

The Effect of Job Displacement on Subsequent Health

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Summary

Using data from the 1994–1996 waves of the German Socio-Economic Panel (GSOEP), this prospective longitudinal study investigates the association between job displacement and subsequent self-assessed health (SAH). The sample consists of 253 displaced workers and a comparison group of 6,934 continuously-employed workers. Controlling for baseline SAH and standard demographic characteristics, we find no statistical association between job displacement and subsequent SAH. Our findings are consistent with those of earlier studies of the relationship between unemployment and subsequent health.

1. Introduction

In the last two decades, many studies have examined the relationship between health and employment status. The notion that unemployment might be negatively related to health is based on the premise that health is determined in part by individuals' social conditions, including employment. Cross-sectional studies (Arber 1987; Cook, Cummins, Bartley, and Shaper 1982; D'Arcy 1986; D'Arcy and Siddique 1985; Mathers and Schofield 1998) and longitudinal research (Ferrie, Shipley, Marmot, Stansfield, and Smith 1998; Gallo, Bradley, Siegel, and Kasl 2000; Hamilton, Broman, Hoffman, and Renner 1990; Hamilton, Hoffman, Broman, and Rauma 1993; Morris and Cook 1991; Westin 1990) have in general established a negative association between unemployment and a variety of physical health indicators. Moreover, a number of longitudinal studies (Brenner and Starrin 1988; Frese and Mohr 1987; Gallo et al. 2000; Kaplan, Roberts, Camacho, and Coyne 1987; Warr, Jackson, and Banks 1988) have indicated a negative effect of unemployment on mental health. Many studies have been conducted in Great Britain, Scandinavia, and the United States. However, because the social context and assistance programs for the unemployed vary considerably across countries, the health impact of unemployment may, in accordance, differ. Thus, findings from other countries may not be relevant to the experience of German workers.

Four studies published in English-language journals have investigated the relationship between unemployment and health (Arrow 1996; Elkeles and Seifert 1993, 1996; Riphahn 1999) using GSOEP data. Taken together,

the German studies suggest that poorer health is associated with subsequent unemployment. In contrast, the hypothesis that unemployment may result in poorer subsequent health has not been supported.

Two of the German studies (Arrow 1996; Riphahn 1999) analyzed the effect of adverse health or health changes on subsequent unemployment. Using data from the 1984–1990 waves, Arrow (1996) found that becoming chronically ill was associated with increased likelihood of job loss among German females. Similarly, Riphahn (1999), who analyzed 1984–1995 data, reported that a health shock increases the risk of subsequent unemployment two-fold.

The two other GSOEP studies (Elkeles and Seifert 1993, 1996) investigated not only the effect of poorer health on subsequent unemployment, but also the effect of unemployment on subsequent health. One study (Elkeles and Seifert 1996), which focused on immigrant workers using data from 1984–1992, found that these workers reported poorer health satisfaction than German workers, and that their poorer health was associated with subsequent unemployment. The results of this study did not, however, indicate that unemployment resulted in subsequent reductions in health for either group. The other study (Elkeles and Seifert 1993), based on data from the 1984–1988 waves, demonstrated that unemployed individuals had poorer health satisfaction, more chronic illness, and greater disability than employed workers. However, as comparisons of health satisfaction before and after job loss suggested relative stability, the authors concluded that there was no evidence of a causal relationship between job loss and subsequent deterioration in health.

The objective of this study is to examine the effect of job displacement on subsequent self-assessed health (SAH) among German workers. Our investigation controls for baseline SAH and other related factors, and accounts for the relationship between pre-displacement health and job loss.

The present study differs from the earlier research in a number of important ways. First, this study investigates the health consequences on displaced workers, a subset of the unemployed whose job separation results from either layoff or plant closure. In addition, our study uses a comparison group of continuously-employed workers rather than the broader class of non-displaced individuals, whose heterogeneity could make our findings difficult to interpret. Second, our dependent variable differs from those examined in the earlier work. We investigate changes in self-assessed health, a measure taken annu-

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ally only since 1994, rather than health satisfaction, the measure used by the previous studies. Though a subjective measure of global health, SAH is commonly studied and widely accepted as a broad indicator of health. Finally, relatively recent developments in statistical techniques (Twisk 1997) allow us to better model health transitions, properly accounting for intra-subject relationships in pooled longitudinal analysis.

2. Methods

Study design and data source

This study employs a prospective longitudinal design that uses the 1994, 1995, and 1996 waves of the German Socio-Economic Panel.

Analysis sample

The analysis sample for this study was constructed by pooling two pairs of survey waves. The first pair of survey waves, or panel, combines 1994 and 1995 data and represents the experience of respondents between the 1994 and 1995 survey dates. The second pair of survey waves combines 1995 and 1996 data and represents the experience of respondents between the 1995 and 1996 survey dates. Panels were pooled so that respondents contribute two observations to the analysis sample: one observation for which 1994 is the baseline and 1995 is the follow-up, and a second observation for which 1995 is the baseline and 1996 is the follow-up.

A multi-step procedure was used to select the eligible sample (Table 1). First, individuals at risk of displacement ($n = 8,883$) were identified from each panel. At-risk individuals were respondents who were (a) employed at baseline, (b) reported working for their baseline employer for three or more years, and (c) were not self-employed. The three-year tenure screen, consistent with earlier stud-

ies of job displacement (Couch 1998; Gallo et al. 2000), reduces sample heterogeneity by eliminating seasonal workers and the marginally employed, individuals who may be especially vulnerable to displacement.

From the group of at-risk workers, individuals who experienced job displacement or remained continuously employed were identified using retrospective information provided at the follow-up surveys. Displaced workers ($n = 286$) were those who reported job separation since the previous survey because of a business closing (company closed down) or layoff (business relations ended/laid off). The comparison group of continuously-employed workers ($n = 7,796$) comprised individuals who reported no change in their employment status since the previous survey. Individuals who retired, left their jobs for reasons other than business closing or layoff, or who did not provide sufficient data to determine changes in employment status ($n = 801$) were eliminated from the sample, yielding an eligible sample of 8,082 respondents. Further elimination of respondents with missing data for the outcome variable or independent variables¹ resulted in a final analysis sample of 7,187 individuals. This analysis sample included 253 displaced workers and a comparison group of 6,934 continuously employed workers.

Measures

The dependent variable in our analyses was follow-up self-assessed health (Table 2). SAH is a five-category measure of global health, which was recoded so that higher values reflect better subjective health. The survey question used to create the SAH dependent variable mea-

¹ Twenty-one observations had missing data for the dependent variable. Missing data for independent variables included baseline SAH ($n = 13$), education ($n = 74$), hourly wages ($n = 569$), and longitudinal weight ($n = 244$).

Table 1

Development of the Sample

	1994–95 Panel	1995–96 Panel	Total
At risk of displacement	4,382	4,501	8,883
Displaced	152	134	286
Continuously employed	3,839	3,957	7,796
Other	391	410	801
Eligible sample (displaced + contin. employed.)	3,991	4,091	8,082
Missing LHS, RHS, or weight variable			895
Analysis sample (used in estimations)			7,187

Source: German Socio-Economic Panel, 1994–1996 waves.

Table 2

**Weighted Means of Variables: Full Sample
and by Displacement**

Variable	Full Sample (N = 7187) Mean (Std. Deviation)	Continuously Employed (N = 6934) Mean (Std. Deviation)	Displaced Workers (N = 253) Mean (Std. Deviation)
Dependent Variable			
Follow-up SAH	3.50 (0.84)	3.51 (0.84)	3.44 (0.77)
Independent Variables			
<i>Exposure Variable</i>			
Job Displacement	0.03 (0.16)	—	—
<i>Baseline Covariates</i>			
Baseline SAH	3.53 (0.84)	3.54 (0.84)	3.41* (0.81)
Age	41.01 (10.55)	41.00 (10.58)	41.53 (9.53)
Male Gender	0.60 (0.48)	0.61 (0.48)	0.54 (0.43)
Marital Status	0.67 (0.46)	0.67 (0.47)	0.66 (0.41)
Blue Collar Occupation	0.35 (0.47)	0.34 (0.47)	0.52*** (0.43)
Education	12.41 (2.77)	12.43 (2.79)	11.75** (2.01)
Hourly Wage	26.92 (16.41)	27.06 (16.52)	21.99*** (12.39)
Cohort	0.50 (0.50)	—	—
<i>Other Variables</i>			
East German	0.17 (0.38)	0.16 (0.37)	0.40*** (0.43)
Manufacturing	0.33 (0.47)	0.33 (0.47)	0.35 (0.41)
Construction	0.06 (0.23)	0.05 (0.23)	0.11** (0.28)
Trade	0.09 (0.28)	0.09* (0.28)	0.13 (0.29)
Services	0.32 (0.46)	0.32 (0.47)	0.16*** (0.31)
Notes: Asterisk represents significant difference between continuously employed and displaced. * $p < .05$, ** $p < .01$, *** $p < .001$ Source: Author's calculations.			

sure was, "How would you describe your health at present?" Response categories were "very poor", "poor", "satisfactory", "good", and "very good".

The principal independent variable was a dummy variable for job displacement. This is a binary variable that takes the value one if a respondent experienced job displacement between survey waves, and zero otherwise. A number of variables were also included to adjust for potential confounding of the relationship between displacement

and follow-up SAH. Covariates included the baseline measure of SAH, age in years, marital status, blue-collar occupation, years of education, and hourly wages. In addition, we also included a dummy variable for the panel from which the observation was derived to control for cohort effects. Inspection of plots of the dependent variable against each of the continuous covariates revealed a linear association. The continuous covariates were therefore not categorized.

Empirical approach

Model of job displacement. The impact of displacement on follow-up SAH was assessed using a residualized change model, in which we covaried the outcome variable with its baseline equivalent, the exposure variable, and a set of baseline covariates. Changes in health were estimated by the following equation:

$$H_{it} = \beta_0 + \sum_{j=1}^J \beta_{1j} X_{ijt-1} + \beta_2 H_{it-1} + \beta_3 D_{is} + \beta_4 p + \varepsilon_{it} \quad (1)$$

where H_{it} = SAH observation of subject i at time t (follow-up); X_{ijt-1} = independent variable j of subject i at time $t-1$ (baseline); β_{1j} = standardized regression coefficient of independent variable j ; J = number of time-dependent and time-independent explanatory variables; H_{it-1} = SAH health observation of subject i at time $t-1$; β_2 = autoregressive coefficient; D_{is} = a dummy variable indicating displacement, where $t-1 < t$; β_3 = effect of displacement on changes in health relative to the continuously employed; p = a control for the panel contributing the observation; t = time; and ε_{it} = measurement error of subject i at time t .

Because the model does not explicitly control for the varying lengths of unemployment of the displaced workers, the dummy variable, D_{is} , captures the effect of job displacement on changes in SAH for the average displaced worker relative to the continuously employed comparison group.² Considering right censoring of unemployment spells, and the fact that duration could only be computed for 219 of the 253 workers who experienced displacement, the average displaced worker was unemployed for 3.79 months. Of the 253 displaced workers, 101 reported re-employment by follow-up.

Empirical technique

Ordinary least squares (OLS) regression was used to fit the multivariate model of follow-up SAH. The model was also estimated with generalized estimating equations (GEE), a technique for analyzing longitudinal epidemiological relationships (Twisk 1997). GEE is appropriate for this research because it accounts for intra-subject correlation, or the notion that repeated observations of a single subject are not independent.

To estimate the effect of job displacement on follow-up SAH, equation (1) was fit using OLS and GEE. Since examination of bivariate associations of covariates with the exposure variable, displacement, indicated that baseline SAH was strongly predictive ($p < 0.05$) of subsequent displacement (i.e., those with poorer subjective health were more likely to be displaced), the model was also fit with a correction for endogeneity of displacement suggested by Hausman (1978). To help with identification, dummy variables for living in Eastern Germany and baseline employment in a services industry, both of which were strongly

associated with displacement, but neither of which was related to follow-up SAH, were added to the first-stage estimation of displacement.

The OLS models were fit using PROC REG in SAS 6.12. Data were weighted for the longitudinal study design. A longitudinal weight, equal to the product of the individual weight from baseline survey and the staying probability from the follow-up survey, was calculated and included in all analyses. The GEE model was fit with PROC GENMOD and was unweighted, as this procedure does not currently support weighted estimation.

3. Results

Descriptive analysis and bivariate associations

Table 3 provides descriptive statistics on the total sample, as well as the sub-samples of displaced and non-displaced workers. Roughly 3 percent of the analysis sample experienced job displacement over the period studied. At baseline, sample members averaged 41 years of age, 12 years of education, and earned approximately DM 27 per hour. About two-thirds of sample members were married, 60 percent were male, and 35 percent worked in a blue-collar occupation. Seventeen percent of the sample reported living in Eastern Germany. On average, baseline and follow-up health scores were in the range of "satisfactory" to "good".

Comparing the sub-samples of displaced and continuously-employed workers reveals several significant differences.³ On average, displaced workers were in poorer baseline health, had lower wages and fewer years of education, and were more likely to live in Eastern Germany. In addition, a higher proportion of displaced workers were employed in a blue-collar occupation, the construction and trade industries, and a lower proportion were employed in the services industry. The results suggest that the unadjusted relationship between job displacement and follow-up SAH is not significant.⁴

² With the model specified in Equation (1.), regression coefficients have no clear interpretation. With a binary exposure variable, as is the case in this study, it is possible only to assert that the health of the group of displaced workers has changed more or less than that of the continuously employed. One cannot, however, claim that the change was absolutely positive or negative.

³ Unadjusted differences between displaced and continuously-employed workers were assessed using bivariate methods (t-tests). Tests of unequal variance were used to assess statistical significance.

⁴ The unadjusted association between job displacement and follow-up SAH was found to be significant when the data were unweighted.

Table 3

**Regressions of Follow-Up SAH: The Effect of Job Displacement
(N = 7,187)**

	Unadjusted Model (OLS) Beta (Std. Error)	Adjusted for Baseline SAH (OLS) Beta (Std. Error)	Fully-Adjusted Model (OLS) Beta (Std. Error)	Fully- Adjusted Model (GEE) Beta (Std. Error)
<i>Exposure Variable</i>				
Job Displacement	-0.07 (0.06)	0.01 (0.05)	0.04 (0.05)	0.06 (0.04)
<i>Baseline Covariates</i>				
Baseline SAH	—	0.57 *** (0.01)	0.52 *** (0.01)	0.56 *** (0.01)
Age	—	—	-0.01 *** (0.01)	-0.01 *** (0.001)
Male Gender	—	—	0.02 (0.02)	0.03 (0.02)
Marital Status	—	—	0.02 (0.01)	0.003 (0.02)
Blue Collar Occupation	—	—	-0.12 *** (0.02)	-0.08 *** (0.02)
Education	—	—	0.02 *** (0.003)	0.01* (0.003)
Hourly Wage	—	—	-0.00004 (0.0005)	-0.001* (0.0005)
Cohort	—	—	-0.0001 (0.02)	-0.005 (0.02)
R-Square	0.00	0.33	0.36	—

Notes: * p < .05, ** p < .01, *** p < .001.
Source: Authors' calculations.

Table 4

Explanation of Regression Variables

Variable	Explanation of Variable
Age	Reported age in years
Baseline SAH	1 = very poor, 2 = poor, 3 = satisfactory, 4 = good, 5 = very good
Blue Collar Occupation	1 if blue-collar occupation, 0 if white-collar or civil service
Cohort	1 if observation contributed from 1994-95 cohort, else 0
<i>Dependent Variable</i>	
East German	1 if East German resident, 0 if West German (derived from PPFAD)
Education	Years of education (derived from Equivalent Data File)
Follow-up SAH	1 = very poor, 2 = poor, 3 = satisfactory, 4 = good, 5 = very good
Hourly Wage	Calculated as monthly earnings/(4*weekly hours worked)
<i>Independent Variables</i>	
Job Displacement	Job loss due to business closing or layoff. 1 if respondent experiences job displacement, 0 if continuously employed
Male Gender	1 if gender is male, 0 if female
Marital Status	1 if married or has partner, else 0
Services	1 if baseline employment in Services industry, 0 otherwise

Multivariate estimation results

Table 4 provides OLS estimation results from the unadjusted model of follow-up SAH, the model adjusted for baseline SAH, and the full set of covariates. Additionally, we provide GEE results from the fully-adjusted model for comparison purposes. As the Hausman Specification Test did not indicate simultaneity of baseline SAH and displacement, the corrected results are not presented.

The results indicate that the unadjusted association between displacement and follow-up SAH is negative, but not significant ($p > 0.05$). After adjusting for baseline SAH, the direction of the association changed, but the association remains non significant ($p > 0.05$). Adding socio-demographic controls had almost no incremental effect. Several of the covariates were associated with follow-up SAH. Both baseline SAH and education were positively related to follow-up SAH, while age and blue-collar occupation were negatively related to follow-up SAH.

4. Discussion

The findings of this study do not indicate that job displacement is associated with adverse changes in self-assessed health among German workers. The findings are consistent with those of previous GSOEP research, which has found no evidence of poorer post-separation health after accounting for previous health and other socio-demographic factors (Elkeles and Seifert 1993, 1996). This is despite evidence of health effects of job loss in the United States (Gallo et al. 2000; Kasl and Jones 2000).

There are several conceivable reasons for our finding. First, the health measure studied is subjective in nature and may include both emotional and physical components.

In contrast, studies reporting health effects of unemployment have typically examined more objective measures of physical or mental health, or use of health services. However, this first possibility is unlikely. Findings from earlier studies have demonstrated mental health effects of displacement, suggesting that an emotional component within SAH would increase its sensitivity to displacement. Second, potential health effects may be mitigated by countervailing factors, such as severance pay, unemployment compensation, and retraining. In our sample, 45 percent reported receiving a cash settlement that averaged roughly DM 9700, or over six weeks of pay. Similarly, re-employment may play a part in negating health effects. In bivariate analysis we found improvements in SAH among displaced workers who found new employment by follow-up. However, this finding was not observed after controls for baseline SAH and other covariates were added.

Some research has suggested that the relationship between unemployment and health may vary for subgroups of the population. For instance, Elkeles and Seifert (1996) conclude that the relationship is apparent for immigrant workers only. In this analysis, we investigated whether the potential association between displacement and subsequent health existed among specific socio-demographic groups, using interaction terms of displacement with the covariates in the multivariate models. No statistically significant interactions between displacement and other covariates were detected.

Future studies in this area can enhance the understanding of the relationship between displacement and health by examining additional measures of physical and mental health and better accounting for specific services that might be available for displaced workers, which might explain differences in post-displacement health.

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