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Working Conditions, Lifestyles and Health*

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Abstract: The aim of this paper is to investigate whether employee health is affected by the environment in which the individual works - in terms of both physical and psychosocial working conditions - and by his or her lifestyle. Health measures are computed from Danish data, and refer to both self assessed general health and two more objective health measures: mental health specific to work-related problems, and physical health. We find that both bad working conditions and bad lifestyles reduce health, especially in its self-assessed component. The impact of lifetsyle indicators have a more modest health impact on both physical and mental health.

JEL Classification: I1, C0

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1. Introduction

Workers' health has become a priority in the policy agenda both at the EU and at the national level. Improving health status is recognised as a major concern not only for individuals, but also for the development of the economic system. Healthy individuals live better, are more employable and, to the extent to which health is considered a human capital input, they produce positive externalities for the society as a whole.

Among the determinants of the health status, a growing attention is addressed to the role played by specific behaviours, such as 'good' lifestyle practices, and by the quality of jobs. More specifically, unhealthy behaviors, i.e., smoking, heavy drinking, adverse food habits, physical inactivity, and related risk factors such as obesity are key modifiable determinants of major preventable diseases. According to WHO estimates, up to 80% of cases of coronary heart disease, 90% of type 2 diabetes cases, and one-third of cancers can be avoided by increases physical activity, healthier diet and quitting smoking (World Health Organisation, 2008). Moreover, the work environment has been modified by the period of rapid transformation and changes in the organisation of the production system, with an increase in the share of atypical jobs and a reduction of hierarchical levels, as well as a growth of service oriented work. In many cases, the content of jobs has changed, with a shift from occupations with manual and 'hard' contents to others with a prevalence of soft and intellectual tasks.

As a result, the traditional sources of adverse physical working conditions are declining, whereas the share of workers subject to psychological job stressors is increasing (Cappelli et al., 1997). A greater importance of "immaterial" job attributes such as stress and work overload relative to strenuous physical working conditions may have non neutral effects on the health of individuals, with a worsening in its mental versus its physical component. Indeed, there is evidence that mental health has worsened especially among the low-skilled and those subject to demanding working conditions (OECD, 2008; Cottini and Lucifora, 2010; Cottini 2012). The EU commission has recognised the importance of job quality and decent working conditions in the implementation of the European Employment Strategy (EU 2001). In particular, through the Framework Directive 89/391/EEC and its individual directives, the European Union clearly identifies that one of the main challenges facing employers today is the increasing importance of `emerging' risks, such as stressful working conditions, and much of the effort of the Europen Agency for Safety and Health at Work is recently addressed to a better understanding of how health and safety risks are actually managed at the workplace level.

The aim of this paper is to study whether employee health is affected by the environment in which the individual works and by his or her lifestyles using individual and workplace data for

Denmark. Whilst the relationship between lifestyle indicators and self-assessed general health has been recently investigated (e.g. Contoyannis and Jones, 2004), the role that working conditions could play in the same context has not received the same attention yet. However, adverse environmental job hazards and, more in general, organisational factors are important determinants of perceived health. From a policy perspective Denmark represents an interesting country to study.

On the one hand, in recent years it has introduced and implemented many wokplace policies targeted to improve health and safety - especially in its mental component. This is reflected, for example, in the high and above-the-EU-average percentage of establishments surveyed by the ESENER in 2009 that declared the existence of procedures to alleviate work related stress and,more in general, the burden of job demands.[2] In general, the survey indicates that at the cross country level there is a negative correlation between the percentage of establishments covered by procedures that deal with work-related stress factors and concerns for the same factors among establishments. Of course, this negative correlation may be spurious and affected by reverse causality and simultaneity biases. On the other hand, Denmark is characterised by high levels of employment security (the so called flexicurity model). At the 'micro' level, under this 'macro' scheme of social insurance - employment protection instead of job protection - job characteristics such as job insecurity are expected not to have a sizeable impact on workers' well being and on perceived health. In this context, it becomes important to shed more light on the extent to which work-related factors and individual behaviours can affect physical and mental health. In turn, this would allow a more accurate analysis of the impact of policy interventions on the well-being of individuals.

The data we use derive from two different sources that are matched through individual identifiers. First is the "Danish Work Environment Cohort Study (DWECS)" which consists in the 2005 and 2000 waves of a panel data collected every 5 years by the Institute for Occupational Health (AMI). Second is Statistics Denmark Integrated Labour Market Database (IDA), which comprises the Danish population of individual and establishment administrative records together with background characteristics, such as annual earnings and demographics. We are able to control for a wide set of working conditions and lifestyles and study their effects on three different health indicators. Our findings show that, in general, bad lifestyles and adverse working conditions have a negative association with self assessed health. Results for simple probit indicate a negative and significative gradient for smoking and obesity, while the negative effect of drinking is associated with a coefficient which is not statistically significant. Working conditions exert a positive effect on

[2]On the other hand, in Denmark the percentage of establishments' managers and employees representatives saying that job demands and work-related stress are of major concern for health and safety at work is below the EU average.

the probability of reporting good health. With respect to working conditions simple probit estimates suggest they always play a negative and significant role also for the mental and physical health components. When we take into account the endogeneity of working conditions and lifestyles we find that the latter have a modest net impact on both PH and MH while effects are maintained with respect to self assessed health indicators. On the contrary working conditions always play a substantial role.Our results suggest that a simple probit may not be fully adequate as it tends to underestimate the true effect of lifestyles and working conditions on health.

The remainder of the paper is organised as follows. In Section 2 we review the relevant literature and describe the economic framework, while the data and the Danish institutional context are overviewed in Section 3. In Section 4 we put forward the empirical specification and in Section 5 we present the main results for the effect of working conditions and lifestyle on individual's health. Section 6 concludes.

2. Related literature and economic background

While the study of lifestyle and health outcomes has been widely studied by epidemiologists (Breslow 1999, Hu et al. 2005; Patja et al. 2005; Poikolainen 1995 among others), only more recently economists have started to focus their attention on the study of behaviours that can play a role in the health production process. However, an extensive body of literature exist in the areas of medicine and occupational health, whereas studies combining these topics are dispersed and have produced unconvincing results (Netterstrøm et al. 1991; Hellerstedt and Jeffery 1997; Otten, Bosma and Swinkels 1999; Siegrist and Rödel 2006; Borg and Kristensen, 2000).

Within the economics literature, one of the first empirical study that models health production taking into account lifestyles is developed by Kenkel (1995). The author estimates health production functions using several output measures, in order to assess the impact of lifestyles on adult health. He finds that health is affected by several lifestyle choices such as diet, smoking, exercise, alcohol consumption, sleep, weight (relative to height), and stress. Other have focused on how single behaviours such as smoking are determined with health (see, e.g., Blaylock and Blisard, 1992 and Mully and Portney, 1990) or have examined interactions between lifestyle choices without the basis of a structural model (see, e.g., Hu et al., 1995). Contoyannis and Jones (2004) estimate the structural parameters of a health production function, together with the reduced form parameters for the lifestyle equations using panel data from the Health and Lifestyle Survey (HALS) conducted in the United Kingdom in 1984 and 1991. In particular they use Maximum Simulated Likelihood (MSL) for a multivariate probit (MVP) model with discrete indicators of lifestyle choices and self-assessed health (SAH). They find evidence of a reduction of the influence of socioeconomic characteristics on health once lifestyle are included in the model. In particular they find that sleeping well, exercising, and not smoking in 1984 have dramatic positive effects on the probability of reporting excellent or good SAH in 1991, and that these effects are much larger having accounted for endogeneity of lifestyles.

On the work-related variables side, Robone et al. (2011) use the BHPS panel to analyse whether health is hampered by adverse working and contractual conditions. They distinguish between self-assessed health and psychological well-being. The working conditions variables are standard controls such as shift work, overtime, unions, supervision, job satisfaction, which are only proxies of the more accurate conceptual categories developed by the literature. They find that being unsatisfied with working hours is negatively related with health, especially in the case of part-time jobs. Having low expectations about future career advancements reduces the health of temporary workers.

Datta Gupta and Kristensen (2008) use ECHP panel data for Denmark, France and Spain to detect a causal relationship between work environment indicators and general health and work related health. However, their proxy for working aspects is a single variable for individual satisfaction with the work environment. Moreover, the authors are not able to distinguish between mental and physical health. In this context, a separate analysis of the determinants of physical and mental health seems particularly relevant, especially for policy purposes.

A series of studies analyse the link between working conditions and single dimensions of health across countries using the European working conditions survey (Cottini and Lucifora, 2010; Cottini 2012, among others). Overall they show that adverse working conditions, in terms of psychological job demands and physical hazards are strongly associated to workers' mental health conditions, supporting the widely debated perception, that adverse working conditions may harm workers'mental health conditions.

In this context the study that is most similar to ours is Borg and Kristiansen (2000), who using the 1990 and 1995 waves from the DWECS analyse the health effects of both lifestyle and work environment.They use the same survey as us, but we differentiate from them by estimating a more rich and flexible empirical specifications, which is derived from an economic framework and takes advantage of the richness of the information available at the individual level to model the potential endogeneity of lifestyle and working conditions and to control for the simultaneous correlation existing between the unobservable determinants of mental and physical health.

In light of the existing literature and the highlighted issues, our analysis of the relationship between lifestyle, working conditions and health is based on a more integrated approach. First, we acknowledge the multi-dimensional nature of working conditions by including a rich set of work characteristics in estimated health equations. Second, we run separate analysis for physical and mental health. In the next section we will present our reference theory, based on the model developed by Contoyannis and Jones (2004), in which health is considered a consumption good produced in our case using, among others, lifestyle and working conditions as inputs. This allows us to derive a model that constitutes the basis of our econometric framework.

Economic framework

In economic terms, individual's health is typically considered as a multifaceted good having both consumption and capital components, which can be partially produced over time by means of individual choices and environmental determinants. In particular health is affected by both work-related and non-work related activities. Among the former, we consider the role played by job characteristics and the environment in which the work is performed (riskiness, exposure to adverse working conditions). For the latter, our focus is on lifestyle practices and risky behaviours (smoking, for example). Moreover, health is a multifaceted good in the sense that it can be ideally analysed over several dimensions: not only overall health and, for example, health at work: but also distinguishing between its mental and physical components.

Based on these assumptions, a simple economic model may be useful to summarise the main implications for the empirical analysis of Sections 5. Our approach is similar to Contoyannis and Jones (2004), whose theoretical model for lifestyle and health choices can be modified to address our case, where health is also a function of working conditions. For simplicity, we consider health as a consumption good which directly affects current utility. The set up can be easily extended to the infinite horizon case, where health is also an investment good as in Grossman (1972), see Balia and Jones (2008). The implications for the empirical analysis are similar.

The individual's utility may be expressed as follows:

$$U(WC, LS, H; X_U, \varepsilon_u)$$

U is overall utility or satisfaction, which comprises non-work utility (leisure, family time) and work-related utility. The latter depends on a number of job attributes and working conditions WC, which may enter directly the utility function as they are typically not adequately compensated (e.g.: bad working conditions are not fully compensated by higher wages as in Rosen, 1974). At least to some extent, jobs are chosen by individuals, and, therefore, so are their characteristics. Utility is also function of a bundle of costly activities under the label "lifestyle" LS and of health H. X_U and ε_u are vectors of individual observable and unobservable (respectively) characteristics affecting preferences.

We also assume that health (H) is produced with the following technology:

$$H = H(LS, WC; X_H, \varepsilon_H) \tag{1}$$

where X_U and ε_u are exogenous observable and unobservable individual characteristics affecting health. H can be thought either as a scalar (such as the overall general health of the individual), or as a vector of different and health components: for example, physical and mental health; health at work and health at home and so on. The health production function can be substituted into the utility function to get:

$$U(WC, LS, H; X, \varepsilon)$$

where X is the union of the partly overlapping vectors X_U and X_H, and similarly for ε.

To get the solution to the utility maximisation problem relative to LS, WC and H, we need to combine the above equations with money and time constraints, which, in its compact formulation, can be expressed as follows:

$$(p_{LS} + w\tau_{LS} + \pi_{LS})' LS + (p_{WC} + \pi_{WC})' WC \leq TI = m + wT$$

where m is exogenous income, wT is total labour income if the individual uses all the time endowment T to work at the exogenous wage rate w. p_{LS} and p_{WC} are vectors of market and implicit prices of the goods included among 'lifestyles' and 'working conditions'. $w\tau_{LS}$ is product between the opportunity cost of lifestyles practices during leisure time (in terms of forgone income) and the amount of leisure time needed to consume one unit of LS. π_{LS} and π_{WC} are the amount of labour time needed to consume one unit of LS and WC, respectively. Here is implicit the assumption that lifestyles are consumed both at work and at home, while working conditions can be consumed only at work. The opportunity cost of lifestyles in non working time (such as smoking when watching the TV) is forgone labour income, while there is no direct money equivalent for the same activity performed during working time. Hence, $(p_{LS} + w\tau_{LS} + \pi_{LS})' LS$ and $(p_{WC} + \pi_{WC})' WC$ are linear combinations expressing the total money equivalent of the overall cost of lifestyles activities and job characteristics.

By combining the above expressions for utility and time plus money constraint, the solution of the model is rather straightforward. In this way, the shadow price of each good, and therefore, the demand for each lifestyle and working condition, is dependent on the wage rate, which varies across individuals. In particular, the solution to the model allows to define a set of demand functions for optimal levels of LS, WC and H :[3]

$$LS^* = LS(Z, \varepsilon) \tag{2}$$

[3]See Contoyannis and Jones (2004) for details about the formal derivation of demand equations in a similar setting.

$$WC^* = WC(Z, \varepsilon) \qquad (3)$$

$$H^* = H(Z, \varepsilon) \qquad (4)$$

where Z combines X (the set of exogenous individual characteristics of the model X_U and X_H) and all the parameters used in the maximisation problem (in particular, the wage rate w, prices and time shares). ε is the union of ε_u and ε_H. These demand functions are reduced forms and do not allow to evaluate separately preference and technological parameters, that is the impact of lifestyles and working conditions on health indicators, which is the core of our analysis. The empirical models combine (1), (2) and (3), where the former is the structural equation for health and the other two are reduced forms for lifestyle and health. The details of the mapping between theory and empirical modelling, as well as specification issues and identification problems will be discussed in Section 4.

Before moving to the data section, a couple of further considerations. First, in the above discussion we do not consider the effect of the time dimension on actual choices. However, for example in the production of health, the time dimension is indeed important but can be easily accommodated in a simple way by interpreting H as an indicator of current and future health. In this way, we can think at health as dependent also on past lifestyle decisions and working conditions (compare with Balia and Jones, 2008, who specify a dynamic model for the evolution of health). In principle, this may affect the specification of the empirical model (contemporaneous versus lagged effects). We will discuss more on that when describing our estimation methodology. Second, the mapping between the theoretical and the empirical model is of course not perfect. On the one hand, while we have focused on interior solutions, the data reveals the prevalence of corner solutions for lifestyles and working conditions. On the other hand, while we have assumed continuous variables for H, LS and WC, - so that utility can be maximised by differentiation to get continuous demand functions - the data often provide instead binary or discrete indicators, such as ordered measures of self-assessed health or dummies for the presence/absence of a given characteristics (e.g. drinking or not).

3. Data and variables

Description of Variables

From a policy perspective Denmark is a unique country because of the peculiarity of its labour market (i.e. flexicurity) and the increased awareness with respect to psychosocial problems at the firm. In fact in recent years the European recommendations in terms of health and safety at work have been implemented by the National Working Environment Authority through a set of guidelines to improve working conditions and screen enterprises in a systematic manner. [4]

The data we use derive from two different sources that are matched through individual identifiers. First, a panel data collected every 5 years from 1990 to 2005 by the Institute for Occupational Health (AMI),"The Danish Work Environment Cohort Study (DWECS)". The questionnaire contains very detailed work environment information, such as exposure to physical agents (noise, radiation, vibration, etc.), chemical agents, biological agents, safety at the workplace, physical workload, mental strain, work organisation issues, social environment (participation and consultation, equal opportunities, violence at work, etc.), together with occupational, health outcomes and lifestyle information. For the purpose of the paper we focus only on 2000 and 2005 since the full set of lifestyle information is available only in these two waves.

Second we use Statistics Denmark Integrated Labour Market Database (IDA), which comprises the Danish population of individual and establishment administrative records together with background characteristics. Danish administrative registers record individual annual earnings as well as demographic and firm characteristics. This dataset has been widely used elsewhere including Mortensen (2003), Bingley and Westergå rd-Nielsen (2003) or Buhai et al. (2008). It should be noted that, even though IDA comprises the whole population of Danish firms and workers, when matched to the representative survey DWECS that collects information on working conditions and lifestyle we end up with 3,000 observations for each wave.

Health is measured in three different ways. The first is an indicator of self-assessed health (SAH). Respondents were asked to rank their health status with respect to people of their own age. We have transformed the categorical indicator of SAH into a binary variable that takes value 1 if individual perceived health is excellent or good, and 0 if it is fair or poor. This is of course a rather rough measure of individuals' health and subject to many well-known conceptual problems. However, it represents the only available information in many data set and it is also the mostly used indicator in the literature (see Datta Gupta and Kristensen 2007, for a discussion about the limitations in the use of SAH).

Fortunately, the information contained in the data enables us to go beyond SAH and to analyse additional and more disaggregated health dimensions. The second indicator we use

[4]Improving the working environment is of high priority in Denmark and in December 2004 a structured system called "smileys" was introduced to further improve conditions for workers at the workplace. Under this system firms are awarded a smiley (colored either green, yellow or red) that reflects the quality of the working conditions at the firm. A plant obtains a green smiley if it has an acknowledged Working Environment Certificate, and it automatically gets exempted from some of the control measure of the Danish Working Environment Authority. More information here: http://arbejdstilsynet.dk/en/engelsk/regulations/executive-orders/255-off-af-virksomhed-arbmiljo-smiley.aspx. Further, since 2005 the requirements for recognition of an occupational disease also became less strict. As a result, Denmark became one of the few countries in the world to include a mental disorders on the list of occupational diseases, by adding post traumatic stress to the list. However, these changes in regulation do not affect our period of observation.

measures physical health (PH). This is constructed starting from questions on specific objective symptoms related to physical problems. Literally, the questions asks: "Have you felt pain in the last twelve months (for more than 30 days) in the..? (i) neck; (ii) knees; (iii) shoulder; (iv) hand; (v) low back?". For each of these symphtoms a dummy variable was created indicating if the symptom was reported by the individual, and the PH dummy takes value 0 if the individual experienced at least one of these symptoms and value 1 otherwise. While the PH measure is based on the incidence of specific health limitations which individuals are more likely to recall and report truthfully, it is nonetheless also self-reported and a recent study shows, for example, that such self-reported " objective" measures can also contain response error; see, for example, Baker et al. (2001). Moreover, an objective health measure may only be weakly correlated with actual physical incapacity. A pragmatic approach is to assume that true health levels are spanned by our subjective and objective indicators, which are both important as they capture different dimensions of health.

Third, an indicator of mental health problems is also constructed. Its definition uses four types of indicators which capture a series of emotional and mood-related problems. Unlike PH , these indicators are reported by the worker as being work-related. Accordingly, the information on mental health refers to what happens at work only, and we label this variable MH . In particular, we measure mental health problems using a set of self-assessed responses to the following questions : "How much of your working hours during the last month you felt..? (i) nervous, (ii) down and nothing could cheer you up, (iii) blue. Out of the above responses we specified a set of dummies that take value 1 if the worker answers that often/most of the time experiences those symptoms, 0 if not. The MH variable is a dummy taking value 0 for at least one of the morbidity variables taking value 1, and taking value 1 otherwise. We paid particular attention in defining the set of dependent variables as dummy variables taking value 1 if "good health " is reported by the individual with respect to each dimension considered.[5]

It should also be noted that, while SAH is an encompassing measure of health, PH refers to a single dimension of physical health that is related to musculoskeletal diseases. This is highly relevant in this context since over 40 million workers in Europe are affected by musculoskeletal

[5]Of course, the way we use to aggregate the symptoms into MH and PH variables is somehow arbitrary. In principle, synthetic indicators like MH and PH are less informative but more empirically tractable and parsimonious than the underlying symptoms, but the theory provides little guidance on their 'optimal' construction. We experimented a bit with the definitions of MH and PH . In particular, we estimated separate probit equations for each component of either PH and MH , to notice that the effect of LS and WC on, say, the dummies for neck, knees, shoulder, hand and low back pain have the same sign and goes in the same direction, suggesting that the aggregation of the information into a single dummy is still informative. We obtained similar results by analyzing separately the single components of MH . Results are available upon request.

diseases (MSDs) attributable to their work. [6] One in six members of the European Union (EU) workforce now have a long-standing health problem or disability that affects their ability to work, and MSDs account for a higher proportion of sickness absence from work than any other health condition. Despite the growth of stress-related illness among European workers, MSDs remain one of the biggest causes of absence from work. It is estimated that up to 2 % of European gross domestic product (GDP) is accounted for by the direct costs of MSDs each year (Bevan et al.2009).

For what concerns the working condition variables (WC), to facilitate comparison with other studies, we follow the literature and specify them as measures of several aspects of the work environment that has been shown to be significant in describing working conditions at the firm.[7] Thus working conditions are characterized as physical and psychosocial conditions relating to the work environment (Cox, Griffiths and Rial-González 2000). About the latter, key items include psychosocial strain, work arrangements, and work organizational factors, whereas physical work conditions refer to traditional physical work demands, i.e. worker expositions to harmful physical factors or agents hazard exposition such as noise and workload (Cox, Griffiths and Rial-González 2000, Stock et al. 2005).

With reference to psychosocial work conditions we construct four indicators that refer to employee roles, role conflicts in organization, and job insecurity. First we define a variable that takes value 1 if the worker never or seldom feels to have much influence on decisions concerning his/her work, zero otherwise; secondly we construct a variable that takes value 1 if the worker never or rarely receives help from his/her colleagues, zero otherwise. Finally, we construct a variable that accounts for the worker's perception about her job (in)security. This takes value 1 if the worker mentions to worry about at least one of the following situations: (i) Losing job?; (ii) Transferred against will?; (iii) Made redundant because of new technology?, (iv) Difficult to find a new job?[8] Moreover, we define a summary indicator that provides a subjective evaluation of harms related to

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[6]Musculoskeletal conditions comprise over 150 diseases and syndromes, which are usually progressive and associated with pain. They can broadly be categorized as joint diseases, physical disability, spinal disorders, and conditions resulting from trauma. Those conditions with the greatest impact on society include rheumatoid arthritis, osteoarthritis, osteoporosis, low back pain, and limb trauma.

[7]See for example Borg and Kristensen (2000); Datta Gupta and Kristensen (2008); Bockermann and Illmakunnas (2008).

[8]In the occupational health literature two theoretical models predict high health risks in workers exposed to adverse working conditions: the demand-control model (Karasek et al.1988 and Karasek and Theorell 1990) and the effort--reward imbalance model (Siegrist et al.1990 and Siegrist 1996). The first model predicts as the worst combination for one individual's health and well being the joint interaction of high job demand and low job control. Psychological demands create stress, if the worker cannot control this stress because of a low level of control, the accumulation of this unreleased stress has a negative impact on the workers' health. Instead, the second model emphasizes the non reciprocity of social exchange at the firm. 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 these two dimensions.

hazardous physical working conditions experienced at the workplace. This indicator is a dummy variable that takes value 1 if a set of physical hazards is experienced by the worker, such that the lowest category corresponds to the perception by a worker that a feature of working conditions is `very much an adverse factor at the workplace: we recode them as 1 when the worker is 'ever exposed'(scale 1-5) to this particular harm during her working time, and 0 if he/she is never exposed. Namely: physical hazards takes value 1 if the worker was exposed to: (i) noise so loud that he/she has to raise his/her voice to talk with other people; or (ii) vibrations from hand tools; or (iii) vibrations from strike his/her whole body; or (iv) bad lighting , (v) temperature fluctuations; (vi) coldness (work outdoor or in cold rooms) or draft; (vii) skin contact with refrigerants or lubricants; (viii) solvent vapor; (xi) or passive smoke; 0 otherwise.

Also for the definition of lifestyle variables we use an approach that is standard in the literature (as in Borg and Kristensen, 2000; Contoyannis and Jones, 2004; Balia and Jones, 2008). Thus, we specify variables that indicate whether the individual is a non-smoker, a heavy consumer of alcohol and if is obese. Smoking is defined in terms of whether the individual is a current smokers or not Drinking is measured by a binary variable which indicates heavy alcohol consumption in the week before the interview. The indicator for obesity is calculated using the body mass index.[9]

As to individual characteristics, we control for gender, 5 age dummies, marital status, the number of children in the household, and 10 educational levels. The set of workplace attributes included in the estimations are 4 dummies for firm's size, 9 sectoral dummies and 3 occupational dummies.[10] We further control for natural logarithm of individual income and for time dummies. A description of the sample is presented in Table A1 in the Appendix of the paper.

In Table 1 we present some descriptive statistics on the distribution of health, lifestyle and job quality measures. We observe that the self assessed level of health is very good/good for almost 80% of the workers included in the sample. With reference to specific health dimensions, good physical health (in terms of absence of any symptom related to physical problems) is reported by 40% of the sample while good mental health is reported by 60% of the sample (line 3). In general we do not find significant differences by health indicators and across lifestyles and working conditions, but some are worth noticing. These statistics can be informative on the relationship we

[9]The definition of the drinking and obesity variables is different across gender. Drink takes value 1 with more than 2 drinks a day for men, and with more than 1 drink in the case of women. About obesity we follow Contoyannis et al (2004) and construct and indicator that takes value 1 if the BMI is greater than 30 for men and greater than 28.6 for women.

[10]We do not control for working hours since in Denmark, collective agreements fix the maximum number of weekly working hours. This maximum has been 37 hours since 1986, and standard job descriptions and public opening hours rely on this working time. For example the majority of Danish women work full-time and approximately forty percent of them work exactly 37 h a week.

are trying to uncover even thought in some cases seem counterintuitive. For example, obese workers report below average percentages of good SAH, while above average percentages of good physical health. However it should be stressed that the numbers shown in Table 1 could be driven by completely spurious correlations, since many compositional effects can drive the observed association between lifestyle, working conditions and health.

4. Empirical strategy

In the spirit of the theoretical considerations outlined in Section 2, we specify a recursive model for lifestyles, working conditions and health, with structural equations for health indicators and reduced forms for lifestyles and working conditions. For simplicity we consider a linear specification for these processes. The potential endogeneity of LS and WC in health equations is introduced allowing for arbitrary correlation between the errors of the equations in the model. The main complication is that we do not observe true health levels but, instead, binary indicators based on them.

The empirical model is specified as follows:

$$D_i^H = I(\alpha WC_i + \delta LS_i + \beta X_{Hi} + \varepsilon_{Hi} > 0)$$

$$D_i^{LS} = I(\gamma Z_i + \varepsilon_{LSi} > 0)$$

$$D_i^{WC} = I(\theta Z_i + \varepsilon_{WCi} > 0)$$

where $I(\#)$ is an indicator function for the argument being true, D^H is alternatively a dummy for SAH, for PH or for MH. In D^{LS} we include three dummy equations for obesity, drinking and smoking. D^{WC} includes an equation for physical hazards, as well as three equations for repetitive work, feeling no support from colleagues and job worries. Each system (one for each health indicator) has than eight simultaneous equations freely correlated through unobservables. If endogeneity issues were not considered, the model for self-assessed health could be estimated, e. g., with simple univariate probits. They are provided in the section of results and used as a benchmark to be compared with the full models.

The estimation is complicated by the fact that the unobservables ε driving the set of lifestyle and working conditions choices is common and that ε is correlated with ε_h. A long standing psychological and epidemiological literature has advanced several explanations for why we expect working conditions and behavioral risk factors to be empirically correlated. In general, the idea is that individuals may respond to environmental challenges such as strenuous working conditions by modifying their behaviour (Bhui, 2002). Accordingly, employees might show a tendency to compensate strenuous work such as either heavy physical or psychosocial demands with unhealthy behaviors (Prättälä, 1998).

For example, these studies suggest that physically and psychosocially strenuous working conditions and other work-related factors extend their effects outside the workplace and influence the behaviors potentially via coping strategies related to drinking or smoking (Greenberg and Grunberg 1995). As smoking is assumed to ease stress, smokers may smoke most when exposed to strenuous work in order to calm themselves down or to alleviate the perceived stress (Perkins and Grobe 1992, Parrott 1999). Similar considerations apply to other lifestyles such as obesity. In other words, both physical and psychosocial working conditions as well as other work-related factors may correlate with behaviors occurring at work and home subject to the nature of work-related exposure in question.

About the model's specification, we could take the advantage of the longitudinal nature of our data to add a dynamic dimension to the model: for example including lagged values of lifestyles and working conditions in the health equations (Contoyannis and Jones, 2004) or adding lagged health as a predictor of current health to capture its persistence (see Datta Gupta and Kristensen, 2008). But in this case we would loose one of the two waves, which is particularly problematic given that our full sample only counts about 6,000 observations and that the estimation of our structural model is quite demanding in terms of data requirements. For this reason, we do not include lags. However, the recursive nature of the model is consistent with the logic of the theory, where LS and WC may precede H.

Alternatively, to solve for the endogeneity of lifestyles and working conditions, fixed effects estimators for panel data may be used. However, in the case of binary dependent variables and binary endogenous regressors, this class of models suffers for severe limitations: in the probit case this estimator is in general not consistent; in the logit case, the information used to estimate the parameters comes from those individual who change health status across periods. But since in general the persistence in health status is high - and our sample makes no exception - the estimates would be rather imprecise. Accordingly, for the estimates we do not take the advantage of the longitudinal dimension of the data and consider our sample as a pooled cross section.

The fact that our model is non linear and with binary dependent variables makes less attractive the option of using simple 2SLS methods to account for possible endogeneity problems. We then assume normality of the error terms in the health, lifestyle and working conditions equations and specify the model as a multivariate probit. Estimates are obtained with simulated maximum likelihood using the GHK alghoritm (Cappellari and Jenkins, 2003). More precisely, the model has one structural equation for health (either SAH, MH or PH) and seven reduced forms for LS and WC, jointly distributed as a eight-variate normal distribution.[11] The correlated errors have a covariance matrix estimated together with the coefficients. Significance of the correlation coefficients between errors in the D^{LS} or D^{WC} and D^{H} equations indicates a joint determination of the corresponding variables and also account for endogeneity problems. If the errors are not correlated, the estimation of the multivariate probit is equivalent to running separate univarite probits.

Identification

In general, the identification of pooled models with endogenous regressors is based on exclusion restrictions. On the theoretical side, the fact that Z appears in the demand functions (2) and (3) and not in the production function for health (1) may suggest that the variables that enter in Z and not in X_H could be used to achieve identification of health's determinants. This subset of variables includes both the parameters of time and money constraints and the individual characteristics that affect work-related and non work-related utility (listed in X) and that do not affect health determination (X_H). On the empirical side, things are complicated by the fact that many of the parameters in Z (such as implicit prices and time shares) are not observable; moreover, although parameters such as the wage rate have not been specifically included in (1), they are typically found among the regressors in the empirical specification of the health equation(s). As a result, as long as the error terms are partly in common across model equations, identification through exclusion restrictions requires that some variables in X (see Section 3) should not appear in X_H.[12] In our specific case there is however another option available: according to Wilde (2000), given the high non linearity of the recursive multivariate probit model, its parameters are identified through the functional form, with no need of exclusion restrictions.

In our empirical analysis we experimented with both identification approaches: we tried to estimate the model, first, without exclusion restrictions and, then, by setting a number of restrictions that are not rejected by the data. By following the strategy suggested by Wilde (2000), i.e. where each equation has the same set of regressors, we were able to get estimates for SAH and MH, but not for PH since the likelihood did not converge to a global maximum. Fortunately, the results for

[11] In principle we may also think at *MH* and *PH* to be correlated through unobservables.

[12] A similar methodology has been applied by Balia and Jones (2008), who use family background variables as exclusion restrictions to identify lifestyle indicators. Unfortunately, this information is not available in our data set. In a preliminary stage, we also experimented with the approach followed by Contoyannis and Jones (2004), who use one period lags of the exogenous variables X_H as exclusion restrictions for current lifestyle indicators. However, using this strategy only a single cross section is available for the estimates. Maybe because the resulting sample is small as compared to the number of parameters, we encountered several problems to achieve convergence to a global maximum in the likelihood maximization.

SAH and MH obtained without exclusion restrictions (available upon request) are very similar to the ones presented in next section.

We then changed the specification by setting a number of exclusion restrictions. As usual, the main problem with observational data is to figure out what variables can be excluded from X_H and included in Z. In absence of a pseudo-experimental settings, the choice of exclusion restrictions should be motivated on economic grounds. In practice, excluding one set of variables instead of another one is typically also a matter of empirical evaluation. Our strategy is rather pragmatic and based on significance tests: given the limited guidance offered by the economic theory and the limitations imposed by data, we exclude from the health equation the variables that turn out to be jointly insignificant in probit preliminary estimates of the health equations, but are significant determinants of lifestyles and working conditions. We evaluate their relevance by comparing the fit of models with and without these restrictions in terms of penalised likelihood criteria. They are reported in the bottom part of Tables 2, 4, and 6, which in the first two columns contain the main probit results for two specifications: In the first column, all the exogenous variables are included in each health equation (model without exclusion restrictions); in the second column, we excluded from the health equations (either for SAH, MH, and PH) size and sector dummies, and geographical variables for living in the north vs in the south of the country, or in Copenhagen vs outside the main city.[13]

It is easy to see that the models with and without exclusion restrictions produce very similar probit estimates of the main health's coefficients. And this is still true if we look at the full set of regressors (in Tables A2, A3 and A4 in the Appendix). In two out of three cases - for both SAH and PH - the Akaike Information Criterion (AIC) supports the model specification with restrictions as the preferable one.[14] For all the three health indicators, the LR-test of the probit model without versus the model with exclusion restrictions gives credit to the latter, which is then our preferable specification. As a consistency check, we also performed a RESET test, which suggests that the health equations are not misspecified either with or without these restrictions.[15]

[13] A preliminary step, where we estimated the model under alternative identifying assumptions (i.e. by setting different sets of exclusion restrictions), revealed that results are not very sensitive to the choice of variables that may reasonably excluded from the health equation based on significance tests; and by setting a number of exclusion restrictions.

[14] The AIC is computed as $(-2\log L+2p)$, where p is the number of parameters. The fit of the model is better when the AIC is smaller. Similar results would also be obtained using the Bayesian information criterion (BIC).

[15] The RESET test is a useful and generally accepted diagnostic tool in this context, but we must advise that, according to Wooldridge (2002), it cannot be used to test for the presence of omitted variables, but only for the miss-specification of the functional form. The RESET test suggests that the health equations are not missspecified in both cases, i.e. with and without restrictions. In particular, the χ^2-test statistics for the SAH equation with restrictions has a $p-$value well above the conventional level ($p=0.873$). We get similar values for MH and PH equations ($p=0.537$

Besides empirical considerations, our set of exclusion restrictions imply that once we control for wage, occupation (plus all the other individual characteristics), lifestyle and working conditions, differences in health indicators between individuals working in firms of different size or in different industries are not significant. All in all, we believe that this set of restrictions is rather plausible also on economic grounds.

In addition, we also manage to improve the precision of the estimates by imposing additional exclusion restrictions in the reduced form equations for lifestyles and working conditions, i.e. regressors that, on the basis of their statistical significance, are included in the latter and not in the former. In these refined specifications we excluded size and sector dummies from the lifestyles equations, and the geographical dummies from the working conditions equations. Here the idea is that, once we control for all the other characteristics, the attitudes toward smoking, drinking or obesity are affected by the area in which an individual live, which proxies for example the climate or cultural/lifestyle differences between metropolitan and rural areas; rather than influenced by generic attributes of the working place, such as the size of the firm of the industry in which it operates. In general, we notice that results for the two specifications of the multivariate probit (with and without asymmetries) are comparable, i.e. not very sensitive to alternative sets of exclusion restrictions. In this case, LR tests and the evaluation of AIC indicate that the model with and without these asymmetries are almost equivalent from the empirical point of view, and no one is preferable to the other one. This suggests that, as has been found in other papers on similar topics, identification issues may not play a crucial role here.

In the next section we will present results from three model's specifications: first, a standard univariate probit - with and without exclusion restrictions -, i.e. assuming no endogeneity issues; second, a multivariate probit where all the variables excluded from the health equations in lifestyle and working conditions equations; finally, a multivariate probit with asymmetries in the set of regressors of lifestyles and working conditions.

5. Results

Self-Assessed Health

We first comment results for SAH, which are directly comparable with the ones of existing studies on the role played by lifestyle or working conditions on perceived health. The findings for MH and PH, which do not have a close counterpart in the literature yet, will be presented in the next subsection.

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and $p = 0.775$, respectively).

Table 2 includes results from an univariate probit for *SAH* where lifestyles and working conditions are exogenous, and, for the full recursive system estimated by multivariate probit with exclusion restrictions, with or without asymmetries in the set of lifestyles and working conditions. Table 2 presents the Average Partial Effects for the variables of interest and the associated standard deviation, plus the statistical significance of the corresponding coefficients as estimated by probit or multivariate probit models.[16] Next, Table 3, panels a) and b), illustrate the matrices of errors' correlations of the full recursive multivariate probit models, which are useful to evaluate the extent of endogeneity of lifestyles and working conditions on health, as well as the role played by the joint determination of the reduced forms for lifestyle and working conditions in the estimates.

Our findings suggest that, first, bad lifestyles and adverse working conditions have always a negative association with self assessed health in both the exogenous and endogenous models. Results for simple probit estimates indicate a negative and significative gradient for smoking and obesity, with a higher effect of the latter (13% reduction in the probability of reporting good health) than of the former (5%), while the negative effect of drinking is associated with a coefficient which is not statistically significant. All the working conditions considered exerts a positive effect of the probability of reporting good health, with the higher importance attached to having job worries and being subject to physical hazards, with an APE of about 6%.

Once unobservable heterogeneity is accounted for in the multivariate setting, we observe that while the overall picture remains unchanged, still there are some differences in the estimated effect of lifestyles and working conditions on health differences. In particular, drinking gains importance as the associated coefficient become statistically significant, with the higher APE of 19%, at the expenses of smoking, which is no longer statistically significant in the MVP without asymmetries and only barely significant in the one with asymmetries.

For what concerns working conditions, the associated estimated coefficients are still significant except the dummy for repetitive work. Overall, we get that when a variable is statistically significant both in the probit and multivariate probit, its APE is higher in the latter, while the opposite happens for variables not statistically significant in the MVP setting. This suggests that a simple probit may not be fully adequate as it tends to underestimate the true effect of lifestyles and working conditions on health, especially for the most relevant ones.

Our results thus suggest that some of these effects may be partly driven by unobservable

[16]The model is estimated by MSL using the command *mvprob* in Stata. The coefficients of the health equation estimated by the multivariate probit are then used to compute predicted health probabilities from the univariate standard normal. To get the marginal (i.e. partial) effects we averaged predicted probabilities over individual characteristics. The level of significance of the partial effects in Tables 2, 4 and 6 is that of the corresponding estimated coefficients. They are reported in Table A2, A3 and A4 in the appendix for both the simple probit and the multivariate probit models.

heterogeity. This is also reflected by the rich conditional correlation pattern across equations presented in Table 3. First, unobservable determinants of SAH are negatively correlated especially with smoking, among lifestyles; and with not receiving support from colleagues among working conditions. By converse, the statistical association between error terms of SAH other working conditions and lifestyle equations is rather weak. However, and more importantly, there is also substantial correlation between the errors of the reduced forms: in particular, and unsurprisingly, this is true especially within the groups of both physical and psychosocial working condition variables. We also find that the two working conditions spheres - physical and psychosocial - are correlated each other. Among the lifestyles, there exists correlation especially between drinking, smoking on the one hand and obesity on the other hand. Across groups, there are some interesting differences between physical and psychosocial working conditions: for example the former are correlated with all of our lifestyle indicators, the latter especially with being obese.

The above findings are qualitatively similar to those by Contoyannis and Jones (2004). They have a slightly different set of lifestyles, but still find a complex correlation structure between errors of SAH and LS equations and that obesity and physical activity are the only variables who are significant SAH determinats when endogeneity is accounted for. Using the 1990 and 1995 waves of Danish data also used by us, Borg and Kristiensen (2000) estimate a logit model and detect a positive statistical association between a worsening in SAH between 1990 and 1995, and factors like smoking and obesity. Also adverse working conditions of the kind we consider appeared positively correlated with a decrease in perceived health. Using a random effect ordered probit, Datta Gupta and Kristensen (2008) similarly find a positive effect of satisfaction for the work environment on SAH.

All in all, the comparison of our results with that reported in previous studies suggest that, in general, both lifestyles and working conditions should be included in the analysis of health determinants.

Physical and Work-Related Mental Health

It could be argued that the effect of lifestyles and working conditions differ across different components of health. For this reason, a separate treatment of physical and mental health appears particularly important. Tables 4 and 6 are the analogues of Table 2 but for a model where PH and MH are determined together with reduced forms for LS and WC.

We look at simple probit estimates first. As one might expect smoking *shows* a negative effect on physical health with an APE of 7.5%, while drinking negatively affects the likelihood of perceiving good mental health by 6%. Obesity has a negative impact on both health measures and to a similar extent (with an APE of about 4%). The results from the multivariate probit reveal that these univariate probit partial effects are not structural: the coefficients behind the set of negative APE of lifestyles on either PH and MH are never significant at usual levels so that they disappear once endogeneity is accounted for.

There are two exceptions, however: in the MVP model with asymmetries for MH, drinking is found to reduce the probability of having a good mental health by 14%; in the model without asymmetries, smoking increases the likelihood of reporting a good MH by 13%. Other papers found that smoking has a positive effect on some components of mental health (e. g. Parrott, 1999; Warburton, 1992) suggesting that smoking aids mood control and acts through reducing smokers feelings of anxiety and anger.

As far as working conditions are concerned, simple probit estimates suggest they always play a negative and significant role also for the mental and physical health components considered here, with the exception of the dummy for not perceiving support from colleagues, which is insignificant in the equation for PH. As we might expect, while being subject to physical hazard is negatively associated with both PH and MH, the effect is much higher in the first case (the APE is 11.7%) than in the former (6.6%). By converse, being insecure job stability affects more the mental health components (the marginal effect is about 14%) than its physical ones (5%). Instead, the two health spheres are affected similarly by the dummy for repetitive work tasks. Similarly to what we described for SAH, results are quantitatively similar but qualitatively somehow different once we move to the multivariate models for MH and PH. In a sense, the results obtained by accounting for endogeneity issues increase the distance between the estimated impact of (insignificant) lifestyles and working conditions.

Our findings offer interesting insights. First, when we control for simultaneity issues some effects disappear, suggesting again that they are not genuine but due to unobservable systematic preferences or characteristics. In general, we find that lifestyles have a modest net impact on both PH and MH: contrary to working conditions that always play a substantial role, the impact of lifestyles does not survive to the shift from SAH to specific health indicators. Second, almost all the working conditions we consider matter for both MH and PH: for example, strenuous working conditions induce a decrease in our indicator not only of physical health - which is hardly surprising - but also of mental health. Moreover, the magnitude of the two partial effects is similar, suggesting that when the consequences of physical hazards are analysed, their effects on the mental well-being of individuals is as important as that on musculoskeletal diseases.

Further, we find that, on the one hand, our measures of psychosocial working conditions - and especially the support received from colleagues and the presence of job worries - are indeed important determinants of mental health, more than job hazards. In a sense, even after controlling for endogeneity, the climate at the workplace is an important determinant of the mental well-being of individuals, at least for what concerns the dimensions of mental attitudes we considered.

It is interesting to notice that, performing repetitive work tasks plays a statistically significant role on the probability to develop physical health problems - indeed is the working condition with associated the higher partial effect of 18-19% - and not on its mental and stress-related component. The lesson learned from the analysis of psycho-social working conditions is that they have a feed-back effect also on the perceived physical problems and not only on stress-related and mental health components, and this should be taken into account when considering their consequences on individuals' and workers' well-being. As before, the difference between simple and multivariate probits can be motivated by the rich error correlation structure presented in Tables 5 and 7. In general, our measures of lifestyles and working conditions are positively correlated with our two health measures, but only in few cases this correlation is significant. As in the case of SAH, there is a rich pattern of correlation both within working conditions and lifestyles measures, and between the items of these two groups. For example, the error of the dummy for physical hazards is correlated with the errors of all the other reduced forms for LS and WC.

6. Conclusion

In this paper we investigate whether workers' health is affected by their work environment and by their lifestyles. Whilst the relationship between lifestyle indicators and self-assessed general health has been recently investigated (e.g. Contoyannis and Jones, 2004), the role that working conditions could play in this context has not received the same attention yet. However, adverse environmental job aspects and, more in general, organisational factors are important determinants of perceived health. We use Danish data for 2000 and 2005 that derive form two sources: the first is the DWECS, a panel of Danish employees that provides very detailed information on lifestyles, working conditions and different measures of health; the second consists in administrative data (IDA) which comprehend the Danish population of individual and establishments administrative records together with demographic characteristics and annual earnings. The main econometric issue that emerges in our analysis is the endogeneity of the lifestyle and working conditions measures in the health equation. To this purpose we use a multivariate probit that uses the GHK algorithm to estimate a recursive system of equations for health, lifestyle and working conditions. We use three health indicators for self-assessed, mental and physical health.

Our results show that, in general, bad lifestyles – especially smoking and obesity - and adverse working conditions have a negative effect on the health of individuals, whatever measure we use. Drinking is associated with a not statistically significant coefficient, except for mental health. When we take into account the endogeneity of working conditions and lifestyles we find that the latter have a modest net impact on both PH and MH while effects are maintained with respect to self assessed health indicators. We find particularly interesting the negative effect of perceived job insecurity, in a flexicurity economy, on worker's health. This might suggest that also in a system characterised by high levels of employment security, employees do not perceive themselves as completely ensured against the loss of their job and perceived job instability, which still has an impact on their well-being, measured in health's terms.

With respect to lifestyles, the negative effect of drinking on mental health is an interesting result, especially for Denmark. Indeed, a report commissioned by the European Union concludes that: 'however much the continent associates alcohol with Ireland, much of the EU has a serious drinking problem -- with Denmark being something of a standout', while, for example, there is now less concern for the consequences of smoking, which is decreasing. This suggest that the interventions aimed at promoting good lifestyle practices and better working conditions should be particularly targeted to specific behaviours or work conditions, and that they may be particularly effective on those health component (the mental ones) that are increasing in their importance in modern societies and workplaces. Finally, it is worth noticing that one of our main findings is that bad psychosocial job characteristics are important negative determinants of work related mental health also in a country, like Denmark, which has recognised the importance of job stress factors on the mental health of their workers and implemented specific policies.

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Tables

TABLE 1

Lifestyles and working conditions by health status (in percentage points)

	SAH	*MH*	*PH*
Lifestyles:			
Drinker	0.79	0.4	0.63
Smoker	0.78	0.43	0.57
Obese	0.67	0.4	0.56
Working conditions:			
Physical hazards	0.79	0.41	0.57
No support from colleagues	0.79	0.36	0.63
Job worries	0.77	0.34	0.57
Repetitive work	0.55	0.55	0.53
Mean	0.72	0.41	0,57

TABLE 2

Self-assessed health estimates (Average partial effects)

	Probit						*Multivariate probit*					
	With exclusion restrictions			*Without exclusion restrict.*			*With exclusion restrictions*					
							Without asymmetries			*With asymmetries*		
	APE	*St.Dv.*	*Stat. Sign. coeff*	*APE*	*St.Dv.*	*Stat. Sign. coeff*	*APE*	*St.Dv.*	*Stat. Sign. coeff*	*APE*	*St.Dv.*	*Stat. Sign. coeff*
Lifestyles:												
Smoker	-0.051	0.016	***	-0.051	0.017	***	-0.037	0.016		-0.081	0.035	*
Drinker	-0.009	0.003		-0.009	0.003		-0.198	0.063	***	-0.253	0.072	***
Obese	-0.130	0.034	***	-0.129	0.034	***	-0.190	0.061	***	-0.170	0.058	***
Working conditions:												
Physical hazards	-0.056	0.019	***	-0.057	0.019	***	-0.084	0.038	***	-0.081	0.037	***
No support from colleagues	-0.032	0.011	***	-0.031	0.011	***	-0.180	0.061	***	-0.188	0.063	***
Job worries	-0.065	0.020	***	-0.064	0.021	***	-0.115	0.046	***	-0.097	0.040	***
Repetitive work	-0.027	0.009	***	-0.026	0.009	***	-0.0196	0.009		-0.0086	0.004	
N. obs.	6,071			6,071			6,071			6,071		
Log likelihood	-2,521.61			-2,515.61			-25,327.86			-25,396.21		
AIC	5,104.09			5,115.23			51,263.72			51,282.42		
LR-test: probit without *vs* with restrictions	Chi2(11) = 10.86; P-value = 0.452											
LR-test: Multiv. probit without vs with asymmetries							Chi2(59) = 136.69; P-value = 0.000					

Notes: The multivariate probit estimates are obtained by Maximum Simulated Likelihood with the mvprobit command in Stata. Full results in terms of estimated coefficients are reported in Table A1 for the probit model with and without exclusion restrictions and for the multivariate probit without asymmetries. Full results for the model with asymmetries in the set of regressors for the reduced forms for lifestyles and working conditions are available upon request. The APE (Average Partial Effects) are calculated for each observation using the marginal (i.e. univariate) distribution of the health outcome, and then averaging over individuals. In the probit case, this is different from using the post-estimation command in Stata dprobit, which evaluate the marginal effect at the mean of observable characteristics. Sample standard deviations, that measure variation of the partial effects across individuals are reported along with the corresponding APE. We also report here the statistical significance of the associated coefficient, as taken from Table A2. The exclusion restrictions in the probit are the sector, size and regional dummies. The asymmetries imposed in the set of regressors of the reduced forms are as follows: the equations for lifestyles include the regional dummies and exclude size and sector dummies; the equations for working conditions contains size and sector dummies but not regional dummies and dummies for the number of children. Statistical significance of coefficients: * = 10% level; ** = 5% level; *** = 1% level.

TABLE 3

Correlation coefficients from the multivariate probit for self-assessed health (SAH)

Panel A) Model with asymmetries

	SAH	*Smoker*	*Drinker*	*Obese*	*Phys. hazards*	*No supp from colleag*	*Job worries*	*Repetit. work*
SAH	1							
Smoker	0.451***	1						
Drinker	0.103	-0.024	1					
Obese	0.105	0.228***	-0.086***	1				
Physical hazards	0.106	0.077***	0.121***	0.042**	1			
No support from colleagues	0.375***	-0.007	0.023	-0.061***	0.049***	1		
Job worries	-0.018	0.014	0.016	0.073***	0.196***	0.020***	1	
Repetitive work	0.118	0.039	0.014	0.026	0.143***	0.078***	0.087***	1.000
LR-test: All correl. coeffs. set to zero (no endogeneity)	Chi2(28) =299.60; p-value = 0.0000							

Panel B), Model without asymmetries

	SAH	*Smoker*	*Drinker*	*Obese*	*Phys. hazards*	*No supp from colleag*	*Job worries*	*Repetit. work*
SAH	1							
Smoker	0.357***	1						
Drinker	0.138	-0.022	1					
Obese	-0.008	0.227***	-0.092***	1				
Physical hazards	0.119	0.075***	0.121***	0.042***	1			
No support from colleagues	0.363***	-0.011	0.023	-0.062***	0.049***	1		
Job worries	0.009	0.010	0.012	0.072***	0.193***	0.021***	1	
Repetitive work	0.156	0.037	0.016	0.025	0.141***	0.078***	0.086***	1
LR-test: All correl. coeffs. set to zero (no endogeneity)	Chi2(28) =292.34; p-value = 0.0000							

Notes: Statistical significance of coefficients: * = 10% level; ** = 5% level; *** = 1% level.

TABLE 4

Physical health estimates (Average partial effects)

	Probit						*Multivariate probit*					
	With exclusion restrictions			*Without exclusion restrict.*			*With exclusion restrictions*					
							Without asymmetries			*With asymmetries*		
	APE	*St.Dv.*	*Stat. Sign. coeff*	*APE*	*St.Dv.*	*Stat. Sign. coeff*	*APE*	*St.Dv.*	*Stat. Sign. coeff*	*APE*	*St.Dv.*	*Stat. Sign. coeff*
Lifestyles:												
Smoker	-0.075	0.007	***	-0.076	0.008	***	0.11	0.002		-0.040	0.007	
Drinker	0.018	0.002		0.020	0.003		0.012	0.002		-0.006	0.001	
Obese	-0.038	0.004	**	-0.037	0.004	***	-0.046	0.008		-0.073	0.013	
Working conditions:												
Physical hazards	-0.117	0.011	***	-0.117	0.011	***	-0.148	0.025	***	-0.133	0.023	***
No support from colleagues	-0.0023	0.0002		-0.0004	0.0001		-0.173	0.027	***	-0.170	0.027	***
Job worries	-0.054	0.006	***	-0.054	0.006	***	-0.141	0.022	**	-0.137	0.022	***
Repetitive work	-0.046	0.005	***	-0.045	0.005	***	-0.182	0.028	**	-0.191	0.029	**
N. obs.	6,071			6,071			6,071			6,071		
Log likelihood	-3,820.69			-3,815.37			-26,628.01			-26,698.43		
AIC	7,703.39			7,714.75			53,864.02			53,886.87		
LR-test: Probit without *vs* with restrictions	Chi2(11) = 10.63, p-value = 0.473											
LR-test: Multiv. probit without vs with asymmetries							Chi2(59) = 140.668; p-value = 0.0000					

Notes: The multivariate probit estimates are obtained by Maximum Simulated Likelihood with the mvprobit command in Stata. Full results in terms of estimated coefficients are reported in Table A1 for the probit model with and without exclusion restrictions and for the multivariate probit without asymmetries. Full results for the model with asymmetries in the set of regressors for the reduced forms for lifestyles and working conditions are available upon request. The APE (Average Partial Effects) are calculated for each observation using the marginal (i.e. univariate) distribution of the health outcome, and then averaging over individuals. In the probit case, this is different from using the post-estimation command in Stata dprobit, which evaluate the marginal effect at the mean of observable characteristics. Sample standard deviations, that measure variation of the partial effects across individuals are reported along with the corresponding APE. We also report here the statistical significance of the associated coefficient, as taken from Table A3. The exclusion restrictions in the probit are the sector, size and regional dummies. The asymmetries imposed in the set of regressors of the reduced forms are as follows: the equations for lifestyles include the regional dummies and exclude size and sector dummies; the equations for working conditions contains size and sector dummies but not regional dummies and dummies for the number of children. Statistical significance of coefficients: * = 10% level; ** = 5% level; *** = 1% level.

TABLE 5

Correlation coefficients from the multivariate probit for physical health (PH)

Panel A) Model with asymmetries

	PH	*Smoker*	*Drinker*	*Obese*	*Phys. hazards*	*No supp from colleag*	*Job worries*	*Repetit. work*
PH	1							
Smoker	0.035	1						
Drinker	0.078	-0.016	1					
Obese	-0.039	0.228***	-0.086***	1				
Physical hazards	0.109	0.077***	0.121***	0.042*	1			
No support from colleagues	0.313**	-0.016	0.021	-0.061***	0.049***	1		
Job worries	0.285*	0.009	0.013	0.070***	0.196***	0.024	1	
Repetitive work	0.188*	0.038	0.020	0.025	0.142***	0.080***	0.088***	1
LR-test: All correl. coeffs. set to zero (no endogeneity)			Chi2(28) =294.45; p-value = 0.0000					

Panel B), Model without asimmetries

	PH	*Smoker*	*Drinker*	*Obese*	*Phys. hazards*	*No supp from colleag*	*Job worries*	*Repetit. work*
PH	1							
Smoker	-0.006	1						
Drinker	0.042	-0.017	1					
Obese	-0.132	0.228***	-0.092***	1				
Physical hazards	0.129	0.076***	0.120***	0.042*	1			
No support from colleagues	0.323***	-0.018	0.019	-0.062***	0.049***	1		
Job worries	0.270*	0.007	0.009	0.068***	0.194***	0.023	1	
Repetitive work	0.197*	0.036	0.019	0.024	0.140***	0.081***	0.086***	1
LR-test: All correl. coeffs. set to zero (no endogeneity)			Chi2(28) =291.17; p-value = 0.0000					

Notes: Statistical significance of coefficients: * = 10% level; ** = 5% level; *** = 1% level.

TABLE 6

Mental health estimates (Average Partial Effects)

	Probit						*Multivariate probit*					
	With exclusion restrictions			*Without exclusion restrict.*			*With exclusion restrictions*					
							Without asymmetries			*With asymmetries*		
	APE	*St.Dv.*	*Stat. Sign. coeff*	*APE*	*St.Dv.*	*Stat. Sign. coeff*	*APE*	*St.Dv.*	*Stat. Sign. coeff*	*APE*	*St.Dv.*	*Stat. Sign. coeff*
Lifestyles:												
Smoker	-0.015	0.002		-0.014	0.002		0.137	0.026	*	0.070	0.014	
Drinker	-0.060	0.008	***	-0.062	0.008	***	-0.043	0.010		-0.141	0.035	*
Obese	-0.043	0.006	***	-0.045	0.006	***	-0.119	0.028		-0.115	0.028	
Working conditions:												
Physical hazards	-0.066	0.008	***	-0.067	0.008	***	-0.195	0.035	***	-0.171	0.033	***
No support from colleagues	-0.071	0.009	***	-0.077	0.009	***	-0.212	0.040	***	-0.233	0.042	***
Job worries	-0.147	0.017	***	-0.144	0.017	***	-0.184	0.037	***	-0.200	0.040	***
Repetitive work	-0.032	0.004	***	-0.032	0.004	***	0.066	0.014		0.064	0.014	
N. obs.	6,071			6,071			6,071			6,071		
Log likelihood	-3,837.90			-3,827.25			-26,646.34			-26,716.66		
AIC	7,737.8			7,738.5			53,900.69			53,923.33		
LR-test: Probit without *vs* with restrictions			Chi2(11) = 11.29 p-value = 0.30									
LR-test: Multiv. probit without vs with asymmetries									Chi2(59) = 140.64; p-value = 0.0000			

Notes: The multivariate probit estimates are obtained by Maximum Simulated Likelihood with the mvprobit command in Stata. Full results in terms of estimated coefficients are reported in Table A1 for the probit model with and without exclusion restrictions and for the multivariate probit without asymmetries. Full results for the model with asymmetries in the set of regressors for the reduced forms for lifestyles and working conditions are available upon request. The APE (Average Partial Effects) are calculated for each observation using the marginal (i.e. univariate) distribution of the health outcome, and then averaging over individuals. In the probit case, this is different from using the post-estimation command in Stata dprobit, which evaluate the marginal effect at the mean of observable characteristics. Sample standard deviations, that measure variation of the partial effects across individuals are reported along with the corresponding APE. We also report here the statistical significance of the associated coefficient, as taken from Table A4. The exclusion restrictions in the probit are the sector, size and regional dummies. The asymmetries imposed in the set of regressors of the reduced forms are as follows: the equations for lifestyles include the regional dummies and exclude size and sector dummies; the equations for working conditions contains size and sector dummies but not regional dummies and dummies for the number of children. Statistical significance of coefficients: * = 10% level; ** = 5% level; *** = 1% level.

TABLE 7

Correlation coefficients from the multivariate probit for mental health (MH)

Panel A) Model with asymmetries

	MH	*Smoker*	*Drinker*	*Obese*	*Phys. hazards*	*No supp from colleag*	*Job worries*	*Repetit. work*
MH	1							
Smoker	0.143	1						
Drinker	0.158	-0.017	1					
Obese	-0.146	0.230***	-0.087***	1				
Physical hazards	0.221***	0.077***	0.122***	0.041**	1			
No support from colleagues	0.330***	-0.011	0.023	-0.061***	0.052***	1		
Job worries	-0.136	0.009	0.008	0.071***	0.194***	0.020	1	
Repetitive work	0.163	0.037	0.019	0.023	0.142***	0.080***	0.089***	1
LR-test: All correl. coeffs. set to zero (no endogeneity)	Chi2(28) =292.4; p-value = 0.0000							

Panel B), Model without asimmetries

	MH	*Smoker*	*Drinker*	*Obese*	*Phys. hazards*	*No supp from colleag*	*Job worries*	*Repetit. work*
MH	1							
Smoker	-0.040	1						
Drinker	0.174	-0.017	1					
Obese	-0.283***	0.228***	-0.094***	1				
Physical hazards	0.251***	0.075***	0.122***	0.040**	1			
No support from colleagues	0.298***	-0.016	0.021	-0.063***	0.051***	1		
Job worries	-0.141	0.009	0.006	0.069***	0.192***	0.020	1	
Repetitive work	0.132	0.036	0.018	0.022	0.140***	0.080***	0.087***	1
LR-test: All correl. coeffs. set to zero (no endogeneity)	Chi2(28) =289.08; p-value = 0.0000							

Notes: Statistical significance of coefficients: * = 10% level; ** = 5% level; *** = 1% level.

Appendix

TABLE A1

Summary statistics

Variable	*Description*	*Mean*	*S.d.*
SAH	Self assessed health	0.78	
MH	mental health	0.43	
PH	physical health	0.64	
Female	1 if female	0.36	
Ageless25	1 if worker is less than 24 years of age	0.125	
Age2534	1 if worker is between 25 and 34 years of age	0.233	
Age3544	1 if worker is between 35 and 44 years of age	0.287	
Age4554	1 if worker is between 45 and 54 years of age	0.223	
Age54plus	1 if worker is more than 54 years of age	0.129	
Educ1	1 if 7-klasse	0.05	
Educ2	1 if 8-klasse	0.016	
Educ3	1 if 9-klasse	0.058	
Educ4	1 if 10-klasse	0.113	
Educ5	1 if gymnasium	0.101	
Educ6	1 if higher commercial exam	0.441	
Educ7	1 if higher technical exam	0.032	
Educ8	1 if vocational education	0.046	
Educ9	1 if boarding school	0.073	
Educ10	1 if BA or more	0.067	
Married	1 if married	0.61	
Child1	1 if has no children	0.54	
Child2	1 if has one child	0.17	
Child3	1 if has two children	0.21	
Child4	1 if has three or more children	0.06	
Sect1	1 for manufactoring	0.28	
Sect2	1 for construction and electricity	0.05	
Sect3	1 for wholesale	0.22	
Sect4	1 for hotels and restaurant	0.034	
Sect5	1 for transport	0.09	
Sect6	1 for financial sector	0.088	
Sect7	1 for PA	0.056	
Sect8	1 for Education	0.11	
Size1	1 for firm size between 1 and 5	0.197	
Size2	1 for firm size between 6 and 50	0.314	
Size3	1 for firm size between 50 and 200	0.129	
Size4	1 for firm size is more than 200	0.234	
Logwage	natural logarithm of real monthly wages	5.21	0.34
Manager	1 if manager	0.03	
White	1 if white collar	0.28	
Blue	1 if blue collar	0.69	

Obesity	1 if obese	0.15
Drink	1 if heavy drinker	0.18
Smoke	1 if currently smoker	0.31
Physical hazards	1 if harmful physical conditions at work	0.39
No support from colleagues	1 if no support from colleagues	0.41
Repetitive work	1 if work is repetitive	0.57
Job worries	1 if worries about job stability	0.35
Reg1	1 if region is Northern area	0.29
Reg2	1 if region is Copenhagen area	0.4
Reg3	1 if region is Southern area	0.31
Y05	1 if year is 2005	0.61

TABLE A2

Probit and Multivariate Probit (without asymmetries) coefficients' estimates for self-assessed health (SAH)

	PROBIT				*MULTIVARIATE PROBIT (with exclusion restrictions. without asymmetries)*															
	With exclusion restrictions		*Without exclusion restr.*																	
Dep. Var(s)	*SAH*		*SAH*		*SAH*		*Smoker*		*Drinker*		*Obese*		*Phys. hazards*		*No supp from colleag*		*Repetit. work*		*Job worries*	
	Coef.	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*
Smoker	-0.211	-4.73	-0.214	-4.78	-0.153	-0.69														
Drinker	-0.041	-0.68	-0.038	-0.64	-0.707	-2.9														
Obese	-0.482	-8.37	-0.477	-8.26	-0.680	-2.62														
Phys. hazards	-0.247	-5.59	-0.255	-5.69	-0.366	-2.03														
No supp. from colleagues	-0.137	-3.32	-0.134	-3.24	-0.707	-3.95														
Job worries	-0.271	-6.51	-0.272	-6.48	-0.463	-2.59														
Repetit. work	-0.118	-2.62	-0.113	-2.5	-0.084	-0.41														
Female	0.105	2.31	0.096	2.06	0.041	0.82	-0.234	-4.76	-0.043	-0.87	-0.117	-3	-0.144	-3.82	-0.091	-2.43	0.293	7.56	0.076	2.01
Ageless25	0.079	0.81	0.074	0.76	0.073	0.76	-0.280	-2.78	0.556	4.68	0.224	2.89	-0.066	-0.83	-0.023	-0.3	-0.096	-1.2	0.170	2.15
Age2534	-0.054	-0.52	-0.063	-0.62	0.048	0.45	0.026	0.24	0.767	6.23	0.318	3.81	-0.121	-1.43	0.194	2.33	-0.068	-0.79	0.439	5.19
Age4554	-0.082	-0.78	-0.098	-0.92	0.075	0.66	0.324	3.03	0.663	5.27	0.311	3.63	-0.169	-1.95	0.237	2.78	-0.050	-0.57	0.671	7.78
Age54plus	-0.121	-1.04	-0.140	-1.2	0.085	0.66	0.492	4.25	0.651	4.81	0.257	2.69	-0.461	-4.82	0.335	3.56	0.053	0.55	0.726	7.64
Educ2	0.043	0.27	0.057	0.36	0.083	0.55	0.086	0.47	0.061	0.36	0.077	0.54	0.190	1.22	0.075	0.52	-0.012	-0.07	0.066	0.46
Educ3	0.271	2.23	0.279	2.29	0.260	2.21	0.300	2.29	0.126	1.03	0.209	2.04	0.027	0.25	-0.197	-1.87	-0.152	-1.3	-0.024	-0.23
Educ4	0.313	2.89	0.315	2.91	0.324	3.06	0.373	3.17	0.022	0.19	-0.014	-0.15	-0.066	-0.69	-0.102	-1.08	-0.312	-2.99	0.109	1.17
Educ5	0.242	2.09	0.235	2.03	0.225	1.9	0.249	1.91	0.018	0.14	-0.158	-1.57	-0.316	-3.09	-0.100	-0.99	-0.517	-4.73	-0.159	-1.58
Educ6	0.264	3.02	0.274	3.12	0.275	3.05	0.266	2.7	-0.106	-1.13	-0.163	-2.08	-0.137	-1.69	0.038	0.49	-0.488	-5.48	-0.153	-1.96
Educ7	0.210	1.49	0.188	1.31	0.202	1.38	0.317	2.01	-0.383	-2.31	-0.448	-3.51	-0.167	-1.38	-0.020	-0.17	-0.650	-5.12	-0.273	-2.23
Educ8	0.214	1.67	0.209	1.62	0.263	1.97	0.381	2.86	-0.228	-1.68	-0.518	-4.6	-0.347	-3.22	0.171	1.6	-0.787	-6.89	-0.160	-1.51
Educ9	0.270	2.2	0.283	2.28	0.287	2.12	0.269	2.05	-0.343	-2.58	-0.537	-4.98	-0.422	-4.05	0.137	1.33	-0.916	-8.18	-0.264	-2.54
Educ10	0.272	2.07	0.260	1.94	0.251	1.7	0.289	2.05	-0.667	-4.13	-0.850	-6.9	-0.575	-5.16	-0.006	-0.05	-0.909	-7.66	-0.127	-1.15
Child2	0.014	0.24	0.012	0.21	0.001	0.02	-0.224	-3.51	-0.073	-1.18	0.020	0.4	-0.016	-0.33	0.084	1.72	0.023	0.46	0.013	0.27

Child3	-0.023	-0.37	-0.025	-0.39	-0.049	-0.83	-0.151	-2.32	-0.177	-2.7	-0.031	-0.58	-0.047	-0.92	0.037	0.73	0.002	0.03	-0.051	-1
Child4	-0.065	-0.72	-0.067	-0.75	-0.106	-1.25	-0.361	-3.57	-0.095	-1.04	-0.087	-1.14	-0.133	-1.8	0.070	0.96	-0.058	-0.78	-0.187	-2.51
Married	-0.100	-1.68	-0.095	-1.6	-0.104	-1.87	-0.007	-0.11	0.096	1.61	-0.184	-3.83	-0.073	-1.55	-0.076	-1.63	-0.061	-1.27	0.006	0.14
Widow	-0.192	-1	-0.186	-0.97	-0.235	-1.21	0.021	0.11	-0.039	-0.18	-0.253	-1.4	0.101	0.57	-0.417	-2.29	-0.256	-1.41	0.017	0.1
Divorced	-0.148	-1.67	-0.144	-1.63	-0.137	-1.55	0.173	1.9	0.007	0.08	0.264	3.55	-0.008	-0.1	-0.113	-1.51	0.134	1.74	0.000	0
Logwage	0.131	1.51	0.144	1.62	0.077	0.78	0.200	2.23	-0.197	-2.12	-0.020	-0.27	-0.298	-4.15	-0.125	-1.76	-0.702	-9.6	-0.361	-4.96
Blue	-0.021	-0.38	-0.017	-0.3	0.012	0.19	0.076	1.28	-0.035	-0.6	0.191	4.03	0.358	8	-0.011	-0.24	0.368	8.16	0.005	0.12
Sect2			-0.086	-1.12			0.252	3.29	0.078	0.96	-0.044	-0.66	0.215	3.17	0.123	1.94	0.169	2.51	-0.274	-4.08
Sect3			-0.035	-0.57			-0.101	-1.55	0.072	1.12	-0.156	-3.04	-0.199	-3.97	-0.078	-1.58	-0.101	-1.97	-0.094	-1.88
Sect4			0.014	0.2			0.018	0.25	0.242	3.44	0.034	0.56	0.077	1.29	0.133	2.33	0.079	1.29	-0.091	-1.56
Sect5			-0.041	-0.6			-0.042	-0.6	-0.055	-0.75	-0.169	-2.93	-0.271	-5.01	-0.053	-1	-0.127	-2.29	-0.064	-1.18
Sect6			0.096	1.13			0.131	1.58	-0.095	-1.04	0.036	0.52	0.215	3.18	-0.186	-2.79	-0.210	-3.07	-0.186	-2.76
Size1			0.010	0.13			0.237	2.91	-0.010	-0.13	0.126	1.87	-0.261	-4	0.263	4.12	-0.150	-2.25	-0.250	-3.86
Size2			0.049	0.68			0.138	1.86	-0.166	-2.21	0.041	0.68	-0.160	-2.73	0.100	1.75	-0.073	-1.22	-0.227	-3.94
Size3			0.116	1.43			0.009	0.11	-0.124	-1.47	0.093	1.35	-0.066	-0.98	0.090	1.38	-0.082	-1.2	-0.049	-0.75
Size4			0.000	0			0.036	0.49	-0.017	-0.24	0.091	1.52	-0.052	-0.9	0.071	1.25	-0.019	-0.32	0.001	0.01
Reg2			-0.065	-1.21			-0.156	-2.93	0.117	2.09	-0.065	-1.46	-0.037	-0.84	-0.030	-0.7	0.003	0.07	0.026	0.6
Reg3			0.004	0.07			-0.264	-4.56	0.067	1.11	-0.095	-2.02	-0.050	-1.09	-0.076	-1.7	-0.038	-0.81	-0.019	-0.41
Y05	-0.350	-8.19	-0.352	-8.17	-0.275	-4.46	-0.309	-6.91	0.126	2.73	-0.221	-6.14	-0.047	-1.32	0.391	10.94	0.132	3.63	-0.051	-1.44
cons	0.928	1.99	0.875	1.81	1.423	2.41	-2.223	-4.6	-0.767	-1.53	-0.232	-0.58	2.223	5.76	-0.072	-0.19	4.083	10.33	1.404	3.59

TABLE A3

Probit and Multivariate Probit (without asymmetries) coefficients' estimates for physical health (PH)

	PROBIT				*MULTIVARIATE PROBIT (with exclusion restrictions. without asymmetries)*															
	With exclusion restrictions		*Without exclusion restr.*																	
Dep. Var(s)	*PH*		*PH*		*PH*		*Smoker*		*Drinker*		*Obese*		*Phys. hazards*		*No supp from colleag*		*Repetit. work*		*Job worries*	
	Coef.	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*
Smoker	-0.206	-5.45	-0.206	-5.42	0.032	0.11														
Drinker	0.053	1	0.059	1.12	0.036	0.12														
Obese	-0.105	-1.99	-0.104	-1.97	-0.135	-0.42														
Phys. hazards	-0.327	-8.93	-0.325	-8.78	-0.434	-2.16														
No supp. from colleagues	-0.006	-0.18	-0.001	-0.04	-0.500	-2.42														
Job worries	-0.149	-4.2	-0.151	-4.23	-0.406	-1.93														
Repetit. work	-0.128	-3.42	-0.124	-3.31	-0.532	-1.93														
Female	-0.222	-5.84	-0.238	-6.04	-0.185	-3.44	-0.228	-4.6	-0.044	-0.9	-0.117	-3	-0.144	-3.81	-0.093	-2.47	0.294	7.61	0.076	2
Ageless25	-0.180	-2.32	-0.172	-2.22	-0.185	-2.24	-0.281	-2.77	0.545	4.58	0.226	2.91	-0.068	-0.86	-0.039	-0.5	-0.104	-1.3	0.165	2.08
Age2534	-0.214	-2.57	-0.207	-2.48	-0.154	-1.48	0.032	0.3	0.761	6.15	0.320	3.84	-0.123	-1.45	0.181	2.19	-0.072	-0.84	0.434	5.14
Age4554	-0.052	-0.61	-0.047	-0.54	0.028	0.23	0.322	2.99	0.654	5.19	0.311	3.64	-0.170	-1.96	0.225	2.67	-0.055	-0.63	0.666	7.73
Age54plus	-0.047	-0.5	-0.044	-0.46	0.061	0.44	0.490	4.21	0.644	4.74	0.257	2.7	-0.465	-4.86	0.322	3.45	0.046	0.47	0.720	7.59
Educ2	0.202	1.4	0.208	1.44	0.208	1.47	0.098	0.53	0.069	0.41	0.078	0.55	0.197	1.26	0.073	0.51	-0.013	-0.08	0.062	0.43
Educ3	0.047	0.44	0.044	0.41	-0.031	-0.28	0.319	2.41	0.126	1.03	0.209	2.04	0.026	0.24	-0.208	-1.98	-0.146	-1.26	-0.028	-0.27
Educ4	0.036	0.37	0.031	0.32	-0.021	-0.21	0.390	3.27	0.022	0.2	-0.013	-0.14	-0.066	-0.68	-0.111	-1.18	-0.306	-2.95	0.103	1.11
Educ5	0.305	2.94	0.299	2.88	0.174	1.55	0.267	2.03	0.012	0.09	-0.157	-1.56	-0.315	-3.09	-0.111	-1.1	-0.512	-4.7	-0.164	-1.63
Educ6	0.159	1.93	0.161	1.96	0.074	0.8	0.286	2.87	-0.105	-1.11	-0.162	-2.06	-0.137	-1.69	0.034	0.43	-0.483	-5.44	-0.157	-2.02
Educ7	0.344	2.71	0.325	2.54	0.198	1.4	0.346	2.18	-0.379	-2.29	-0.449	-3.52	-0.165	-1.36	-0.020	-0.17	-0.642	-5.07	-0.278	-2.27
Educ8	0.286	2.56	0.294	2.62	0.180	1.27	0.398	2.97	-0.231	-1.7	-0.522	-4.62	-0.347	-3.22	0.162	1.51	-0.783	-6.87	-0.167	-1.57
Educ9	0.347	3.17	0.355	3.23	0.208	1.46	0.285	2.16	-0.352	-2.64	-0.539	-4.99	-0.421	-4.04	0.130	1.26	-0.912	-8.17	-0.266	-2.57
Educ10	0.356	3.07	0.352	3.01	0.196	1.28	0.295	2.08	-0.671	-4.14	-0.848	-6.88	-0.574	-5.16	-0.017	-0.15	-0.909	-7.67	-0.131	-1.19
Child2	-0.099	-2	-0.098	-1.99	-0.077	-1.56	-0.220	-3.45	-0.073	-1.17	0.018	0.36	-0.018	-0.36	0.085	1.75	0.022	0.44	0.013	0.26

Child3	0.024	0.47	0.022	0.43	0.021	0.4	-0.157	-2.4	-0.175	-2.67	-0.032	-0.61	-0.050	-0.97	0.032	0.63	-0.003	-0.06	-0.052	-1.02
Child4	0.235	3.01	0.235	3	0.202	2.56	-0.361	-3.55	-0.094	-1.03	-0.086	-1.13	-0.135	-1.83	0.071	0.97	-0.061	-0.83	-0.187	-2.52
Married	-0.119	-2.46	-0.119	-2.46	-0.123	-2.47	-0.004	-0.07	0.096	1.6	-0.185	-3.86	-0.072	-1.53	-0.078	-1.68	-0.059	-1.24	0.008	0.16
Widow	0.043	0.23	0.047	0.25	-0.043	-0.25	0.036	0.18	-0.050	-0.22	-0.257	-1.43	0.106	0.6	-0.429	-2.34	-0.243	-1.32	0.024	0.14
Divorced	-0.025	-0.33	-0.027	-0.35	-0.050	-0.61	0.162	1.77	0.003	0.03	0.262	3.53	-0.007	-0.09	-0.119	-1.59	0.132	1.71	0.001	0.01
Logwage	0.021	0.29	0.030	0.41	-0.145	-1.61	0.203	2.25	-0.203	-2.19	-0.021	-0.28	-0.297	-4.15	-0.129	-1.81	-0.698	-9.52	-0.362	-4.99
Blue	0.000	0	0.012	0.25	0.067	1.1	0.058	0.99	-0.038	-0.65	0.190	4.01	0.357	7.98	-0.012	-0.26	0.366	8.12	0.003	0.07
Sect2			-0.130	-1.97			0.258	3.31	0.076	0.92	-0.052	-0.78	0.220	3.23	0.136	2.14	0.182	2.72	-0.265	-3.91
Sect3			0.034	0.66			-0.105	-1.59	0.066	1.04	-0.159	-3.11	-0.202	-4.05	-0.094	-1.92	-0.099	-1.95	-0.099	-1.99
Sect4			0.020	0.33			0.033	0.44	0.245	3.49	0.036	0.61	0.078	1.31	0.132	2.3	0.074	1.21	-0.094	-1.61
Sect5			-0.002	-0.03			-0.052	-0.74	-0.057	-0.77	-0.172	-3	-0.271	-5.03	-0.060	-1.13	-0.120	-2.18	-0.065	-1.2
Sect6			0.054	0.78			0.141	1.68	-0.086	-0.94	0.034	0.49	0.219	3.24	-0.176	-2.64	-0.210	-3.11	-0.182	-2.71
Size1			-0.020	-0.29			0.243	2.95	-0.010	-0.12	0.124	1.83	-0.254	-3.89	0.278	4.35	-0.140	-2.1	-0.242	-3.75
Size2			0.050	0.85			0.144	1.92	-0.163	-2.18	0.043	0.72	-0.158	-2.71	0.104	1.81	-0.074	-1.25	-0.226	-3.94
Size3			-0.045	-0.67			0.010	0.12	-0.120	-1.42	0.087	1.27	-0.055	-0.82	0.119	1.84	-0.067	-0.99	-0.036	-0.56
Size4			0.029	0.49			0.035	0.46	-0.016	-0.22	0.094	1.57	-0.054	-0.93	0.069	1.22	-0.021	-0.36	-0.004	-0.07
Reg2			0.006	0.13			-0.162	-3.01	0.112	2	-0.064	-1.45	-0.041	-0.94	-0.045	-1.07	-0.002	-0.04	0.020	0.46
Reg3			0.007	0.15			-0.262	-4.48	0.062	1.04	-0.096	-2.04	-0.050	-1.1	-0.082	-1.84	-0.040	-0.86	-0.020	-0.45
Y05	0.059	1.68	0.062	1.77	0.154	2.88	-0.314	-7	0.125	2.7	-0.222	-6.16	-0.048	-1.36	0.387	10.82	0.129	3.54	-0.052	-1.47
cons	0.698	1.79	0.615	1.52	1.962	3.51	-2.246	-4.62	-0.722	-1.44	-0.227	-0.57	2.223	5.76	-0.023	-0.06	4.060	10.27	1.424	3.65

TABLE A4

Probit and Multivariate Probit (without asymmetries) coefficients' estimates for mental health (MH)

	PROBIT				*MULTIVARIATE PROBIT (with exclusion restrictions. without asymmetries)*															
	With exclusion restrictions		*Without exclusion restr.*																	
Dep. Var(s)	*MH*		*MH*		*MH*		*Smoker*		*Drinker*		*Obese*		*Phys. hazards*		*No supp from colleag*		*Repetit. work*		*Job worries*	
	Coef.	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*	*Coef.*	*z*
Smoker	-0.042	-1.1	-0.039	-1.03	0.407	1.82														
Drinker	-0.170	-3.2	-0.175	-3.28	-0.132	-0.54														
Obese	-0.120	-2.22	-0.122	-2.26	-0.365	-1.29														
Phys. hazards	-0.181	-5.05	-0.186	-5.11	-0.576	-3.4														
No supp. from colleagues	-0.196	-5.56	-0.197	-5.53	-0.626	-3.12														
Job worries	-0.408	-11.25	-0.404	-11.04	-0.552	-2.94														
Repetit. work	-0.088	-2.37	-0.089	-2.39	0.200	0.93														
Female	-0.243	-6.38	-0.228	-5.77	-0.271	-5.96	-0.227	-4.58	-0.047	-0.96	-0.113	-2.91	-0.149	-3.94	-0.096	-2.55	0.296	7.63	0.073	1.93
Ageless25	0.072	0.94	0.088	1.14	0.063	0.77	-0.281	-2.78	0.550	4.65	0.228	2.94	-0.070	-0.88	-0.039	-0.51	-0.098	-1.23	0.166	2.09
Age2534	0.182	2.2	0.200	2.4	0.201	2.06	0.032	0.3	0.765	6.22	0.321	3.85	-0.125	-1.47	0.184	2.22	-0.072	-0.84	0.437	5.18
Age4554	0.318	3.76	0.342	4.01	0.336	3.06	0.321	2.99	0.655	5.22	0.312	3.65	-0.172	-1.98	0.229	2.71	-0.053	-0.6	0.668	7.75
Age54plus	0.468	4.95	0.488	5.11	0.446	3.47	0.489	4.2	0.647	4.77	0.260	2.73	-0.465	-4.87	0.325	3.48	0.049	0.5	0.723	7.61
Educ2	0.200	1.44	0.198	1.42	0.222	1.57	0.099	0.53	0.065	0.39	0.077	0.54	0.197	1.26	0.070	0.49	-0.007	-0.04	0.065	0.46
Educ3	0.094	0.88	0.095	0.89	0.037	0.35	0.318	2.41	0.123	1.01	0.206	2.01	0.035	0.33	-0.208	-1.98	-0.156	-1.35	-0.027	-0.26
Educ4	0.009	0.1	0.007	0.07	0.016	0.16	0.389	3.27	0.022	0.2	-0.014	-0.15	-0.058	-0.61	-0.108	-1.15	-0.310	-2.98	0.108	1.17
Educ5	-0.259	-2.54	-0.250	-2.44	-0.243	-2.18	0.268	2.03	0.018	0.14	-0.153	-1.53	-0.315	-3.09	-0.110	-1.09	-0.515	-4.72	-0.161	-1.6
Educ6	0.011	0.14	0.000	-0.01	0.046	0.52	0.286	2.87	-0.106	-1.13	-0.166	-2.11	-0.130	-1.61	0.038	0.48	-0.489	-5.49	-0.153	-1.97
Educ7	-0.204	-1.65	-0.218	-1.75	-0.131	-0.95	0.346	2.19	-0.375	-2.27	-0.451	-3.54	-0.159	-1.31	-0.024	-0.2	-0.652	-5.14	-0.272	-2.22
Educ8	-0.250	-2.29	-0.264	-2.4	-0.127	-0.94	0.398	2.96	-0.230	-1.69	-0.522	-4.64	-0.339	-3.15	0.172	1.61	-0.788	-6.9	-0.159	-1.49
Educ9	-0.240	-2.27	-0.230	-2.16	-0.135	-0.99	0.285	2.16	-0.359	-2.69	-0.538	-4.99	-0.420	-4.04	0.128	1.24	-0.914	-8.16	-0.265	-2.55
Educ10	-0.516	-4.52	-0.505	-4.35	-0.411	-2.75	0.295	2.08	-0.674	-4.17	-0.853	-6.92	-0.574	-5.16	-0.017	-0.15	-0.907	-7.65	-0.129	-1.18
Child2	-0.023	-0.45	-0.024	-0.49	-0.015	-0.32	-0.220	-3.44	-0.069	-1.11	0.021	0.41	-0.019	-0.38	0.084	1.72	0.022	0.43	0.013	0.27
Child3	-0.002	-0.05	-0.006	-0.11	-0.009	-0.18	-0.157	-2.41	-0.179	-2.72	-0.032	-0.62	-0.047	-0.91	0.036	0.71	0.001	0.02	-0.050	-0.98

Child4	0.077	1.02	0.075	0.99	0.068	0.9	-0.361	-3.56	-0.096	-1.05	-0.089	-1.16	-0.135	-1.82	0.077	1.06	-0.057	-0.77	-0.186	-2.5
Married	0.109	2.29	0.103	2.17	0.113	2.34	-0.004	-0.06	0.098	1.63	-0.181	-3.78	-0.073	-1.55	-0.082	-1.75	-0.060	-1.27	0.006	0.13
Widow	-0.448	-2.57	-0.464	-2.65	-0.394	-2.21	0.036	0.18	-0.046	-0.21	-0.260	-1.44	0.106	0.6	-0.433	-2.37	-0.253	-1.39	0.023	0.13
Divorced	-0.059	-0.75	-0.062	-0.78	-0.134	-1.72	0.162	1.77	0.000	0	0.266	3.59	-0.008	-0.11	-0.125	-1.67	0.138	1.78	-0.001	-0.01
Logwage	-0.042	-0.58	-0.006	-0.07	0.062	1.03	0.057	0.97	-0.034	-0.57	0.186	3.94	0.359	8.04	-0.005	-0.11	0.366	8.12	0.006	0.14
Blue	0.080	1.73	0.066	1.4	-0.069	-0.77	0.204	2.26	-0.199	-2.14	-0.016	-0.22	-0.304	-4.25	-0.137	-1.92	-0.695	-9.47	-0.365	-5.03
Sect2			0.099	1.47			0.261	3.32	0.056	0.67	-0.023	-0.34	0.193	2.82	0.095	1.47	0.182	2.68	-0.287	-4.23
Sect3			0.115	2.26			-0.103	-1.55	0.052	0.79	-0.141	-2.75	-0.220	-4.42	-0.113	-2.27	-0.092	-1.77	-0.108	-2.15
Sect4			-0.026	-0.43			0.034	0.45	0.244	3.48	0.032	0.56	0.079	1.34	0.143	2.5	0.077	1.27	-0.086	-1.48
Sect5			-0.100	-1.77			-0.055	-0.76	-0.051	-0.7	-0.189	-3.3	-0.259	-4.79	-0.045	-0.82	-0.138	-2.47	-0.060	-1.08
Sect6			0.049	0.71			0.142	1.7	-0.102	-1.1	0.038	0.55	0.211	3.13	-0.185	-2.76	-0.203	-2.98	-0.183	-2.72
Size1			-0.017	-0.26			0.243	2.96	-0.001	-0.02	0.126	1.89	-0.249	-3.83	0.277	4.34	-0.152	-2.29	-0.243	-3.75
Size2			-0.005	-0.08			0.145	1.93	-0.156	-2.08	0.044	0.74	-0.153	-2.63	0.113	1.96	-0.075	-1.26	-0.222	-3.86
Size3			-0.018	-0.27			0.010	0.11	-0.117	-1.37	0.093	1.37	-0.059	-0.89	0.112	1.71	-0.083	-1.21	-0.041	-0.63
Size4			-0.013	-0.21			0.035	0.47	-0.011	-0.15	0.094	1.59	-0.054	-0.94	0.077	1.35	-0.019	-0.33	0.001	0.02
Reg2			0.040	0.9			-0.161	-3	0.109	1.95	-0.061	-1.39	-0.047	-1.1	-0.051	-1.2	0.005	0.12	0.017	0.4
Reg3			-0.025	-0.53			-0.263	-4.5	0.062	1.05	-0.104	-2.23	-0.047	-1.04	-0.082	-1.82	-0.040	-0.85	-0.020	-0.43
Y05	-0.509	-14.64	-0.510	-14.53	-0.384	-6.4	-0.314	-7.01	0.127	2.74	-0.220	-6.11	-0.048	-1.35	0.393	10.97	0.131	3.6	-0.052	-1.46
cons	0.654	1.69	0.446	1.1	0.871	1.46	-2.252	-4.64	-0.748	-1.49	-0.257	-0.64	2.257	5.87	0.009	0.02	4.048	10.22	1.434	3.68

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