Occupational segregation and gender differences in sickness absence:

Evidence from 17 European countries

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Introduction

Women live longer than men and are less exposed to a number of life-threatening diseases. On most health indicators, however, women fare less well than men, with higher rates of morbidity and psychological distress, more negative self-assessments of health, and more use of health services (e.g., Bambra et al., 2009; Green and Pope, 1999). Absence from work due to sickness (or sick leave) fits into this general pattern, with most studies showing higher rates for women than for men (Barmby, Ercolani and Treble, 2002; Laaksonen et al., 2008; Mastekaasa and Dale-Olsen, 2000).

Two main explanations for these gender differences in health have been suggested (Denton et al., 2004, Rieker and Bird, 2000). According to the *exposure hypothesis* women and men occupy different structural locations or social roles. Women are for instance more often found in low SES jobs, and are more exposed to stresses and strains associated with such jobs. The *vulnerability hypothesis* suggests instead that health differences arise because various exposures have stronger negative effects for women than for men. Poor interpersonal relationships in the workplace may be one example of this (Gadinger et al., 2010).

Although health is obviously the outcome of a multitude of factors, work-related exposures are generally assumed to be important (Landsbergis, 2010; Stansfeld and Candy, 2006). Given the high degree of gender segregation in the labour market, one would, moreover, expect men and women to be exposed to *different* work-related exposures to a considerable extent. Whether women are on the whole in more unhealthy jobs than men is not obvious, however. It is widely accepted that the gender segregation in the labour market implies large disadvantages for women in terms of wages, career opportunities and workplace authority (de Ruijter, van Doorne-Huiskes and Schippers, 2003; Abendroth, Maas and Van der Lippe, 2011), but opinions differ on whether the female disadvantage extends to the full range of employment and working conditions. One line of argument sees segregation primarily as the outcome of women's own choices. Women may choose jobs that are less demanding and easier to combine with family life because they have other lifestyle preferences than men (Hakim, 2002) or because such choices provide an economically optimal division of household labour (Polachek, 1981). It has also been suggested that women and men choose different types of jobs because of gender-essentialist beliefs (Charles and Bradley, 2009; England, 2010), which may lead women to avoid, for instance, physically demanding work or jobs involving high accident risks. The implication of these ideas is that women may tend to choose jobs that are favourable to health. In contrast to these arguments, gender segregation can be seen as basically a result of discrimination (Reskin and Padavic, 2002; Reskin and Maroto, 2011): Women tend to get the less attractive jobs, and there is no reason to believe that low wages etc. are compensated by advantages in terms of other job characteristics. Thus, women would be expected to be on average in less healthy jobs than men.

In this paper we address these opposing views on the healthiness or unhealthiness of men's and women's work by examining how the gender difference in sickness absence is affected by control for detailed occupational categories. If women have higher sickness absence than men because they are sorted into unhealthy jobs, such control should reduce or eliminate this gender difference. If women are sorted or sort themselves into easier or healthier work, the opposite should be the case, i.e. the female excess in sickness absence should increase once the favourable selection is controlled for.

In addition we extend previous research on this issue by also assessing whether the gender differences in sickness absence that occur even within detailed occupations are related to differences in vulnerability to job-related exposures. Occupations provide different mixes of healthy and unhealthy job characteristics. Differential vulnerability should therefore lead to relatively small gender differences in sickness absence in some occupations, and to relatively large differences in others. More specifically, we argue that one may assume that women are relatively more vulnerable to exposures typically found in male-dominated occupations and that men are relatively more vulnerable to exposures that are associated with female-dominated occupations. The second objective of the article is to evaluate this proposition.

In controlling for detailed occupational categories, we take the same approach as a couple of earlier Finnish and Norwegian studies (Laaksonen et al., 2010; Mastekaasa and Dale-Olsen, 2000). Findings from these two Nordic welfare states may, however, tell us little about the situation in, e.g., Eastern European or Mediterranean labour markets. Also, the findings in the Finnish and Norwegian studies were quite different, with occupational segregation explaining 30 percent of the gender difference in sickness absence in the former, while having a weak impact in the opposite direction in the latter.

Not only is the previous research limited to a few countries, but methodological differences also make it difficult to compare the findings across countries. In this paper we contribute by using standardized general population data for 17 countries from the EU Labour Force Surveys covering all parts of Europe.

Theory and hypotheses

The sickness absence concept

In epidemiological research sickness absence has received considerable attention in recent years, and a number of authors have suggested that extent of long-term absence may be used as a measure of health (Kivimäki et al., 2003; Mazzuco and Suhrcke, 2011). The main argument for this is the relatively strong association between such absences and mortality (Kivimäki et al., 2003; Vahtera , Pentti and Kivimäki, 2004; Ferrie et al., 2009). Kivimäki et al. (2003) found that medically certified absences of more than one week's duration were also a much better predictor of mortality than was self-rated health, which has long been a widely used measure of health in epidemiological and sociological research (see, e.g., Olsen and Dahl, 2007).

In research on sickness absence (or absenteeism) in economics, on the other hand, health has received little attention. The most common approach has been to regard absence behaviour (or absenteeism) as the outcome of a trade-off between work and leisure (Brown and Sessions, 1996). The epidemiological and economic approaches are not necessarily in conflict, however, as health may also be included in the economic model. Barmby et al. (1994) suggest, for instance, that health may be seen as a factor influencing the utility derived from leisure, i.e. being able to stay away from work is more valuable when the worker is ill than when he or she is perfectly fit to work.

In this paper we define sickness absence as absence from work that is either certified by a physician or at least justified by the employee her- or himself as due to illness. Thus, we regard it as a form of *illness behaviour*, which is defined by Mechanic (1983) as ‘the manner in which people monitor their bodies, define and interpret their symptoms, take remedial action and utilise various sources of help as well as the more formal health care system’. We believe this is consistent with the approach taken by Barmby et al. (1994). It may be useful to think of an employee as having a sickness *threshold*; when below this level of sickness he/she goes to work, and when above he/she stays at home (cf. Barmby et al., 1994). The threshold will depend on various individual characteristics, but also on other factors, such as the nature of the work (e.g., how demanding it is). It follows that higher sickness absence among women than among men may arise because of more health problems or because women are more inclined than men to stay at home when they experience such problems. Although we shall for simplicity talk about ‘healthy’ (or ‘unhealthy’) work, the relative importance of each of these two factors cannot be determined in this study.

A possible objection to the conceptualization of sickness absence as illness behaviour is that registered or reported sickness absence may reflect ‘pure’ shirking (i.e., be causally unrelated to health). There is evidence from both Norway and Finland that outright shirking is quite limited (Bergsvik, Markussen and Raaum, 2010; Vahtera, Kivimäki and Pentti, 2001). In the present study we also consider specifically absence episodes of at least one week’s duration. There are at least two reasons to believe that long-term absences are rarely unrelated to health. In the first place, longer absences require certification by a physician in most countries.[1] Second, previous research has found medically certified absences of more than one week’s duration to be strongly related to mortality, whereas no such association was found for short-term absences (Kivimäki et al., 2003).

Gender segregation and exposure to stressors

According to Robert Karasek's influential Demand-Control model the stressfulness of a job is mainly determined by the combination of work demands and autonomy (Karasek and Theorell, 1990). Occupations with both high work demands and low autonomy, so-called high-strain jobs, are especially detrimental to workers' health. Another influential theory is the so-called 'effort-reward imbalance' theory developed by Johannes Siegrist. The central assumption here is 'that failed reciprocity in terms of high-cost and low-gain elicits strong negative emotions with special propensity to sustained autonomic and neuroendocrine activation and their adverse long-term consequences for health' (Siegrist, 2009: 307). In addition to the 'psycho-social' mechanisms assumed by these theories, chemical and physical exposures may of course also have more direct effects on health. According to Piha et al. (2013) manual and blue-collar occupations, which are largely dominated by men, are more prone to work injury than others.

As noted above, different assumptions about the underlying causes of the gender segregated labour market lead to different opinions on the level of negative exposures in men's and women's jobs. Using data from the European Social Survey (ESS), Muhlau (2011) found that men had advantages in terms of higher levels of job complexity, autonomy and participation. Women had the benefit of lower levels of exposure to health or safety risks, and were less likely to work beyond normal working hours. There was no gender difference in the perception of job security. Similar results for autonomy and job security were obtained by Esser and Olsen (2012), also using the ESS. Stier and Yaish (2012) analyzed data from the International Social Survey Programme (ISSP) and found that men more often than women reported that they had to do hard physical work or that the working conditions were dangerous, while women reported less control over the scheduling of their work, and also slightly more often found their work mentally exhausting; no gender difference was found for challenging and interesting job content or for job security. Using data from the European Working Conditions Survey in 2005 and a broad measure of work intensity, work autonomy, physical work factors and job security, Leschke and Watt (2008) found women to be slightly better off than men. Overall these cross-national studies underscore that it is not obvious whether men or women have on the whole the most healthy or unhealthy jobs.

A small number of studies that have tried to assess more directly whether the gender difference in sickness absence can be explained as a result of different work-related exposures have yielded quite variegated results. In a Norwegian sample Smeby et al. (2009) found that the estimated gender difference was largely unaffected by control for perceived control in the work situation and whether the work was perceived to be 'heavy' or not. In a study of Finnish municipal employees, on the other hand, Laaksonen et al. (2008) found that the total impact of controlling for a broader range of perceived working conditions was a reduction in the rate ratio associated with gender from 1.34 to 1.23.[2] The results reported in Casini et al.'s (2013) Belgian study seems to be intermediate between Smeby et al.'s (2009) and Laaksonen et al.'s (2008) findings.

The different assumptions noted above on occupational selection and the (un)healthiness of men's and women's work give rise to opposing hypotheses, and as we have seen the empirical evidence is also equivocal:

Hypothesis 1A: Since women are in less healthy occupations than men, control for detailed occupational categories will reduce the estimated gender (female versus male) difference in sickness absence.

Hypothesis 1B: Since women are in healthier occupations than men, control for detailed occupational categories will increase the estimated gender difference in sickness absence.

Vulnerability and occupational gender composition

The vulnerability hypothesis implies that men and women are differentially affected by given stressors. To the extent that this is the case, it seems reasonable to expect female-dominated occupations to be relatively better adapted to women, and male-dominated occupations to be relatively better adapted to men (cf. Stier and Yaish, 2012). This follows from the assumption that both men and women will, *ceteris paribus*, prefer occupations they perceive to be low in stressfulness. In addition, an occupation may also develop over time in such a way that it better accommodates the preferences of the kind of people it typically attracts. There are for instance more opportunities for part time work in female-dominated occupations. Employer adjustment to female workers' preferences is a likely explanation for this pattern (Kjeldstad and Nymoen, 2012). Under these assumptions one would expect the excess amount of sickness absence in women compared to men to be relatively large in male-dominated occupations, and relatively small (or even reversed) in female-dominated occupations.

Hypothesis 2: The excess sickness absence of women relative to men in the same occupation is negatively related to the proportion of women in the occupation.

The hypothesis that women are relatively speaking worst off in male-dominated occupations receives some support in studies of a population sample from a Swedish county (see, e.g., Alexanderson et al., 1994). A Norwegian general population study, on the other hand, found little if any systematic variation in the gender difference in sickness absence (Mastekaasa, 2005). This was also the case for a Finnish study of municipal employees (Laaksonen et al., 2012). Thus, no consistent cross-national pattern has emerged.

Data and statistical method

Sample

The European Union Labour Force Survey (EU LFS) is a continuous household survey conducted in the 27 Member States of the European Union, along with three candidate countries and members of the European Free Trade Association (Eurostat, 2010). Through Eurostat we have been given access to anonymized datasets from all EU countries except Malta, plus Norway and Iceland. Bulgaria, Poland and Slovenia are not included in our analyses because detailed occupation codes are not included. Bulgaria, Cyprus, Estonia, Greece, Iceland, Latvia, Lithuania, Luxembourg and Romania are excluded since the samples were not large enough to provide estimates with sufficient precision.

The main purpose of the EU LFS survey is to provide quarterly results on labour force participation for the entire adult population. All countries apply probability sampling methods, but there is variation with regard to stratification, use of single versus multi-stage sampling etc. Different methods of data collection are used; viz. personal visits, telephone interviews, and self-administered questionnaires. In addition, the exact wording of the questions and their order is not standardized across countries. In all but one of the countries analysed, panel data are collected with respondents participating in four to eight waves. In 2008 the average (unweigthed) response rate for the 17 countries analysed by us was 82 percent, ranging from 55 in Denmark to 97 in Germany (Eurostat, 2010).

We restrict our analyses to employees between 20 and 59 years of age (family workers and self-employed are excluded). We use pooled data from 1998-2008, except for Belgium where data for 1998 are missing, and for Germany with missing data for 1998 to 2001. The Eurostat data does not include panel identifiers, so it is not possible to track individuals across interview waves, and thus to adjust standard errors for clustering. This leads to some underestimation of standard errors. For Norway, we also had access to data files containing (anonymized) respondent identification numbers (from Statistics Norway and the Norwegian Social Science Data Services). This allowed us to compare standard errors with and without correction for clustering. This comparison suggested that the underestimation was of an order of about 29 percent, which means that the critical value for rejection in a two-tailed t-test at the .05 level should be about 2.75 (instead of 1.96), or a nominal significance probability of .006. These results do not generalize perfectly to other countries than Norway, but since each individual is interviewed eight times in Norway, the clustering effect is probably relatively large in this country. We use t=2.75 or a nominal significance level of .006 as a rule of thumb in evaluating the findings below.

Rules and regulations with regard to sickness absence vary strongly among the countries (see Note 1). In some countries, for instance, there is no upper limit on the time an employee may receive sick pay, whereas in other countries the limit may be as short as six months. This is likely to affect strongly the total number of sickness absence days during a year, and the number of people counted as absent in any given week. We take this variation and other comparability problems noted above into account by doing all analyses separately for each country, thus basing our conclusions entirely on variation within countries.

Variables

In the Labour Force Surveys employed respondents are asked whether they did any work for pay last week (the reference week), and if not, about the reason for the absence. The dependent variable *sickness absence* distinguishes between employees who were absent during the entire reference week with the reason given as 'own illness, injury or temporary disability' on the one hand (coded 1) and employees who were not absent (coded 0) on the other.[3] Absence for other reasons (such as vacation or labour conflicts) generally implies that the employee was not under risk of sickness absence during the week; such employees were therefore excluded from the analysis. It may be noted that the EU LFS data also include information on partial absences (fewer hours worked than usual) in the reference week, although not for Denmark, Finland, Norway and Sweden. To assess the robustness of the findings, we have replicated all analyses using a measure that distinguishes between any health-related absence (leading to loss of at least one working hour during the reference week) on the one hand and no such loss on the other.[4]

Occupation is given as three-digit ISCO codes. The number of occupations varies from 100 to 147 in the various countries.

Occupational gender composition is the proportion of women in the three-digit ISCO occupation, calculated separately for each country and ranging from 0 to 1.

Preliminary analyses indicated that the relationship between the occupational gender segregation and sickness absence was often highly non-linear. Both polynomials and spline functions turned out to be overly sensitive to extreme values. We therefore settled for a dummy variable solution, creating dummies for four intervals, (0, .2], (.2,.4], (.6,.8], and (.8,1), with (.4,.6] as the omitted category.

Gender is coded 0 for men and 1 for women. *Age* is given in five-year intervals in the original data. Age 41-45 years is used as reference. *Level of education* is based on UNESCO's ISCED classification (ISCED 1997 levels in parentheses). There are dummy variables for compulsory lower secondary school or less (0-2), post-secondary, non-tertiary education (4), higher education at the bachelor level (5), and higher education at the master/Ph.D. level (6), using upper secondary school (3) as reference. *Hours usually worked per week* is measured by dummy variables for less than 15 hours per week, 16-20 hours, and 21-25 hours and so on up to 'more than 50 hours per week'. We use 36-40 hours per week as reference.

Statistical methods

Since the dependent variable is dichotomous and extremely skewed, a non-linear probability model is preferable, and logistic regression is employed. With a very skewed dependent variable, the odds ratio (OR) can be interpreted as an approximate risk ratio (RR).

In order to see the impact of occupational segregation on the gender difference in sickness absence, we compare logistic regression models with and without control for occupation. The latter model is given by the following equation:

$$ln[p/(1-p)] = \alpha + \beta GENDER_{ij} + X_{ij}\gamma \qquad \text{(Model 1)}$$

The subscript *j* refers to the occupation and *i* to the individual; *p* is the probability of sickness absence, *X* is a vector of control variables (survey year, age, level of education and working hours), α and β are regression coefficients, and γ is a vector of coefficients. We then add the 100 to 147 occupation dummies:

$$ln[p/(1-p)] = \alpha + \beta GENDER_{ij} + X_{ij}\gamma + O_j\delta \qquad \text{(Model 2)}$$

O is the vector of occupation dummies (omitting one) and δ the vector containing their coefficients, and the other terms are explained above.

In a standard linear model for continuous variables, a comparison of β in models with and without given control variables is straightforward. This is not the case for logistic regression and other non-linear probability models, however, because the coefficients in such models are influenced by the amount or error variance (or unobserved heterogeneity) in the model (Karlson, Holm and Breen, 2012) – the larger the error variance, the smaller the coefficient will be (in absolute value). Since control variables reduce the error variance, the error variance will be larger in Model 1 than in Model 2. To deal with this problem, we employ the so-called KHB method suggested by Karlson, Holm and Breen (2012) and implemented in the user written Stata command *khb* (Kohler, Karlson and Holm, 2011). This allows us to compare the ORs in a larger model (such as Model 2) with the ORs in a smaller model (Model 1) that would be obtained under an identical level of unobserved heterogeneity.[5]

To examine whether the gender difference in sickness absence depends on the gender distribution of the occupation, Model 2 is augmented by dummies for the proportion of women in the occupation (omitting the dummy for the gender balanced category) and the interactions of these dummies with gender:

$$ln[p/(1-p)] = \alpha + \beta GENDER_{ij} + X_{ij}\gamma + O_j\delta + C_j\pi + \left(GENDER_{ij} \cdot C_j\right)\omega \qquad \text{(Model 3)}$$

C is the vector of dummies for the proportion of women in the occupation and π and ω are vectors of coefficients.[6] Note that Model 3 is not a pure fixed effects model, since we estimate the effect of a variable that only varies over occupations (the proportion of women).

Before proceeding it should be underscored that the available data do not allow any formal identification of causal effects. Most importantly, the results may be affected by various selection effects. In the first place, health or other factors affecting sickness absence may also affect the selection to more or less healthy occupations. The most obvious scenario is that people with health problems avoid stressful and hazardous occupations, but it is also possible that absence prone individuals to a greater extent than others end up in such occupations, for instance because they are less able to compete for less stressful jobs. Secondly, there is also health-related selection into and out of employment. These selection problems imply that the results must be interpreted with care and that only tentative conclusions can be drawn.

[Tables 1 and 2]

Results

Overall absence levels and gender differences

Table 1 provides the mean absence level for men and women in each country. The means vary strongly across countries, for men from a minimum of .0105 (1.05 percent absent in the reference week) in Ireland to .0333 in Norway, and for women from .0130 in Italy to .0535 in Sweden. The ratio of women's to men's absence ranges from 1.03 in Austria to 1.86 in Sweden.

Table 2 gives estimated ORs for Models 1 and 2 for all countries. The bottom row gives average estimates over all countries when weighted with the size of the population of employees aged 20-59 in each country.

All of the Model 1-estimates are significantly above one, indicating that women are more often absent from work because of sickness than are men. The average OR across countries is 1.31 or 1.34 when using the KHB estimates; thus, women are more than 30 percent more likely to be absent in a given week. The largest ORs are found in some of the Scandinavian countries and in Ireland, and the smallest ones in central Europe (Germany and Austria in particular) and in Italy.

Control for occupation (Model 2) leads to a significant increase in the estimated gender effect in all countries but Denmark, Finland, Sweden and the UK (see the OR_{KHB} (1)/OR(2) column). Across all countries the average OR increases from 1.34 to 1.47. Even in Germany and Austria women are now 24 and 25 percent, respectively, more likely to be absent than men.

The Pseudo R^2 values indicate that our general ability to explain the incidence of sickness absence is low. In relative terms, however, adding the occupation dummies has a significant impact, with an increase in the average Pseudo R^2 of 35 percent (from .023 to .031).

Although we are primarily interested in relatively long-term physician-certified absences (which are presumably most strongly related to health), we have also replicated all the analyses above on an alternative absence measure that includes even partial absences in the reference week.

Due to space limitations, the results are only available as an online table (Table A). We note here only that the results are generally very similar to those reported in Table 2. The weighted average OR_{KHB} for Model 1 is 1.36 and the OR for Model 2 is 1.48 (compared to 1.34 and 1.47, respectively, in Table 2).

[Table 3 and Figure 1]

Gender differences in male- and female-dominated occupations

To test whether the gender difference in sickness absence is smaller or larger in female-dominated or male-dominated occupations, Model 3 is estimated for each country. As seen in the rightmost column of Table 3, the interaction of gender with percent women in the occupation is significant in 9 of the 17 countries, using Wald tests with four degrees of freedom and the nominal .006 significance level. In all these countries the estimated gender difference is smaller in the most female-dominated occupations than in gender-balanced occupations (indicated by ORs for the interaction term being less than one), and in seven of these countries significantly so. This is also evident in Figure 1 where men and women in more or less female- or male-dominated occupations are compared to men in gender-balanced occupations (40-60 percent women). The same is the case for the weighted averages across all 17 countries.

The significant interaction effects for about half of the countries are consistent with the hypothesis that the gender difference in sickness absence is relatively small in female-dominated occupations. Nevertheless, these interaction effects are not very large; when averaging over countries, the OR of .849 for the Gender · (.8, 1] women in the occupation interaction means that the gender difference here is 15 percent smaller than in gender-balanced occupations (the reference category). It is also worth noting that strongly male-dominated occupations do not stand out with particularly large gender differences.

Although the main focus in this study is on the differences between men and women, we may note that the level of sickness absence is higher in strongly male-dominated than in gender-balanced occupations in nearly all countries in Figure 1. In a majority of the countries sickness absence also tends to be relatively high in female-dominated occupations; thus, the overall relationship between the gender composition and sickness absence approaches a U-shaped pattern. This is also the main pattern for the 17 countries as a whole, as the weighted averages in Table 3 show: Compared to men in gender-balanced occupations, men in strongly male-dominated and female-dominated occupations have 1.560 and 1.326 times higher odds of sickness absence. The graphs in Figure 1 (and the estimates for the interaction terms that are often close to one) show that the pattern tends to be similar for women, although with a less clear tendency toward higher absence in strongly female-dominated occupations.

Discussion and conclusion

The most important novel result in our study is that the estimated gender difference in absence probabilities tends to increase when men and women within the same occupation are compared. Thus, women seem to be on average in less rather than more stressful occupations than men, and the view that women are pushed into unhealthy occupations through discrimination or discrimination-like processes is not supported (which is not to say, of course, that discrimination may not to a greater or lesser extent explain gender differences in other job-related outcomes like wages or managerial positions).

Some limitations of the current study should be noted. In the first place, we are not able to control for potentially important selection effects, so clear conclusions about causal relationships cannot be drawn. Longitudinal studies following individuals over many years are likely to be crucial in order to model and analyse these selection processes, and should be an important priority for future research.

Although this study suggests that occupational segregation does not contribute to gender differences in sickness absence, the findings cannot be automatically generalized to segregation *within* occupations, i.e. between employers or between men and women who both work for the same employer and in the same occupation. We do not, however, see any strong reason to believe that women should for some reason sort into relatively healthy occupations (e.g., occupations facilitating the combination of paid work with home demands), but into relatively unhealthy jobs within these occupations. Given the results of our study, such a potential unfavourable sorting of women within occupations would also have to be of some strength to outweigh the favourable sorting at the occupational level. Previous research has also shown that once control for occupation has been carried out, the estimated gender difference in sickness absence is little affected by further control for within occupation variation between employers or workplaces (Laaksonen et al., 2010; Mastekaasa and Dale-Olsen, 2000). However, the generalizability of these previous findings to all countries in our data can obviously not be taken for granted.

Mainly because of space limitations this study has only considered the job domain and has not taken into account the possibility that job-related exposures may interact with exposures arising in other life domains, e.g. so-called 'double burden' effects of combining employment with care for children (Bratberg et al., 2002; Floderus et al., 2011). It may be noted, however, that the double burden hypothesis has received little support, both in broad descriptive studies (Mastekaasa, 2012; Väänänen et al., 2008) and in studies examining the underlying processes in more detail by means of panel data and fixed effects models (Rieck and Telle, 2013). At any rate, the presence of double burden effects would primarily introduce more heterogeneity among women and would hardly affect our main conclusion that women tend on average to be in less rather than more unhealthy jobs than men.

Although the estimated gender difference increases in most countries when control for occupation is introduced, there is considerable variation among the countries. Since European countries vary strongly in occupational and industrial composition, this is not surprising. As shown in Table 3 and Figure 1, the probability of sickness absence tends on the whole to be highest in the most male-dominated occupations. A high proportion of the workforce employed in such occupations is thus one factor contributing to smaller overall gender differences in sickness absence in a country's workforce (since high absence levels in male dominated occupations increase men's average sickness absence much more than it affects women). It is consistent with this reasoning that three of the four countries in which control for occupation had no impact on the estimated gender difference (the UK, Denmark and Sweden) are also the three countries with the lowest proportion of the workforce in occupations with more than 80 percent men (results not shown).

In a few countries there is some tendency toward a smaller gender difference in female-dominated than in male-dominated occupations. This could be taken as support for the idea that men and women have different needs or preferences with regard to jobs and working conditions, and that women's (men's) preferences are most likely to be satisfied in female-dominated (male-dominated) occupations. The support for these theories is, however, quite limited, as the gender difference in sickness absence was found to be unrelated to the gender composition of the occupation in 8 of the 17 countries. And even in the most female-dominated occupations (80 to 100 percent women) there is a substantial gender difference in most countries; when averaging over all countries, the OR for gender is only about 10 percent lower in these occupations than in the gender-balanced ones (as indicated by an OR for the interaction term of .895 in Table 3).

To conclude, the hypothesis that women are in more stressful occupations than men is not supported in any of the 17 European countries included in this study. In most of the countries there is evidence that men are instead overrepresented in occupations with high levels of sickness absence, although not by a large margin. Thus, differential exposure to job-related stressors is an unlikely explanation for the considerably higher sickness absence among women than among men. The gender difference in sickness absence tends to be slightly smaller in strongly female-dominated occupations. On the whole, however, the association between the gender composition of the occupation and sickness absence is quite similar for both genders: Strongly male-dominated occupations are characterized by a high probability of sickness absence for both men and women; the same applies to a lesser extent to strongly female-dominated occupations, but this is less consistent across countries.

Notes

[1] In 2008 medical certification was required in all countries except Denmark and the Netherlands, according to the EU Mutual Information System on Social Protection / Social Security (MISSOC). See: http://www.missoc.org/MISSOC/comparativeTables

[2] These numbers refer to their analyses of all physician-certified absences; control for working conditions had no impact on the estimated gender difference in self-certified absences.

[3] Reason for absence during the entire reference week is given by the variable NOWKREAS in the EULFS data. Code 04 is '[o]wn illness, injury or temporary disability'.

[4] Reason for partial absence during the reference week is given by the variable HOURREAS. Code 08 is 'own illness, injury or temporary disability'.

[5] The basic idea of the method is to replace Model 1 with Model 1', which includes as explanatory variables the residuals of the control variables obtained when regressing these on the original explanatory variables in Model 1. Since these residuals are uncorrelated with the original explanatory variables, the only effect of including them will be to make the error variance equal to that in Model 2, and the difference in the estimates in Models 1 and 1' will only be due to the 'corrected' error variance of the latter.

[6] Since *C* is a grouping of occupational categories, one occupation belonging to each of the five *C* categories is omitted from the *O* vector. In addition, effect coding of occupations within each *C* category is used instead of dummy coding (deMaris, 2004: 131-133). This means that each coefficient in δ will estimate how much the log odds of sickness absence in a particular occupation deviates from the average over all occupations in the same *C* category (controlling for other variables). More importantly, the coefficients in ω will now compare these average levels with the average level in the omitted *C* category (gender balanced occupations). (With dummy coding of occupations the coefficients in ω would in stead only compare the omitted occupations in the various *C* categories.)

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Table 1. Proportion of men and women absent because of sickness in the reference week, along with the ratio of these proportions.

	Men	Women	Women/Men
Austria	0.0138	0.0143	1.03
Belgium	0.0278	0.0314	1.13
Czech Rep.	0.0268	0.0380	1.42
Germany	0.0168	0.0173	1.03
Denmark	0.0184	0.0284	1.54
Spain	0.0209	0.0257	1.23
Finland	0.0255	0.0328	1.29
France	0.0266	0.0330	1.24
Hungary	0.0117	0.0186	1.59
Ireland	0.0105	0.0177	1.69
Italy	0.0111	0.0130	1.17
Netherlands	0.0263	0.0357	1.36
Norway	0.0333	0.0530	1.59
Portugal	0.0138	0.0197	1.43
Sweden	0.0287	0.0535	1.86
Slovakia	0.0126	0.0154	1.22
UK	0.0174	0.0265	1.52
Weighted average[a]	0.0192	0.0250	1.30

Note: Data from the EU LFS pooled over 1998-2008. [a] Weighted by the average number of employees aged 20-59 in each country 1998-2008 (the variable referred to as lfsa_egaps in Eurostat's database, see http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database).

Table 2. Selected results from logit models of sickness absence estimated for each country using the EU LFS data

	Model 1			Model 2		OR_{KHB} (1)/ OR (2)	N of obser-vations
	OR	OR_{KHB}	Pseudo R^2 (McFadden)	OR	Pseudo R^2 (McFadden)		
Austria	**1.093**	**1.120**	0.036	**1.251**	0.043	**0.895**	732088
	(0.025)	(0.026)		(0.036)		(0.017)	
Belgium	**1.352**	**1.430**	0.043	**1.582**	0.054	**0.904**	322154
	(0.032)	(0.035)		(0.047)		(0.020)	
Czech Rep.	**1.336**	**1.345**	0.019	**1.715**	0.030	**0.784**	942884
	(0.016)	(0.017)		(0.029)		(0.014)	
Germany	**1.092**	**1.118**	0.021	**1.244**	0.027	**0.899**	970107
	(0.019)	(0.020)		(0.027)		(0.012)	
Denmark	**1.458**	**1.519**	0.017	**1.631**	0.033	0.931	262988
	(0.042)	(0.045)		(0.059)		(0.033)	
Finland	**1.290**	**1.363**	0.031	**1.408**	0.042	0.968	505770
	(0.022)	(0.025)		(0.036)		(0.022)	
France	**1.245**	**1.288**	0.021	**1.382**	0.029	**0.932**	900245
	(0.016)	(0.017)		(0.023)		(0.016)	
Hungary	**1.579**	**1.595**	0.018	**1.895**	0.027	**0.842**	969491
	(0.027)	(0.029)		(0.046)		(0.017)	
Ireland	**1.809**	**1.827**	0.023	**2.009**	0.029	**0.909**	1065631
	(0.034)	(0.035)		(0.047)		(0.013)	
Italy	**1.256**	**1.277**	0.016	**1.472**	0.023	**0.867**	1581693
	(0.020)	(0.021)		(0.028)		(0.011)	
Netherlands	**1.394**	**1.437**	0.026	**1.557**	0.032	**0.923**	1474277
	(0.018)	(0.019)		(0.023)		(0.009)	
Norway	**1.626**	**1.720**	0.024	**1.808**	0.037	**0.952**	402271
	(0.028)	(0.031)		(0.041)		(0.019)	
Portugal	**1.582**	**1.626**	0.042	**1.848**	0.050	**0.880**	578325
	(0.034)	(0.036)		(0.055)		(0.020)	
Sweden	**1.850**	**1.916**	0.040	**1.879**	0.055	1.020	846922
	(0.023)	(0.025)		(0.030)		(0.017)	
Slovakia	**1.203**	**1.192**	0.022	**1.444**	0.028	**0.826**	418793
	(0.033)	(0.033)		(0.055)		(0.029)	
Spain	**1.430**	**1.474**	0.032	**1.657**	0.039	**0.890**	2050536
	(0.014)	(0.015)		(0.022)		(0.010)	
UK	**1.435**	**1.461**	0.017	**1.473**	0.028	0.991	1291072
	(0.020)	(0.021)		(0.025)		(0.018)	
Weighted average[a]	**1.309**	**1.342**	0.023	**1.471**	0.031	**0.912**	
	(0.007)	(0.007)		(0.009)		(0.005)	

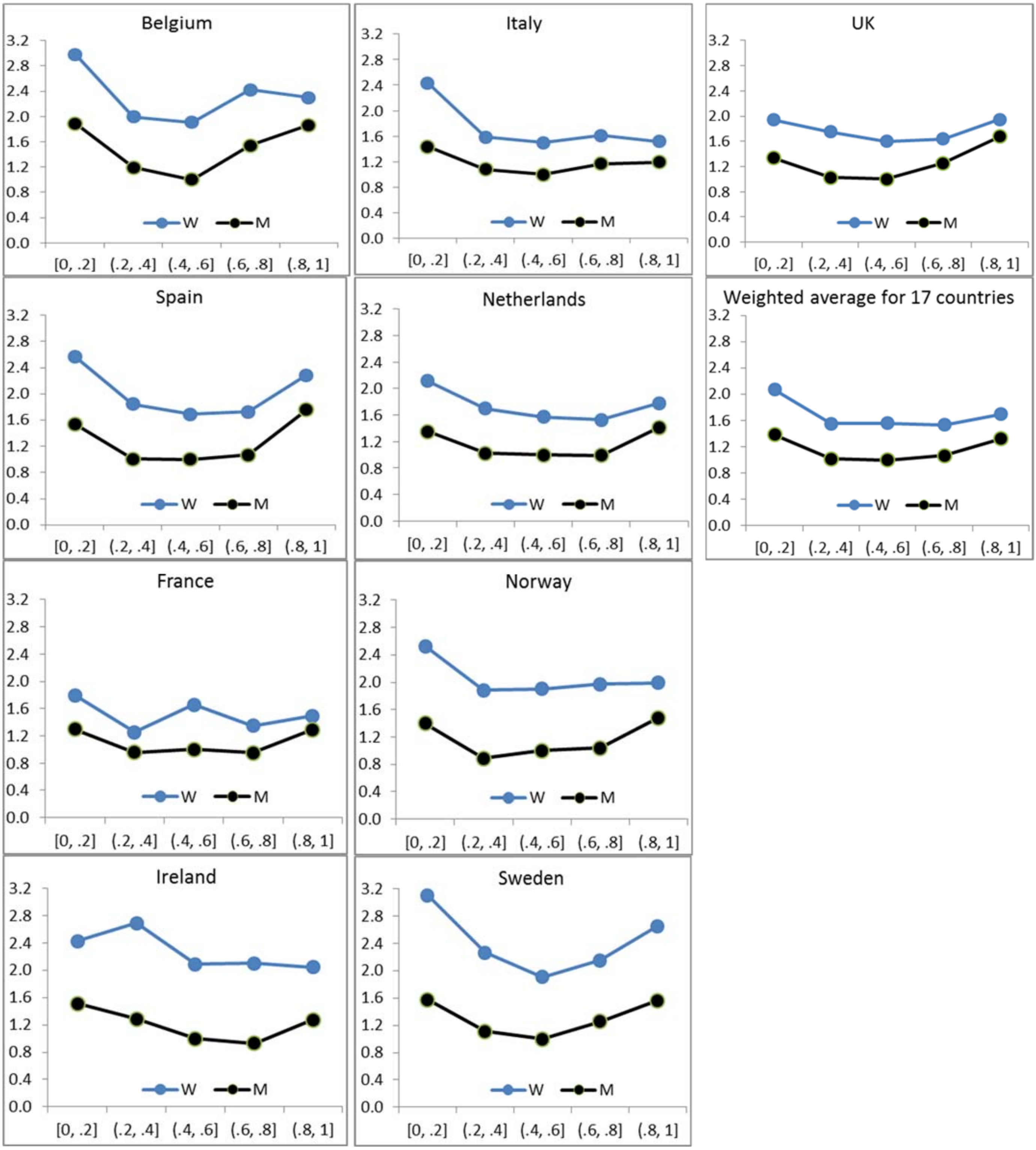
Notes: Model 1 regresses sickness absence on gender, survey year, age, working hours and level of education. Model 2 = Model 1 + detailed occupational categories. OR is the ordinary odds ratio estimate, OR_{KHB} is the KHB estimate. Numbers in parentheses are standard errors. 'OR_{KHB} (1)/OR (2)' is the ratio of the KHB estimate for Model 1 to the estimate for Model 2. OR estimates significantly different from one at the nominal .006 level are in bold type. Data are pooled over the years 1998-2008, except for Belgium and Germany where the periods covered are 1999-2008 and 2003-2008, respectively. [a] See note to Table 1.

Table 3. Country-specific logistic regression of sickness absence on gender, the proportion of women in the occupation and the interaction of these variables, plus control variables. Random occupation effects. Exponentiated coefficients (ORs) with standard errors in parentheses.

	Gender (man as ref.)	Prop. of women in the occupation, (.4, .6] as reference				Prop. of women in the occupation · Gender (woman)				χ^2 for prop. of women (4 df.)		
		[0, .2]	(.2, .4]	(.6, .8]	(.8, 1]	[0, .2]	(.2, .4]	(.6, .8]	(.8, 1]	Eff. for men	Eff. for wom.	Diff. M - W
Austria	**1.225**	**1.384**	1.108	1.029	**1.489**	**1.074**	1.084	1.078	0.826	**32.11**	**16.03**	10.05
	(0.060)	(0.109)	(0.107)	(0.107)	(0.158)	(0.096)	(0.087)	(0.078)	(0.075)			
Belgium	**1.906**	**1.890**	1.191	**1.541**	**1.863**	0.828	0.877	0.824	**0.647**	**50.69**	**21.39**	**14.89**
	(0.163)	(0.204)	(0.160)	(0.188)	(0.254)	(0.085)	(0.096)	(0.080)	(0.076)			
Czech Rep.	**1.594**	1.138	0.908	**0.815**	**0.742**	1.060	1.055	**1.147**	**1.194**	**49.36**	**32.05**	13.33
	(0.051)	(0.066)	(0.059)	(0.058)	(0.049)	(0.050)	(0.053)	(0.054)	(0.071)			
Germany	**1.277**	**1.382**	0.972	1.001	1.063	0.962	0.887	0.998	1.046	**61.06**	**40.03**	5.86
	(0.058)	(0.086)	(0.066)	(0.073)	(0.086)	(0.063)	(0.058)	(0.060)	(0.080)			
Denmark	**1.715**	**1.641**	**1.465**	1.253	**1.556**	1.062	1.065	0.931	**0.742**	**36.12**	**33.01**	14.00
	(0.143)	(0.086)	(0.090)	(0.116)	(0.123)	(0.128)	(0.118)	(0.118)	(0.078)			
Finland	**1.384**	**1.262**	0.885	0.889	0.919	1.018	1.156	0.937	1.006	**52.04**	**37.62**	7.69
	(0.071)	(0.073)	(0.077)	(0.070)	(0.079)	(0.076)	(0.089)	(0.068)	(0.087)			
France	**1.660**	**1.297**	0.956	0.949	**1.292**	**0.835**	**0.791**	**0.857**	**0.697**	**56.84**	**36.30**	**58.11**
	(0.056)	(0.070)	(0.070)	(0.056)	(0.068)	(0.046)	(0.038)	(0.045)	(0.034)			
Hungary	**1.916**	**1.256**	1.126	0.959	1.143	1.008	0.991	0.988	0.942	13.49	12.24	0.65
	(0.088)	(0.101)	(0.088)	(0.088)	(0.110)	(0.080)	(0.063)	(0.071)	(0.077)			
Ireland	**2.087**	**1.510**	**1.286**	0.929	1.275	**0.771**	1.004	1.085	**0.768**	**58.22**	**22.50**	**30.01**
	(0.107)	(0.113)	(0.094)	(0.072)	(0.132)	(0.066)	(0.065)	(0.075)	(0.065)			
Italy	**1.500**	**1.436**	1.077	1.164	1.189	1.128	0.982	0.920	0.851	**61.69**	**80.31**	**17.36**
	(0.058)	(0.075)	(0.073)	(0.075)	(0.107)	(0.066)	(0.054)	(0.046)	(0.075)			
Netherlands	**1.571**	**1.350**	1.021	0.995	**1.414**	0.996	1.058	0.979	**0.802**	**92.94**	**41.94**	**38.39**
	(0.055)	(0.058)	(0.049)	(0.061)	(0.077)	(0.049)	(0.043)	(0.041)	(0.042)			
Norway	**1.904**	**1.397**	0.886	1.039	**1.481**	0.951	1.119	0.998	**0.706**	**85.65**	**20.86**	**43.53**
	(0.087)	(0.084)	(0.067)	(0.072)	(0.115)	(0.064)	(0.083)	(0.063)	(0.048)			
Portugal	**2.027**	1.267	1.056	0.844	0.981	0.868	0.956	0.878	**0.758**	**16.54**	**17.87**	7.40
	(0.117)	(0.117)	(0.100)	(0.091)	(0.165)	(0.087)	(0.085)	(0.068)	(0.087)			
Sweden	**1.907**	**1.575**	1.112	**1.253**	**1.566**	1.034	1.069	0.901	0.888	**114.42**	**119.60**	**24.94**
	(0.077)	(0.082)	(0.063)	(0.068)	(0.085)	(0.058)	(0.053)	(0.050)	(0.047)			
Slovakia	**1.419**	1.161	1.002	1.040	**0.748**	1.091	0.951	0.934	1.130	**14.53**	**16.31**	3.02
	(0.087)	(0.103)	(0.118)	(0.160)	(0.097)	(0.113)	(0.105)	(0.115)	(0.134)			
Spain	**1.692**	**1.539**	1.008	1.067	**1.760**	0.987	1.081	0.956	**0.767**	**218.78**	**134.37**	**46.02**
	(0.086)	(0.053)	(0.036)	(0.053)	(0.093)	(0.067)	(0.075)	(0.071)	(0.054)			
UK	**1.602**	**1.339**	1.025	**1.251**	**1.677**	0.904	1.068	**0.819**	**0.726**	**70.98**	**18.73**	**76.05**
	(0.057)	(0.067)	(0.085)	(0.059)	(0.121)	(0.056)	(0.049)	(0.038)	(0.041)			
Weighted average[a]	**1.560**	**1.383**	1.019	**1.068**	**1.326**	0.962	0.967	**0.929**	**0.849**			
	(0.022)	(0.027)	(0.025)	(0.024)	(0.034)	(0.021)	(0.020)	(0.019)	(0.023)			

Notes: ORs for survey year, age, education and working hours are not shown. ORs and χ2-statistics significant at the nominal .006 level are in bold type. Data are pooled over the years 1998-2008, except for Belgium and Germany where the periods covered are 1999-2008 and 2003-2008, respectively. [a] See note to Table 1.

Figure 1. The relationship between the proportion of women in the occupation (horizontal axis) and men's and women's sickness absence (vertical axis) for countries in which this relationship is significantly different for men and women along with weighted averages across all 17 countries.



Note: ORs based on Table 3; see the note to that table for details. All ORs in the figure are relative to men in occupations with the proportion of women in the (.2, .4] interval. ORs for men are the ORs for the Proportion of women in the occupation given in Table 3. ORs for women are obtained by multiplying the OR for Gender, the OR for the Proportion of women in the occupation and the OR for the Gender · Proportion of women interaction. M = Men, W = Women