

The contribution of health selection to occupational status inequality in Germany - differences by gender and between the public and private sectors

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Abstract

Objectives: Estimating the size of health inequalities between hierarchical levels of job status and the contribution of direct health selection to these inequalities for men and women in the private and public sector in Germany

Study Design: The study uses prospective data from the Socio-Economic Panel study on 11,788 women and 11,494 men working in the public and private sector in Germany.

Methods: Direct selection effects of self-rated health on job status are estimated using fixed-effects linear probability models. The contribution of health selection to overall health-related inequalities between high and low status jobs is calculated.

Results: Women in the private sector who report very good health have a 1.9 [CI: 0.275; 3.507] percentage point higher probability of securing a high status job than women in poor self-rated health. This direct selection effect constitutes 20.12% of total health inequalities between women in high and low status jobs. For men in the private and men and women in the public sector no relevant health selection effects were identified.

Conclusions: The contribution of health selection to total health inequalities between high and low status jobs varies with gender and public versus private sector. Women in the private sector in Germany experience the strongest health selection. Possible explanations are general occupational disadvantages that women have to overcome to secure high status jobs.

Keywords: Germany; Health inequalities; Occupational Health; Gender; Health Selection

Introduction

The relationship between health and labor market positions has been studied intensively. One important process of stratification on the labor market that has received little attention is status hierarchy *within* occupations. Anderson et al.¹ demonstrate that, for British white collar workers, a promotion is followed by a substantial reduction in the risk of heart disease. Chandola et al.² show that an increase in employment grade among British white collar workers reduces the risk of negative health conditions. These studies investigated health inequalities due to hierarchical job status from a social causation perspective. The social causation hypotheses states that social circumstances and working conditions, which are different for jobs with different statuses, affect workers' health. An alternative explanation is the health selection hypothesis, which states that health-related inequalities arise due to a process selecting those in poor health into lower-status positions and those in good health into higher-status positions, a selection process which seems especially plausible for the labor market. When employers decide which persons to hire or to promote, health status or health-related productivity can be an important criterion^{3,4}. Studies that take a health selection approach to the study of health-related inequalities have often investigated occupational class, employment status, or wages⁵⁻¹⁰. Hierarchical job status within occupations has only rarely been assessed within a framework of health selection. Elovainio et al. is one of the few exceptions¹¹. They find childhood health to be an important predictor of job status in adulthood, but not health during adult life. Using the same data from the Whitehall II study, Chandola et al.² find no health selection effects on employment grade. However, the analysis of both studies is limited to civil servants. The authors acknowledge that there is almost no downward movement possible in this setting. It might therefore be worthwhile to compare a situation in which job security and career paths are fairly similar to the Whitehall II study with a situation in which competition and more flexible labor laws allow for upward and downward movement within an occupation. In this study, I use data from the German labor market to investigate the extent to which health inequalities

between high and low status jobs are produced by health selection processes in the private and the public sector for men and women. The differentiation between the public and private sectors serves as a distinction between more open positions in which competition should lead to stronger selection (private sector) and closed positions in which high job security and promotion schemes based on tenure allow for little health-related selection (public sector). Promotion schemes in the public sector in Germany are determined to a lesser degree by performance than in the private sector, although recent years have seen an increase in policies such as performance measurement in the public sector in Germany¹²; however, they have not been in place for the whole period of observation, and promotion procedures are still more bureaucratic than in most of the private sector. Therefore, I expect to find health selection effects to contribute to health inequalities between high and low status jobs in the private but not in the public sector. It is further expected that health selection effects are approximately the same strength for men and for women given the same sector. In addition, the question will be addressed how much health selection contributes to overall health inequalities between high and low job status for men and women in the private and public sector.

The focus on health selection does not include *indirect* health selection, which works through higher human capital in the form of educational credentials or skills acquired throughout life, and only examine *direct* health selection effects¹³. As direct health selection effects I understand the influence of health through performance that cannot be explained by human capital, effort related (e.g. household burdens), or personality factors that might be a cause of both health and job status.

Methods

The study uses data from the German Socio-Economic Panel Study (SOEP) to conduct the analyses. The SOEP is a representative household survey with annual interviews, starting in 1984, and currently includes more than 20,000 personal interviews from more than 10,000 households drawn from the

original sample and regular refreshment samples (in years 1998, 2000, 2002, 2006, and 2009 for the present study)^{14,15}. The sample for the regression analyses comprises the annual waves K (1994) to BB (2011). Excluded are self-employed individuals, non-employed individuals, those who are still in the educational system, and all those above the age of 59 and below the age of 30. The effects of the restrictions on sample size can be seen in detail in appendix A. Individuals are followed on average 5.3 years in the restricted sample.

Health is measured as self-reported health on a five-point scale (bad, poor, satisfactory, good, and very good), which has been shown to be a strong predictor of morbidity and mortality¹⁶⁻¹⁹. Due to the low prevalence of bad and poor health in the data, these two categories are combined into one category, labeled poor health, which is the reference for the study. Health is always measured at time t compared to job status, which is measured at $t+1$ (one year later). This ensures that the change in health precedes the change in job status.

The job status of an individual is based on categorizations of their position within their company's hierarchy, corresponding to the degree of autonomy, skill, and responsibility²⁰. An individual is defined as being in a high status job if he or she reports having a job that requires either highly specialized skills or supervisory tasks, or both. According to this definition the responses to question have been categorized as high or low status jobs (see table 1). It should be noted that the terms for the positions indicated in the table are well known to German employees and established in practice. More common measures associated with job or labor market status like the EGP-classification²¹ or ISEI²² cannot be used for the research question, because they are designed to reflect also differences *between* occupations, while the focus of this study is the strictly on the hierarchy *within* occupations. In the logic of analyzing promotions and demotions according to hierarchal positions *within* occupations, distinctions between blue-collar and white-collar or service jobs are not necessary. The indicator seems externally reliable as individuals in higher job status are more often male, higher

educated, earn higher wages, and are older which is to be expected on the German labor market (see appendix B).

The sector is measured by a question asking the respondents whether their employer is part of the public sector or a private company. It is measured at the same time as job status. If sectors are changed, individuals are first analyzed in the group of private sector employees and after the change to public sector in the group of public sector employees or vice versa. Employees who change their employer are retained in the analyses as upward mobility through a job at a different company might be a health selective process. The same is true for downward mobility initiated through employer change (e.g. job loss, temporary contract ended). Note that individuals who become unemployed (or lose or quit their job) and then re-enter the labor market in a lower status job are longitudinally captured by the analysis and contribute to estimation of the health selection process. This is the most common way in downward mobility in job status occurs in contrast to direct demotion.

To exclude alternative explanations of the association between health and job status – such as indirect selection, or other forms of spurious correlation – a wide range of possible confounders are controlled in the analyses. The categories of observed controls for spurious correlation are human capital endowment, occupational intensity including a scale that represents the average physical and psychological strain in an occupational group²³, non-occupational responsibilities, demographic factors, and anticipation effects. The last category is especially important, because subjects might be aware of promotions or demotions in advance, which might influence their reported health. This would thus be a mechanism reflecting social causation, rather than health selection. Table 2 lists the corresponding variables in detail. They are included in all of the presented models in this article. Appendix C shows the summary statistics of the variables in the data set. Missing data in the variables listed in table 2 was addressed by generating 25 datasets through multiple imputation by chained equations²⁴. The analyses were run on all 25 datasets and were combined according to Rubin's rules²⁵.

Instead of using the common logistic regression approach, I estimate a linear probability model with fixed-effects and a sandwich estimator for the standard errors ²⁶ to be able to estimate the relative contribution of health selection to health inequalities between high and low job status. As a robustness check I also ran fixed-effects logistic regression models, and the results are very similar to those from the linear probability model (see appendix D). The estimated model is defined as:

$$P(\text{Status}_{i(t+1)} = 1) = \alpha + \sum_{k=1}^3 (\beta_k \dot{H}_{kit}) + \dot{X}_{it}\gamma + \dot{\epsilon}_{it} \quad (1)$$

The indices i and t stand for the individual and time point respectively. k stands for the three categories of self-rated health (the fourth is the reference category). \dot{X} is a vector of covariates including all controls listed in table 2, and γ the corresponding vector of coefficients. The apostrophes above the variables indicate that the estimation is based only on changes in job status, health, and the control variables. The equation therefore estimated the effect of change in health on change in job status. This implies that those individuals who do not experience a change in health or job status do not contribute to the estimation of the coefficients.

I estimate the relative contribution of health selection to the overall health inequalities between high and low status jobs in three steps. First, the overall health inequalities are estimated. For this purpose, the typical order of independent and dependent variable is reversed. Health is the predictor variable and job status the dependent variable (as later in the health selection equations). This changes the metric of the health inequalities from percentage point differences in health groups, dependent on job status, to percentage differences in high job status dependent on health groups, but it does not change the magnitude of the overall health inequalities. Second, I assume that the overall health inequalities are the same if they are estimated using measures of health at t and job status at $t+1$, instead of both variables measured at time point t . In the appendix E I show that the empirical differences between the estimations of health inequalities and job status measured at t or

$t+1$ are negligible. Based on these two steps I define the estimate of the overall health inequalities as the $\tilde{\beta}_k$ coefficients from the following equation:

$$P(\text{Status}_{i(t+1)} = 1) = \tilde{\alpha} + \sum_{k=1}^3 \tilde{\beta}_k H_{kit} + e_{it} \quad (2)$$

Third, I calculate the proportion of the health inequalities due to health selection (ρ_{HS}) by dividing the direct health selection effect by the total health inequalities:

$$\rho_{HS_k} = \frac{\beta_k}{\tilde{\beta}_k}, k \in 1,2,3 \quad (3)$$

Results

Figure 1 shows differences in health status according to job status, gender, and sector of employment. On average, individuals in high status jobs report being in good or very good health 10 percentage points more often than those in low status jobs. All differences are significant at $p < 0.01$. There are no apparent differences in these inequalities between men and women or the private and public sectors. In order to judge the relevance of these overall inequalities, figure 2 reports the same inequalities in self-rated health according to education (CASMIN classification). Health inequalities by education are a well-established phenomenon, and rank highest among the inequalities due to different dimensions of social stratification²⁷. The difference between those in the lowest and those in the highest educational group is about 16 percentage points. Inequalities in self-rated health due to hierarchical job status are thus two thirds of the size of health inequalities between the highest and lowest educational group.

Table 3 presents an overview of the mobility pattern between high and low status jobs by health status. We can mainly see that those in good health are more often stayers in high status jobs while those with poor health are more often stayers in low status jobs. Overall mobility is slightly higher for those in good health which is probably due to the fact that these individuals are on average much

younger and experience more change in their career. It is therefore necessary to proceed to the multivariate fixed-effects regression to get a better impression of the association of health and job status.

Table 4 reports three estimates for each of the four groups under investigation. The columns labeled TI report the overall differences in job status between the health categories and the columns labeled HS report the health selection effect as estimated by equation (1). These two results should be interpreted as percentage points difference between each health category and those in poor health (reference) in the probability of having a high status job in the next year. The third estimates is the proportion of the overall differences that can be explained by health selection and are reported in the columns labeled ρ_{HS} . The baseline probability indicates the average probability of being in a high status job in each of the four groups and is provided as a reference for the effect size. We can see that the only apparent gradient exists for women in the private sector. Compared to those in poor health, women who reported good health have a 0.9 [CI: -0.115; 1.923] percentage points higher probability of securing a high status job, with those in very good health having a 1.9 [CI: 0.275; 3.507] percentage points higher probability. Compared to the baseline probability of about 10%, this is an increase in probability of approximately 10% for those in good health and 19% for those in very good health. Only the effect for those in very good health is statistically significant. Surprisingly, for men in the private sector health seems to have no direct influence on job status. The same is true for women in the public sector. For men in the public sector, we find the curious results that the estimates of the direct effects of, for example, very good health (2 percentage points [CI: -1.748; 5.750]) are relatively large, but that statistical uncertainty is also very high. This might be due to the fact that a very low number of transitions from low to high status and vice versa take place, which increases the uncertainty of the estimates for this group. An even larger sample would be necessary to assess whether the low variability of the dependent variable is the problem, or whether the associations measured in this study are random findings. Note, however, that – relative to the

baseline probability – the estimates are still smaller than for women in the private sector (about 5.8% increase in probability). While the difference in the effects between public and private sector was expected it is not significant in a cross-model test ($p=0.055$)²⁸, it is surprising that no health selection process could be identified for men in the private sector. These results indicate that women in the private sector are the group most affected by direct health selection into and out of high status jobs. The difference between men and women is also not significant in a cross model test ($p=0.062$).

The relative contribution of health selection effects in the four groups towards the overall health inequalities between high and low status jobs are reported in the columns labeled ρ_{HS} in table 4.

For men in the private sector and men and women in the public sector we see that health selection contributes almost nothing to the explanation of overall health inequalities, as all their direct effects are close to zero. For women in the private sector, approximately one fifth of the inequalities between those in very good health and those in poor health can be attributed to health selection, rising to two thirds for the inequalities between average and poor health. It should be noted, however, that the overall inequalities between these categories are very small and the difference to the reference category is not statistically significant. This high contribution could therefore be a statistical artifact for this group.

Summing up, the most striking result is that for women in the private sector health selection can be seen as a relevant factor contributing to health inequalities in the vertical stratification between high and low status jobs on the German labor market.

Discussion

This study presented results describing the effect of subjective health on job status on the German labor market. The descriptive results show that health inequalities between high and low status jobs

are substantial in nature, approximately 60-100% of the size of health inequalities between individuals from the highest and lowest educational groups. As expected, no consistent role of health in the attainment of a high job status could be found in the public sector. Surprisingly, in the private sector health only plays a role for women – not for men. One explanation for this gender difference could be that women are faced with several disadvantages on the German labor market. First, women are more often responsible for housework and childcare than men are²⁹⁻³¹. This means they have less energy for work and are under a *double burden*³². Second, discrimination against women in the hiring process could lead to the fact that women need to demonstrate greater ability than men to be offered the same positions³³: women are often evaluated less favorably than men with regard to their chances of promotion, given the same performance levels³⁴. In both cases, poor health would be more harmful to women than to men with respect to their career prospects, as they would either need to be in good health to face the double burden or overcome discriminatory practices. A third explanation would be that men are less reactive towards their health problems than women³⁵⁻³⁷. If they have a stronger tendency for presenteeism and take less time to recover from an illness, this might explain why their health is less important for their job status^{38,39}.

For women in the private sector, health selection processes contribute about 20% to overall health inequalities between jobs with high and low status. This is a considerable amount, but also shows that 80% of inequalities are determined by either social causation processes or through indirect selection (or spurious correlation). Disentangling the exact contribution of the latter two processes should be the objective of future studies.

The results of the study are in line with previous findings in the literature for health selection who report no substantial health selection effect in the public sector^{2,11}. The novel finding is that there is a health selection effect for women in the private sector, but not for men. The most likely explanation seems that a combination of a system that relies more strongly on performance evaluation for promotions is combined with a structural disadvantage for females. This combination

leaves women vulnerable to poor health in the occupational hierarchy. For the specific application of job status the study reproduces the general finding that health selection effects are relevant in certain situations, but can only explain a limited amount of overall health inequalities between social positions⁴⁰⁻⁴³.

Strengths and Limitations

The study further contributes to the discussion of health selection by analyzing within occupation job status and distinguishes two different types of labor market regimes, operationalized as private and public sector. The advantages of the study are the long running panel study that follows individuals over many years and allows controlling for many important confounding variables. The fixed-effects approach can control for all unobserved time-constant confounders which include systematic misclassifications in the self-rated health variable (e.g. personality related over or under estimation of own health by the respondents).

The limitations of the study lie, firstly, in the restriction of the analysis to the German labor market. In other labor market settings, the relationship could be different, especially if there is greater flexibility in either the private or public sector regarding lay-offs or promotions. The relatively strong formalization of the hierarchy within occupations in Germany could also make it a special case for the study of health selection. Secondly, the study does not address the situation of self-employed persons. Although there is no clear equivalent to job status for the self-employed, future research could investigate the role of health for the business success of the self-employed. The key feature of using self-rated health as a predictor of subsequent job status is that it is a non-specific health indicator. On the one hand, it could be argued that the indicator does not identify functional limitations, which might be of interest in the context of labor market related health inequalities. On the other hand, it captures health impairments that do not directly limit a certain physical functioning, but decrease resistant to stress and workload as well as overall productivity. If the

former view is taken, the results should be lower bound estimates of the health selection process. If the latter view is taken, it should capture general trend in health selection, which is the objective of this study.

The last limitation is the potential for a causal interpretation of the estimates in this study. In an observational study of two factors that are expected to be highly endogenous, it cannot be ruled out that the estimates are biased due to unobserved factors. It is furthermore possible that inaccurate measurements of timing of changes in health and job status could introduce problems of reversed causality that cannot be captured entirely by the time-lag used in the analyses. Despite the fact that further analysis is necessary to confirm the causal influence of health on job status and its heterogeneity, I believe that this study represents the best attempt thus far in the literature, and constitutes a good foundation for further studies and improvement.

Conclusion

Policy advice based on this study should be considered with care. Health selection only contributes substantially to health inequalities for women in the private sector. This might seem an unfair disadvantage for women. Easing the double burden of domestic tasks and employment for women has often been the focus of recent policy interventions, potentially enabling women to better compensate for poor health, making them less subject to health selection processes. The results of this study suggest that policies like this might contribute to a modest reduction in health inequality between high and low status jobs for women in the private sector. However, it should be noted that these results are the first of their kind regarding intra-occupational status, so that replication is warranted.

Figure captions:

Figure 1 – Health inequalities between high and low status jobs

Figure 2 – Health inequalities between educational groups

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Ethical Approval

The SOEP is approved as being in accordance with the standards of the Federal Republic of Germany for lawful data protection; all participants gave free and informed consent to participate in the survey. The survey ethics are monitored by an independent advisory board at the German Institute of Economic Research (DIW). No further ethical approval is needed.

Competing Interests

There are competing interests.

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