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**Sick of your Job? – Negative  
Health Effects from Non-Optimal  
Employment**

Jan Kleibrink

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German Socio-Economic Panel Study (SOEP)  
DIW Berlin  
Mohrenstrasse 58  
10117 Berlin, Germany

Contact: Uta Rahmann | [soeppapers@diw.de](mailto:soeppapers@diw.de)

# Sick of your Job? – Negative Health Effects from Non-Optimal Employment

Jan Kleibrink\*

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## Abstract

In an empirical study based on data from the German Socio-Economic Panel, the effect of job quality on individual health is analyzed. Extending previous studies methodologically to estimate unbiased effects of job satisfaction on individual health, it can be shown that low job satisfaction affects individual health negatively. In a second step, the underlying forces of this broad effect are disentangled. The analysis shows that the effects of job satisfaction on health run over the channels of job security and working hours above the individual limit. Job quality not only has a strong impact on mental health but physical health is affected as well. At the same time, health-damaging behavior including smoking and being overweight is not affected.

*JEL classifications:* I14; J24; J28

*Keywords:* Individual Health; Job Satisfaction

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\*University of Duisburg-Essen; CINCH - Health Economics Research Center. Edmund-Koerner-Platz 2, 45127 Essen, Germany. Telephone: +49 (0)201 183 2539. Email: [jan.kleibrink@uni-due.de](mailto:jan.kleibrink@uni-due.de)

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# 1 Introduction

The development of the German labor market over the last years can be regarded a success. The unemployment rate has decreased from 11.7% in 2005 to 6.9% in 2014. Even during the severe Euro-crisis in the early 2010s<sup>1</sup>, the unemployment rate has not risen as strongly as in other European countries and the number of gainfully employed individuals has constantly increased over the last years.<sup>2</sup> However, these numbers only show one facet of the development. The positive employment development was partly realized over a strong increase of atypical employment situations, including time-limited contracts or part-time work.<sup>3</sup> While such employment situations are likely to be connected to lower wages, the German welfare system guarantees a relatively stable economic situation for marginally employed or even unemployed individuals. Nevertheless, non-satisfactory employment situations can also affect individuals in a non-monetary way. Against this background, this paper analyzes the effects of job satisfaction on individual health empirically. Extending previous studies on this question to estimate causal effects, it can be shown that the satisfaction with one's job has a significant effect on individual health. In a second step of the analysis, it can be shown that this effect mainly runs over the channel of mental health but physical health is affected as well. Furthermore, by assessing different levels of job quality, job security and working hours can be identified as underlying forces whereas being over- or undereducated does not influence individual health.

In the previous economic literature, spillover effects from the individual labor market situation to other fields of life have already been shown empirically. The worst-case scenario in an individual labor market career, unemployment, has been shown to have severe effects on individual wellbeing, over and above the economic loss. Negative effects of unemployment on individual life satisfaction have been shown for a wide range of countries, data sets and methodological approaches (see e.g. Easterlin, 1974; Clark and Oswald, 1994; Senik, 2005; Winkelmann and Winkelmann, 1998; Clark, 2003; Lucas et al., 2004; Kind and Haisken-DeNew, 2012). Results show that a large, negative (causal) effect of entering unemployment on individual wellbeing can be observed, even comparable in size to negative life events like divorce or death of a spouse (Clark and Oswald, 1994; Kassenboehmer and Haisken-DeNew, 2009).

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<sup>1</sup><http://de.statista.com/statistik/daten/studie/1224/umfrage/arbeitslosenquote-in-deutschland-seit-1995/>

<sup>2</sup><https://statistik.arbeitsagentur.de/Navigation/Statistik/Statistik-nach-Themen/Beschaeftigung/Beschaeftigung-Nav.html>

<sup>3</sup><http://www.bpb.de/nachschlagen/zahlen-und-fakten/soziale-situation-in-deutschland/61708/atypische-beschaeftigung>

While negative wellbeing effects of unemployment are well-documented, the effects of unemployment on other fields of life, as for example individual health, are less clear. Browning et al. (2006); Salm (2009) and Böckerman and Ilmakunnas (2009) do not find causal effects of entering unemployment on individual health, while other studies suggest negative health consequences of job loss (Sullivan and Von Wachter, 2009; Eliason and Storrie, 2009). For Germany, Gordo (2006) finds negative effects of unemployment on health for males while Schmitz (2011) does not find causal effects of being unemployed on individual health. Hence, results largely depend on the chosen methods and health measures.

However, not only the worst-case scenario of being unemployed involuntarily is of interest but also suboptimal employment situations. Against the background of non-monetary effects of unemployment, non-satisfying jobs must be considered as a possible source of negative consequences for individual wellbeing as well.

A negative relationship between job satisfaction as an overall measure of job quality and individual health in Germany is shown by Fischer and Sousa-Poza (2009), a meta-study of this field of literature is provided by Faragher et al. (2005). While this clearly hints at the existence of non-monetary effects of low job quality, there is still room for a more detailed analysis of the relationship. It is still to be answered conclusively whether (1) the effect of job satisfaction on individual health is causal and (2) which channels drive the effect – both on the side of different dimensions of job quality and individual health. Several studies have already shed some light on the question which dimensions of job satisfaction show considerable effects on individual health. Ulker (2006), Artazcoz et al. (2009), Wooden et al. (2009) and Bell et al. (2012) show that there are negative health effects of non-optimal working hours in Australia, Spain and Germany, respectively, for a meta-study of the relationship between working hours and health, see Sparks et al. (1997). Reichert and Tauchmann (2011) show that the fear of unemployment affects mental health negatively, Friedland and Price (2003) show in their study for the US that there are negative health effects for a variety of sources of dissatisfaction with one’s working life, including hours- and education mismatch. Belkic et al. (2004) show a positive relationship between job strain and cardiovascular disease risk in Norway. Indirect health effects over the channel of unhealthy behavior can be assumed, as e.g. Radi et al. (2007) and Eriksen (2005) show a positive relationship of adverse job situations on individual smoking behavior, at least for selected samples.

As this overview shows, considerable research has been done on suboptimal labor market situations and their effects on various fields of an individual’s life. This study contributes to this body of literature by analyzing the causal effect of job satisfaction

on health satisfaction as overall measure of individual health in Germany. Using panel data from the German SOEP, it is possible to account for unobserved heterogeneity, a problem that is well-known in this field of literature. To tackle the problem of reverse causality, lagged dependent variables are included as regressors and an IV approach is used. The introduction of a novel instrument alongside different panel models contributes to the most demanding challenge in this field of literature, to establish causality. As the analysis shows that individual health is affected by job satisfaction, a second step of the analysis is undertaken to shed light on the underlying causes of this relationship. This is done by decomposing job satisfaction into different dimensions, including job security, hours as well as educational mismatch. Finally, different dimension of health are analyzed to show which aspects of individual health are affected by working conditions.

Results show that there are significant negative effects of low job satisfaction on health to be found in Germany. Extending previous methodological approaches for Germany (Fischer and Sousa-Poza, 2009), causal effects can be shown, accounting for a possible bias due to of reverse causality. Concentrating on different dimensions of job quality, results show that individuals suffer from low job security and from working more hours than desired. The number of working hours in general as well as working below the individual threshold does not have any health effects, the same is true for educational matches. Decomposing health into different levels shows that the abovementioned effects mainly run over the channel of mental health, however, physical health is also affected by job quality. Health-damaging behavior including smoking as well as being overweight is unaffected by job quality, hence, individuals do not compensate for low job satisfaction by unhealthy behavior.

Unstable employment situations – especially in early career stages – have become an increasingly common phenomenon in the German labor market over the past years, a development that has even increased due to the labor market policies designed to smooth unemployment rates during the financial crisis over the last years. That this has severe health consequences, especially in terms of mental health is highly relevant in terms of labor market policies. The German Federal Institute for Occupational Safety and Health identified mental disorders which are strongly affected by job strain are the reason for 41 % of early retirements in Germany and more than 53 million sickness days in 2012 (Lohmann-Haislah, 2012). Obviously, this will have effects on the productivity of companies in the medium and long run, see, e.g. findings by Ose (2005) or Demerouti et al. (2001) – rising health costs not yet considered.

The paper is structured as follows: Section 2 introduces the data used, section 3 explains the econometric strategy. Results are presented and analyzed in section 4,

a conclusion is found in section 5.

## 2 Data

The analysis is based on data from the German Socio-Economic Panel (SOEP), a large German household data set.<sup>4</sup> Data are collected from more than 11,000 households and more than 20,000 individuals on a yearly base since 1984. The SOEP includes detailed information from various fields of life, including information on labor activities, health information and various socio-demographic aspects (Wagner et al., 2007).

The sample analyzed in this paper consists of employed individuals who are between 18 and 60 years old. The retirement age in Germany is 65 for older, 67 years for younger ages in the sample. To avoid distortions due to people going into early retirement for health reasons, people older than 60 are not regarded (Fischer and Sousa-Poza, 2009). 20 years of observations (1993 - 2012) are analyzed.

### 2.1 Dependent Variables

In line with the work by Fischer and Sousa-Poza (2009) for the effect of job satisfaction on health in Germany, health satisfaction is used as an overall measure of individual health. Health satisfaction is a subjective measure of individual health. It is measured on an eleven-point scale ranging from very unsatisfied (0) to very satisfied (10). The variable is chosen as it represents an overall measure of individual health and is therefore a suitable measure to answer the question whether there are any health effects of job satisfaction on individual health. However, being an overall measure, it cannot show which aspects of individual health are affected. Therefore, in the second part of the analysis, other health measures are included to test the robustness of findings and shed further light on this question.

For the main results, health satisfaction serves as overall health measure. To test the robustness of findings, two other overall health measures are used in the second part of the analysis. As objective health measure, overnight stays in hospital within 5 years – excluding fertility-related hospital stays – is applied.<sup>5</sup> While it is hardly a perfect

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<sup>4</sup>All data are extracted using the Stata Add-on PanelWhiz, written by John P. Haisken-DeNew (Haisken-DeNew and Hahn, 2010).

<sup>5</sup>For the years from 2009 onwards, only the years until the end of the sample period can be analyzed. Analyses applying a dummy for the next year only and a continuous variable of nights spent in hospital does not lead to new insights.

measure of general health, it is an accepted objective proxy for individual health in the health economics literature (Browning et al., 2006; Schmitz, 2011).<sup>6</sup> In addition to this objective measure, there is a further subjective one applied: Self-assessed health (SAH), answered on a five-point scale ranging from very bad to very good. This measure is applied to back the findings for the health satisfaction variable as respondents might answer this variable in a more objective way than the satisfaction variable.

The three health measures described so far measure the overall health situation. To analyze the affected health dimension in more detail, it is necessary to apply more specific measures of individual health. The first of these is the question for mental health. Mental health does also play a role when respondents answer the question on their current health status but it is only one aspect of many. Mental health is measured in the SOEP by the SF-12v2 health survey. This is an abstract of 12 questions from the SF-36v2 (Nübling et al., 2007). This set is a widely accepted measure of health, covering 8 domains of health. These domains are then grouped into two variables, physical health and mental health. Not only mental health is applied in a split category but also physical health, hence, it is possible to clearly distinguish between possible effects on these two fields of individual health. The measure of physical health is – strongly comparable to the measure of mental health – an index composed of the answers to 12 questions about different aspects of an individual’s health condition.

Finally, two variables are applied that do not directly measure the individual health condition but individual behavior. These are the smoking behavior and a dummy for showing whether an individual is overweight, as indicated by the body mass index (BMI).<sup>7</sup> Being a smoker and being overweight belong to the most important causes of many serious health problems, hence, behavior in these fields is a good proxy for the individual health condition in the long run. As for the other health variables, a higher value means a more positive health outcome, hence, they are coded as not being a smoker and not being overweight.

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<sup>6</sup>The dummy variable is coded as 1 indicating no hospital stays. For all health variables used in this study, a higher value indicates a better health situation, making the comparison of effects easier.

<sup>7</sup>The BMI is an internationally approved index that relates body weight to body height. The higher the index, the higher is a person’s weight in relation to his height. A value above 25 indicates overweight. Using the BMI value directly instead of the overweight dummy does not change results qualitatively.

## 2.2 Explanatory Variables

Job satisfaction is applied as explanatory variable of main interest. Like health satisfaction, it is supposed to be an overall measure that can be used to answer the question whether there are any health effects of job quality. In the second part of this paper, it is crucial to split overall satisfaction into more specific categories.

The first of these specific measures of job quality is self-assessed job security. In the SOEP, respondents are asked whether they are worried about job security, answers are given on a three-point scale ranging from very concerned to not concerned at all. As long-term economic planning, including aspects like family planning is complicated by insecure jobs, this measure covers one of the most crucial aspects of work quality. Reichert and Tauchmann (2011) use the same information in a study explaining the effects of the fear of unemployment on mental health using data from the SOEP.

Then, a measure for the educational match is included. Educational mismatch has been extensively studied with regard to its effects on individual wages. While the focus of this study is different, it is intuitive to assume a possible effect on individual health as well. It is operationalized by dummy variables indicating whether individuals are over-/ or undereducated. This is measured by comparing the individual education to the modal education within the occupation one works, the so-called realized match (RM) approach (see e.g. Verdugo and Verdugo, 1989; Kiker et al., 1997; Hartog, 2000; Bauer, 2002; Voon and Miller, 2005; Nielsen, 2011; Leuven and Oosterbeek, 2011; Kleibrink, 2013).

Previous literature shows that there is a correlation between health and working hours (e.g. Ulker, 2006; Geyer and Myck, 2010). Bell et al. (2012) show that it is especially a disequilibrium between desired working hours and the actual number of hours that can have detrimental effects on individual health. Hence, it is not just the workload in general but the individual maximum load. To account for this in the analysis, there is a control for the actual hours of work as well as for the excess (or deficit) of hours over (under) the individual level of desired working hours.

Table 1 shows descriptive statistics sorted by the seven different individual health measures. First, it has to be mentioned that not the same number of observations can be guaranteed for all health measures. This is mainly due to fact that the sf-12 questionnaires for mental and physical health as well as one of the behavioral questions (BMI) were introduced in 2002 and are only asked every other wave. Hence, the number of available information is about one third lower as compared to other measures. They still offer a profound number of observations (more than 50,000 person-year observations for each variable) but the statistical power is naturally de-

Table 1: Descriptive Statistics

	No Hosp. 5 Yrs.	SAH	Health Sat.	Mental	Physical	Not Overweight	No Smoker
No Hospital 5 Years	0.768 (0.42)						
SAH		3.589 (0.84)					
Health Satisf.			7.017 (1.96)				
Mental Health				50.035 (9.25)			
Physical Health					52.536 (7.92)		
Not Overweight						0.498 (0.50)	
No Smoker							0.837 (0.37)
Male	0.536 (0.50)	0.536 (0.50)	0.536 (0.50)	0.523 (0.50)	0.523 (0.50)	0.522 (0.50)	0.536 (0.50)
Job Satisf.	7.043 (1.97)	7.043 (1.97)	7.044 (1.97)	7.047 (1.96)	7.047 (1.96)	7.043 (1.96)	7.043 (1.97)
Job Security	2.301 (0.71)	2.301 (0.71)	2.301 (0.71)	2.310 (0.71)	2.310 (0.71)	2.309 (0.71)	2.301 (0.71)
Overeducated	0.344 (0.47)	0.344 (0.47)	0.344 (0.47)	0.349 (0.48)	0.349 (0.48)	0.348 (0.48)	0.344 (0.47)
Undereducated	0.325 (0.47)	0.325 (0.47)	0.325 (0.47)	0.308 (0.46)	0.308 (0.46)	0.309 (0.46)	0.325 (0.47)
More hours	5.029 (6.98)	5.028 (6.98)	5.029 (6.98)	4.942 (6.73)	4.942 (6.73)	4.953 (6.74)	5.029 (6.98)
Less hours	1.648 (6.30)	1.648 (6.30)	1.648 (6.30)	1.853 (6.91)	1.853 (6.91)	1.859 (6.93)	1.648 (6.30)
Working hours	39.344 (12.13)	39.343 (12.13)	39.344 (12.13)	38.993 (12.40)	38.993 (12.40)	39.007 (12.39)	39.344 (12.13)
Age	40.917 (10.62)	40.916 (10.62)	40.917 (10.62)	41.927 (10.49)	41.926 (10.49)	41.947 (10.50)	40.917 (10.62)
Tenure	10.218 (9.52)	10.217 (9.52)	10.218 (9.52)	10.739 (9.68)	10.739 (9.68)	10.752 (9.69)	10.218 (9.52)
PHI	0.124 (0.33)	0.124 (0.33)	0.124 (0.33)	0.162 (0.37)	0.162 (0.37)	0.162 (0.37)	0.124 (0.33)
HH Inc.	3400.552 (1978.22)	3400.479 (1978.37)	3400.557 (1978.29)	3091.632 (2064.45)	3091.589 (2064.45)	3088.902 (2060.40)	3400.552 (1978.22)
Children	0.671 (0.90)	0.671 (0.90)	0.671 (0.90)	0.640 (0.89)	0.640 (0.89)	0.639 (0.89)	0.671 (0.90)
Married	0.633 (0.48)	0.633 (0.48)	0.633 (0.48)	0.624 (0.48)	0.624 (0.48)	0.624 (0.48)	0.633 (0.48)
Civil Servant	0.073 (0.26)	0.073 (0.26)	0.073 (0.26)	0.079 (0.27)	0.079 (0.27)	0.079 (0.27)	0.073 (0.26)
Low Educ.	0.313 (0.46)	0.313 (0.46)	0.313 (0.46)	0.271 (0.44)	0.271 (0.44)	0.272 (0.45)	0.313 (0.46)
High Educ.	0.237 (0.43)	0.237 (0.43)	0.237 (0.43)	0.261 (0.44)	0.261 (0.44)	0.260 (0.44)	0.237 (0.43)
Self-employed	0.077 (0.27)	0.077 (0.27)	0.077 (0.27)	0.084 (0.28)	0.084 (0.28)	0.084 (0.28)	0.077 (0.27)
Parttime	0.175 (0.38)	0.175 (0.38)	0.175 (0.38)	0.191 (0.39)	0.191 (0.39)	0.191 (0.39)	0.175 (0.38)
East Germany	0.243 (0.43)	0.243 (0.43)	0.243 (0.43)	0.230 (0.42)	0.230 (0.42)	0.231 (0.42)	0.243 (0.43)
N	150443	150298	150397	53096	53097	53801	150443

Note: Author's calculations based on the SOEP (1993 - 2012). Means of variables, standars deviations in parantheses.

creased compared to the other health measures with more than 150,000 person-year observations. Still, as descriptive statistics for all variables show, the samples for the different measures are highly comparable. Especially when comparing the *high-observation health measures* (no hospital stays within the next the five years; SAH; health satisfaction; not being a smoker) and the *low-observation health measures* (mental health; physical health; not being overweight) within their groups, means for all variables are nearly identical. Hence, results for all measures are comparable.

About 23% of individuals spend at least one night in hospital within the next five years, mean self-assessed health is around 3.6 (five-point scale, the mean level of health satisfaction is 7 (eleven-point scale). Exactly half of the sample are overweight and 16% of the sample are smokers.

When looking at the descriptives for job characteristics, one can see that mean job satisfaction is around 7 (0 - 10 scale), job security (1-3 scale) at 2.3. Overeducation as well as undereducation include about one third of the sample each, which shows that educational mismatch is a severe phenomenon. While these numbers seem quite large, they are perfectly in line with other studies of educational mismatch in Germany (e.g. Bauer, 2002). Mean working hours are nearly 40 hours and respondents work about 5 hours more than desired.

Descriptives for the standard controls show that average age in the sample is 41-42 years, 12-16% have a private health insurance contract. Nearly the same share of respondents (about 8%) are self-employed or civil servants, two occupational categories that build the two extremes of secure (civil servants) and insecure (self-employed) job situations. About one quarter of respondents live in East Germany.

### 3 Econometric Strategy

The analysis aims at explaining causal effects of job satisfaction on individual health. As the analyzed variables are of subjective nature, this has to be accounted for in the empirical analysis. Furthermore, unobserved heterogeneity and reverse causality have to be regarded. All of these problems are approached in a step-by-step econometric strategy. First, to get an idea of the direction of correlations, a simple OLS regression is run as formally shown by Equation 1.

$$Health_{it} = \beta_0 + x_{it}\beta + Job_{it}\gamma + \varepsilon_{it} \quad (1)$$

$Health_{it}$  is the dependent variable health satisfaction,  $x_{it}$  is a vector of (socio-economic) controls, including age and its second polynomial, health insurance status, log. household income, educational level, family status, employment status (employed, self-employed or civil servant), a control for living in Eastern Germany and year dummies. Furthermore, workplace-specific controls are accounted for including tenure, company size and occupational dummies created on ISCO 2-level (descriptive statistics can be found in Table 1).  $Job_{it}$  is the variable of main interest, job satisfaction.

However, the OLS approach might be biased for several reasons. First, unobserved heterogeneity has to be accounted for. Subjective variables as well as health variables in general are strongly influenced by time-invariant individual fixed-effects like genetic preconditions. Then, there might be a common source bias. As answers for the health

as well as job satisfaction are self-reported and taken from the same data source, this might bias the results of the econometric analysis. Finally, reverse causality can be a problem, hence, it is not an unsatisfying job environment that has detrimental health effects but it is a poor health condition driving people into bad jobs. All of these problems are well-known in the empirical literature in this field (see e.g. Fischer and Sousa-Poza, 2009).

Fischer and Sousa-Poza (2009) approach the first problem estimating a fixed effects model.<sup>8</sup>

$$Health_{it} = \beta_0 + x_{it}\beta + Job_{it}\gamma + \alpha_i + \varepsilon_{it} \quad (2)$$

Accounting for individual-specific, time-invariant differences, both the problems of unobserved heterogeneity as well as common source bias can be targeted effectively.<sup>9</sup>

As discussed in the papers by Fischer and Sousa-Poza (2009) and Reichert and Tauchmann (2011) on similar questions for Germany, there is a further possible problem: Reverse causality. Following Gupta and Kristensen (2008), a lagged dependent variable is included. This is one way to account for reverse causality, however, most studies apply IV strategies to deal with it. While Fischer and Sousa-Poza (2009) lack a time-variant instrument, Reichert and Tauchmann (2011) use information on previous staff reductions in the firms respondents work at. Although this is a very promising approach, it leads to the problem that only a small fraction of observations is affected by this and the validity assumption that mental health is only affected by staff reductions over the channel of the own job security is questionable. Therefore, a different instrument is used in this application as a final robustness check.

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<sup>8</sup>As Ferrer-i Carbonell and Frijters (2004) show for the case of life satisfaction, one gets meaningful results from linear regression models on cardinal data when unobserved heterogeneity is accounted for. Therefore, linear fixed effects models are applied here. As robustness checks, a conditional fixed effects logit estimator is applied (Chamberlain, 1980; Kassenboehmer and Haisken-DeNew, 2009). While the results of these robustness checks may not be interpreted as marginal effects, coefficients show the expected signs and significance, confirming the findings of the linear models. Tables are available upon request.

<sup>9</sup>In addition, the panel dimension of the dataset can be exploited using a random effects model (RE). A random effects model is applied on a similar research question by Gupta and Kristensen (2008). The results obtained from the random effects specification are preferred to the FE model if the individual-specific heterogeneity is uncorrelated with the independent variables. In this application, this is not expected intuitively and a Hausman test suggests preferring the fixed effects specification. To ensure comparison to previous studies, RE results are run as robustness checks. Results are qualitatively unchanged, tables are provided upon request.

Job satisfaction is instrumented by the occupation-specific unemployment rate.<sup>10</sup> The job-specific unemployment rate is included as categorical variable to account for different levels of the UE rate instead of the mean effect of a continuous variable only.

This measure can serve as an instrumental variable in the analysis if (1) it has a significant influence on job satisfaction and (2) it does not have an effect on individual health over and above this effect. The occupation-specific unemployment rate varies over occupation and time. Therefore, it can be applied in a fixed effects IV model. Job-specific unemployment rates are supposed to influence the perception of job satisfaction as it is a very detailed measure of the current situation within occupational fields and can influence the working conditions and atmosphere within certain jobs. While first stage regressions show a significant effect of the job-specific unemployment rate on job satisfaction (see table 5), F-statistics suggest that the instrument is weak. The instrument is not supposed to affect individual health over a different channel than job satisfaction. It is a clearly job-specific measure and job satisfaction is a broad, overall measure of the perception of a job. Therefore, all possible channels over which the unemployment rate within an occupation could affect individual health are supposed to be covered by job satisfaction.

Nonetheless, the validity of instrumental variables can never be proven beyond any doubt. Therefore, the results from the IV regressions rather serve as a final qualitative robustness check rather than being quantitatively interpreted. However, using the lagged dependent variable approach to account for reverse causality and the IV approach as a further test of robustness of the findings offers a comprehensive base for interpreting effects as causal.

To sum up, the empirical strategy is undertaken in four steps: As starting point and benchmark, an OLS regression is applied. As this is prone to bias due to unobserved heterogeneity, individual fixed effects are accounted for. As this does not solve the second possible source of bias, reverse causality, the fixed-effects regression is re-estimated including the lagged dependent variables and in a fourth step, an instrumental variable approach is undertaken.

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<sup>10</sup>Data on occupation-specific unemployment rates are provided by the German Federal Employment Agency, collected and published in the project "Berufe im Spiegel der Statistik" by the Institut fuer Arbeitsmarkt- und Berufsforschung, the research institute of the German Federal Employment Agency (<http://bisds.infosys.iab.de/>) and merged to the SOEP data using occupational classifications from the Statistical Office of Germany. This measure is comparable, but not identical to the ISCO three-digit classification.

## 4 Results

Table 2 shows the effects of job satisfaction on health satisfaction.

Table 2: Health Effects of Job Satisfaction

	OLS	FE	FE + Lag. Dep. Var.	IV
Job Satisf.	0.392*** (0.003)	0.258*** (0.004)	0.257*** (0.004)	0.597* (0.311)
L.Health Satisf.	-	-	0.066*** (0.004)	-
SC	Yes	Yes	Yes	Yes
Years	Yes	Yes	Yes	Yes
N	150397	150397	136203	102100

Note: Author's calculations based on the SOEP (1993 - 2012). Instrument: Occupational UE rate. \*\*\* p<0.01; \*\* p<0.05; \* p<0.1. Robust standard errors in parentheses.

The first column shows the results for the simple OLS regression. While this can hardly show more than correlations, it can provide a first hint at the direction of effects. Results show that there is a positive correlation between the two variables, hence, high job satisfaction is correlated with high health satisfaction. This results does not yet provide any evidence for causal effects as it might be biased by unobserved heterogeneity and reverse causality.

To account for the first problem, the regression is rerun controlling for time-invariant individual fixed effects. The coefficient of the job satisfaction variable becomes smaller than in the first regressions (0.258 compared to 0.392), however, remains highly statistically significant. Hence, controlling for unobserved heterogeneity does not change the direction of results.

Still, reverse causality has to be accounted for as a sorting into unsatisfying jobs based on poor health might also explain the findings. In a first step to deal with this problem, the lagged dependent variable is included. As the results in column three show, the lagged health variable is significantly correlated with the current health state but the coefficient of main interest, job satisfaction, does hardly change at all. This is an important step towards the identification of causal effects. As a further test of the robustness of findings, a second method to account for reverse causality, namely an IV approach is applied.

The fourth column shows the results from the IV regressions. The coefficient of job satisfaction is larger than in the previous regressions. As already discussed, the first-stage correlation between the instrumented variable and the instrument is quite weak, explaining imprecise estimates as shown by large point estimates and standard errors. The IV estimates are therefore only interpreted as a robustness check. Nevertheless, the coefficient of job satisfaction is positively significant, a further hint that the effect

of job satisfaction on health can be interpreted causally.

So far, the analysis shows that there is a significant effect of job satisfaction on health in Germany. While this relationship has previously been shown by Fischer and Sousa-Poza (2009), this analysis extends the econometric strategy to confirm their results and offer a causal interpretation.

While this relation between job satisfaction and health is interesting in itself, it only offers a broad overview. To gain a more detailed understanding of the underlying mechanisms, health as well as job quality is split up into more specific categories.

## 4.1 Analysis of Subcategories

In this second step of the analysis, previous regressions are rerun using different health variables as well as different measures of job quality. This section presents the results of the fixed effects OLS regressions including lagged dependent variables. This model accounts for unobserved heterogeneity and reverse causality and is therefore supposed to deliver causal effects.<sup>11</sup>

First, effects of job satisfaction on different measures of health are presented to show whether previous results are robust and which levels of individual health are mainly affected by job satisfaction.

Table 3: Linear FE Regressions – Including Lagged Dependent Variables

	No Hosp. 5 Yrs.	SAH	Mental	Physical	Not Overweight	No Smoker
Job Satisf.	-0.002*** (0.001)	0.062*** (0.001)	0.971*** (0.035)	0.172*** (0.028)	0.001 (0.001)	-0.002*** (0.001)
SC	Yes	Yes	Yes	Yes	Yes	Yes
Years	Yes	Yes	Yes	Yes	Yes	Yes
N	138916	131286	36602	36602	37799	138916

Note: Author's calculations based on the SOEP (1993 - 2012). For physical and mental health and overweight, only the years 2002, 2004, 2006, 2008, 2010 and 2012 are available.  
\*\*\* p<0.01; \*\* p<0.05; \* p<0.1. Robust standard errors in parentheses.

Table 3 shows the results for the linear fixed-effects regressions including lagged dependent variables for the health measures nights in hospital, self-assessed health, mental health, physical health, smoking and overweight.

When using different categories of individual health as outcomes, some interesting patterns emerge. The first two health variables shown in table 3 are general measures

<sup>11</sup>OLS as well as FE OLS regressions without the lagged dependent variables are estimated as well. The development of results over the models is comparable to the regressions for job satisfaction. The robustness check using IV regressions cannot be repeated as several time-variant instruments had to be found that fulfill the IV criteria.

of health. Results do therefore not yet serve as a more detailed look into the mechanisms but as robustness checks for the previous results for health satisfaction. There is a statistically significant effect on hospital stays, however, the coefficient is very small. Hence, while being statistically significant, the effect cannot be interpreted as economically significant. Using SAH as outcome variable is a further way of testing the validity of the health satisfaction variable and confirms previous results.

The final four health outcomes shown in table 3 show single aspects of individual health, allowing for a more detailed discussion of the mechanisms behind the general findings. Comparing the effects on mental and physical health shows that mental health is affected by job satisfaction much more strongly than physical health (0.971 against 0.172). This is not surprising as satisfaction with the working life is rather supposed to show over the mental health channel. Still, there is a significant effect of job satisfaction on physical health to be detected showing that individuals suffer from low job satisfaction not only mentally but also physically.

The final two columns show the effects on behavioral variables. There is no significant effect on being overweight. This shows that excessive eating does not play a role as compensation mechanism for an unsatisfying work life. For not being a smoker, there is a statistically significant effect to be seen. Interestingly, the coefficient is negative suggesting that individuals with high job satisfaction are more likely to be smokers. However, as for the hospital variable, while the coefficient is statistically significant, an economically significant effect is not found here as the coefficient is too small.

Going into more detail for the outcome variable shows that the results for health satisfaction are robust to changing the outcome to self-assessed health (SAH) while effects on hospitalizations are not found. This might be explained by the fact that inpatient treatments are only necessary for severe medical problems. Concentrating on different aspects of individual health shows that mental health is most strongly affected by job satisfaction but there is a small effect on physical health as well. Health-damaging behavior as compensation for a non-satisfying jobs is not affected.

In the final step of the analysis, other measures of job quality are applied to analyze which aspects of a job affect individual health.

Table 4 shows the results for the linear fixed-effects regressions including lagged dependent variables. Results for the health measures nights in hospital, self-assessed health, mental health, physical health, smoking and overweight can be seen. Job quality is measured by job security, a comparison of actual working hours to desired working hours and controls for educational mismatch. Results are from separate

Table 4: Linear FE Regressions – Including Lagged Dependent Variables

	No Hosp. 5 Yrs.	SAH	Health Sat.	Mental	Physical	Not Overweight	No Smoker
Job Security	-0.003* (0.002)	0.052*** (0.004)	0.135*** (0.009)	1.020*** (0.097)	0.244*** (0.078)	0.004 (0.003)	0.002 (0.002)
More hours	0.001*** (0.000)	-0.004*** (0.000)	-0.008*** (0.001)	-0.078*** (0.012)	-0.020** (0.009)	-0.000 (0.000)	-0.000 (0.000)
Less hours	-0.000 (0.000)	-0.000 (0.000)	0.001 (0.001)	-0.012 (0.009)	0.010 (0.008)	0.000 (0.000)	0.000 (0.000)
Working hours	-0.001*** (0.000)	0.000 (0.000)	0.002** (0.001)	-0.016 (0.011)	0.026*** (0.009)	-0.000 (0.000)	-0.000* (0.000)
Overeducated	-0.009** (0.005)	-0.015 (0.012)	-0.033 (0.027)	-0.186 (0.355)	0.077 (0.269)	0.002 (0.013)	-0.001 (0.006)
Undereducated	-0.002 (0.004)	0.005 (0.011)	-0.002 (0.026)	-0.242 (0.335)	0.273 (0.255)	0.005 (0.012)	0.015*** (0.005)
SC	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Years	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	138916	131286	136203	36602	36602	37799	138916

Note: Author's calculations based on the SOEP (1993 - 2012). For physical and mental health and overweight, only the years 2002, 2004, 2006, 2008, 2010 and 2012 are available. \*\*\* p<0.01; \*\* p<0.5; \* p<0.1. Robust standard errors in parentheses.

regressions, divided by horizontal lines.<sup>12</sup>

Results for job security look very similar to the previously discussed results for job satisfaction. There is no significant influence to be seen for the objective indicator hospital stays but large positive coefficients for the subjective health variables including the indicators for physical and mental health. Again, the effect on mental health is much larger than the effect on physical health. Effects on health-damaging behavior are not to be seen. A very strong correlation between job security and mental health shows that sorrows about the labor market lead to mental stress assuming that the costs of unemployment are significantly larger than previously assumed. Not only people directly affected suffer but even those in employment do when being afraid of losing their jobs. This is especially true for mental (Reichert and Tauchmann, 2011) but also for physical health.

The third level of job characteristics analyzed are working hours. The results for hours exceeding the desired amount show a small, economically negligible but statistically significant effect on hospital stays and working more hours than desired leads to negative outcomes in subjective indicators, including mental and physical health. As for job satisfaction, effects for mental health are larger than effects for physical health. The coefficients for overweight and smoking behavior are zero. For hours worked below the desired level, hardly any effects are detected. This is interesting as the theoretical expectations for this variable are not clear. On the one hand, a negative effect can be expected because people are dissatisfied with the mismatch between the amount they want to work and the amount they actually do work. On the other hand, as working less hours than desired is connected to more leisure time, this can increase health. It might well be possible that effects level each other out.

<sup>12</sup>Including all of the measures of job quality in one regressions does not lead to qualitatively different results.

The actual amount of working hours does not show considerable effects, coefficients are very small and hardly statistically significant. This shows that it is rather the fit between actual working hours and individual preferences than the actual amount that matters for individual health.

Educational mismatch does not play any considerable role for individual health. While nearly all coefficients for overeducation carry a negative sign, none of them is statistically significant and they are very small. For undereducation, coefficients are bigger and signs are mainly positive, however, far from conventional significance levels. The only exception is the smoking variable, indicating that undereducated individuals are less likely to be smokers.

Comparing different levels of job quality leads to new insights. Job security plays a crucial role for individual health, low job security leads to worse health. The same can be shown for working more than desired. These effects can be found for general health measures and mental health is more strongly affected than physical health. Working less than desired and educational mismatches do not have significant effects on individual health.

## 5 Discussion

This paper answers the question whether job quality has an effect on individual health.

In a first step, the general relationship is analyzed by applying broad measures of job quality (job satisfaction) and health (health satisfaction). The empirical analysis applying data from the German Socio-Economic Panel advances in four steps: OLS regressions are the starting point and the correlations serve as a benchmark. To avoid biased estimates due to unobserved heterogeneity, a linear FE model is applied in the second step. Third, the FE estimations are rerun including lagged dependent variables to overcome reverse causality. Fourth, an IV approach is used as final check of the robustness of findings. The analysis confirms previous results and the broad econometric strategy extends previous findings, allowing for a causal interpretation of effects.

In a second part of the analysis, a closer look at the underlying mechanisms behind the effect of job satisfaction on health is undertaken. Therefore, health as well as job quality are measured on different levels to disentangle the channels over which effects run. Health is operationalized with the number of hospital stays within the

next 5 years as objective measure. As subjective measures, self-assessed health is used. Then, measures for mental and physical health are applied as well as two variables concerning health behavior, being a smoker and being overweight. Job quality is measured on three levels: Subjective evaluation (job security), working hour constraints and educational match.

Results suggest that workplace quality has a significant influence on individual health. Low levels of job satisfaction and job security lead to a deterioration of health, regardless of the analyzed health measure. For working hours, it can be seen that the actual amount of working hours does not seem to play a role for individual health but the fit to the desired amount of work. People working more hours than desired suffer in terms of health. For educational mismatch, no significant effects on health can be found. Job security is the most important aspect of job quality in terms of health. Mental health is most severely affected by all job levels, however, physical health is also affected.

The findings are highly relevant on several levels. First, employees have to be aware of the effects non-optimal employment can have on their health as the acceptance of unstable and non-optimal working conditions is not uncommon. That this leads to considerable negative health effects should be considered in individual labor market decisions. Second, these findings are important for employers. In the medium and long run, productivity will suffer from a workforce in poor health (Demerouti et al., 2001; Ose, 2005). It might therefore be worth investing in good working circumstances, e.g. guaranteeing job security by limiting the amount of time-limited contracts. This problem can also be generalized from single employers to the whole economy. Third, there is a financial aspect. Dealing with rising costs of the health systems due to the ongoing demographic aging in Germany is one of the most important political tasks to date. Adverse job circumstances leading to a deterioration of health of people in employment – hence contributors to the social security system – worsens the problem. It is therefore not only in the individual but in societal interest to guarantee a long-run stable economic environment in which companies can afford to invest in good working circumstances for their employees.

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## 6 Appendix

Table 5: First Stage Regressions - Job Satisfaction

	Job Sat.
Age	-0.015 (0.032)
Age(sq)	-0.000 (0.000)
PHI	0.111*** (0.040)
Tenure	-0.054*** (0.003)
Comp. Size	0.029*** (0.005)
Log. HH. Inc	0.247*** (0.023)
Children	-0.007 (0.013)
Married	-0.027 (0.029)
Civil Servant	0.164* (0.097)
Low Educ.	-0.145* (0.075)
High Educ.	-0.041 (0.071)
Self-employed	0.125** (0.053)
Parttime	-0.009 (0.027)
East Germany	-0.195** (0.086)
Occup. UE Rate 5-10	-0.011 (0.020)
Occup. UE Rate 10-30	-0.047* (0.025)
Occup. UE Rate 20-40	-0.093*** (0.035)
Occup. UE Rate >30	-0.056 (0.049)
Years	Yes
F-Stat.	2.12
N	102100

Note: Author's calculations based on the SOEP (1993 - 2012). Instrument: Occupation-specific unemployment rate. \*\*\* p<0.01; \*\* p<0.05; \* p<0.1. Robust standard errors in parentheses.