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Document de travail
Working paper

Working Conditions and Health of European Older Workers

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DT n° 8

Février 2008

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Working Conditions and Health of European Older Workers[♣]

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Abstract

Working conditions have greatly evolved in recent decades in developed countries. This evolution has been accompanied with the appearance of new forms of work organisation that may be sources of stress and health risk for older workers. As populations are ageing, these issues are particularly worrying in terms of the health, labour force participation and Social Security expenditure.

This paper focuses on the links between quality of employment and the health of older workers, using the Share 2004 survey. Our research is based on two classical models: the *Demand-Control* model of Karasek and Theorell (1991) and the *Effort-Reward Imbalance* model of Siegrist (1996), which highlight three main dimensions: *Demand* that reflects perceived physical pressure and stress due to a heavy work load; *Control* that refers to decision latitude at work and the possibilities to develop new skills; and *Reward* that corresponds to the feeling of receiving a correct salary relatively to efforts made, of having prospects for personal progress and receiving deserved recognition. These models also take into account the notion of support in difficult situations at work and the feeling of job security.

Our estimations show that the health status of older workers is related to these factors. Fairly low demand levels and a good level of reward are associated with a good health status, for both men and women. Control only influences the health status of women. Lastly, the results reveal the importance on health of a lack of support at work and the feeling of job insecurity; regardless of gender; these two factors are particularly related to the risk of depression. Thus health status and working conditions are important determinants of the labour force participation of older workers.

JEL code: I10, J28
Keywords: Working conditions, Health, Older Workers

[♣] *This paper uses data from release 2 of SHARE 2004. The SHARE data collection has been primarily funded by the European Commission through the 5th framework programme (project QLK6-CT-2001-00360 in the thematic programme Quality of Life). Additional funding came from the US National Institute on Ageing (U01 AG09740-13S2, P01 AG005842, P01 AG08291, P30 AG12815, Y1-AG-4553-01 and OGHA 04-064. Further support by the European Commission through the 6th framework program (projects SHARE-I3, RII-CT-2006-062193, and COMPARE, CIT5-CT-2005-028857) is gratefully acknowledged. For methodological details see Boersch-Supan and Juerges (2005).*

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During last decades, firms production methods and working conditions have greatly changed in developed countries. Workers are exposed to new demands due to evolutions of the job market, productive processes and relationships between firms: increase of international constraint, use of sub-contractors, etc. (Schmidt, 1999, Swinnerton and Wail, 1995). This "new deal" could partly explain the intensification of work (Green and McIntosh, 2001, Wanner, 1999), constraints in terms of work rhythm, greater versatility, etc. In parallel to this transformation of work, health burdens and problems caused by the professional environment are increasing in all sectors of activity. Physical risks at work are growing, although primary sector jobs, which are often associated with heavy physical workloads, are becoming rarer. Psychological problems are also increasing. Stressful work is responsible for a growing number of work-related health problems. And Hamermesh (2001) shows that levels of job satisfaction declined at the ending of 20th century.

Health status and working conditions are important variables that explain early retirement (Lumsdaine and Mitchell, 1999). More particularly, current characteristics of work organisation and resulting forms of stress are to be taken into consideration along with other institutional, financial, contextual or family-related variables. Difficult working conditions that are detrimental to health reduce the productivity of older workers, increase their absenteeism rate and the probability of them losing their jobs, and incite them to leave the employment market as soon as possible (Blanchet and Debrand, 2005). Preserving the health of older workers in the workplace to keep them working as long as possible may be one key to the success of current policies aimed to preserve Social Security systems.

This research is carried out as part of the public debate on postponed retirement age to deal with ageing populations (Gruber and Wise, 1999). In the objective announced at the European Council in Stockholm March 2001([1]), European countries would like 50% of people aged between 55 and 64 to be in employment by 2010. But, in 2003, the average European employment rate for this age bracket was only 42.3%. To achieve this objective, we need to solve the problem of healthy ageing of older workers.

This study deals with the characteristics of the quality of work as determining factors of the health status of older workers, i.e. 50 years old and over. The influence of working conditions on health has been the subject of many researches in the fields of epidemiology, medicine, sociology, psychology, ergonomics, etc. Usually, these studies distinguish the effects of two forms of work-related stress: physical stress and psychological stress. Our study is based on two models: the model of imbalance between demand and control (*Demand-Control* model, Karasek and Theorell, 1991) and the model of imbalance between demand and reward (*Effort-Reward Imbalance* model, Siegrist, 1996). These two models provide a framework for analysing the effects of psychological stress at work on health status of workers. They involve three main dimensions: *demand* that reflects physically demand and pressure

[1] *http://www.consilium.europa.eu*

due to a heavy workload; *control* that refers to latitude decision and possibilities to develop new skills; and *reward* that corresponds to the feeling of receiving correct salary relatively to the efforts made, of having prospects for personal progress and receiving deserved recognition. These models also take into account the notion of support at work and the feeling of job security. All of these dimensions were included in the *Share* 2004 survey. Our study proceeds as follows. After a review of literature studying the relationship between working conditions and health status (section 1), we describe the dataset derived from the Share survey (section 2). The general purpose of the paper is to examine how the quality of work affects the health of older workers. We use four indicators to describe health status: self-reported health; an indicator of depression based on score Euro-D scale[2] ; limitations with activities; and declarations of chronic diseases. We analyse simultaneously the impact of several determinants of work organisation on the four heath indicators (section 3). Our strategy of study consists of three steps. Firstly, we explore the relations between health status and the nine indicators of working conditions that were included in Share data. Secondly, we measure these effects introducing synthetic indicators that reflect the notions of demand, control and reward. Thirdly, we test the model of imbalance between demand and control (demand-control, Karasek and Theorell, 1991) and the model of imbalance between demand and reward (derived from Siegrist, 1996). Last (section 4), we get our result in the economic literature about labour force participation of older workers.

1. Related literature

A look of the economic literature on the relationship between working condition and health reveals that it has two distinct strands, not opposite just parallel. One, it comes from labor economists. Freeman (1978) said that "*subjective variables like job satisfaction which economists traditionally view with suspicion contain useful information for predicting and understanding behavior, but that they also lead to complexities due to their dependency on psychological states*". But afterwards, working conditions have been included in different economic analyses through their impact on the health of individuals (see Faragher, Cass and Cooper (2005) for a large review not only economic). Case and Deaton (2003) question the evolution of health during the life cycle, and the influence of education, employment, income and working conditions on this evolution. They use the intertemporal model of health capital put forward by Grossman (1972), which analyses the health level and deterioration rate during the life cycle. The underlying idea of this representation is that deterioration of health capital is a biological process, but that characteristics related to consumption, healthcare and

[2] *The Euro-D module, made up of the 12 items below, aims to identify depression problems. For each respondent, it provides a score between 0 (no risk of depression) and 12 (high risk of depression), by adding up his/her answers to each item. According to Dewey and Prince (2005), an individual with a score above 3 shows a considerable risk of suffering from depression for which therapeutic treatment is necessary. We use this same threshold to characterise the risk of depression.*

more generally living conditions, act on this capital and its deterioration over time. This deterioration can depend on working conditions. In this model, health status is explicitly linked to current and past working conditions. This representation thus puts forward the idea that health status at the end of working life results from current working conditions, as well as all previous working conditions. Working conditions may be considered as exogenous variables in the same way as environmental characteristics in which individuals evolve (quality of water, air, living conditions, etc.). This is one of the hypotheses developed by Murrinen (1982) in his model that generalised Grossman's model. Generally working conditions are economic variables, used to understand individual behaviours; for instance labour force participation (Currie and Madrian, 1999; Blanchet and Debrand, 2008), labor turnover (Clark, Georgellis and Sanfey, 1998; Souza-Poza and Souza-Poza, 2007), wages (Clark and Oswald, 1996)….

Second strand of literature reflects the growing interest in the impact working condition on invidual health status. According to the model of Karasek and Theorell (1991), workplace organisation determines some of the psycho-social characteristics of work, which themselves have an influence on the health of workers. The authors develop the idea that a low level of control combined with a strong demand represents a risk for health. They make the hypothesis of an intrinsic effect of the work organisation on health that is different from the individual's own characteristics. They show, for example, a high prevalence of symptoms of heart disease among people who say they have, both, a low level of control and a high level of demand. Other studies have shown the influence of these factors on the risk of developing heart disease (Bosma *et al*. 1998) or mental illnesses (Stansfeld *et al.,* 1999) and on the self-reported health status (Ostry *et al.*, 2003).

Siegrist's model (1996) takes into account some work characteristics (the fact of having a demanding job or not, of having workload that is more or less heavy, etc.) as well as individual characteristics relating to the level of involvement of a worker and monetary and non-monetary reward that he receives (recognition, progress, satisfaction, etc.). The main idea of this model is that an imbalance between demand and reward exposes workers to high psychological stress, leading in the long term to the appearance of pathologies, such as cardiovascular disease, mental or physical health problems. The notion of effort put forward by Siegrist also covers both the notion of involvement of individuals in their work and the notion of demand defined by Karasek (Niedhammer and Siegrist, 1998). However, the results of our study only consider the notion of demand. Until now, empirical studies that have analysed the effect on health of the ratio between demand and reward have confirmed Siegrist's hypotheses. Thus, the values of this ratio are inversely proportional to the measure of self reported health (Ostry *et al*., 2003; Niedhammer and Siegrist, 1998; Siegrist *et al.*, 2004), with cardiovascular disease (Bosma *et al.*, 1998); Niedhammer and Siegrist, 1998), depression (Pikhart *et al.*, 2004) and chronic diseases (Ostry *et al*., 2003)..

Lastly, these two models consider that the risks of deterioration of health increase when these situations of imbalance are combined with lack of support at work or a feeling of job insecurity. However, these factors can play a role in multiplying risks for health in a more general context. Väänänen *et al* (2004) remind that a lack of support at work can play on health in two ways: by a loss of control of the situation and by a direct effect on demand. They show, in particular, that having support at work can enable individuals to face up to a structural change, such as the merging of two companies. In addition, job insecurity is today considered an important source of stress (Ferrie *et al.*, 2005; Ferrie *et al.*, 1998). This is particularly true for the category of older workers for whom the possibility of finding another job, if they lose their job, is low.

For our subject, these analyses recall two important points. On the one hand, the influence of working conditions on health at the end of active life reflects the effects of current and past conditions. On the other hand, there are complex selection phenomena that explain the working conditions of individuals. The answers to this question are complex. It is difficult, for instance, to describe the effects of the intensification of work on health. These effects may be positive, insofar as the intensification may make the work of an individual more interesting and rewarding, but these effects may also be negative when the intensification of work turns into extreme pressure and physically demanding work.

2. Share: a European survey to study the health-work relation for older workers

Our analysis uses data from the first wave of the *Share* survey: "*Survey on Health Ageing and Retirement in Europe"* (Börsch-Supan *et al.*, 2005), carried out in 2004 among 30,000 people aged 50 and over, living in the following eleven European countries: Austria, Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden and Switzerland. SHARE is inspired by similar experiments in the United States and in the UK: the Health and Retirement Survey (HRS) in the United States, which is in its sixth wave, and the British panel ELSA (English Longitudinal Survey of Ageing). The topics considered within the context of SHARE are of particular interest to the following disciplines: health, psychology, economics and sociology. The data collected include health variables (Self reported health status, physical and cognitive tests, behaviour with regard to health and use of the healthcare system), psychological variables (mental health, well-being, satisfaction), socio-economic variables (professional status, characteristics of professional activity, retirement age, financial resources, level of income, housing, education) and social support variables (family support, financial transfers, social networks, voluntary work, etc.). For this survey, we retain workers aged from 50 to 65, representing 7,592 people. Around 42% of them are women, but this proportion varies considerably from one country to another: 49% in France and Sweden, 30% in Greece and 39% in Spain. In addition, these workers aged between 50 to 65 years are distributed differently according to

age: 6% of Austrians and 5% of French are between 60 and 65 years old, whereas over 20% of Swedes, Swiss and Greek are in this age bracket. These differences between countries reflect differences in job market structure and production activity, that are more or less marked according to the country, as well as heterogeneous institutional contexts (Börsch-Supan 2007, Blanchet and Debrand 2007). It is therefore important to keep these differences between countries in mind when analysing the results of this survey.

For our study, four health indicators, in dichotomous form, were retained: self-reported health indicator; an indicator of depression based on the score Euro-D[3] ; limitations with activities; and declarations of chronic diseases.

The *Share* survey questionnaire contains nine questions on working conditions that are used in the models of Karasek and Theorell (1991) and Siegrist (1996). Each question was answered based on a four-level scale indicating the degree of agreement of the respondents: “strongly agree”, “agree”, “disagree”, or “strongly disagree”. This survey distinguishes three main subsets defined as follows: the first examines the notion of demand: “My job is physically demanding”, “I am under constant time pressure due to a heavy workload”; the second concerns control: “I have very little freedom to decide how I do my work”, “I have an opportunity to develop new skills”; and the third concerns reward: “I receive the recognition I deserve for my work”, “Considering all my efforts, my salary is adequate”, “My job promotion prospects are poor”. In order to obtain three synthetic indicators for each of these sets, we use the method suggested by Siegrist, Knesebeck and Wahrendorf (2005), which consists in adding together the respondents’ answers. To take account of links between health and imbalances – between demand and control or reward – two ratios were calculated: the “demand-control” ratio and the “demand-reward” ratio. In addition to these indicators, two other questions were considered. The first concerns support at work: “I receive adequate support in difficult situations”; and the second, job security: “My chances to keep my job are poor”.

[3] *The Euro-D module, made up of the 12 items below, is aimed to identify depression problems. For each respondent, it provides a score between 0 (no risk of depression) and 12 (high risk of depression), by adding up his/her answers to each item. According to Dewey and Prince (2005), an individual with a score above 3 shows a considerable risk of suffering from depression for which therapeutic treatment is necessary. We use this same threshold to characterise the risk of depression.*

Using the responses to those nine propositions, further scores have been established:

« What do you think about those items? »	Response	Score
Q1: "My work is physically demanding"	Totally agree	4
	Agree	3
	Disagree	2
	Totally disagree	1
Q2: " I am constantly under pressure because of a heavy workload"	Totally agree	4
	Agree	3
	Disagree	2
	Totally disagree	1
Q3: I have little freedom to decide how to do my work"	Totally agree	1
	Agree	2
	Disagree	3
	Totally disagree	4
Q4: "I have the opportunity to develop new skills"	Totally agree	4
	Agree	3
	Disagree	2
	Totally disagree	1
Q5: "I receive the recognition I deserve for my work"	Totally agree	4
	Agree	3
	Disagree	2
	Totally disagree	1
Q6: "Taking into account the psychological demand expended, my salary is correct"	Totally agree	4
	Agree	3
	Disagree	2
	Totally disagree	1
Q7: "My prospects of promotion/personal advancement are not good"	Totally agree	1
	Agree	2
	Disagree	3
	Totally disagree	4
Q8: I receive appropriate recognition in difficult circumstances at work"	Totally agree	1
	Agree	2
	Disagree	3
	Totally disagree	4
Q9: "My chances of keeping my job are not good"	Totally agree	4
	Agree	3
	Disagree	2
	Totally disagree	1

The synthetic indicators used in this study derive from those nine scores. They have been calculated as the following way:

Synthetic indicators	Continuous form :	classes :
Synthetic indicators		
Demand	= Score (Q1) + Score (Q2)	6 < : low ; [6 ; 7[: middle ; 7 ≥ : high
Control	= Score (Q3) + Score (Q4)	7 < : low ; [7 ; 8[: middle ; 8 ≥ : high
Reward	= Score (Q5) + Score (Q6) + Score (Q7)	8 < : low ; [8 ; 9[: middle ; 9 ≥ : high
Ratio		
« Demand./Control »	= 10*(Score (Q1) + Score (Q2)) / (Score (Q3) + Score (Q4))	7,5 < : low ; [7,5 ; 8,8[: moyen ; 8,8 ≥ : fort
« Damand/Reward »	= (3/2)*10*(Score (Q1) + Score (Q2)) / (Score (Q5) + Score (Q6) + Score (Q7))	9,0 < : low ; [9,0 ; 11[: moyen ; 11,0 ≥ : fort
Support at work	= Score (Q8)	[1;2] : Support at work ; [3,4]: no support
Job insecurity	= Score (Q9)	[1;2] : Job security ; [3,4] : insecurity

2.1. European workers are not equal in terms of health and work-related stress

Self-reported health status of older workers varies largely according to country: 73,3% of Italians consider themselves to be in good health, compared to 91,3% of Swiss, 85,9% of Danish and 86,8% of Greeks (see table 1) (for more details see Mackenbach *et al*., 2005). The proportion of older workers who do not suffer from a chronic disease or do not declare to have limitations with activities also varies widely from one country to the next. The results concerning the risk of depression are more homogenous: in seven out of the ten countries, the proportion of individuals who do not present a risk of depression is between 85% and 88%; this proportion is relatively lower in France (74,2%), Italy (75,5%), Spain (79,4%) and Belguim (79,6%). Other surveys that are based on the full sample of the *Share* survey (Borsch-Supan *et al.,* 2005) or on other European surveys, confirm this heterogeneity between countries that cannot be explained by objective health status alone. These works often show that declarations of health status follow a North-South divide: individuals from the North of Europe consider themselves to be in good health more often than those living in the South, even though life expectancies follow a reverse trend. Other explanations, such as differences in education level, background, social protection systems, and culture are often put forward to explain these differences.

<< Tab. 1>>

Working conditions indicators also follow a North-South divide (Siegrist, Knesebeck and Wahrendorf., 2005). Three groups of countries can be identified. Older workers living in Sweden, Denmark, the Netherlands and Switzerland declare having more satisfactory working conditions: a higher level of control, less demand, better reward and lower demand-control and demand-reward ratios. Inversely, Italians and Greeks declare having less favourable working conditions for all of these indicators. The other countries are situated in the middle. Once again, it is difficult to interpret these differences. The characteristics of older workers differ largely from one country to another in terms of composition by age and sex and also in terms of socio-economical and cultural characteristics.

2.2. Working is good for health…but poor working conditions are linked to a bad health

Eight older workers out of ten are in good health: 80% consider themselves to be in good health; 82% show no risk of depression; 77% declare they are not limited by their health to carry out their job; lastly, 78% declare they are not suffering from any chronic disease. These proportions are higher than those observed in the population aged 50 to 65 years old not in employment (respectively: 57%, 72%, 56% and 58%) (see fig. 1). Thus, on average, older workers declare themselves to be in a better health status than those who do not work.

<< Fig. 1>>

This leads us to make a first comment on our results: the estimations of links between health and the working conditions are subject to a selection bias according to which a poor health status reduces the probability to be in employment (healthy worker effect). These results may also be affected by selection phenomena within the population of older workers itself. They choose jobs that do not affect their health. They can also be selected by companies based on criteria related to their health status or their capacity to adapt to demanding jobs from a physical or psychological point of view. Some firms develop strategies to oust older worker in poor health by adopting forms of work organisation to which they cannot adapt. All of this reverts back to the different ways on selection-exclusion phenomena in the relation between health and work at the end of one's active life. These selection mechanisms tend to underestimate the effects obtained in our analysis. In fact, phenomena to exclude workers in poorer health or to make a selection in terms of jobs tend to minimise the influence of quality of work on the health of older workers.

The analysis reveals two phenomena (see table 2). First, the dimension with the greatest variation in number of people in good health, for both men and women, is reward. Second, working conditions are more associated with the health status of women than with that of men, particularly in terms of depression. We note in particular for men a 13 points difference related to level of reward, from low to high. The proportion of men who do not report risks of depression evolves from 80% to 93%. For women, the difference is about 24 points: the proportion of women who do not report risks of depression evolves from 57% to 81%. Control is the dimension that seems to be less linked to the health status of older workers. In addition, they are in a better health status when they receive adequate support in difficult situations and when they have a feeling of job security. These two different elements of older workers are particularly associated with a lower risk of depression.

<< Tab. 2>>

These initial results show up the following two relations. Firstly, older workers are on average healthier than those who do not work and secondly, the health of those who work is poorer when their working conditions are negative. It is difficult to anticipate the links between health and work, due particularly to two opposing effects (Strauss and Thomas, 1998): on the one hand, poor health leads to early departure from the job market and on the other hand, difficult working conditions change one's health status, particularly at the end of one's active life.

Moreover, as the women interviewed have not the same type of work and have not the same levels of wages as the men, and not the same declarations in terms of health, we propose to analyse their behaviour separately. These differences can be found in the observation of health indicators and working condition indicators. In comparison to men, women declare, on average, a lower level of

control, lower demand, and lower reward and, thus, they have lower “demand-control” and “demand-reward” ratios. They are also more often concerned by job insecurity and lack of support at work.

3. Work characteristics and health status of older workers: a *ceteris paribus* analysis

3.1. Econometric method

The relationships between health indicators and working conditions are considered within the framework of a system of four equations. Health status is measured by four dichotomous variables representing successively self-reported health (y_1), risk of depression (y_2), limitations with activities (y_3) and declarations of chronic diseases (y_4). These health variables are represented in the following way:

$$y_i = \begin{cases} 1 \text{ (good "health" status)} \\ 0 \text{ (poor "health" status)} \end{cases} \quad \text{if} \quad y_i^* > 0, \quad \forall\ i = 1,...4$$

(y_i^*) are the four corresponding latent variables.

In our model, these variables are explained by a set of working conditions of older workers, named *Z*, and a set of control variables, named *X*. The latter include individual characteristics (age, level of study, marital status, country, health status of partner in a couple), employment characteristics of respondents (public or private sector, responsibilities) and their risk behaviours (body mass index, tobacco consumption).

The system of equations describing these relations is written:

$$\begin{cases} y_1^* = \alpha_1 X + \omega_1 f(Z) + \mu_1 \\ y_2^* = \alpha_2 X + \omega_2 f(Z) + \mu_2 \\ y_3^* = \alpha_3 X + \omega_3 f(Z) + \mu_3 \\ y_4^* = \alpha_4 X + \omega_4 f(Z) + \mu_4 \end{cases}$$

The function *f(.)* represents a transformation of vector *Z*. We have used this vector in different ways (see results of the *ceteris paribus* analysis*)*. In this system, $(\mu_1, \mu_2, \mu_3, \mu_4)$ is a vector of four disturbances distributed according to a multivariate standard normal distribution and a variance-covariance matrix $corr(\mu_1, \mu_2, \mu_3, \mu_4)$:

$$corr(\mu_1, \mu_2, \mu_3, \mu_4) = \begin{bmatrix} 1 & \rho_{12} & \rho_{13} & \rho_{14} \\ \rho_{12} & 1 & \rho_{23} & \rho_{24} \\ \rho_{13} & \rho_{23} & 1 & \rho_{34} \\ \rho_{14} & \rho_{24} & \rho_{34} & 1 \end{bmatrix}$$

This multivariate model is an extension of the simple dichotomous model to a system made up of four equations, the dependent variables of which are dichotomous. It is estimated by maximum likelihood based on the G-H-K simulator for normal multivariate distributions, a method developed by Geweke, Hajivassiliou and Keane (Hajivassiliou, 1993). The model supposes that the residual values $(\mu_1, \mu_2, \mu_3, \mu_4)$ are potentially correlated, which makes it possible to test the hypothesis of the existence of unobserved heterogeneity. Our estimations confirm this hypothesis.

This heterogeneity may be partly due to the existence of omitted variables linked to the different dimensions of health status and to working conditions. These variables may be working conditions not observed in the *Share* 2004 survey, such as untypical working hours, exposure to toxic products, manual work, etc. In order to assess the importance of this type of bias, we have estimated several models in which the variables relating to working conditions have been made endogenous. Those models show that the results of our simultaneous system are a potentially overestimate the relationships between Y and Z. Moreover, we have also estimated each equation as part of Heckman's model in order to assess the importance of selection effects between individuals in employment and individuals not in employment. The results of these estimations have not enabled us to prove such a selection process. Almost all of the independence tests that we calculated have not shown significant correlation between the residual values of the equation of interest (health variables) and the equation of selection (to be or not in employment).

3.2. The health of older workers is related to different work components

Using this econometric model, we realize our analysis into three steps. In the first stage, the nine working condition indicators are introduced as variables that influence health status. The second stage involves measuring the effects on health of three summary indicators that reflect the notions of demand, control and reward. The third step examines the hypothesis according to which organisational risks are rooted in the imbalance of these dimensions with two ratio: demand-control and demand-reward.

The correlations between health and working conditions indicators, obtained at each step, can be interpreted in many ways. Beyond the effect of working conditions on health, they can also reflect an effect of health on working conditions, in other words, the idea that health status of individuals influences their way of perceiving their working conditions. The worse the health of an individual, the

more his working conditions appear difficult to him; inversely, the better the health of an individual, the better his working conditions appear to him. These correlations may also cover a personality effect: an individual with a "negative" personality, Watson and Pennebaker (1989) say negative affectivity, will report a poor health status and poor working conditions, and inversely for a "positive" individual. They assume that "*self-report measures of stress and health both contain a significant negative affectivity component, correlations between such measures likely overestimate the true association between stress and health*".

In the first step, we observe the relations between health status and the nine working conditions indicators. Ceteris paribus[4], men more often consider themselves to be in poor health if they consider that their work is physically demanding, if they estimate that their wage is too low relatively to their efforts, and if they have few prospects for personal advancement (see table 3). However, women consider themselves more often to be in poor health if they are constantly exposed to heavy workload, if they estimate that their wage is too low in relation to their efforts, or if they have little chance to keep their job. For both men and women, the risk of depression is correlated with the feeling of a constant exposure to heavy workload, not receiving adequate recognition, lack of support at work and the feeling of job insecurity. For women, this risk is higher when they consider their wage to be too low relatively to their efforts. Limitations with activities are more frequent for men and women who consider their wage is too low in relation to their efforts. These difficulties also concern women who declare to have a physically demanding work, to be under constant pressure, who have poor job advancement prospects and who lack of support. Lastly, chronic diseases are more frequent in men who consider that their wage is too low relatively to their efforts.

<< Tab. 3>>

The health of older workers appears to be strongly linked to the work elements retained for this analysis, except for those relating to decision latitude (having little freedom to decide how one does one's work and little opportunity to develop new skills). Relationships between health status and an inadequate wage, the absence of prospects for job advancement, lack of support in difficult situations and job insecurity are the most significant.

In the second step, we set up our model introducing the three synthetic indicators Demand control, reward. The evaluation of the relations between health and the three summary indicators (see annex 1) shows that the dimension which has the biggest influence on the health status of older workers is

[4] *The analysis controls the effects of the following individual characteristics: age, level of education, marital status, country, partner's health status, employment characteristics of respondents (public or private sector, responsibilities) and their risk behaviours (body mass index, tobacco consumption). For these control variables, the estimated correlations show a number of classic results: age, body mass index and tobacco consumption are generally linked to a less favourable health status, whereas a high level of education, the fact of having responsibilities at work or working independently, the fact of living as a couple and having a partner in good health are associated with a good health status. Differences in health status are considerable between countries. These results are solid, whatever the form of the function f specifying, for each step of the analysis, the effects of the work-related stress variables on health.*

reward (see table 4).Demand and lack of control tend to have a greater influence on women's health than on men's health. Women who are exposed to few demand, compared to those who are greatly subjected to demand, are more likely to consider themselves in good health, to declare no limitations with activities and to have no risk of depression. For men, these situations are only associated with self-reported health status. In addition, women who have high levels of control in their job, compared to those with a low level, are more likely to consider themselves in good health and to show no risk of depression. For men, control is only related to a good self-reported health.

<< Tab. 4>>

In a third stage, our analysis looks at the effects of the imbalances suggested by Karasek and Theorell (1991) and by Siegrist (1996). Concerning the first imbalance, the results show that older workers who are not affected by situations combining high demand and low control are in a better health status than those who are in such a situation (see table 5). According to Karasek and Theorell (1991), the working conditions determine some of the psycho-social characteristics of work and these characteristics influence the health status of older workers. In this model, a low level of control associated with demand represents a risk for health. With our estimations, the older workers are more likely to declare they have no limitations with activities, regardless of their gender. For men, the probability of considering themselves to be in good health also increases. For women, the probability to have no risks of depression increases. Thus, we confirm the results of Bosma *et al*. 1998 Stansfeld *et al.,* 1999 and Ostry *et al.*, 2003. The results also confirm the hypothesis relating to the second imbalance. Older workers who are not in situations where there is an imbalance between demand and reward are in a better health status than those who are in such situations (see table 6). In our estimation we take the same determinants as in Siegrist's model (1996): the fact of having a demanding job or not, of having a workload that is more or less heavy, etc. and individual characteristics relating to the level of involvement of an employee in his work and monetary and non-monetary reward (recognition, progress, satisfaction, etc.). Whatever the gender, this shows into a higher probability of considering oneself to be in good health, not showing risks of depression and declaring no limitations with activities. The probability of not suffering from any chronic disease also increases, but only for women.

<< Tab. 4>>

<< Tab. 5>>

With the Share database, these two models show that the deterioration of health status increases when the working conditions are imbalanced. Moreover this situation can be worsening if they are combined with lack of support at work or a feeling of job insecurity. However, whatever the form of the indicators of work organisation retained (the nine working condition indicators, the three summary

indicators or the two ratio), we find a strong correlation between lack of support at work or feeling of job insecurity and the four health indicators. So, in a context where production processes in the European countries are changing and in a context of organisational changes and strain on the job market, a lack of support at work and the feeling of job insecurity are important sources of risk for one's health. Those results are thus coherent with the results of Väänänen *et al* (2004) Ferrie *et al.* (2005), Ferrie *et al.* (1998). These estimations are static, thus we do not know if a deterioration of the working condition becomes in Europe (Hamermesh, 2001; Wanner, 1999). But our model show that exist several ways to rely the working conditions and health status.

4. What are the consequences of work characteristics on the labour force participation of older workers?

European data from the *Share* 2004 survey show that the health status of older workers is related to the working conditions retained for this analysis. A slightly low level of demand, but at least, a good level of reward, are associated with a good health status, for both men and women. Control only has a positive influence on the health status of women. In addition, our results are coherent with the hypotheses of the models of Karasek and Theorell (1991) and Siegrist (1996). They show there is a significant correlation between health and the imbalances suggested in these models (imbalance between demand and control and imbalance between demand and reward). Lastly, the results reveal the importance on health of a lack of support at work and the feeling of job insecurity; regardless of gender, these two factors are related to the risk of suffering depression, in particular.

The *Share* survey, which was carried out for the first time in 2004, is going to be carried out again in the coming years to become a panel database. This information will be used to add to the analyses presented here. We will be able to observe relations between work and health over the long term and correct a part of the effects of unobserved heterogeneity, in particular those related to declaration phenomena and certain selection devices, such as the *healthy worker effect*.

The characteristics of work and health are important factors determining the involvement of older workers in the labour market. So, if we want to encourage the employment of old workers and preserve their health in the workplace, an efficient solution would be to implement a device to avoid negative working conditions. However, the efficiency of such a reorganisation depends on time, because the organisational risks, as defined in the two models, are long-term processes. The efficiency in terms of health and therefore the improvement of the labour force participation of older workers can only be observed over the long term. Thus, there is an indirect relationship between stressful work and the labour force participation. The question of the effects of working conditions on the health of older

workers has often been raised. But, as far as we know, the simultaneous application, using the same database, of Karasek and Theorell (1991) and Siegrist (1996) models, on the population of older workers had never been done. These effects of working conditions on health are reflected on the involvement of older workers in the job market, insofar as there is a significant relationship between health and labour force participation of older workers. To study this aspect, most studies use declarations of limitations with activities. Bound (1991) and Campolieti (2002) show significant links between labour force participation and limitations with activities, even after eliminating part of the biases inherent in the self-declaration of these difficulties. Using data from the *Share* 2004 survey, Debrand (2007) confirms the conclusions of these two authors.

Working conditions of older workers can also influence their perception of the utility of work in relation to leisure (Lumsdaine and Mitchell, 1999): work that is damaging to health, stressful and poorly paid increases their preference for leisure and incites them to take retirement early. The results of Blanchet and Debrand (2005) are coherent with this hypothesis. Using data from the *Share* survey, they show that the desire to take early retirement is considerably higher for older workers in poor health, for those who consider they are not suitable to do their job and for those with difficult working conditions. Working conditions and the labour force participation for older workers appear to be linked, whether directly or indirectly.

Fig 1 Health and Employment status

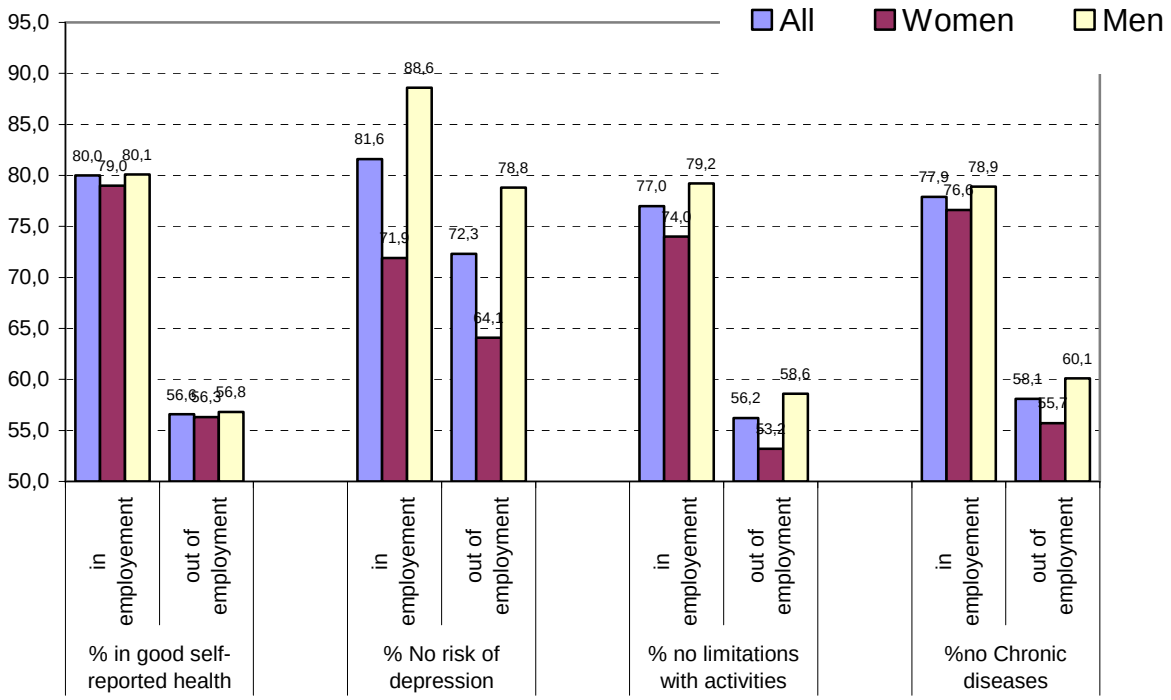

Table 1 : General descriptive statistics (*)

	% women	Age (average)	% [50;54]	% [55;59]	% [60;65]	% Good health status	% No risk of depression	% No limitation with activities	% No chronic disease	Demand (average)	Control (average)	Reward (average)	% Job security	% Social support at work	Average ratio « demand / Control»	Average ratio « Demand / Reward»
Austria	37,5	54,4	54,3	39,5	6,2	78,4	86,7	69,7	82,8	5,43	5,68	7,82	71,1	79,6	10,8	11,4
Germany	42,8	55,1	52,9	31,3	15,8	79,8	87,4	73,0	79,6	5,42	5,90	7,62	74,1	78,0	10,1	11,6
Sweden	48,5	56,3	39,2	37,2	23,7	79,0	85,4	69,1	75,8	5,03	6,23	7,44	76,4	79,2	8,7	11,0
Netherlands	40,6	54,9	50,7	38,9	10,4	85,8	85,5	66,3	82,1	4,78	6,10	8,11	80,0	66,6	8,5	9,4
Spain	39,1	55,3	49,7	35,1	15,2	79,7	79,4	82,2	74,4	5,03	5,37	7,46	77,5	83,9	10,2	10,8
Italy	36,2	55,2	47,1	40,8	12,1	73,3	75,5	81,6	76,9	5,64	5,60	7,24	57,4	75,5	11,2	12,8
France	49,1	54,2	55,9	38,1	5,9	79,6	74,2	80,7	75,9	4,80	5,72	7,26	65,0	81,2	9,7	11,4
Denmark	46,4	55,4	45,0	38,4	16,6	85,9	85,7	73,2	72,7	5,30	6,31	7,74	80,1	81,7	9,1	11,1
Greece	29,7	55,5	48,3	30,4	21,3	86,8	86,2	89,1	81,4	5,63	5,32	7,48	67,7	66,3	11,7	12,3
Switzerland	41,7	55,8	45,5	33,7	20,8	91,3	85,9	78,1	87,3	4,95	6,19	8,43	79,8	79,9	8,5	9,3
Belgium	41,5	55,1	50,1	39,0	10,9	84,4	78,1	79,6	72,5	5,28	5,71	7,89	70,9	77,9	10,3	10,9
Total	*42,4*	*55,0*	*50,9*	*35,7*	*13,3*	*80,0*	*81,6*	*77,0*	*77,9*	*5,22*	*5,79*	*7,54*	*70,6*	*78,1*	*10,0*	*11,4*

(*) Those statistics concern the sample of workers aged 50 to 65. The method used to obtain indicators related to work characteristics are presented in the text.

Table 2 : Health status and workplace organisation: descriptive statistics (*)

	Men				**Women**			
	Good self-reported health	No risk of depression	No limitation with activities	No chronic disease	Good self-reported health	No risk of depression	No limitation with activities	No chronic disease
Difference of prevalence								
between a low and a high demand	8,2	0,8	6,2	-1,2	10,8	7,9	10,8	6,0
	(=86,1–77,9)	(=88,7–87,9)	(=81,7– 75,6)	(=79,1–80,3)	(=85,0-74,3)	(=75,2–67,4)	(=80,1-69,3)	(=79,5 – 73,5)
between a high and a low control	8,5	6,7	5,6	2,0	14,4	13,4	5,2	6,3
	(=84,0–75,5)	(=92,6–85,9)	(=82, 3–76,7)	(=80,9-78,9)	(=86,4-72,0)	(=78,1-64,7)	(=76,2–71,0)	(=79,5-73,2)
between a high and a low reward	11,6	10,5	10,6	12,0	15,5	23,5	9,0	8,4
	(=85,7-74,1)	(=92,4-82,0)	(=82,5-71,8)	(=83,5-71,5)	(=85,0-69,5)	(=80 ,4-56,8)	(=78,6-69,6)	(=80,4-72,0)
between a low and a high "Demand/Control" ratio	9,9	2,7	9,2	1,8	14,2	12,1	10,6	6,5
	(=86,0–76,2)	(=89,8-87,1)	(=84,2-75,0)	(=80,3–78,4)	(=87,0–72,8)	(=77,0-65,0)	(=79,1-68,5)	(=80,6-74,1)
between a low and a high "Demand/Reward" ratio	13,9	6,3	12,2	4,0	13,7	15,2	13,2	9,5
	(=89,0–75,2)	(=91,9-85,6)	(=86,0-73,8)	(=81,2-77,2)	(=85,1-71,4)	(=78,8-63,6)	(=80,0-66,8)	(=81,3-71,8)
Support at work	4,6	9,1	7,5	3,5	7,9	12,7	5,8	3,7
	(=82,3-77,7)	(=91,5-82,5)	(=81,7-74,3)	(=80,0-76,5)	(=82,0-74,1)	(=78,6-65,9)	(=72,4-66,6)	(=77,1-73,4)
Job security	3,1	9,3	2,3	3,3	11,4	13,7	6,6	7,5
	(=81,5-78,4)	(=91,0-81,6)	(=79,8-77,4)	(=79,7-76,4)	(=80,0-68,6)	(=74,7-61,0)	(=73,8-67,2)	(=77,6- 70,1)

(*) Those statistics concern the sample of workers aged 50 to 65. The method used to obtain the indicators related to work characteristics are presented in Annex 1.

Table 3: Health status and workplace organisation, *ceteris paribus* (First step)

	Men								Women							
	Good self-reported health		No risk of depression		No limitation with activities		No chronic disease		Good self-reported health		No risk of depression		No limitation with activities		No chronic disease	
	Coef		Coef		Coef		Coef		Coef		Coef		Coef		Coef	
Physically demanding work	-0,14	**	0,07		-0,08		-0,01		-0,05		-0,00		-0,08	**	-0,04	
Constant pressure because of a heavy workload	-0,08	*	-0,14	**	-0,01		-0,05		-0,11	**	-0,21	***	-0,16	***	-0,08	
Little freedom to decide how to do my work	-0,02		-0,08		-0,02		-0,05		-0,06		-0,01		0,00		0,01	
No opportunity to develop new skills	-0,11		-0,04		-0,05		0,06		-0,12	*	-0,10	*	-0,02		-0,05	
No recognition for my work	-0,06		-0,21	***	-0,12	*	-0,01		-0,10		-0,19	**	-0,01		0,10	*
Salary incorrect, relatively to psycho. demand	-0,23	***	-0,10		-0,1 3	***	-0,12	**	-0,23	***	-0,11	**	-0,11	**	-0,08	*
No prospects of personal advancement	-0,10	***	-0,08		-0,08	*	-0,08	*	-0,04		-0,07		-0,18	**	-0,10	*
No support at work	-0,05		-0,16	***	-0,10	*	-0,05	*	-0,13		-0,20	***	-0,19	**	-0,11	*
Job insecurity	-0,06	*	-0,25	***	0,00		0,02		-0,28	**	-0,16	**	-0,10	*	-0,09	*
Sector (Ref : private sector)																
Public	-0,03		-0,04		0,02		-0,12	*	-0,08		-0,06		-0,12	*	-0,10	
Independant	0,09	*	0,03		0,07		0,12	**	0,16	*	-0,07		0,18	**	0,11	
Manager (Ref : no)																
Yes	0,15	***	0,09		-0,00		0,03		0,14		0,12	**	0,17	**	0,08	
Education (Ref : primary)																
Secondary	0,20	***	0,09		0,14	**	0,00		0,28	**	0,14	**	0,19	**	0,09	
Tertiary	0,37	***	0,09		0,21	**	0,12	**	0,39	***	0,15	**	0,17	**	0,08	
Household (Ref : living alone)																
Couple without child	-0,01		-0,15	*	0,02		-0,12		-0,05		-0,11		0,01		0,14	
Couple with child(ren)	0,12	*	-0,09		0,15	**	-0,04		0,06		-0,10	**	0,04		0,02	
Heath of spouse (Ref : bad health status)																
Good	0,21	***	0,23	***	0,12	**	0,05		0,20	**	0,16	**	0,11	*	0,10	
Body mass index (Ref : normal or low BMI)																
High	-0,07	*	0,03		-0,04		-0,24	***	-0,19	**	-0,10	**	-0,12	*	-0,28	***
Obesity	-0,40	***	-0,15	**	-0,23	***	-0,58	***	-0,45	***	-0,21	***	-0,33	**	-0,52	***
Tabacco (Ref : smoker)																
Don't smoke	0,07		-0,03		0,08	*	0,16	***	-0,11	**	0,03		-0,01		-0,09	
Smoker	0,18	***	0,15	**	0,17	***	0,25	***	-0,00		0,13	**	0,01		0,09	*
Age (Ref : 50-54)																
55-59	-0,15	**	0,01		-0,13	*	-0,20	***	-0,08		0,15	**	-0,05		-0,26	***
60-65	-0,22	***	0,15	**	-0,24	**	-0,48	***	-0,15	**	0,19	**	-0,13		-0,49	***
Country (Ref : Switzerland)																
Austria	-0,51	***	0,09	**	-0,24	***	-0,05	**	-0,08	**	0,07	***	0,21	***	-0,31	***
Germany	-0,42	***	0,19	***	-0,03	***	-0,08	**	-0,33	***	0,22	***	-0,04	*	-0,26	***
Sweden	-0,35	***	0,02		-0,04	*	-0,23	***	-0,25	***	0,20	***	-0,08	**	-0,29	***
Netherlands	-0,24	***	-0,06	**	-0,30	***	-0,11	***	-0,06	**	0,19	***	-0,30	***	-0,26	***
Spain	-0,30	***	-0,10	***	0,18	***	-0,21	***	0,00		-0,07	**	0,27	***	-0,53	***
Italy	-0,43	***	-0,32	***	0,38	***	-0,20	***	-0,24	***	-0,07		0,47	***	-0,27	***
France	-0,48	***	-0,40	***	0,18	***	-0,29	***	0,02		-0,25	***	0,18	***	-0,47	***
Denmark	-0,31	***	-0,13	***	-0,07	**	-0.39	***	-0,04		0,25	***	-0,11	***	-0,46	***
Greece	-0,10	**	-0,01		0,70	***	0,07	**	0,15	***	0,17	***	0,69	***	-0,15	***
Belguim	0,20	**	-0,24	***	0,08	**	-0,36	***	0,16	***	-0,04		0,17	***	-0,49	***
Constant	1,37	***	1,52	***	0,79	***	1,30	***	1,22	***	0,81	***	0,79	***	1,47	***
corr (2;1)	0,35	***							0,31	***						
corr (3;1)	0,58	***							0,56	***						
corr (4;1)	0,43	***							0,45	***						
corr (3;2)	0,31	***							0,29	***						
corr (4;2)	0,26	***							0,27	***						
corr (4;3)	0,38	***							0,44	***						
Loglikelihood	-6928,5								-6554,7							
N	4 200								3 392							

Table 4 : Health status and workplace organisation, *ceteris paribus*

(Second step)

Significativity : * : 10 %, ** : 5 %, *** : 1 %	Men								Women							
	Good self-reported health		No risk of depression		No limitation with activities		No chronic disease		Good self-reported health		No risk of depression		No limitation with activities		No chronic disease	
	Coef		Coef		Coef		Coef		Coef		Coef		Coef		Coef	
Demand (Ref: high)																
Middle	0,05		0,00		0,09		-0,01		0,09		0,10	**	0,13	**	0,05	
Low	0,18	**	0,07		0,09	*	0,04		0,17	**	0,19	**	0,25	***	0,08	
Control (Ref: low)																
Middle	0,09		0,02		0,03		0,02		0,16	**	0,16	**	0,01		0,14	**
Low	0,16	**	0,13		0,10		-0,01		0,10	*	0,11	**	0,01		0,02	
Reward (Ref: low)																
Middle	0,11		0,08		0,10	*	0,05		0,13		0,17	***	0,01		0,03	
Low	0,28	***	0,24	***	0,21	***	0,12	**	0,31	***	0,30	***	0,23	**	0,17	*
No support at work	-0,05		-0,23	***	-0,13	**	-0,07	**	-0,12		-0,20	***	-0,13		-0,02	
Job insecurity	-0,06	*	-0,25	**	-0,01		-0,01		-0,24	**	-0,17	**	-0,12	**	-0,11	**

Tableau 5: Health and "psychological demand/decision latitude" ratio, *ceteris paribus*

(Third step)

Significativity : * : 10 %, ** : 5 %, *** : 1 %	Men								Women							
	Good self-reported health		No risk of depression		No limitation with activities		No chronic disease		Good self-reported health		No risk of depression		No limitation with activities		No chronic disease	
	Coef		Coef		Coef		Coef		Coef		Coef		Coef		Coef	
Ratio Demand / Control (Ref: ratio fort)																
Middle	0,15	*	0,02		0,10		0,01		-0,08		0,06		0,13	**	-0,05	
Low	0,21	**	0,07		0,16	**	0,05		0,13	*	0,22	***	0,24	***	0,05	
Reward (Ref: low)																
Middle	0,11		0,09		0,09	*	0,05		0,15	*	0,18	***	0,01		0,05	
Low	0,28	***	0,25	***	0,21	***	0,13	**	0,34	***	0,31	***	0,22	***	0,18	**
No support at work	-0,06		-0,24	***	-0,13	**	-0,07	**	-0,14		-0,21	***	-0,12		-0,03	
Job insecurity	-0,06	*	-0,26	***	-0,01		-0,02		-0,25	**	-0,18	**	-0,11	*	-0,11	**

Tableau 6: Health and "psychological demand/reward" ratio, *ceteris paribus*

(Third step)

Significativity : * : 10 %, ** : 5 %, *** : 1 %	Men								Women							
	Good self-reported health		No risk of depression		No limitation with activities		No chronic disease		Good self-reported health		No risk of depression		No limitation with activities		No chronic disease	
	Coef		Coef		Coef		Coef		Coef		Coef		Coef		Coef	
Ratio Demand / Reward (Ref: high ratio)																
Middle	0,16	**	0,13	**	0,16	*	0,05		0,25	***	0,24	***	0,17	**	0,13	**
Low	0,33	***	0,23	***	0,17	**	0,07		0,24	***	0,30	***	0,34	***	0,15	**
Control (Ref: low)																
Middle	0,10		0,03		0,03		0,03		0,17	***	0,17	***	0,02		0,14	**
Low	0,16	**	0,14		0,11		0,02		0,12	**	0,12	**	0,02		0,03	
No support at work	-0,07	*	-0,26	***	-0,16	**	-0,09	**	-0,17		-0,24	***	-0,15	*	-0,04	
Job insecurity	-0,06		-0,26	***	-0,01		-0,02		-0,25	**	-0,19	**	-0,12	**	-0,12	**

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