 2.

Table 4. Selected results from Poisson regression of sickness absence with psychological diagnoses on proportion women in the occupation and control variables. Exponentiated coefficients (IRR's) with standard errors in parentheses. Full results as supplementary online material (Table S3).

	Men			Women		
	Model 1A	Model 1B	Model 2	Model 1A	Model 1B	Model 2
Proportion of women, >.4, ≤.6 as reference						
≥.0, ≤.1	0.733 ***	0.903 ***	0.997	1.040	1.080 *	1.125 *
	(0.024)	(0.022)	(0.034)	(0.053)	(0.033)	(0.052)
>.1, ≤.2	0.773 ***	0.894 ***	1.015	0.897 *	0.953	1.033
	(0.030)	(0.028)	(0.042)	(0.038)	(0.030)	(0.039)
>.2, ≤.3	0.846 ***	0.955	1.054	1.011	1.038	1.149 ***
	(0.039)	(0.032)	(0.037)	(0.064)	(0.036)	(0.035)
>.3, ≤.4	0.956	0.978	1.047	0.967	1.006	1.051
	(0.046)	(0.038)	(0.044)	(0.044)	(0.031)	(0.035)
>.6, ≤.7	1.224 *	1.051	0.929	1.102	1.014	0.914 **
	(0.099)	(0.046)	(0.046)	(0.060)	(0.032)	(0.027)
>.7, ≤.8	1.148	1.041	0.912 *	1.045	0.988	0.901 ***
	(0.095)	(0.034)	(0.037)	(0.037)	(0.022)	(0.024)
>.8, ≤.9	1.256 ***	0.976	0.808 ***	1.015	0.905 **	0.823 ***
	(0.073)	(0.034)	(0.040)	(0.048)	(0.033)	(0.030)
>.9, ≤1.0	1.665 ***	1.132 **	0.945	1.170 ***	1.014	0.947
	(0.121)	(0.045)	(0.053)	(0.047)	(0.022)	(0.031)
χ^2-test Prop. of women	320.71	71.36	39.29	37.33	26.54	90.94
N of occupations	8206	6571	6571	7594	6228	6228
N of individuals	1398711	96363	96363	1336152	194017	194017
N of observations	8748513	698960	698960	8188747	1410793	1410793

See the note to Table 2.

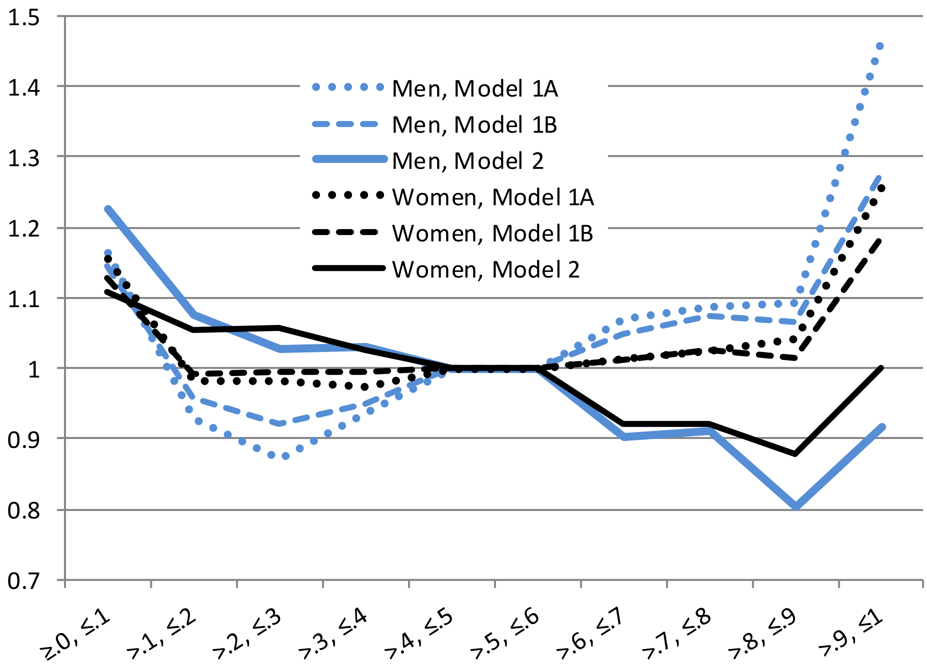

Figure 1. Sickness absence as a function of the proportion of women in the occupation. Relative rates compared to individuals in gender balanced occupations (=1). Women and men. FE (Model 2) and ordinary (Models 1A and 1B) Poisson regression estimates.

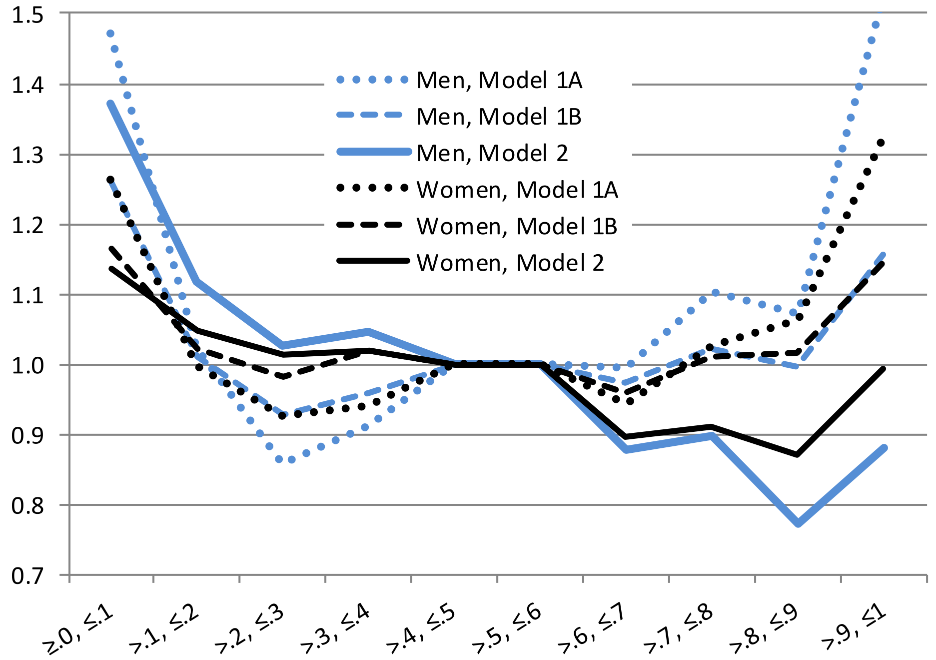

Figure 2. Sickness absence with musculoskeletal diagnosis as a function of the proportion of women in the occupation. Relative rates compared to individuals in gender balanced occupations (=1). Women and men. FE (Model 2) and ordinary (Models 1A and 1B). Poisson regression estimates.

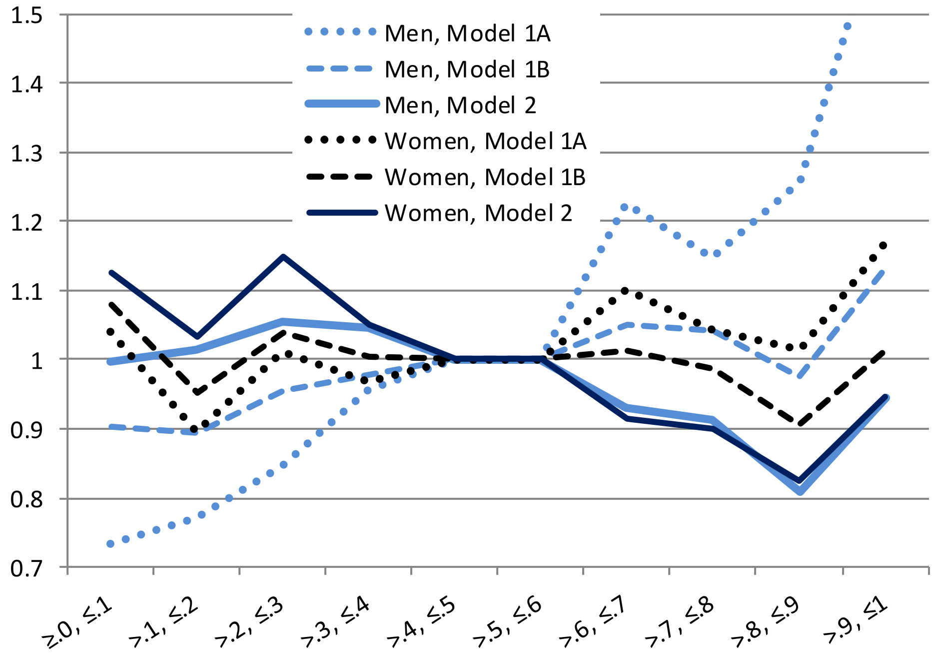

Figure 3. Sickness absence with psychological diagnosis as a function of the proportion of women in the occupation. Relative rates compared to individuals in gender balanced occupations (=1). Women and men. FE (Model 2) and ordinary (Model 1A and 1B) Poisson regression estimates.

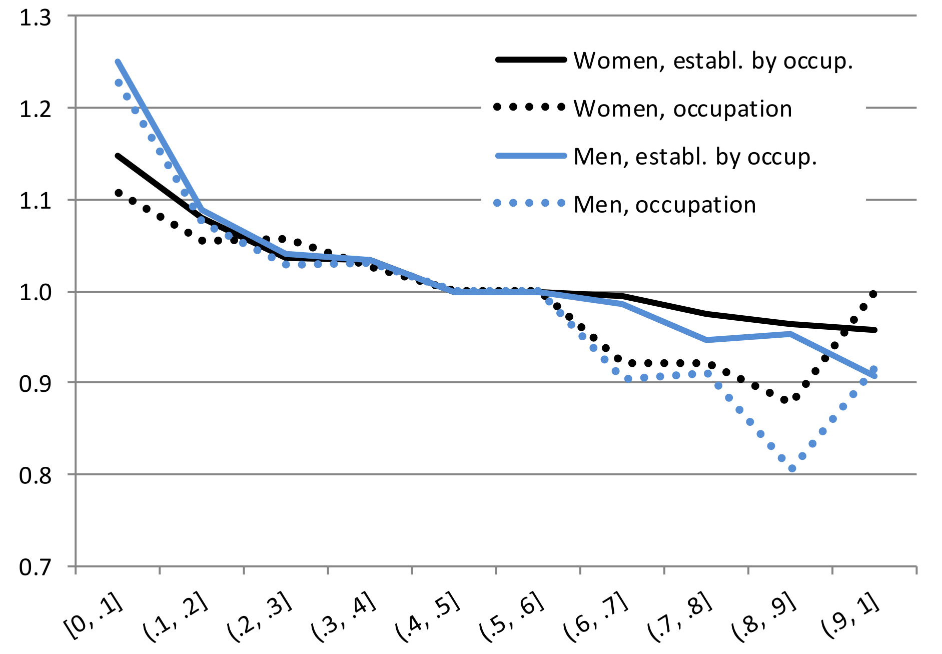

Figure 4. Sickness absence as a function of the proportion of women in the occupation and in the establishment by occupation cell. Relative rates compared to individuals in gender balanced occupations or establishment by occupation cells. Individual fixed effects (Model 2). Poisson regression estimates.