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Contractual Conditions, Working conditions, Health and Well-Being in the British Household Panel Survey

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Abstract

We consider the effects of contractual and working conditions on self-assessed health and psychological well-being using twelve waves (1991/92 – 2002/2003) of the British Household Panel Survey. While one branch of the literature suggests that "atypical" contractual conditions have a significant impact on health and well-being, another suggests that health is damaged by adverse working conditions. As far as we are aware, previous studies have not explicitly considered the two factors jointly. Our aim is to combine the two branches of the literature to assess the distinct effects of contractual and working conditions on health and psychological well-being and how these effects vary across individuals. For self-assessed health the dependent variable is categorical, and we estimate non-linear dynamic panel ordered probit models, while for psychological well-being we estimate a dynamic linear specification. Our estimates show that being unsatisfied with the number of hours worked has a negative influence on the health of individuals who have a part-time job. Having a high level of employability appears to influence positively the health and psychological well-being of individuals with temporary job arrangements. Family structure appears to influence the health and well-being of workers with atypical contractual conditions.

Keywords: working conditions, contractual conditions, self assessed health, psychological well-being, dynamic panel data models

JEL: C230, I100, J410, J810

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1. Introduction

Over the past 20 years or so, changes in the labour market have had a substantial impact on the working arrangements of employees. For example, the number of "standard" full time permanent jobs has decreased, while non-standard work arrangements (temporary work, part-time contract, unregulated work etc.) have become more common (Kivimäki et al. 2003). Working conditions have also undergone significant changes over recent decades. The decline of manufacturing jobs, the growth of service oriented work and computerization appear to have made "traditional" sources of adverse physical and environmental working conditions less relevant and have increased the scope for psychosocial job stressors (Cappelli et al. 1997). Given these changes, it is relevant to evaluate whether and how contractual and working conditions affect health and psychological well-being in society today.

We consider the effects of contractual and working conditions on self-assessed health (SAH) and psychological well-being (derived from the General Health Questionnaire (GHQ)) using twelve waves (1991/92 – 2002/2003) of the British Household Panel Survey (BHPS). While one branch of the literature suggests that "atypical" contractual conditions have a significant impact on health and well-being, another suggests that health is damaged by adverse working conditions. As far as we are aware, previous studies have not explicitly considered the two factors jointly. Our aim is to combine the two branches of the literature to assess the distinct effects of contractual and working conditions on health and psychological well-being and how these effects vary across individuals. In particular, we attempt to evaluate the role that preferences for the number of hours of work, the level of employability and family structure play in affecting the relationship between contractual/working conditions and health and psychological well-being. When considering the effects of working conditions on health and psychological well-being, many studies refer to the "demand-control-support" model (Karasek et al. 1988; Karasek & Theorell 1990) and the "effort–reward imbalance" model (Siegrist et al. 1990; Siegrist 1996). These are two of the most influential models developed to investigate the possible mechanisms underlying these effects. In our study, we also try to evaluate if the data we analyse provide some empirical evidence in favour of these two models.

2. Literature Review

2.1. Contractual conditions

The empirical evidence regarding the influence of contractual conditions on health is mixed. If we consider fixed versus permanent jobs, studies have reported that fixed-term workers have worse physical health than permanent workers (see for example, Benavides et al. 2000; Gash et al. 2006). In other studies fixed-term contracts have been shown to have either no influence (Virtanen et al. 2003) or positive influences on health (Sverke et al. 2000). Benach et al. (2004) is one of the few studies to make reference to the association between general self-assessed health and part-time working arrangements. They show that full time workers have worse indicators of health compared to part-time workers.

Psychological well-being is traditionally considered to be negatively affected by fixed-term employment. This traditional assumption is confirmed by several studies (Lasfargues et al. 1999; Martens et al. 1999). Evidence from recent papers, however, suggests that people with atypical contractual conditions cannot be considered as a homogeneous group when comparing their health and well-being with that of permanent workers. Individuals with atypical contractual conditions experience a worsening of health only if their jobs are associated with low levels of employability, are involuntary or offer no contractual certainty (Artazcoz et al. 2005; Price & Burgard 2006; Silla et al. 2005).

Some caution should be exercised when considering the influence of atypical contractual employment arrangements on health across countries. Differences in national employment rates and employment regulations, for example, will determine what can be considered typical and atypical employment contracts and may serve to moderate their impact on health (Benach et al. 2004). Accordingly, generalising relationships formed at national level is often difficult (Virtanen et al. 2003). If we focus on studies that use the BHPS, Bardasi and Francesconi (2004) find that atypical employment (representing temporary or part-time employment) does not appear to be strongly associated with adverse general health. However, there is some evidence that those in seasonal or casual jobs have poorer mental health. Rodrigues (2002) finds that the health status of part-time workers with permanent contracts is not significantly different from those who are employed full-time. However, part-time casual work without a contract is reported to be associated with poorer health.

2.2. Working conditions

Several studies present evidence that adverse working conditions have negative effects on health and psychological well-being. Many of these studies make reference to the broad categories of working conditions present in two of the most influential models developed to investigate these effects, the "demand-control-support" model developed by Karasek et al. (1988) and Karasek and Theorell (1990) and the "effort–reward imbalance model" of Siegrist et al. (1990) and Siegrist (1996). The demand-control-support model considers the categories of job demand, decision latitude (job control, ie. high levels of decision authority and skill utilization) and social support at work. Job demand can be physical (regarding manual work), psychological (regarding pace of work, quantity of work and conflicts at work) and contractual (considering the number of working hours and irregular work schedule) (Marchand et al. 2005). The model postulates that negative health effects derive not from a single aspect of the work environment, but from the joint effect of the demands of a work situation and the range of discretion in decision-making available to the workers facing those demands. In particular, high job demand and low job control is seen as the worst combination for health. Social relationships have been added to this model as a second analytical level. "Individuals who are 'socially integrated' link together their capacities for accommodating stress. […] social support buffering should reduce the strength of association between task characteristics and strain symptoms" (Karasek et al. 1982, pag. 182). The effort–reward imbalance model considers the categories of effort, such as the demands of the job and the motivation of workers in challenging situations, and reward at work in terms of salary, esteem, job stability and available career opportunities. It predicts that a negative impact on health occurs when there is an imbalance between the two dimensions (Siegrist 1996).

Several empirical studies considering physical and mental health have provided evidence in favour of the two models (see, for instance, Pikhart et al. 2004; Godin & Kittel 2004). Other studies, however, have failed to support the theories (for example, Vermeulen & Mustard 2000) and overall there does not appear to be a clear consensus on the empirical validity of these models.

Considering studies that focus on general health and that perform prospective analysis, evidence that jobs with high demands, low control, and low social support have a negative influence on health is provided by Cheng et al. (2000), Niedhammer et

al. (2003), Warren et al. (2004) and Datta Gupta and Kristensen (2007). Evidence that job insecurity and shift work have a negative influence on health is provided by Ferrie et al. (2002) and Ahmed-Little (2007) with regard to British data.

The majority of the studies providing evidence that adverse working conditions affect negatively well-being are cross sectional (see, for instance, Kawakami et al. 1992; Martens et al., 1999). Few studies have performed a prospective analysis. Among those studies, Niedhammer et al. (1998) and Rugulies et al. (2006) support the hypothesis of Karazek and Theorell (1990), while Marchand et al. (2005) provide mixed evidence.

3. The BHPS Dataset

We use panel data from the first 12 waves (1991/92–2002/2003) of the BHPS, a longitudinal survey of private households in Great Britain. This survey includes rich information on occupational, socio-demographic and health variables. The dataset was designed as an annual survey and the initial sample was collected in 1991.[1] It contains observations about each adult member (16+) of a nationally representative sample of more than 5000 households. Approximately 10,000 individuals were interviewed in the first wave, and the same individuals were re-interviewed in successive waves. In case they split off from their original households, they were re-interviewed along with all adult members of their new households.[2]

In our analysis we use an unbalanced sample, which contains all the available observations at each wave that provide complete information on the variables used in the model. The sample also includes new entrants to the survey. Given the objective of our analysis, we consider only employees, and we exclude from our sample people outside the job market or self-employed. The final sample consists of 45,658 observations (23,309 for women and 22,349 for men). We only consider individuals for which at least two consecutive waves of data are available, since we condition health and psychological well-being on one-period lagged values. Table 1 summarizes the variables used in our empirical models.

3.1. Dependent variables

[1] A two-stage stratified systematic sampling procedure was used to do the initial selection of households for inclusion in the survey. The procedure was designed to give each address an approximately equal probability of selection.
[2] For further details see Taylor et al. (1998).

Self-assessed Health (SAH)

The use of all the first 12 waves of the BHPS could be problematic with regard to SAH. For waves 1-8 and 10-12 the SAH variable represents "health status over the last 12 months". Respondents are asked: "Compared to people of your own age, would you say your health over the last 12 months on the whole has been: excellent, good, fair, poor, very poor?". The SF-36 questionnaire was included in wave 9. In this questionnaire, the SAH question was re-worded and included a modification to the response categories. The SAH variable for wave 9 represents the "general state of health", using the question: "In general, would you say your health is: excellent, very good, good, fair, poor?". To make wave 9 comparable to the other waves we collapse the original SAH variable to create a categorisation that has common support over the two versions of the question. The final SAH is a categorical variable that represents the following four health categories: "poor or very poor", "fair", "good or very good", "excellent".[3]

In our analysis we always divide our sample by gender. Dividing the sample by gender is quite common in empirical studies about contractual conditions, working conditions and health and reflects the differential trends in health over time between men and women together with any differences in working arrangements between the sexes (Artazcoz et al. 2005; Bardasi & Francesconi 2004; Benach et al. 2004; Kivimäki et al. 2003; Rugulies et al. 2006).

Psychological Well-being (GHQ)

As a measure of psychological well-being, we use the reduced version of the General Household Questionnaire (GHQ) (Goldberg & Williams 1988) available in the BHPS. For each of the 12 items present in the GHQ, respondents are asked to indicate on a four-point scale (where 0 is the best scenario and 3 the worst) how they recently felt in relation to each item. In our analysis our dependent variable is the Likert scale (Likert 1952), which reports an overall score summing the individual components of the GHQ. The Likert scale, therefore, ranges from 0 to 36. Maintaining the same range we rescale the variable so that it is increasing in good psychological health.

3.2. Independent variables

[3] For further details about this procedure see Hernandez-Quevedo et al. (2005).

Contractual conditions

In our analysis the variables regarding contractual conditions are represented by having a part-time contract (*part-time job*), defined as working less than 30 hours a week, and having a non-permanent contract (*temp job*).[4] Both variables are binary variables with reference categories representing full-time and permanent contract respectively.

Working Conditions

The BHPS offers a rich source of information about the working conditions of the individuals interviewed. In order to facilitate the comparison between our results on the influence of these variables on health and psychological well-being and evidence found in previous literature, we group the working conditions according to some of the broad categories present in the models of Karasek et al. (1988) and Siegrist et al. (1990), as discussed in Section 2.2..[5] We underline that the variables that we use to represent working conditions are only proxies for the conceptual categories used in the literature (described in Section 2.2). Most of the previous studies are based on datasets that contain more detailed information on the working conditions of the employee. However, these studies usually consider only a very small sample of employees, (i.e. employees working in a particular firm, or a particular city) and their conclusions cannot be generalized at a national level. In contrast, the use of the BHPS, which comprises observations on workers from all over Great Britain, makes our conclusions more general and valid for all Great Britain. Accordingly there is a trade-off between accuracy of measurement and generalization of results. Here, we compromise by using proxy measures to obtain results that can be generalized to a wider population.

Demanding job conditions

We consider working outside regular office hours and working unpaid overtime as conditions of high job demand. To represent the former, we use the variable *not daytime*, which is equal to l if respondents do not work during day time or if they have

[4] To define if workers have a permanent or temporary job, they are asked "Leaving aside your own personal intentions and circumstances, is your current job permanent or non-permanent?"

[5] From waves 2 to 4 individuals were not asked information about some variables (*not daytime*, *unions*, *payrise* and *promotion opportunities*) if they were still in the same job as the previous year. For these cases, we assume that the value of these variables did not change from the last year it was recorded.

rotation shifts, 0 otherwise. The variable *overtime hours* represents the number of overtime hours that are *not paid* that respondents work in a normal week. It is equivalent to the difference between the total number of overtime hours and the number of *paid* overtime hours. We expect these two variables to have a negative relationship with health and psychological well-being, as indicated in previous literature on high job demand (Cheng et al. 2000; Lindberg et al. 2006; Martens et al. 1999).

Control and social support

To approximate the presence of social support at the workplace, we use the variable *unions*, which is equal to 1 if a union or staff association is present at the workplace of the respondent, 0 otherwise. The extent of control over work is approximated by the variable *managerial supervision*, which is equal to 1 if the respondent has a managerial or supervision role, 0 otherwise. We expect *unions* and *managerial supervision* to have a positive relationship with health and psychological well-being, as shown for other characteristics denoting high job control and social support (Cheng et al. 2000; Godin & Kittel 2004; Lindberg et al. 2006)

Reward

To consider the possible rewards that respondents might enjoy in their work, we include in our analysis the variable *payrise*, which is equal to 1 if the pay of respondents includes an annual increment, 0 otherwise, and *promotion opportunities*, which assumes value 1 if there are opportunities for promotion in the current job, and 0 otherwise. In previous literature, variables denoting positive reward have been shown to have a positive influence on health and well-being (Marchand et al. 2005; Rugulies et al. 2006). Accordingly, we expect *payrise* and *promotion opportunities* to have a positive influence on well-being.

Working environment

As indicators of work environment we include the location/venue and the size of the company/institution where respondents work. The BHPS variable representing the former is a categorical indicator of whether employees work at the employer's location, at home, travel or other. From this variable, four discrete indicators are derived as follows: *workplace_employer*, *workplace_home*, *workplace_travel* and *workplace_other*.

The size of the company/institution is approximated by the number of employees. The original variable present in the BHPS is a categorical one, representing, for example, if respondent works in a place where there are 1-2 employees, 3-9 employees, 10-24 employees, etc. From these we have created a continuous variable representing the midpoint of each category for each individual, following the procedure described by Contoyannis and Rice (2001).[6] Working in larger companies/institutions might have a positive influence on the health and well-being of employees, through offering greater career opportunities or access to better facilities.

Work satisfaction

We use three measures of work satisfaction available in the BHPS, namely: *satisfaction_total pay*, *satisfaction_security* and *satisfaction_work*. All are binary variables indicative of an employee being satisfied with the particular aspects of employment.

We further consider preferences for the number of hours worked each week. The BHPS contains a categorical variable reporting whether individuals would prefer to work fewer hours (*preference less hrs*) or greater hours (*preference more hrs*). From responses to these questions two binary variables are created against a base category of being satisfied with current hours of work.

Other covariates

We control for age, which is included in a cubic form (*age*, *age^2* and *age^3*) to allow for a non-linear relationship with health and psychological well-being, and marital status, by including categories for divorced or separated (*divsep)*, never married (*nevermar)*, or widowed (*widowed)* against a base category of being married or living as a couple. We take into consideration the ethnic origin of respondents (*race*), the number of individuals living in the household (*household size*), and the presence of children (*children*). We further control for individual income (*income*), measured as gross annual (labour and non-labour) income. For education and social class we include the variables *high education* and *social class* in the model. *High education* is equal to 1 if people

[6] "We created a continuous variable by taking the midpoint of each category for each individual. For those who could not report the category into which their establishment fell, but were able to report whether it was above or below a particular value, we estimated their observation as a weighted average of the midpoints of the relevant categories. The weights used are the proportions of the relevant sub-sample which are in the relevant categories" (Contoyannis & Rice 2001, p.610).

have a qualification equal or superior to A level, and 0 otherwise. S*ocial class* is equal to 1 if people belong to the BHPS categories "skilled manual" "armed forces", "partly skilled", "unskilled", and 0 otherwise. Year dummies are included to account for aggregate health shocks, time-varying reporting changes and possible effects of age which are not captured by cubic term.

Table 2 presents the mean, standard deviation, minimum and maximum for the regressors used in our empirical models for the sub-samples of women and men. Overall, the differences in means between the two sub-samples appear very small. A higher percentage of women, however, have a part-time job than men. Moreover, a higher percentage of men than women work in a place different from the employer's or at home, have a managerial or supervision role and have greater promotion opportunities.

4. The Econometric Models and Estimation Strategy

4.1. The econometric models

To model self-assessed health we use a dynamic panel ordered probit specification with random effects. The ordered probit can be used to model discrete dependent variables taking ordered multinomial outcomes. Therefore, it applies well to our measure of self-assessed health, which has categorical outcomes "poor or very poor", "fair", "good or very good", "excellent".

The latent variable specification of the model that we estimate can be written as:

$$h^*_{it} = \beta' x_{it-1} + \gamma' h_{it-1} + \alpha_i + \varepsilon_{it} \qquad (1)$$

$i = 1,\ldots N$ (number of individuals in the sample)

$t = 2,\ldots T$ (number of waves of the survey)

where x_{it-1} is a set of observed variables which may be associated with the health indicator. These variables are lagged one period to account for delays between contractual conditions and working conditions impacts on health.[7] Moreover, the SAH variable makes reference to health status over the last 12 months, while many of the job related variables makes reference to the present time. Therefore, to try to ensure that

[7] This has been stressed, for example, by Bartley et al. (2004).

measures of contractual and working conditions are obtained before measures of health and well-being it is necessary to use the one-year lag of the former variables. α_i is an individual-specific and time invariant random component while ε_{it} is a time and individual-specific error term. This error term is assumed to be normally distributed, uncorrelated across individuals and waves, and uncorrelated with α_i. The x_{it-1} are assumed to be uncorrelated with ε_{is} for all *t* and *s*. We restrict the variance of the idiosyncratic error term to be equal to one, since we do not have a natural scale for the latent variable.

The estimation of the effects of contractual and working conditions on health and psychological well-being may raise concerns about the presence of endogeneity bias, unless one can establish that the causation is unidirectional (as has been proposed, for example, by Adams et al. 2003). To reduce concerns about reverse causality (i.e. health and psychological well-being affecting contractual and working conditions) and following previous studies (Chapman & Hariharan 1994; Contoyannis et al. 2004), we include previous health status lagged one period, $h_{it-1,}$ in our empirical models. This further allows us to identify the impact of working conditions and contractual conditions on changes in health status.

Since we consider self reported data, we do not observe the latent level of health h^*_{it} , but only an indicator of the category in which the latent indicator falls, h_{it}:

$$h_{it} = j \quad \text{if} \quad m_{j-1} < h^*_{it} < m_j \quad j = 1,\ldots 4 \qquad (2)$$

where $m_0 = -\infty$, $m_{j-1} <= m_j$, $m_4 = +\infty$.

Assuming that the error term is normally distributed, the probability of observing the particular category of SAH reported by individual *i* at time t (h_{it}), conditional on the set of regressors and the individual effect, can be expressed as:

$$P_{itj} = P(h_{it} = j) = \Phi(m_j - \beta' x_{it-1} - \gamma' h_{it-1} - \alpha_i) - \Phi(m_{j-1} - \beta' x_{it-1} - \gamma' h_{it-1} - \alpha_i) \qquad (3)$$

Where $\Phi(.)$ is the standard normal distribution function. This formulation shows that it is not possible to identify separately an intercept in the linear index (β_0) and the cut points (m), since the model only allows identification of ($m_j - \beta_0$). We adopt a conventional normalization, setting $\beta_0 = 0$, to deal with this issue. The random effect

ordered probit specification is estimated with STATA (release 9.0, Stata Corporation) using the program *reoprob.ado*, written by Frechette (2001).

In our analysis psychological well-being is measured using the GHQ. We model psychological well-being with a linear model. This model can be expressed by equation (1), keeping all the related assumptions. In this case, however, we need to underline that h^*_{it} does not represent a latent variable but the observed one**.**

To allow for the possibility of correlation between observed regressors and the unobserved individual effect we parameterize the random effect (Chamberlain 1984; Mundlak 1978; Wooldridge 2005), allowing it to be a function of the within-individual means of the time-varying regressors. The dynamic panel data models we estimate contain the problem of initial conditions (Heckman 1981). Two assumptions are typically made concerning a discrete time stochastic process with binary outcomes (Heckman 1981). The same issues arise when we deal with ordered categorical outcomes (Contoyannis et al. 2004). The first assumption is that the initial observations are exogenous variables, while the second assumption is that the process is in equilibrium, meaning that the marginal probabilities have approached their limiting values and can be considered time-invariant. If the error process is not serially independent and the first observation is not the true initial outcome of the process the first assumption is not valid, and the estimators we obtain are inconsistent. In our case, we know that the latter condition does not hold, since the first year for which we have observations does not coincide with the start of individuals` health trajectory. The second assumption is not valid if non-stationary variables such as age and time trends are included in the model, as they are in our study.

For both the linear and non-linear model, we deal with the initial condition problem by adopting the conditional maximum likelihood approach of Wooldridge (2005), modelling the distribution of the unobserved effect conditional on the initial value and the within individual means of any exogenous explanatory variables.[8] The likelihood function resulting from Wooldridge's approach is based on the joint distribution of the observations conditional on the initial observations. A limitation of this approach is that it requires specifying a complete model for the unobserved effects. This approach, therefore, may be sensitive to misspecification.

[8] Wooldridge's (2005) approach for dealing with linear panel models is also used by Hauck and Rice (2004).

Following the approach of Wooldridge, we parameterize the distribution of the individual effects as:

$$\alpha_i = \alpha_0 + \alpha_1 h_{i1} + \alpha_2 \bar{x}_i + u_i \qquad (4)$$

where $\bar{x}_i$ is the average over the sample period of the observations on the time-varying socio-economic controls variables and u_i is assumed to be distributed $N(0, \sigma^2_u)$, independent of the regressors, the idiosyncratic error term (ε_{it}), and the initial conditions.

4.2. Estimation Strategy

Our models regress SAH and GHQ, respectively, on the contractual and working conditions variables and the set of controls. To assess the effects of voluntary or involuntary part-time employment, we introduce variables representing the joint effect of having a part-time job and being unsatisfied with the number of hours worked, that is the interaction terms *part-time job*preference less hrs* and *part-time job*preference more hrs*. We expect these interaction terms to be negatively related to health and well-being.

For workers on temporary contracts we consider the potential impact of the individuals` chances of finding alternative employment (should they wish to do so) by considering variables representing potential employability (Silla et al. 2005). In this study we consider higher levels of education as a proxy for higher employability. We, therefore, introduce the interaction terms *temp job*high edu*. We expect this term to have a positive effect on health and well-being, since temporary workers with a high level of employability should be less concerned about a lack of job security.

We also try to consider the role that family structure plays for workers in part-time and temporary jobs, by allowing contractual conditions to have different effects on health and well-being according to whether an employee has children. Therefore, we introduce the interaction terms *part-time job* children* and *temp job*children*. The rationale for introducing the latter term is that the stress due to insecurity of job could be worse for workers who have children to support and accordingly we expect to observe a negative sign on the effect of this variable. It is harder to predict the influence

of *part-time job* children*. Indeed, employees with children could benefit from having a part-time job, due to having more time to spend with their family. However, for workers who have to maintain children, the lower income associated with a part-time job could have stressful effects. Therefore, the final effect on health and psychological well-being could depend on which of these effects prevails.

We further attempt to evaluate if the data provide support for the theoretical frameworks of Karasek et al. (1988) and Siegrist et al. (1990) (from now on, referred to as Karasek and Siegrist). Considering Karasek's framework, we introduce the interaction term *no daytime*managerial/supervision*, where working outside normal daytime hours is an indicator of high job demand, and having a managerial supervision role is an index of high control. A positive coefficient would provide support for Karasek`s framework. In support of Siegrist's framework, we introduce the interaction term *no daytime*promotion opportunities*, where not working during the day is an indicator of high effort while having promotion opportunities is an indicator of reward. [9]

A positive coefficient would lend support to Siegrist`s framework. We also introduce variables representing satisfaction with working conditions (*satisfaction_total pay*, *satisfaction_security* and *satisfaction_work*), because they reflect, at least partly, a balance between effort and reward at work. We are aware that work satisfaction may be influenced not only by objective working conditions but also by personality characteristics of respondents (i.e. if individuals have a tendency to be pessimistic or optimistic). However, while not offering conclusive results, positive coefficients on these variables would provide some support for Siegrist`s model.

To account for differential trends in health over time between men and women together with any differences in working arrangements between the sexes we stratify the sample by gender (Artazcoz et al. 2005; Bardasi & Francesconi 2004; Benach et al. 2004; Kivimäki et al. 2003; Rugulies et al. 2006).

We emphasise that in the model for SAH, since we are dealing with a non-linear ordered categorical dependent variable, the estimated coefficients have only qualitative content. To provide information about the magnitude of the effects we present partial effects (Wooldridge 2002). In particular, we report the change in the probability of

[9] Actually, the interaction terms *no daytime*managerial supervision* and *no daytime*promotion opportunities* are not introduced contemporaneously in the third model, because the two terms are highly correlated. We estimate a model where we introduce *no daytime*managerial supervision* only and another model where we introduce *no daytime*promotion opportunities* only. Since the results of these two models are extremely similar, we have chosen to present the results of the latter model, and to report only the results related to *no daytime*managerial supervision* for the former model**.**

reporting excellent health due to a marginal change for continuous variables and to a discrete change for binary variables.[10] We compute the effects for a hypothetical representative agent with "average characteristics".[11] Inference on the significance of the estimated coefficients is undertaken using Wald tests.

When dealing with non-linear models, attention should be given to interaction terms, as highlighted by Ai and Norton (2003) and Norton et al. (2004). First, the partial effect for an interaction term could be non-zero even if the directly estimated coefficient of the interaction term is zero. Secondly, we cannot rely on standard tests on the coefficients of the interaction term to test the statistical significance of the interaction effect. Thirdly, the interaction effect is conditional on the independent variables and may have different signs for different values of the covariates. Therefore, to compute the magnitude of the interaction effects it is necessary to compute the cross derivative (for continuous variables) or differences (for categorical ones). Moreover, the statistical significance of the interaction effect must be tested for the cross partial derivative (difference) of the dependent variables and not for the directly estimated coefficient of the interaction term. In our analysis we adopt the strategy proposed by Ai and Norton (2003) and Norton et al. (2004) to compute the partial effect and the standard errors for the interactions.[12]

5. Results

For the models described in the previous Section, the coefficients for the lagged and the initial value of the dependent variable are statistically significant at the 1% level and substantial in magnitude. This result supports our use of a dynamic model and indicates that current health is a function of previous period health.[13]

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[10] Notice that the direction of the effect of the covariates on the probabilities of reporting the extreme outcomes ("poor or very poor" and "excellent" health, in our study) is unambiguously determined by the sign of the coefficients (Wooldridge 2002)

[11] We attribute the mean value to the covariates that are continuous and the modal value to the covariates that are categorical. To make the partial effects meaningful, when we compute the partial effects of *part-time*pref less hrs*, *part-time*pref more hrs* and *part-time*children* the representative agent is assumed to have a part-time job, while computing the partial effects for *temp job*high education* and *temp job*children* this individual is assumed to have a temporary job. Considering the partial effects for *not daytime*manag-sup* and *no day time*prom opp*, the representative agent is assumed not to work during the daytime.

[12] The standard errors of the interactions are computed by applying the delta method (Norton et al. 2004).

[13] In our paper we do not consider the problem of health-related attrition. Contoyannis et al. (2004) and Jones et at. (2006), however, show that although health-related attrition exists in the BHPS data, it does not appear to distort the magnitude of the effects of socioeconomic variables when modelling the determinants of health. This result allows us to think that attrition should also not be relevant in the estimate of the effect of contractual and working conditions.

5.1. Self-assessed Health

Table 3 reports the estimated coefficients and related standard errors and Table 4 reports the corresponding partial effects and related standard errors. The first column of each Table presents results for women; the second column considers men. To conserve space, we report the results only for the variables related to contractual and working conditions, satisfaction with working conditions and the interaction terms *no daytime*managerial/supervision* and *no daytime*promotion opportunities*. Inference on the statistical significance of the relationship between the main terms and SAH is done by referring to the standard errors of the estimated coefficients, while considering the interaction terms we refer to the standard errors of the partial effects (see Ai & Norton 2003 and Norton et al. 2004).

Our results suggest there is a positive and statistically significant relationship between health and having a part-time job (compared to having a full time job), for employees satisfied with the number of hours worked or who do not have children. This result is consistent with previous studies (Price & Burgard 2006). However, and as expected, not being satisfied with the number of hours worked or having children has a negative influence on the health of part time workers. This holds for both women and men. However, these effects are not significant at conventional levels. The magnitude of the computed partial effects, overall, is larger for men than for women.[14] Notice that the partial effects for *part-time*pref less hrs* and *part-time*pref more hrs* are larger than that for *part-time*children.* This suggests that the health of part-time workers is influenced more by preferences for hours worked than by the demands of a family.

Consistent with previous literature (Silla et al., 2005), our analysis reveals a negative relationship between health and having a temporary job (compared to having a permanent job) for women with a low level of education. Unexpectedly, however, this relationship appears positive (even if not statistically significant) for less educated men. The health of highly educated women and men is positively associated with having a temporary job. This anomaly might reflect the fact that highly educated employees have more opportunities in the labour market compared to the less well educated and this is reflected in their health status. A further asymmetry between women and men relates to

[14] For people satisfied with the number of hours worked or without children, a shift from full time to part-time increases the probability of reporting excellent health by 2.6% for women and 7.0% for men. If the person with the part-time job wishes to work less hours, the probability of reporting excellent health reduces by about 6% for both women and men, while if she/he wishes to work more hours the probability reduces by 1.9% and 4.6% for women and men, respectively. If the part-time workers have children, the probability reduces by 0.8% and 3.1% for females and males, respectively.

the presence of children. The relationship between having a temporary job and health is positive for women with children, while the relationship is negative for men. Notice that the magnitude of the partial effect (in absolute terms) for *temp job*children* is smaller than that for *temp job*high education* for women, while the opposite result holds for men.[15] Moreover, *temp job*high education* is statistically significant for women, while *temp job*children* is statistically significant for men. These results suggest that, for men with a temporary job, the family structure has a larger influence on reporting excellent health than their level of employability, while for women the opposite holds. The asymmetries we observe between women and men about the influence of temporary jobs on health could perhaps derive from the different roles women and men play within the family structure. Our results, indeed, could be explained in the light of a "traditional" view of the family, where taking care of children is mainly a responsibility of women while men are the ones with the main responsibility for child material sustenance.

As far as working conditions is concerned, the partial effects of some conditions exhibit the expected sign (*payrise* and *overtime hours* for women and men, *not daytime* and *managerial supervision* for women). The partial effect of other variables (*promotion opportunities* and *unions* for females, *not daytime*, *promotion opportunities, managerial supervision* and *unions* for males), however, is not as expected.[16] The magnitude of all of these effects, however, is small and they are statistically significant only for women.[17]

If we considering variables related to the working environment, we observe an asymmetry between men and women. The relationship between working at home (compared to working at the employer's workplace) and health is positive for women and negative for men, while the opposite holds for workers who travel or for workers in places different from the employer's workplace. For women, the magnitude of these partial effects seems to be large compared to that of most of the other working conditions variables. Notice that the partial effect of working at home for females is particularly high and is statistically significant. This could be due to the fact that

[15] In fact, the partial effect for the probability of reporting excellent health for temporary workers with a high level of education is 0.055 for females and 0.034 for males, while that partial effect for temporary workers with children is 0.024 and -0.089.
[16] Notice that the partial effect of *promotion opportunities* and *unions* for females is also statistically significant.
[17] The variation in the probability of reporting excellent health induced by any of these working conditions is smaller than 2%.

working at home may allow a high level of flexibility (people can organize their time in a better way, they can reduce the travel time to work, they can take care of family or the house at the same time, etc). The relationship between the number of employees at the workplace and health is negative for women and positive and statistically significant for men. The magnitude of the related partial effects, however, is small. [18]

Our findings appear to provide some support in favour of the Karasek`s framework for women, but not for men, since the partial effect of *no daytime*managerial supervision* is positive for females and negative for males (neither of these, however, is statistically significant). Regarding Siegrist`s framework, the interpretation of our finding is more ambiguous, since some of the factors considered lend support to the framework while others do not. For both women and men, *satisfaction_security* and *satisfaction_work itself* show a positive and highly statistically significant relationship with health, while *no daytime*promotion opportunities* exhibits a negative (and statistically non-significant) relationship.

5.2. Psychological Well-being

Table 5 reports the coefficients and standard errors for the models for psychological well-being for females and males respectively. Results for the relationship between contractual conditions and psychological well-being are similar to those found for self-assessed health. Some differences, however, are apparent. For men, the coefficient of the interaction term *part-time*children* is statistically significant and has a high magnitude compared to *part-time*, *part-time*pref less hrs* and *part-time*pref more hrs*. This suggests that having children and having a part-time job has a particular negative influence on the psychological well-being of men. For females having a temporary job the coefficient of the variable *temporary job*children* is negative (the partial effect for this variable in the model for SAH is positive) and its magnitude, in absolute terms, is larger than that of *temp-job* and *temp-job*high education.* These differences suggest that family structure plays a greater role for psychological well-being than for general self-assessed health.

With regards to working conditions, our results are generally similar to those for SAH, however, some differences are apparent. The relationship between psychological

[18] The value reported in the table is about 0.00005 for females and males, meaning that, for example, the presence of 100 more people at the workplace increases the probability of reporting excellent health by 0.5%.

well-being and working unpaid overtime hours appears to be more relevant than in the case for SAH. For both women and men, the coefficient of *overtime hours* is non-negligible and is statistically significant. The magnitude of the coefficients for the variables relating to the work place continues to be large while that relating to the number of employees at the work place remains negligible. All of these coefficients, however, are not statistically significant. For women, it is interesting to note that working at home has a positive relationship with health, while it appears to be negatively related to psychological well-being. The opposite holds for the variable *workplace other*, which is negatively related to SAH, and positively related to psychological well-being. Results similar to those found for self-assessed health in support or otherwise of Siegrist`s and Karasek`s models also hold for psychological well-being.[19] [20]

In Annex 1 we report sensitivity analyses performed to assess the robustness of our results. First, the negative relationship between *unions* and health and psychological well-being suggested by our estimates is unexpected. To assess the robustness of this result, we define the variable *unions* in a different way (making reference to individual union membership instead of the presence of a union at the workplace) and re-estimate our models using this new variable. Secondly, we are aware that our results regarding Karasek`s and Siegrist`s frameworks could be affected by the choice of the specific variables we use to approximate the broad conceptual categories of "job demand" and "job reward" used in these models. Therefore, we evaluate alternative specifications of the interaction terms introduced to investigate these theoretical models, using *overtime hours* instead of *not daytime* to represent the conceptual category of "job demand", and *payrise* instead of *promotion opportunities* to represent the category of "job reward". Overall, the sensitivity analysis suggests that our results are not sensitive with regard to the definition of the *union* variable and the way we approximate the conceptual categories of "job demand" and "job reward".

6. Discussion

[19] Notice that in the model for psychological well-being, the work satisfaction variables that are positive and highly statistically significant are *satisfaction_total pay* and *satisfaction security*.

[20] In a further specification (not reported here), we have run the model for GHQ not including the variables denoting satisfaction with work. The sign and the level of statistical significance of *not daytime*promotion opportunites* do not change**.** Therefore, the results in the main specification do not appear to be influenced by the presence of multicollinearity between the two sets of regressors related to Siegrist`s framework.

Our study investigate the influence that contractual and working conditions have on self-assessed health and psychological well-being of employees using twelve waves (1991/92 – 2002/2003) of the British Household Panel Survey. The results suggest that both contractual and working conditions have some influence on health and psychological well-being and that asymmetries among women and men exist with regard to these effects.

We further attempt to evaluate the role that preferences for the number of hours of work, the level of employability and family structure play in affecting the relationship between contractual/working conditions and health and psychological well-being. Our estimates show that being unsatisfied with the number of hours worked has a negative influence on the health of individuals who have a part-time job. Having a high level of employability (proxied by having higher levels of education) appears to influence positively both health and psychological well-being of individuals with temporary job arrangements. For workers with atypical contractual arrangements, family structure appears to influence their health and well-being. For workers with part-time or temporary work arrangements, the presence of children in the family is negatively related to health and psychological well-being (with the exception of women with temporary jobs). Our results appear to provide limited support in favour of Karasek's model for women (but not for men), while the interpretation of our findings with regards to Siegrist's model is more ambiguous since this model does not receive direct support by the inclusion of the interaction term *no daytime*promotion opportunities* but receives some indirect support considering the effects of satisfaction with work variables. Due to data limitations and the use of proxies to represent the working conditions present in the models of Karasek and Siegriest, we are unable to test directly the theoretical foundations of those models. Instead we use a general framework that allows us to examine their predictions to the extent that our data permit. Should more detailed information become available in the BHPS about the working conditions of employees, a more precise evaluation of the two models could performed.

Results concerning the relationship between contractual/working conditions and psychological well-being are similar to those found for self-assessed health. Some differences, however, are observed. In particular, family structure and working unpaid overtime hours appear to play a larger role for psychological well-being than for general self-assessed health.

Our own study contributes to the literature in a number of ways. We assess the distinct effects of contractual and working conditions on health and psychological well-being, combining two distinct branches of the literature. As far as we are aware, previous studies have not considered *explicitly* the two factors jointly. Secondly, the analysis of the effects of contractual and working conditions on both self-assessed health and psychological well-being, for both women and men, allows us to highlight interesting asymmetries in these effects. Thirdly, most of the previous studies in the literature have focused on specific occupations (i.e. civil servants, nurses, etc.), and this makes the generalisation of their results to the entire workforce problematic. In our study we use the BHPS, a dataset containing a representative sample of the British population. Fourthly, the methodology we adopt for our analysis has several advantages compared to other studies and in particular the dynamic panel data specifications allow us to account for the presence of individual specific effects and reduce concerns about reverse causality.

Our study suggests that, under certain circumstances, adverse contractual and working conditions can have a negative influence on the health and psychological well-being of workers in Great Britain. Improving the health and psychological well-being of workers could not only improve population health and reduce health inequalities, but could also have positive implications for the wider economy (Bartley et al., 2004). Workers with better health and psychological well-being, indeed, are likely to suffer less from illnesses limiting their working capacity and to have better work performance and less sickness leave. The implications at a macro-economic level of an improvement in the health conditions of workers can be particularly relevant in Great Britain, given that this country reports a low level of labour productivity compared to the other G7 countries (Office for National Statistics 2008). Policy makers, therefore, should make some efforts to consider the cost, both at a social and economic level, of the health limitations that might derive from adverse contractual and working conditions.

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Annex 1. Sensitivity analysis [21]

Unions

The estimates presented in Section 4.5.1 and 4.5.2 suggest a negative relationship between *unions* and health and psychological well-being. This result is unexpected since studies in the literature suggest that social support at work positively influences health and psychological well-being (Cheng et al. 2000; Godin & Kittel 2004) and we consider the presence of unions at workplace as an element of social support for employees. To check the robustness of this result we consider individual union membership instead of the presence of unions at workplace. The former variable is also present in the BHPS. This variable is equal to 1 if a worker is a member of a union or association, and 0 otherwise. We re-estimate our models using this new variable for both self-assessed health and psychological well-being. The results for this alternative specification are extremely similar to those of the original specification. In particular, in the models for self-assessed health the coefficient has the same negative sign and the same level of significance as in the original models, while in the models for psychological well-being the coefficient remains negative but is not statistically significant. Therefore, our results appear not to be sensitive to the definition of the *union* variable.

Karasek`s and Siegrist`s frameworks

The results presented in Sections 4.5.1 and 4.5.2 regarding Karasek`s and Siegrist`s frameworks could be affected by the choice of the specific variables we use to approximate the broad conceptual categories of "job demand" and "job reward" used in these models. Therefore, we evaluate alternative specifications of the interaction terms introduced to investigate these theoretical models, using *overtime hours* instead of *not daytime* to represent the conceptual category of job demand, and *payrise* instead of *promotion opportunities* to represent the category of job reward. First, we re-estimate our models substituting the interaction term *not daytime*managerial supervision* with *overtime hours*managerial supervision* and *not daytime*promotion opportunities* with *overtime hours*promotion opportunities* in the model for both SAH and the GHQ, for both women and men. Generally, the results found with this new specification are very

[21] The results for these sensitivity checks are not reported here but are available on request

similar to those found with the original one, for both females and males, and for both self-assessed health and psychological well-being. In all cases the interaction terms are not statistically significant (as in the original specification), and some of them (*overtime hours*promotion opportunities* in the model for SAH for females, and *overtime hours*managerial supervision* and *overtime hours*promotion opportunities* in the model for the GHQ for males) change sign. Secondly, we re-estimate our models substituting the interaction term *not daytime*promotion opportunities* with *not daytime*payrise* and *overtime hours*promotion opportunities* with *overtime hours*payrise*. The results are very similar to those in the original models, for both females and males, and for both self-assessed health and psychological well-being. In all the cases the interaction terms are not statistically significant (as in the original specification), and just one interaction term (*overtime hours*payrise* in the model for the GHQ for female) changes sign. Given that none of these effects are statistically significant, a change in sign is not of great concern. These sensitivity checks suggest that our specification is not sensitive to the way we approximate the broad conceptual categories of "job demand" and "job reward", particularly for the models for SAH.

Table 1. Variable definitions

Self-assessed health	1 if “poor or very poor”, 2 if “fair”, 3 if “good or very good”, 4 if “excellent” health
GHQ	Psychological well-being (0-36, where 0 is the worst level, 36 the best)
CONTRACTUAL CONDITIONS	
part-time job	1 if current job is part-time, 0 otherwise
temp job	1 if current job is temporary, 0 otherwise
WORKING CONDITIONS	
Demanding job conditions	
not daytime	1 if not working during the day or having rotation shift, 0 otherwise
overtime hours	number of overtime hours in normal week
control	
unions	1 if there is a union or staff association at workplace, 0 otherwise
managerial supervision	1 if managerial or supervision duties, 0 otherwise
reward	
payrise	1 if pay includes annual increment, 0 otherwise
promotion opportunities	1 if opportunities of promotion in current job, 0 otherwise
working environment	
workplace home	1 if working at home, 0 otherwise
workplace travel	1 if working travelling, 0 otherwise
workplace other	1 if NOT working at the employeer, home or travelling, 0 otherwise
employed at workplace	number of people employed at the workplace
WORK SATISFACTION	
satisfaction_total pay	1 if satisfied with total pay of the job, 0 otherwise
satisfaction_security	1 if satisfied with security of the job, 0 otherwise
satisfaction_work itself	1 if satisfied with the work itself, 0 otherwise
preference less hrs	1 if preferred working fewer hours, 0 otherwise
preference more hrs	1 if preferred working more hours, 0 otherwise
CONTROLS	
age	Age in years at 1st December of current wave
divsep	1 if divorced or separated, 0 otherwise
nevermar	1 if never maried, 0 otherwise
widowed	1 if widowed, 0 otherwise
race	0 if white, 1 otherwise
household size	n. of people in the household including the respondent
children	1 if in the household there is at least one child (less than 16), 0 otherwise
income	log of Annual labour income (in pounds)
high education	1 if people have a qualification equal or superior to A level, 0 otherwise
social class	1 if "skilled manual” “armed forces”, "partly skilled", "unskilled”, 0 otherwise.

Table 2. Regressors` mean, standard deviation, minimum and maximum

	Females N= 23,309				Males N= 22,349			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
CONTRACTUAL CONDITIONS								
part-time job	0.352	0.478	0	1	0.046	0.210	0	1
temp job	0.070	0.256	0	1	0.050	0.218	0	1
WORKING CONDITIONS								
Demanding job conditions								
not daytime	0.350	0.477	0	1	0.297	0.457	0	1
overtime hours	1.540	4.349	0	71	2.296	5.485	0	80
control								
unions	0.525	0.499	0	1	0.501	0.500	0	1
managerial supervision	0.325	0.468	0	1	0.426	0.495	0	1
reward								
payrise	0.499	0.500	0	1	0.435	0.496	0	1
promotion opportunities	0.454	0.498	0	1	0.555	0.497	0	1
working environment								
workplace home	0.011	0.104	0	1	0.008	0.088	0	1
workplace travel	0.032	0.177	0	1	0.132	0.338	0	1
workplace other	0.047	0.212	0	1	0.096	0.295	0	1
employed at workplace	212.189	318.103	1	1000	257.645	329.004	1	1000
WORK SATISFACTION								
satisfaction_total pay	4.865	1.627	1	7	4.655	1.616	1	7
satisfaction_security	5.442	1.540	1	7	5.156	1.628	1	7
satisfaction_work itself	5.572	1.337	1	7	5.404	1.376	1	7
preference less hrs	0.309	0.462	0	1	0.356	0.479	0	1
preference more hrs	0.082	0.274	0	1	0.075	0.263	0	1
CONTROLS								
age	37.604	11.598	15	76	37.470	11.686	16	81
divsep	0.085	0.279	0	1	0.043	0.203	0	1
nevermar	0.176	0.381	0	1	0.216	0.412	0	1
widowed	0.019	0.138	0	1	0.005	0.070	0	1
race	0.027	0.163	0	1	0.028	0.164	0	1
household size	2.989	1.196	1	10	3.085	1.264	1	11
children	0.370	0.483	0	1	0.375	0.484	0	1
(log) income	9.041	0.832	0.693	12.472	9.591	0.759	0	13.082
high education	0.514	0.500	0	1	0.589	0.492	0	1
social class	0.279	0.448	0	1	0.470	0.499	0	1

Table 3. Correlated random effects model for self-assessed health. Estimated coefficients.

	female			male		
	Coef.		Std. Err.	Coef.		Std. Err.
contractual conditions						
part-time job	0.074	**	0.037	0.176	***	0.069
temp job	-0.020		0.067	0.051		0.080
part-time*pref less hrs	-0.113	**	0.052	-0.107		0.151
part-time*pref more hrs	-0.091		0.068	-0.053		0.106
temp job*high educat	0.117	*	0.072	0.026		0.090
part-time*children	-0.015		0.044	-0.073		0.140
temp job*children	0.065		0.072	-0.215	**	0.103
working conditions						
working environment						
workplace home	0.220	**	0.095	-0.023		0.111
workplace travel	-0.052		0.053	0.051		0.032
workplace other	-0.066		0.043	0.008		0.034
employed at workplace	-2E-06		3E-05	1E-04	***	4E-05
demanding job conditions						
not daytime	-0.040		0.028	0.031		0.030
overtime hours	-3E-04		0.002	-4E-04		0.002
control and social support						
unions	-0.054	**	0.024	-0.015		0.024
managerial supervision	0.011		0.023	-0.017		0.024
reward						
payrise	0.019		0.020	0.004		0.024
promotion opportunities	-0.047	*	0.024	-0.003		0.021
satisfaction_total pay	-0.008		0.006	-0.009		0.007
satisfaction_security	0.015	**	0.006	0.035	***	0.006
satisfaction_work itself	0.022	***	0.007	0.033	***	0.007
pref less hrs	-0.036		0.023	-0.045	***	0.210
pref more hrs	0.045		0.055	-0.066	*	0.038
not daytime*manag-sup	0.021		0.042	0.010		0.044
no day time*prom opp	0.019		0.038	-0.023		0.041
Log Likelihood	-22396.224			-20510.123		
N	23309			22349		

***, ** and * denote significance at 1%, 5% and 10% levels respectively.

The other regressors included in our model are: the lagged and the initial value of SAH**,** age, age^2, age^3, divsep, nevermar, widowed ,race, household size, children, income, high education , social class.

The interaction terms “no daytime*managerial/supervision” and “no daytime*promotion opportunities” are not introduced contemporaneously in the third model. We estimate a model where we introduce “no daytime*managerial/supervision” only and another model where we introduce “no daytime*promotion opportunities” only. Since the results of these two models are extremely similar, we present the results of the latter model, and report only the results related to the variable “no daytime*managerial/supervision” for the former model.

Table 4. Correlated random effects model for self-assessed health. Partial effect on probability of reporting excellent health.

	female		male	
	Part Eff	Std. Err.	Part Eff.	Std. Err.
contractual conditions				
part-time job	0.026	0.023	0.070	0.026
temp job	-0.007	0.022	0.020	0.030
part-time*pref less hrs	-0.059	0.019	-0.061	0.059
part-time*pref more hrs	-0.019	0.016	-0.046	0.038
temp job*high educat	0.055	0.028	0.034	0.035
part-time*children	-0.008	0.017	-0.031	0.055
temp job*children	0.024	0.031	-0.089	0.042
working conditions				
working environment				
workplace home	0.074	0.062	-0.009	0.043
workplace travel	-0.018	0.022	0.020	0.013
workplace other	-0.024	0.020	0.003	0.013
employed at workplace	-5E-05	2E-05	5E-05	7E-05
demanding job conditions				
not daytime	-0.020	0.015	0.012	0.012
overtime hours	-2E-04	2E-03	-2E-04	9E-04
control and social support				
unions	-0.019	0.014	-0.005	0.010
managerial supervision	0.004	0.008	-0.005	0.002
reward				
payrise	4E-04	0.008	0.001	0.009
promotion opportunities	-0.014	0.011	-0.001	0.008
satisfaction_total pay	-0.018	0.016	-0.021	0.016
satisfaction_security	0.032	0.023	0.081	0.030
satisfaction_work itself	0.047	0.030	0.077	0.031
pref less hrs	-0.013	0.011	-0.019	0.010
pref more hrs	0.016	0.026	-0.026	0.019
not daytime*manag-sup	0.010	0.015	-0.004	0.016
no day time*prom opp	-0.011	0.013	-0.011	0.019
N	23309		22349	

***, ** and * denote significance at 1%, 5% and 10% levels respectively.

The other regressors included in our model are: the lagged and the initial value of SAH**,** age, age^2, age^3, divsep, nevermar, widowed ,race, household size, children, income, high education , social class.

The partial effects indicates the change in the probability of reporting excellent health due to a marginal change for continuous variables and to a discrete change for binary variables

We compute the partial effects for a hypothetical representative agent with “average characteristics”. We attribute the mean value to the covariates that are continuous and the modal value to the covariates that are categorical.
To compute the partial effect of "part-time*pref less hrs", "part-time*pref more hrs" and "part-time*children" we make reference to the representative individual with a part-time job. To compute the partial effect of "temp job*high educat" and "temp job*children" we make reference to the representative individual with a temporary job.

The interaction terms “no daytime*managerial/supervision” and “no daytime*promotion opportunities” are not introduced contemporaneously in the third model. We estimate a model where we introduce “no daytime*managerial/supervision” only and another model where we introduce “no daytime*promotion opportunities” only. Since the results of these two models are extremely similar, we present the results of the latter model, and report only the results related to the variable “no daytime*managerial/supervision” for the former model.

Table 5. Correlated random effects model for psychological well-being. Estimated coefficients.

	female		male	
	Coef.	Std. Err.	Coef.	Std. Err.
contractual conditions				
part-time job	0.078	0.128	0.444 **	0.199
temp job	0.012	0.245	0.299	0.247
part-time*pref less hrs	-0.349 *	0.191	0.189	0.470
part-time*pref more hrs	0.300	0.251	0.238	0.326
temp job*high educat	0.020	0.262	0.245	0.275
part-time*children	-0.077	0.150	-0.853 **	0.419
temp job*children	-0.115	0.262	-0.566 *	0.321
working conditions				
working environment				
workplace home	-0.499	0.315	-0.134	0.317
workplace travel	-0.197	0.183	0.109	0.086
workplace other	0.088	0.151	-0.030	0.096
employed at workplace	5E-05	1E-04	1E-04	9E-05
demanding job conditions				
not daytime	0.068	0.097	-0.045 *	0.098
overtime hours	-0.020 **	0.008	-0.011 *	0.006
control and social support				
unions	-0.219 ***	0.077	-0.174 ***	0.063
managerial supervision	0.044	0.077	-0.056	0.066
reward				
payrise	0.065	0.071	0.064	0.059
promotion opportunities	-0.137 ***	0.084	0.025	0.071
satisfaction_total pay	0.056 ***	0.021	0.015	0.019
satisfaction_security	0.062 ***	0.023	0.113 ***	0.019
satisfaction_work itself	-0.008	0.026	0.064 ***	0.023
pref less hrs	-0.195 **	0.084	-0.007	0.062
pref more hrs	-0.336	0.206	0.085	0.118
not daytime*manag-sup	0.052	0.147	-0.020	0.127
no day time*prom opp	-0.212	0.135	-0.190	0.124
N	23309		22349	

***, ** and * denote significance at 1%, 5% and 10% levels respectively.

The other regressors included in our model are: the lagged and the initial value of GHQ, age, age^2, age^3, divsep, nevermar, widowed ,race, household size, children, income, high education , social class.

The interaction terms “no daytime*managerial/supervision” and “no daytime*promotion opportunities” are not introduced contemporaneously in the third model. We estimate a model where we introduce “no daytime*managerial/supervision” only and another model where we introduce “no daytime*promotion opportunities” only. Since the results of these two models are extremely similar, we present the results of the latter model, and report only the results related to the variable “no daytime*managerial/supervision” for the former model.