

Poor health, employment transitions and gender: evidence from the British Household Panel Survey

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Received: 5 December 2011 / Revised: 7 November 2012 / Accepted: 29 November 2012 / Published online: 20 December 2012
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Abstract

Objectives We examined health selection in the context of transitions across employment statuses (employment, unemployment and inactivity), with attention to gender differences.

Methods 60,536 transitions from 7,901 individuals were pooled from 17 waves of the British Household Panel Survey. Associations between self-rated health and transitions across employment statuses were examined using multilevel multinomial analysis.

Results Health selective employment transitions between year $t-1$ and t were observed at entry to as well as exit from employment. Associations for poor health with the transitions were similar for men and women in transitions from employment to both unemployment and to inactivity, but with some differences in other transitions. When leaving employment, transitions from employment to

unemployment (OR_{adjusted} (adjusted odds ratio) = 1.51, 95 % CI = 1.21–1.89 for men and $OR_{\text{adjusted}} = 1.60$, 95 % CI = 1.25–2.04 for women) and to inactivity ($OR_{\text{adjusted}} = 1.58$, 95 % CI = 1.21–1.89 for men and $OR_{\text{adjusted}} = 1.63$, 95 % CI = 1.35–1.96 for women) were affected by health status among both men and women. Similarly, poor health lowered the probability of transitions to employment from unemployment and inactivity; however, the negative impact of poor health was statistically significant only for women.

Conclusions There is a strong relationship between health and transitions both into and out of employment suggesting an independent role for poor health, and these associations were similar for men and women.

Keywords Health selection · Gender difference · Employment status · Health inequalities · Multilevel modelling

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Introduction

Although inequalities in health between employment statuses have been consistently reported across studies, there have been disputes concerning the details of the causal relationship. A large number of studies have shown that unemployment has a strong negative effect on health (social causation) (Bartley et al. 1999; Kasl and Jones 2000; Virtanen et al. 2003), whilst other studies have indicated that poor health could increase the risk of leaving employment and decrease the probability of returning to employment, demonstrating health selection (Åhs and Westerling 2006; Cardano et al. 2004; Dahl 1993; Elstad and Krokstad 2003; Jusot et al. 2008; Schuring et al. 2007; van de Mheen et al. 1999; van den Berg et al. 2010), which

has consequently been suggested as a partial explanation for inequalities in health by employment status (Acheson 1998; Kasl and Jones 2000). Across several European (Arrow 1996; Cardano et al. 2004; Disney et al. 2006; Jusot et al. 2008; Schuring et al. 2007; van de Mheen et al. 1999) and North American countries (Dwyer and Mitchell 1999; Flippen and Tienda 2000; McDonough and Amick 2001; Ojeda et al. 2010), health selection has been consistently linked with various health measures, such as mental illness (Ojeda et al. 2010), physical disability (Baldwin and Johnson 2000; Loprest et al. 1995), chronic diseases (Schuring et al. 2007; van de Mheen et al. 1999) and self-rated health (Disney et al. 2006; Jusot et al. 2008; McDonough and Amick 2001; Mutchler et al. 1999; Schuring et al. 2007; van de Mheen et al. 1999).

Different approaches to the identification of subtypes of non-employment

Some health selection studies have used the simple dichotomy of employment versus non-employment (Arrow 1996; Jusot et al. 2008; McDonough and Amick 2001; Mutchler et al. 1999; Ojeda et al. 2010), the latter used to describe all those currently not working and neglecting the considerable level of heterogeneity in non-employment domains (Arber 1996). A few studies have disaggregated non-employment into specific dimensions (Bound et al. 1999; Cardano et al. 2004; Disney et al. 2006; Dwyer and Mitchell 1999; Flippen and Tienda 2000; Lindholm et al. 2001; Schuring et al. 2007; van den Berg et al. 2010), and demonstrated that the different types of transitions relate to poor health differently. Despite these advances, only a few studies have dealt with both exit and entry simultaneously (Mutchler et al. 1999; Schuring et al. 2007; van de Mheen et al. 1999). Most have exclusively focused on the exit from employment (Arrow 1996; Bound et al. 1999; Cardano et al. 2004; Disney et al. 2006; Dwyer and Mitchell 1999; Flippen and Tienda 2000; Jusot et al. 2008; Karpansalo et al. 2004; Loprest et al. 1995; McDonough and Amick 2001; van den Berg et al. 2010) or have been limited to a few pre-selected transitions, typically early retirement (Disney et al. 2006; Dwyer and Mitchell 1999; Karpansalo et al. 2004), whilst other transitions have remained under-researched. This is primarily because the available data were limited by small numbers of individuals making rare transitions, such as the transition from unemployment to employment.

Gender differences in employment transitions responding to poor health

The gender gap in the employment structure, in particular the lower proportion of women in paid employment, has been well established (Robinson 2003). This, together with

the observation of the adverse impact of poor health on employment transitions, implies that health may play an active role in constructing gender differences in labour market outcomes. Despite the significance of the implication, the link between health and gender differences in employment transitions has been addressed in only a few studies (Arrow 1996; Cardano et al. 2004; Flippen and Tienda 2000; Jusot et al. 2008; McDonough and Amick 2001; Ojeda et al. 2010; Schuring et al. 2007; van de Mheen et al. 1999) and the evidence is too inconsistent to draw reliable conclusions. A few studies have found that poor health was a more significant risk factor among men than women (Ojeda et al. 2010; Cardano et al. 2004; McDonough and Amick 2001; van de Mheen et al. 1999), particularly when employment status was dichotomized into two groups (i.e., employment and non-employment) (Ojeda et al. 2010; McDonough and Amick 2001; van de Mheen et al. 1999), while others reported that women with poor health experienced more disadvantage in the labour market transition than men with the same condition (Schuring et al. 2007; Arrow 1996). Interestingly, based on more detailed categories of employment status, Schuring et al. (2007) reported that the effects of poor health on the chance of entering paid employment from unemployment was worse for women than for men.

Given the insufficient and conflicting evidence to date, further research is needed to unravel a more detailed explanation on health selection with particular attention to gender differences. For this purpose, we disaggregated employment status into three groups (i.e., employed, unemployed and inactive) and examined exit and entry into these statuses simultaneously. The presence of health selection was defined when health status in year $t-1$ was related to transitions, measured by a change in employment status between year $t-1$ and year t . To avoid a small number of transitions in some categories, data were aggregated by pooling 17 waves of BHPS (British Household Panel Survey). Even with this enlarged sample, our approach was still limited in further elucidation of inactivity categories into specific domains such as early retirement and family care.

Methods

Study population

The BHPS is an ongoing annual survey that has been conducted since 1991. This nationally representative sample of the UK population is composed of around 5,500 households and approximately 10,000 individuals. The same individuals and their children, once aged over 16, have been re-interviewed each successive year (Lynn et al.

2006). The sample used here was initially drawn from 17 waves (1991–2007) of the BHPS. Several selection criteria were applied to deliver the sample used in this analysis. First, additional samples that were added to the original sample members for specific purposes were excluded. They were the members of European Community Household Panel sample added after wave 7, and the booster sample for Scotland, Wales and Northern Ireland that was added after wave 9. Second, since this study conceptualized a transition as happening over 2 years, between year $t - 1$ and year t , only observations covering two consecutive years were retained for the analysis. Third, the sample was restricted to men aged between 30 and 64, and women between 30 and 59 at the point of each survey to avoid those who were in their early careers and to exclude transitions appearing after State Pension age. Finally, since the question concerning general health status was not asked in wave 9, transitions from wave 9 to wave 10 were omitted from the analysis (Sacker et al. 2005). The final sample comprised 60,536 transitions from 7,901 individuals.

Measures

Employment status was grouped into three distinct categories; employed, unemployed and inactive. The employed group consisted of those who were fully employed or self-employed. The unemployed group included all individuals who were looking for work. The inactive group were those who defined themselves as withdrawn from employment, and comprised those who had taken early retirement or were involved in family care. For a health measure, self-reported general health status was recoded as a binary variable. A rating of ‘good health’ was defined when the respondents reported having experienced good or excellent health over the last 12 months, whereas when they responded with fair, poor or very poor health, they were identified as having ‘poor health’.

Some relevant covariates were identified from the literature (Arrow 1996; McDonough and Amick 2001) for inclusion in the models. Educational attainment is assessed on a five point scale; (1) no qualifications; (2) CSE, GCSE, or GCE O level (primary education or secondary education ordinary level); (3) GCE A level (secondary education advanced level); (4) vocational qualification; (5) higher degree level qualification. When we initially examined age as both a linear and quadratic term, there were signs indicating a nonlinear relationship between age and employment transition, so age was grouped into three categories; 30–39, 40–49 and 50–64 (50–59 for women). Since the age effect is confounded with period and cohort effects in a longitudinal analysis, a period-specific dummy variable was constructed to indicate the early 1990s recession as a proxy for a period effect and, for the

consideration of a cohort effect, birth cohorts were grouped into 10-year intervals.

Statistical analysis

The association between health and transitions across employment status was estimated using multilevel multinomial analysis to account for the structure of pooled data with serial correlations between repeated measurements within an individual (Rasbash et al. 2004). The probability for a transition from one employment status to another (a lag time of 1 year) was modelled separately for each of the three employment statuses (resulting in nine possible transitions from and to the three employment statuses). To fit a multilevel multinomial model with repeated measurements (i : level 1) within an individual (j : level 2) with r categories ($s = 1, \dots, r$) of response variable, a series of $r - 1$ equations for the remaining categories was formulated compared to the reference category ($s = r$). Using a logit link, the probability ($P_{ij}^{(s)}$) for i th response within an individual j in a transition s was defined as the product of both level 1 and level 2 (Rasbash et al. 2004);

$$\text{Log} \left(\frac{P_{ij}^{(s)}}{P_{ij}^{(r)}} \right) = \beta_0^{(s)} + \beta_1^{(s)} H_{ij} + \beta_2^{(s)} E_{ij} + \beta_3^{(s)} A_{ij} + \beta_4^{(s)} C_{ij} + \beta_5^{(s)} P_{ij} + u_j^{(s)}$$

In the above equation, the s superscript ($s = 1, \dots, r - 1$) denotes each transition with transition-specific intercepts and coefficients. H, E and A represent the health, education and age variables. In addition, all models were adjusted for cohort (C) and period (P) effects, as described earlier. The transition-specific random intercept ($u_j^{(s)}$) was introduced to allow for variability across individuals. A covariance between random effects was used to demonstrate the degree of correlation between transitions (Steele et al. 2004). Because of convergence problems with a small number of observations for some categories and increasing complexity in multilevel modelling, the current modelling was limited with respect to increasing the number of parameters, so no further specification of the employment transitions was possible (e.g., separation of the employed group into full-and part-time employment subcategories; separation of the inactive group into early retirement, family care and long-term sickness subcategories). Two random intercept models were fitted in a stepwise fashion; initially, we included health as the predictor (Model I) and then added other covariates (Model II). The independent role of health in employment transitions was examined based on observed changes in OR by health status between model I and model II. Markov Chain Monte Carlo (MCMC) methods were used to estimate parameters, because quasi-likelihood

procedures are unreliable when the sample size within level 2 is small and may produce biased estimates for a multinomial model (Rasbash et al. 2004). So after obtaining starting values from corresponding quasi-likelihood procedures, analysis was switched into MCMC methods. Results were gained from a burn-in (iteration for initial parameter) of 3,000 and a chain length (iteration for final parameter) of 30,000. Gender differences were narratively assessed by comparing estimates obtained from separate analysis for men and women. During the preliminary analysis, we found that women in 30 s were highly mobile in employment status before becoming most stable in their 40 s, while men in 30 s and 40 s were far more stable in employment status to a similar degree than 50 s (data not shown). To accommodate this difference in the analysis, the 40 s was taken as a reference category. We then repeated the same analysis using the subsample where three inactivity categories (early retirement, family care and long-term sick) were included (data not shown).

Sample attrition over repeated surveys is a potential problem in the analysis of longitudinal data. In the BHPS, sample weights are provided to adjust for attrition. The

sample weights were applied to descriptive analyses. However, since differences between the weighted and unweighted samples were modest and previous work showed that over decades, the follow-up sample remained representative of original population (Jones et al. 2006), only results from the unweighted analyses were reported here. The analysis was conducted in SAS 9.1 for data construction and bivariate analysis, and MLwiN 2.12 for the random effects model.

Results

The sample comprised 29,839 transitions from 3,926 men and 30,697 transitions from 3,975 women (Table 1). Despite their younger age, women tended to have a higher proportion of inactivity, poor health and low education ($p < 0.001$). The main reason for inactivity among women was family care (89.8 %), while the main reason among men was early retirement (87.2 %).

For both men and women, the employed group was younger and experienced a more favourable level of health and educational attainment than the unemployed and

Table 1 Demographic and social characteristics of the study sample pooled over 17 years (1991–2007) in the British Household Panel Survey

Variables	Men		Women		<i>p</i> value ^a
	<i>N</i>	% ^b	<i>N</i>	%	
No. of employment transitions	29,839	49.3	30,697	50.7	
No. of individuals	3,926	49.7	3,975	50.3	
Average No. of transitions per person	3,926	7.6(±5.0)	3,975	7.7(±4.7)	
Age	29,839	44.5 (±9.4)	30,697	43.0(±8.2)	<0.001
<i>Employment status</i>					
Employed	26,994	90.5	23,762	77.4	
Unemployed	1,363	4.5	703	2.3	
Inactive	1,482	5.0	6,232	20.3	<0.001
<i>Inactive categories</i>					
Retirement	1,293	87.2	628	10.2	
Family care	189	12.8	5,557	89.8	<0.001
<i>Health status</i>					
Good	23,688	79.4	22,983	74.9	
Poor	6,151	20.6	7,714	25.1	<0.001
<i>Educational level</i>					
No qualification	4,786	16.0	5,810	18.9	
GCE O levels or less	5,875	19.7	7,962	25.9	
GCE A levels	3,477	11.6	2,697	8.8	
Vocational qualification	10,848	36.4	10,203	34.8	
Higher degree	4,853	16.3	4,025	13.1	<0.001

Analyses were based on the number of transitions (observations), apart from number of individuals and average number of transitions per person which was obtained at an individual-level

^a *p* values were obtained from Chi square test for categorical data and ANOVA test for continuous variable

^b Apart from age and average number of transitions per person, all other measures are presented in percentage terms based on the numbers in left side

Table 2 Bivariate associations of employment status and employment transitions with health and other measures for men and women pooled over 17 years (1991–2007) in the British Household Panel Survey

	N (%)	Health status		Age ^a				Educational attainment ^b				
		Good	Poor	30 s	40 s	50 s	Mean (±SD) ^c	I	II	III	IV	V
<i>Men</i>												
Employment status												
Employment	26,994 (90.5)	80.4	19.6	37.7	33.9	28.4	43.8 (±9.0)	14.4	20.1	11.8	36.9	16.8
Unemployment	1,363 (4.6)	69.7	30.3	36.3	28.4	35.3	44.8 (±9.8)	38.4	19.0	8.4	26.9	7.3
Inactivity	1,482 (5.0)	68.9	31.1	3.1	8.0	88.9	57.5 (±6.5)	25.8	12.7	12.7	34.7	14.1
Total	29,839 (49.3)	79.4	20.6	35.9	32.4	31.7	44.5 (±9.4)	16.0	19.7	11.6	36.4	16.3
Employment transition												
Employment to Employment	26,150 (87.6/96.9) ^d	80.7	19.3	38.1	34.3	27.6	43.6 (±8.9)	14.1	20.2	11.7	37.0	17.0
Employment to unemployment	512 (1.7/1.9) ^d	72.9	27.1	37.3	32.0	30.7	44.1 (±9.2)	24.6	19.7	12.7	33.4	9.6
Employment to inactivity	332 (1.1/1.2) ^d	71.7	28.3	4.2	9.0	86.8	56.2 (±6.7)	22.3	10.5	12.3	38.9	16.0
Unemployment to employment	537 (1.8/39.4) ^d	74.5	25.5	43.0	32.6	24.4	42.4 (±8.7)	23.3	19.2	11.9	34.8	10.8
Unemployment to unemployment	685 (2.3/50.3) ^d	67.9	32.1	36.9	26.6	36.5	44.9 (±9.8)	49.0	19.3	5.7	20.9	5.1
Unemployment to inactivity	141 (0.5/10.3) ^d	60.3	39.7	7.8	21.3	70.9	53.7 (±8.6)	44.7	17.0	7.8	25.5	5.0
Inactivity to employment	106 (0.4/4.9) ^d	77.4	22.6	8.5	19.8	71.7	53.0 (±8.4)	13.2	13.2	15.1	40.6	17.9
Inactivity to unemployment	74 (0.3/4.3) ^d	56.8	43.2	9.5	21.6	68.9	52.8 (±8.6)	52.7	14.9	5.4	23.0	4.1
Inactivity to inactivity	1,302 (4.4/90.8) ^d	68.9	31.1	2.3	6.2	91.5	58.1 (±6.0)	25.3	12.5	13.0	34.9	14.3
<i>Women</i>												
Employment status												
Employment	23,762 (77.4)	77.3	22.7	37.9	38.1	24.0	42.9 (±7.9)	15.4	25.2	9.1	35.6	14.7
Unemployment	703 (2.3)	60.9	39.1	35.6	34.0	30.4	43.7 (±8.4)	31.0	22.9	7.5	29.7	8.8
Inactivity	6,232 (20.3)	67.0	33.0	42.4	27.1	30.5	43.2 (±9.1)	31.1	29.0	7.9	24.7	7.3
Total	30,697 (50.3)	74.9	25.1	38.8	35.8	25.5	43.0 (±8.2)	18.9	25.9	8.8	33.2	13.1
Employment transition												
Employment to Employment	22,505 (73.3/94.7) ^d	77.8	22.2	37.6	38.7	23.7	42.9 (±7.9)	14.9	25.1	9.0	35.9	15.0
Employment to unemployment	353 (1.2/1.5) ^d	68.6	31.4	36.3	36.3	27.4	43.4 (±8.0)	23.2	26.6	11.6	28.9	9.6
Employment to inactivity	904 (2.9/3.8) ^d	69.7	30.3	45.3	24.7	30.0	42.9 (±9.2)	23.7	27.0	9.0	30.5	9.8
Unemployment to employment	301 (1.0/42.8) ^d	70.4	29.6	41.9	33.5	24.5	42.4 (±8.1)	20.6	22.9	9.0	36.9	10.6
Unemployment to unemployment	201 (0.6/28.6) ^d	52.2	47.8	28.4	38.8	32.8	44.9 (±8.0)	40.3	19.4	5.5	26.9	7.9
Unemployment to inactivity	201 (0.6/28.6) ^d	55.2	44.8	33.3	29.9	36.8	44.5 (±8.9)	37.3	26.4	7.5	21.9	7.0
Inactivity to employment	972 (3.2/15.6) ^d	73.5	26.5	58.1	28.0	13.9	39.6 (±7.4)	20.6	31.5	10.4	28.8	8.7
Inactivity to unemployment	150 (0.5/2.4) ^d	52.0	48.0	46.7	27.3	26.0	42.6 (±8.9)	42.0	22.7	3.3	26.0	6.0
Inactivity to inactivity	5,110 (16.7/82.0) ^d	66.2	33.8	39.3	26.9	33.8	43.8 (±9.2)	32.8	28.7	7.5	23.8	7.1

^a 30s range from 31 to 40, 40s range from 41 to 50, while 50s range from 51 to 64 for men, and from 51 to 59 for women

^b No qualification (I), GCE O levels or less (II), GCE A levels(III), vocational qualification(IV), and higher degree (V)

^c Apart from age, all other measures are presented in percentage terms based on the numbers in far left side

^d The former percentage refers to the total number of transitions as a denominator, while the latter percentage refers to the number of transitions specific to the same origin as a denominator

inactive group (Table 2). For women, the prevalence of poor health was higher for the inactive group (33.0 %) than the employed group (22.7 %) and was the highest in the unemployed group (39.1 %). In contrast, for men the unemployed (30.3 %) and the inactive group (31.1 %) had similar levels of poor health, while the employed group (19.0 %) showed a much lower level of poor health. For both men and women, remaining in employment in the next year was a most common situation (87.6 % for men

and 73.3 % for women), followed by remaining in inactivity (4.4 % for men and 16.7 % for women). Of all potential transitions for those in employment (including staying in employment) 3.1 % of men and 5.3 % of women moved out of employment. 39.4 % of unemployed men and 4.9 % of inactive men moved into employment, while 42.8 % of unemployed women and 15.6 % of inactive women moved into employment. For any given employment status, both men and women who moved into

employment were healthier, younger and more educated than those who undertook different transitions.

Table 3 presents the associations of health and other covariates with transitions across employment statuses. Poor health had a significant impact on most of the employment transitions. For men, when leaving employment, transitions from employment to unemployment (OR = 1.54, 95 % CI = 1.23–1.92) and to inactivity (OR = 1.74, 95 % CI = 1.33–2.27), compared with remaining employed, were affected by health status (Model I). When adjusted for covariates, such as age and education, the magnitude of associations remained largely unchanged (Model II). However, poor health was associated neither with a transition from inactivity to employment nor with a transition from unemployment to employment. For women, poor health increased the risk of leaving employment to both unemployment (OR = 1.62, 95 % CI = 1.28–2.05) and inactivity (OR = 1.62, 95 % CI = 1.35–1.94), compared to those remaining employed (Model I). Trends in the opposite direction were seen with returning to employment among women; respective ORs for transitions to employment from both unemployment and inactivity were 0.28 (95 % CI = 0.15–0.55) and 0.70 (95 % CI = 0.58–0.86), respectively. These associations altered only slightly when adjusted for covariates (Model II). For the transition from inactivity to unemployment the association with health was strong and significant in women (OR = 1.85, 95 % CI = 1.20–2.86) but not in men. When the long-term sick group was included into the inactive category, poor health was associated with exit from and entry into employment in men but by far more strongly in men (data not shown).

Findings from Table 3 also demonstrated that the transition from employment to inactivity increased with age for men and women in their over-50s (OR = 5.00, 95 % CI = 3.16–7.93 for men and OR = 1.73, 95 % CI = 1.34–2.24 for women). A higher educational level appeared to be particularly associated with an increased chance of staying in employment for both men and women. All transition-specific random effects, except the transition from unemployment to inactivity among women, were highly significant, indicating that between-individual variation was large for every transition. An estimated correlation from the covariance matrix between transitions from employment both to unemployment and to inactivity implied that women who underwent one transition tended to have a high propensity for undergoing the other changes in employment status (correlation coefficient = 0.39).

Discussion

In this large prospective study, health selection was observed across various types of transitions between

employment statuses, not only out of, but also back into employment. These associations remained after adjustments for relevant covariates, suggesting an independent role for poor health. Our findings indicate that two major forms of non-employment, unemployment and inactivity, are linked with poor health in different ways and should not be simplified into a single category. Generally, women were more insecure than men in the labour market, with a higher rate of transition out of employment. The patterns of association between poor health and employment transitions in men and women were similar when moving out of employment, but possibly different in some transitions; greater for women in transitions from unemployment to employment and greater for men in transitions involving movement into and out of the long-term sick category.

Methodological considerations

Some major strengths of this study are the large sample size with nationwide representation and the prospective design. Also, instead of using pre-selected transitions, a full range of movements across three main employment statuses were considered simultaneously in this study, offering a better opportunity for a detailed examination. By using a multilevel multinomial model, we were able to preserve every transition route and test each route individually. Data pooling over 17 years provided a powerful approach to analysis, particularly when considering relatively rare employment transitions. Nevertheless, some groups comprised small numbers of transitions (e.g., men moving from inactivity to either employment or unemployment) and yielded estimates with large variances, suggesting the need for further research on these rare transitions.

Despite the strengths, there are some potential limitations to our study. First, the multilevel analysis was made on the assumption that transitions between employment statuses depend on conditions from the previous wave. This is the first-order Markov assumption, in which a transition probability at one time is assumed to depend only on the most recent events. To relax this assumption, some alternative approaches, such as the higher-order Markov model, may be considered as a direction for future work (Mosconi and Seri 2006). Second, our findings may be limited by the characteristics of health measure used; for example, it may be argued that self-rated health is a less effective predictor of the employment transition than disease-specific measures. As such, the consideration of data such as SHARE (The Survey of Health, Aging and Retirement in Europe), which covers both overall health status and disease-specific measures would be particularly relevant for the future work. Despite its subjective nature, however, self-reported health has long been used as a measure of overall health

Table 3 Multivariate associations of health and other covariates with employment transitions across employment statuses in men and women pooled over 17 years (1991–2007) in the British Household Panel Survey

Transitions	Model I ^a		Model II								Random effect ^d				
	Fixed effect ^b		Fixed effect								Variance		Correlation		
	Health	Poor vs good	Health	Poor vs good	Age	50s vs 40s	50s vs 40s	Education ^c	I vs V	II vs V	III vs V	IV vs V			
<i>Men</i>															
Employment	⇒Employment ^e	–													
	⇒Unemployment	1.54 [1.23, 1.92] [‡]	1.51 [1.21, 1.89] [‡]	1.22 [0.91, 1.64]	0.97 [0.70, 1.34]	3.23 [2.05, 5.06] [‡]	1.86 [1.21, 2.88] [‡]	1.94 [1.21, 3.11] [‡]	1.66 [1.11, 2.48] [†]	1.87 (0.32) [‡]					
	⇒Inactivity	1.74 [1.33, 2.27] [‡]	1.58 [1.21, 2.06] [‡]	0.97 [0.48, 1.94]	5.00 [3.16, 7.93] [‡]	0.61 [0.44, 0.84] [‡]	0.46 [0.29, 0.75] [‡]	0.98 [0.61, 1.58]	0.70 [0.48, 1.01]	0.72 (0.25) [‡]				–0.04	
Unemployment	⇒Employment	0.73 [0.49, 1.09]	0.70 [0.46, 1.04]	0.42 [0.23, 0.76] [‡]	0.64 [0.34, 1.22]	0.14 [0.05, 0.35] [‡]	0.39 [0.15, 1.01]	0.77 [0.27, 2.19]	0.73 [0.30, 1.79]	3.37 (0.72) [‡]					
	⇒Unemployment ^e	–													
	⇒Inactivity	0.70 [0.43, 1.13]	1.39 [0.79, 2.45]	0.27 [0.08, 0.88] [†]	1.58 [0.64, 3.91]	0.59 [0.16, 2.17]	1.00 [0.24, 4.14]	1.50 [0.30, 7.48]	1.05 [0.27, 4.08]	4.05 (1.55) [‡]				–0.02	
Inactivity	⇒Employment	0.55 [0.26, 1.15]	0.54 [0.23, 1.30]	1.00 [0.13, 7.60]	0.28 [0.07, 1.06]	0.14 [0.02, 0.96] [†]	0.54 [0.08, 3.49]	0.56 [0.09, 3.30]	0.75 [0.17, 3.32]	9.35 (3.78) [‡]					
	⇒Unemployment	1.53 [0.80, 2.92]	1.30 [0.65, 2.61]	1.42 [0.26, 7.66]	0.23 [0.07, 0.74] [†]	9.22 [1.79, 47.54] [‡]	4.35 [0.69, 27.37]	1.07 [0.13, 8.56]	1.51 [0.28, 8.11]	4.92 (2.43) [‡]				0.03	
	⇒ Inactivity ^e	–													
<i>Women</i>															
Employment	⇒Employment ^e	–													
	⇒Unemployment	1.62 [1.28, 2.05] [‡]	1.60 [1.25, 2.04] [‡]	1.26 [0.90, 1.78]	1.07 [0.74, 1.53]	2.36 [1.49, 3.75] [‡]	1.77 [1.14, 2.74] [†]	2.10 [1.26, 3.48] [‡]	1.30 [0.85, 1.99]	1.31 (0.30) [‡]					
	⇒Inactivity	1.62 [1.35, 1.94] [‡]	1.63 [1.35, 1.96] [‡]	3.15 [2.42, 4.08] [‡]	1.73 [1.34, 2.24] [‡]	3.04 [2.07, 4.47] [‡]	1.99 [1.39, 2.85] [‡]	1.73 [1.13, 2.67] [†]	1.47 [1.05, 2.05] [†]	3.06 (0.34) [‡]				0.39 [‡]	
Unemployment	⇒Employment	0.28 [0.15, 0.55] [‡]	0.23 [0.10, 0.53] [‡]	1.43 [0.53, 3.89]	0.69 [0.28, 1.72]	0.35 [0.06, 1.96]	0.69 [0.12, 3.96]	2.41 [0.27, 21.19]	1.84 [0.30, 11.17]	6.55 (2.89) [†]					
	⇒Unemployment ^e	–													
	⇒Inactivity	0.81 [0.49, 1.32]	0.90 [0.54, 1.52]	1.17 [0.53, 2.57]	1.78 [0.82, 3.86]	1.10 [0.40, 3.04]	1.30 [0.46, 3.68]	1.32 [0.34, 5.09]	0.71 [0.24, 2.09]	1.65 (1.25)				–0.13	
Inactivity	⇒Employment	0.70 [0.58, 0.86] [‡]	0.77 [0.63, 0.94] [†]	0.91 [0.70, 1.18]	0.38 [0.27, 0.53] [‡]	0.63 [0.40, 0.99]	0.85 [0.55, 1.31]	1.03 [0.61, 1.75]	1.18 [0.76, 1.82]	2.61 (0.24) [‡]					
	⇒Unemployment	1.89 [1.25, 2.87] [‡]	1.85 [1.20, 2.86] [‡]	1.05 [0.55, 2.01]	0.60 [0.29, 1.23]	1.87 [0.65, 5.40]	0.91 [0.31, 2.69]	0.40 [0.09, 1.82]	1.60 [0.55, 4.67]	4.38 (1.06) [‡]				–0.02	
	⇒Inactivity ^e	–													

^a Model I fits only with health variable, while Model II is adjusted for covariates listed in the table as well as period and cohort effects

^b OR (95 % CI) is presented and the same N for every transition is used as identified in Table 2

^c No qualification (I), GCE O levels or less (II), GCE A levels (III), vocational qualification (IV), and higher degree (V)

^d A transition-specific random effect is assumed and a correlation coefficient is calculated from a covariance between random effects

^e Reference category

[†] $p < 0.05$, [‡] $p < 0.01$

status (Grossman 1972). Moreover, it is difficult to argue that a disease-specific health measure would perform more effectively, because decisions around work will be driven by subjective interpretations (Gerdtam and Johannesson 1999). Third, as a transition in this study was defined to occur over a period of 1 year, so the current analysis mainly reflects short-term transitions and does not cover transitions that involved a longer time lag between a health event and change in economic activity. However, a prior study with multiple timescales reported that poor health experienced a year before employment transitions had strongest effect (Schuring et al. 2007). The fourth shortcoming concerns the inability of the study in dealing with subtypes of inactivity and so it does not fully address our critique highlighting the heterogeneity of the non-employed group. In fact, the current approach combined the different inactivity subtypes (e.g., early retirement and family care) into a single category, so it was limited to assessing the overall effect of the inactive group. However, by consecutively adding components of the inactive category, we were partly able to differentiate the effects that were related to the long-term sick category (data not shown).

Interpretations of key findings

Overall, our findings of associations between poor health and employment transitions are consistent with long-standing evidence that poor health leads to a decrease in labour force participation (Åhs and Westerling 2006; Cardano et al. 2004; Dahl 1993; Elstad and Krokstad 2003; Jusot et al. 2008; Schuring et al. 2007; van de Mheen et al. 1999; van den Berg et al. 2010). Moreover, the present study provides additional evidence to earlier studies (Mutchler et al. 1999; Schuring et al. 2007; van de Mheen et al. 1999), which primarily focused on transitions into a broadly defined non-employment category (Mutchler et al. 1999; van de Mheen et al. 1999). Several explanations can be offered to account for negative health selection in employment transitions. One possible explanation is that changes in employment status can happen as a natural consequence of changes in health. Health can be considered as a precondition for economic activity and as a part of human capital, along with skills and knowledge (Grossman 1972). There has been growing evidence showing the loss of work productivity as a consequence of health problems (Alavinia et al. 2009; Schultz and Edington 2007; Boles et al. 2004). Poor health therefore may affect ability to work to some degree, which constitutes a common premise for the realization of health selection. However, previous studies have observed that wage differences in relation to poor health were more pronounced than the degree to which physical limitation lowered

productivity, suggesting discrimination (Baldwin and Johnson 2000). Moreover, some disability studies have shown that the disabled who are outside the labour force could be a part of it with some support (Baldwin and Johnson 2000; Findley and Sambamoorthi 2004).

A second explanation is that the negative health selection noted here may be understood in the context of British social policy. By providing a degree of social protection, governments can intervene and lessen the impact of poor health, and therefore the decision of whether workers with health problems continue to work or turn to unemployment reflects national differences in social welfare systems (Schuring et al. 2007; van den Berg et al. 2010). As an illustration, in the UK the availability of incapacity benefit was often considered as one of the most potent 'pull' factors from employment (Little 2007), while in the US insurance coverage is often dependent on employment so those with illness tended to remain at work due to the increased access to health benefits (Bradley et al. 2002). This may imply that, to stay within employment, workers with poor health may consider a number of options. Besides social policy, several studies have pointed the role of workplace factors in maintaining paid employment for those with poor health. If a workplace provides flexibility to adjust the working environment, including reduced working hours, generous sick leave, and assignment to a task with less physical requirement (Schultz and Edington 2007; Holland et al. 2006; Kessler et al. 2003), then workers would be less likely to be forced to leave employment on account of health problems.

Our study demonstrated not only that the influence of poor health on employment transitions was detrimental, but also that the extent of the influence was either similar or greater among women, compared to men. However, when those in the long-term sick group were included in inactivity category, the influence of poor health in transitions to and from inactivity was much stronger for men. This in turn suggests that the strong association of poor health with inactivity among men was mainly mediated by transitions into the long-term sick category (Little 2007). In contrast to our study, some previous studies (Cardano et al. 2004; Loprest et al. 1995; McDonough and Amick 2001; Ojeda et al. 2010; van de Mheen et al. 1999), but not all (Arrow 1996; Jusot et al. 2008; Schuring et al. 2007), reported that men with health problems experienced a higher risk of adverse employment transition than women. The difference in results may be partly attributed to a different identification of the categories of employment status. Noticeably, when studies were based on a simple dichotomy (i.e., employment and non-employment), most studies showed that men are more subject to poor health in employment transitions than women (McDonough and Amick 2001; Ojeda et al. 2010; van de Mheen et al. 1999). Overall, this

study suggests that gender differences in health selection involving inactivity and non-employment may vary depending on how subtypes are defined.

Acknowledgments The BHPS data were made available through the UK Data Archive. The data were originally collected by the ESRC Research Centre on Micro-social Change within the Institute for Social and Economic Research at the University of Essex. Neither the original collectors of the data nor the archive bear any responsibility for the analyses or interpretations presented here. The authors are grateful to both organizations for allowing access to the data and to all participants in the BHPS survey. This research was supported by Graduate School Research Scholarship and Overseas Research Student Award from University College London awarded to MK.

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