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Differences between older and younger employees in Denmark**

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**Does the health effect of bad lifestyles and risky working conditions vary by age?
Differences between older and younger employees in Denmark**

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Abstract

Using a panel of data (2000 and 2005) obtained merging the Danish Work Environment Cohort Study with the Integrated Labour Market Database on a representative sample of Danish employees, we analyse the differences in the effect of working conditions and lifestyles on a set of health indicators between older employees (aged 50 – 65) and younger (aged 25 – 49) counterparts. We consider four self-reported health measures: mental health, vitality (constructed from the SF-36); self-assessed health and musculoskeletal health. We define several indicators of working conditions and lifestyles. We estimate both random and fixed effect models on a sample of about 3,000 observations, and use the results to perform a decomposition of health differences by age group *a la* Oaxaca. We find that, on average, older workers score lower in self-assessed and musculoskeletal health, but higher in mental health and vitality and that both working conditions and lifestyles do a play a role for these observed differences. We show that the combined effect of working conditions on health is similar in the two groups, while lifestyles contribute to lowering the health of older employees relatively more than younger peers. This is true especially for the lack of a right diet and of physical activity, which are key in this context. This result holds also once we account for unobserved individual characteristics. Finally, we find that the older/younger health differential is not attributable to differences in average individual or job attributes, working conditions or lifestyles between the two groups; but more on the effects that given characteristics have on health as an employee gets older.

Keywords: health measures, working conditions, lifestyles, older workers, fixed effects, Oaxaca decomposition.

1. Introduction

Individuals' health is affected by several risk factors related both to work and non-work activities. Among the former, adverse physical demands and psychosocial stressors play the biggest role (Karasek and Theorell, 1990; Johnson, 1986). Among the latter, unhealthy behaviors, such as smoking, heavy drinking, bad food habits, physical inactivity, are key determinants of major preventable diseases with high economic and social costs (Contoyannis and Jones, 2004).

Whether adverse working conditions and bad lifestyles have a different effect on the health of older compared to younger employees might have important consequences for policy purposes. Good working conditions and lifestyles can prevent early exits from work based on mental and physical factors (see Robroeck et al, 2013). Especially at later stages of the career, these are key questions in the context of healthy ageing, when combined with expanded working careers often achieved through postponed retirement (Cai and Kalb, 2006).

The aim of this paper is to analyse the difference in the health impact of lifestyles and working conditions for older employees as compared to their younger counterparts also controlling for several observable and unobservable characteristics; and to decompose health differentials into the part due to differences in the observable characteristics of younger and older employees and the part due to differences in the effect that similar characteristics would exert on health levels in the two groups.

While some recent studies highlighted that older workers are more exposed to specific work-related health risks compared to their younger peers, only few papers analysed differences in health by age also controlling for working conditions (Jones et al., 2013), but none how much of the differential can be attributed to them. Similarly, while several studies have investigated the connections between risky lifestyles and health, none of them explored their age gradient.

We study these issues using a two-year (2000 and 2005) panel of data on a representative sample of Danish employees obtained merging the Danish Work Environment Cohort Study (DWECS) with the Integrated Labour Market Database (IDA). We use five indicators for the physical and psychosocial work environment and four indicators for lifestyles, and we study their effect on four health measures: self-assessed health, a scales for musculoskeletal health (associated with physical pain), and the SF-36 derived mental health and vitality indices.

From a policy perspective, Denmark is an interesting country. First, as in many other European countries population ageing is recognized to be a challenge, which calls for policies that promote longer working lives and delayed retirement. In general, older workers in Denmark

have better prospects than the EU average and are on average in better health, still about 20% senior workers leave before retirement due to poor working conditions (OCSE, 2015).

Work pressure and physically demanding work are main barriers to remain in the same job until retirement, and high proportions of older workers report that reduced work pressure, less physical workload and recognition from managers and colleagues are key factors to delay retirement (Eurofound, 2013). Lifestyles such as smoking, alcohol abuse, physical inactivity are key determinants of life expectancy in Denmark as in many other European countries.

The remainder of the paper is organised as follows. In Section 2 we review the relevant literature, while the data are overviewed in Section 3. In Section 4 we present the empirical strategy and results, which are then discussed in Section 5.

2. Related literature

In the economics literature, most empirical results suggest that adverse working conditions may harm workers' health, especially its mental component. Robone et al. (2011) use UK data and find that being unsatisfied with working hours negatively relates to health. Datta Gupta and Kristensen (2008) use panel data for Denmark, France and Spain and detect a causal relationship between work environment indicators and general versus work-related health. Cottini and Lucifora (2013) using the data for 15 European countries show that job quality have a strong effect on the mental health of workers, and that this results is robust when the endogeneity of job quality is taken into account.

In this literature, age was rarely the variable of main interest. Jones et al. (2013) study whether older workers are significantly different to their younger counterparts over a range of health and job-related risk indicators for the effects of adverse working conditions including physical, ergonomic and psychosocial risk factors. Results from simple least squares regressions show that older workers and younger workers are similar in terms of the effect of work-related included characteristics on health outcomes. However, once controlling for endogeneity and the 'healthy worker effect', the exposure to adverse working conditions reduces perceived health especially among older workers, by 5 to 11% depending on the measure considered. Debrand and Lengagne (2008) analyse the links between quality of work and health among older European workers. They find that low 'demand' and high 'reward' levels are positively associated to a variety of health status; 'Control' influences only the health of women. Both the lack of support by peers and job insecurity negatively affect health, increasing in particular the risk of depression.

Fletcher et al. (2011) use US data and find that individuals who work in jobs characterised by ‘bad’ and risky conditions experience a decrease in health and that this effect is more evident for older workers.

The relationship between lifestyles and health outcomes has received considerable attention especially by epidemiologists (see Breslow, 1999; Patja et al. 2005) and in the areas of medicine and occupational health (among the others, Netterstrøm et al., 1991; Hellerstedt and Jeffery, 1997; Otten et al., 1999; Siegrist and Rödel, 2006).

In the economics literature, Kenkel (1995) finds that health is affected by several lifestyle choices such as diet, smoking, exercise, alcohol consumption, sleep, weight (relative to height), and stress. Others 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 (e.g., Hu et al., 1995).

Contoyannis and Jones (2004) use a UK panel data and find that sleeping well, exercising, and not smoking in 1984 have dramatic positive effects on the probability of reporting excellent or good self-assessed health in 1991. These effects are much larger when controlling for the non-random allocation of lifestyles. To our knowledge, Borg and Kristiansen (2000) is the only study that analyses the health effects of both lifestyle and work environment using the 1990 and 1995 waves of our data for Denmark. We differentiate from them, first, by taking into account the unobserved individual characteristics that could affect both lifestyle, working conditions and health. Second, by considering a larger set of health indicators and third by explicitly considering the older – younger workers gradient.

3. Data and variables

The data we use derive from two different sources matched through individual identifiers. First, The Danish Work Environment Cohort Study (DWECS), which is a panel data collected every 5 years by the Institute for Occupational Health (AMI). The questionnaire covers many dimensions of the Copenhagen Psychosocial Questionnaire and contains very detailed work environment information, such as exposure to physical agents (noise, vibration, etc.), chemical agents, physical workload, work organisation issues, social environment, 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 and working conditions 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. It should be noted that, even though IDA comprises the whole population of Danish firms and employees, when matched to DWECs we end up with about 3,600 observations. The final sample includes employees in the 25 – 65 age interval employed in all the sectors. We excluded employees older than 65 in order to avoid issues related with endogenous retirement, i.e. the fact that only the healthier individuals stay at work when they can retire. We also experimented by leaving the employees older than 65 in the sample. Results are very much in line with the ones presented here.

According to their age, employees can be in the younger group (25 – 49) or in the older group (50 plus). As for the latter, we use the same definition of the SHARE (Survey of Healthy Ageing and Retirement in Europe) target population, which is broader than that employed by Jones et al. (2013), who identify older employees as people aged 55 years old or more. We use the ‘50 plus’ definition (and define a ‘50 plus’ dummy variable) as it is more generally accepted in the literature. Results using the ‘55 plus’ definition are however qualitatively very similar. The construction of our health and working conditions’ measures follows the approach typically used in the epidemiology and occupational health literature (e.g. Kristensen et al., 2002; Poulsen et al., 2013).

The health variables that we use in the empirical analysis are four. The first is an indicator of self-assessed health, which is an ordered variable from 0 to 4. Respondents were asked to rank their health with respect to people of their own age. This is a rough measure of individuals’ health and subject to many well-known conceptual problems (see Datta Gupta and Kristensen, 2007). However, it represents the only available information in many data sets and it is also the mostly used indicator in the literature. Next, we take advantage of the information contained in our data to define three additional health variables: mental health, vitality and musculoskeletal health. Each variable is a scale obtained by adding up answers to 4 or 5 questions, normalised to vary between 0 (low health: severe health problems/limitations/diseases) and 100 (high health: no health problems or chronic diseases), with equal weight given to the individual questions on the scale. All questions had six possible responses from 1 (none of the time or conceptually similar) to 6 (all of the time or conceptually similar). In all cases, the questions refer to symptoms experienced by the individual during the last month. The three health scales have reasonable Cronbach’s alpha values.

Musculoskeletal health is based on five questions of the Nordic Musculoskeletal Questionnaire, as follows: "Do you feel pain in the neck/knees/shoulder/hand/low back in the last 12 months?". A slight complication in the definition of this variable is that in 2005 the

questions for neck and shoulder were collapsed into a single question, while in 2000 they were kept separated. This means that for 2005 there is less variability in the index. However, the mean of the Musculoskeletal Health scale is very similar for 2000 and 2005, giving support to our strategy of pooling the 2000 and 2005 samples together. This index captures only a very specific dimension of physical health problems, which is however highly relevant in our context since over 40 million workers in Europe are affected by musculoskeletal diseases (MSDs) attributable to their work, and in general older workers are more affected than younger ones.

The mental health index is based on the five questions of the so-called Mental Health Inventory (MHI-5), subscale of the Short Form Health Status Survey (36 items, SH-36) widely used in the literature, which encompasses 4 major dimensions of mental health: anxiety, depression, psychological well-being. Low values of our index are therefore intended to capture general psychological distress (nervosism/depression). The five questions are: “How much of the time during last month you felt: nervous/down/blue/not happy/not calm and peaceful?”.

Vitality is based on 3 questions from the SH-36 (“How much of the time during last month you felt: full of pep/worn out/tired”). It is constructed similarly to mental health and intended to capture energy/fatigue. Vitality is an important domain reflecting both the physical and emotional components of health-related quality of life, and captures general and ‘positive’ health and wellbeing (Ware and Gandek, 1998).

Concerning working conditions, the DWECS questionnaire contains several questions out of which we construct 5 scales related to the job demand – control - reward (or support) dimensions, based on the standard conceptual framework used in the empirical literature, which combines the demand - control model of Karasek and Theorell (1991) and the effort – reward model of Siegrist (1996). The ‘Demand’ dimension is associated with physical stress (demanding physical working conditions); ‘Control’ refers to the degree of control on performed tasks and the possibility to develop new skills. ‘Reward’ reflects the prospects for personal progress at work and of receiving the deserved attention by peers, and which can be captured, for example, by the support that the worker receives at job by peers and the perceived level of job security (Bockermann and Illmakunnas, 2008).

Contrary to health measures, our working condition scales are expressed in ‘negative’ terms (high values for worse working conditions). Except for one case (see below), each scale is based on questions with six response options and varies in the 0 - 100 range. In our analysis, the ‘Demand’ dimension of work is captured by a summary indicator for hazardous physical working conditions experienced at the workplace (‘Hazard’). It is obtained aggregating scores to 11 questions about work environmental conditions in the last two months. They include physical

exposure (loud noise or vibrations from tool hand or vibrations from strike whole body, etc), termical exposure (temperature fluctuations or coldness or draft), chemical exposure (skin contact with solvents or solvent vapor or passive smoke). Next we use four indexes related to psychosocial work conditions. Two of them refer to the 'Control' the worker possesses over its job. The first captures the degree of influence on work, again with reference to the last two months. The variable is called 'No influence' and it obtained as the aggregated scale from these items: influence on decisions/on who to work with/on amount of work/on what you do at work. The second if the work involves repetitive tasks in the last two months ('Repetitive': do you repeat the same task many times per hour?/learn new things?/work varied?/can take the initiative?).

The 'Reward' dimension is proxied by two indexes. The first measures whether the worker receives or not help from his/her colleagues/supervisor ('No social support'). The second accounts for the worker's perception about her job (in)security ('Job worries'). 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? Otherwise zero. Since these worries are dummy variables, there is little scope in aggregating into a 0-100 index which would take on only four values.

For the definition of lifestyle variables we follow the literature (Borg and Kristensen, 2000; Contoyannis and Jones, 2004; Balia and Jones, 2008) and specify four dummy variables. One for being a current smoker and one for heavy alcohol consumption in the week before the interview. The third is for not undertaking any regular physical activity in the last year (almost passive or light physical activity for less than 2 hours a week), and the fourth for not eating regularly fruit and vegetables (less than once a day).

We also control for a number of additional individual and work characteristics which otherwise may act as counfunding factors: gender, marital status, presence of children in the household, educational levels; dummies for firm's size, as well as sectoral dummies and occupational dummies. We further control for the natural logarithm of individual income and for a dummy for 2005. In Table 1 we show some descriptive statistics on the distribution of health, lifestyle and working conditions indicators, in the whole sample and separately for younger and older employees. After excluding observations with missing values in key variables, our final sample consists of about 3,000 observations, of which about 700 are older employees and the remaining younger employees.

<Table 1 here>

In the whole sample, the average level of self-assessed health is 3.23, which means a perceived very good/good level of health for almost 80% of the employees. With reference to specific health dimensions, all the scales are well above two thirds of the range of variation. Vitality has the lowest mean with 71 out of 100, while the mean of physical health is 78 out of 100. Finally, the average of Mental health is the highest and equal to 84. With respect to working conditions, the highest score (worst condition) is reported for No influence in decisions, followed by Repetitiveness of work, No social support and Hazards. One third of employees report to feel insecure with respect to their job. About 1 out of 3 employees is a current smoker, 1 out of 5 does not eat fruit and vegetables, and 1 out of 10 does not do any physical activity and is an heavy drinker.

Employees in the ‘50 plus’ group represent 24 percent of the sample. They have on average lower levels of self-assessed health. Concerning specific health dimensions, they show, on the one hand, higher scores of mental health and vitality, while, on the other hand, more physical problems as measured by the musculoskeletal scale. With respect to working conditions, they report to be less exposed to hazard conditions, but more to the absence of ‘rewards’ as measured by social support and job worries. Finally, on the lifestyle side, they are less likely to smoke, but more to drink and also not to eat fruit and vegetables. Table 1 also shows that the differences in observed health, working conditions and lifestyles between older and younger employees are small in absolute values, but often statistically significant.

Of course, the differentials shown in Table 1 could be due to many compositional effects, driving the association between lifestyle, working conditions and health. In the next section, we will address these issues by a more appropriate multivariate analysis.

4. Empirical strategy and results

We estimate four health equations – one for each health outcome – first on the overall sample and, second, separately on the two subsamples of employees aged 25 – 49 and 50 plus. Given the longitudinal nature of our data, we use panel data methods to account for the fact that the observations come from the same individuals observed over time every five years. We present both random and fixed effects estimates.

Random effects are similar to standard least squares (OLS), except that the unobservable health determinants (the ‘errors’) can be serially correlated as they come from the same individuals. Random effects estimates can also be used to compute the health differential between older and younger employees and to decompose it *a la* Oaxaca into: (i) an ‘explained’ part due to different characteristics of employees and of their jobs in the two groups (the

'endowments' effect); (ii) an 'unexplained' part due to differences in the 'hedonic prices', i.e. in the effect that given characteristics exert on health (the 'coefficients' effect); (iii) a residual component, due to the fact that both returns/prices and characteristics varies across age groups (Jann, 2008; Oaxaca and Ramson, 1994).

The fixed effects model has the advantage of taking into account the correlation between unobservable traits that are constant over time and both health outcomes and explanatory variables – in particular with respect to working conditions and lifestyles. This happens when unobservable fixed individual characteristics are correlated with both health and working conditions perceptions (endogeneity of working conditions); or when is the health level that affects, say, eating and physical activity behaviours and not vice-versa (reverse causality). To the extent to which more healthy individuals self-select into occupational cohorts as they get older because of time invariant traits and preferences, fixed effects estimates also control for the so-called 'healthy worker effect' (Li and Sung, 1999). If self-selection is due to unobservable time varying characteristics, fixed effects tend to underestimate adverse health effects, thus providing a lower bound for the true effects.

By controlling for individual unobserved heterogeneity, fixed effects estimates are useful to get insights on what happens to the health of older employees if we 'forced' them to stay at work (e.g. due to changes in retirement rules).

The disadvantage of fixed effects is that they use part of the variability in health and explanatory variables to estimate the individual effects, while the identification of the other coefficients only uses the variability that occurs over time within each individual. This means that only individuals who change their health or working condition scales or lifestyles contribute to the estimates. This tends to reduce the precision of coefficients, especially when the variables have a small range of variability and when changing status is a rare event (such as our dummies for lifestyles and job worries), and/or in the case of small sample sizes, as for our sample of older employees. Another disadvantage of fixed effects is that they do not allow the computation of the health differential between older and younger employees, nor its decomposition *a la* Oaxaca. This happens because there are no estimates of coefficients for time invariant variables and because the estimates of individual-specific intercepts are biased and inconsistent if the panel contains few observations for each individual (Woodcock, 2008).

Tables 2 and 3 reports our estimates of the impact of working conditions and lifestyles on each health outcome, both for the whole sample and also separately for the two groups of older and younger employees.

<Table 2 here>

First, we briefly comment results of Table 2, where we re-estimate the health differential by age group as in Table 1, but now conditional to a large set of observable characteristics. The results are qualitatively similar: also controlling for several covariates, the probability that an older employee reports a high level of self-assessed health is 7 percent less than younger peers. Older employees have on average about 2.5 point more of mental health and vitality, and 2.7 points less in the musculoskeletal scale. These are absolute effects on scales that vary in the 0 – 100 range. To make them comparable, it is useful to normalise them, for example relatively to the sample average of the corresponding variable. For example, since the mean of mental health is 84 and that of vitality is 71, a 2.5 point effect of being an older employee on both mental health and vitality would be on average relatively stronger for the latter, since its mean is lower.

As we would expect, the overall effect of ‘bad’ working conditions on health is negative. Interestingly, physical hazards matter not only for musculoskeletal problems and vitality, but also for mental health. As for the interpretation of coefficients, an increase of 10 points (out of 100) in the physical hazard scale is associated with a decrease of 2.5 points in musculoskeletal health. As expected, social support matters more for mental health and vitality, less for musculoskeletal problems while job worries show a more encompassing health effects, being associated with a decrease in all health indicators.

The effect of ‘bad lifestyles’ on health is in general negative but of smaller magnitude than working conditions.

<Table 3 here>

Given this preliminary evidence, Table 3 presents random effects estimates by age groups. Overall, our results show that there are not big differences between 50 plus and younger employees in the effect of working conditions. Table 3 results also suggest that lifestyles matter more than working conditions to explain differences in observed health scores across older and younger employees.

More in detail, an hazardous job environment – the ‘Physical demand’ dimension - affects more the musculoskeletal health of the 50 plus employees, while for younger employees the effect is higher on their mental health. About the consequences of the lack of influence and of repetitive work, our proxies for the ‘Control’ dimension of work, they exert a larger and negative effect on the mental health of older employees. Finally, not receiving social support and job insecurity, which captures the lack of ‘Rewards’ from the job, have the same effect across age groups.

By converse, the health effects differ a lot across age groups in the case of lifestyles. For example, in the sample of older employees a lack of physical activity and of a right diet is associated with significantly lower health scores.

The next step is to investigate if the differences in the effect of lifestyles and working conditions that emerged in Table 3 can explain the health differences between older and younger employees that we documented in Tables 1 and 2. To this purpose, Table 4 reports the results of the Oaxaca decomposition based on random effects estimates of Table 3.

<Table 4 here>

We first compute the decomposition using the whole model estimated in Table 3, i.e. all the explanatory variables included in our regressions. This is the content of Panel a) of Table 4, which reports the raw difference in each health scale between 50 plus and younger employees, and its decomposition into the parts due to characteristics, coefficients and interaction effects. In Panel b) of Table 4 we show more details of the decomposition, by showing how each lifestyle and working condition contributes to endowment and coefficient effects. Finally, in Panel c) we summarise the overall contribution of our bunch of working conditions and lifestyles to observed differences in health between 25 – 49 and 50 plus employees in Denmark.

The results show, first, that the raw differences in self-assessed health, vitality, mental health and musculoskeletal problems of Table 1 between older and younger employees are due for the most part to the ‘coefficient’ part and not to ‘characteristics’. Second, that this is true when the differential is either positive (Mental health and Vitality) and negative (Self-assessed health, Musculoskeletal problems).

For our purposes, it is of course important to isolate the effect of lifestyles and working conditions. Table 4 results suggest that if we look only at working conditions and lifestyles, the portion of the differential explained by coefficients is still the most important, especially for what concerns the effect of lifestyles. There is however a key difference with respect to the overall picture: if was only for lifestyles, differences in our health measures would be always negative. About the coefficients’ part of the decomposition, the effect of working conditions is smaller and lacks statistical significance. By converse, working conditions seems to matter more for the endowment part, especially for mental health. This means that, by isolating the contribution of working conditions, the mental health of older employees would be lower than that of younger peers.

Results for the fixed effects model are in Table 5. In general, as expected from our previous discussion, in some cases key coefficients show less statistical significance compared to the model with random effects. However, the overall picture is both quantitatively and

qualitatively similar to that of Table 3. Since in Table 5 we control for individual unobserved heterogeneity, this suggests that most of the effects highlighted so far are genuine and not due to individual time-invariant characteristics not directly observable.

For employees over 50 years of age we find, on the one hand, no working conditions or lifestyle effects on musculoskeletal disease; on the other hand, that some working conditions never show any statistical significance (as in the case of Job worries and Hazards). For the employees over 50, the social climate and the degree of repetitiveness over work matters most, i.e. some components of the ‘Control’ and ‘Reward’ dimensions, more than that of the ‘Demand’ one. This happens especially in the case of mental health and vitality. In any case, 50 plus employees are affected by these factors to a lesser extent than those in the 25 – 49 group. To some extent, this result holds in general: in the group of older employees, we find a smaller overall impact of working conditions, also for those that keep statistical significance.

<Table 5 here>

Interestingly, the working conditions that matter more in the 25 – 49 sample are exactly those that play no role in the equation for older employees. Indeed, a bigger role is for hazard and social support from colleagues, which show a statistically significant effect for all health variables except in the case of self-assessed health.

Surprisingly there is no statistically significant effect for job insecurity. This is the main difference between random effects and fixed effects estimates. At its face value, this would suggest that there are unobservable traits constant over time that make individuals who are more likely to be worried about their job also more likely to report low health levels. This can happen if, for example, being worried for the job and feeling health problems are both driven by risk aversion or pessimism. Hence, the lack of statistical significance in fixed effects estimates of the effect of being worried for the job call some caution in the interpretation of random effects which could be plagued by spurious correlations and overstate true effects. In general, results in Table 5 suggest that the abovementioned ‘positive selection’ effects exists not only between health and job worries (higher health correlated with higher job security/lower job worries), but has a more general content. Indeed, the estimated correlation between the fixed effects and the covariates – $\text{corr}(u_i; Xb)$ in Table 5 - is always negative, meaning that, overall, there are unobservable traits and individual characteristics that make people more likely to express more health and, at the same time, more favourable working conditions and less healthy lifestyles. Moreover, we also find that this positive selection is higher for older employees (e.g. for Vitality, the correlation is -0.151 in the ‘25 – 49’ group and -0.8 for ‘50 plus’). This means that

controlling for individual fixed effects is important especially to gauge the genuine effect of lifestyles and working conditions on health among older employees.

5. Discussion and conclusions

We analysed health differences between younger employees (age 25 – 49) and older (age 50 years or more) in Denmark, in particular the differential effect of several working conditions and lifestyles across the two groups. The dimensions used to define our working conditions refer to the Demand – Control – Reward framework.

We find that, on average, older employees have lower scores of self-assessed and musculoskeletal health, but higher levels of mental health and vitality and that both working conditions and lifestyles do a play a role for observed differences.

Overall, the effect of working conditions on health is similar in the two groups, while lifestyles play a bigger role, as they contribute to lowering the health of employees with an age higher or equal 50 relatively more than their younger peers. This is true especially for the lack of a right diet and, especially, of physical activity, which are key in this context.

At a more disaggregated levels, we find some heterogeneity by age and health indicators in the effect of single lifestyles and working conditions. For example, for 50 plus employees physical demanding jobs seem to impact negatively especially on our indicator of physical health (musculoskeletal problems), while for employees in the 25 – 49 age group the effect is higher on the mental health side. A lack of control tend to reduce the health of both groups of employees, but more for older ones. Finally, that on the ‘Reward’ side and in particular for what concerns worries about job-related insecurities the effect on all the health dimensions is the same, irrespective of the age of employees. In a flexicure labour market such as the Danish one this is an interesting result, suggesting that both younger and older employees feels equally insured by the system.

Finally, we find evidence that the health differences between 50 plus and 25 – 49 employees are not due to differences in average individual characteristics or mean job attributes, working conditions or lifestyles; but because these characteristics tend to have a different effect on perceived health as an employee gets older. This ‘return’ effect tend to lower the level of self-assessed health and increase musculoskeletal problems (‘hardware’ health), and this is the ‘bad news’ for older employees. The ‘good news’ is that, at the same time, it tends to increase mental health and vitality (‘software’ health).

A closer look that isolates the effect of working conditions and lifestyles revealed that, if older and younger employees had the same set of lifestyles, this would contribute to reduce the

health of the former not only in the case of self-assessed health and musculoskeletal problems, but also of mental health and vitality. Bad lifestyles – in particular the lack of physical activity and of a right diet - have more detrimental effects on the vitality and mental health of older employees, although on average they have higher health levels. By converse, the contribution of working conditions is more on the ‘endowments’ side. For example, older employees experience lower mental health because they express lower levels of social support and higher job worries.

To summarise, ‘good’ lifestyles seem to be more important than ‘good’ working conditions for the ‘good’ health of older employees and similar working conditions have heterogeneous effects depending on the health dimension and the age of employees. This suggest that in countries characterised by a rich and encompassing welfare state like Denmark, the design of ‘good’ policies aimed at favouring employment at late stages of the career and at giving incentives to postpone retirement is rather complex and calls for multidimensional interventions, covering several aspects of life other than job attributes.

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Tables

Table 1 – Variables, sample and descriptive statistics

<u>Variable</u>	<u>Whole sample</u>			<u>Age</u>	<u>Age</u>	<u>Unconditional</u>	
	<u>Mean</u>	<u>Min</u>	<u>Max</u>	<u>50 plus</u>	<u>25 – 49</u>	<u>coef</u>	<u>t-stat</u>
Age 50 plus	0.24	0	1				
<i>Health variables</i>							
Self-assessed health	3.23	0	4	3.15	3.25	-0.10***	-3.22
Mental health	84.65	0	100	85.93	84.23	1.69***	3.2
Vitality	71.52	0	100	73.04	71.03	2.01**	2.69
Musculoskeletal health	78.58	0	100	76.18	79.35	-3.18***	-3.7
<i>Working conditions</i>							
Hazard	12.52	0	100	10.48	13.18	-2.70***	-6.01
No influence	47.48	0	100	46.19	47.90	-1.70	-1.57
Repetitiveness	28.26	0	100	29.24	27.95	1.29	1.63
No social support	21.98	0	100	23.99	21.34	2.65***	3.75
Job worries	0.35	0	1	0.45	0.32	0.13***	6.53
<i>Lifestyles</i>							
Smoking	0.30	0	1	0.25	0.31	-0.06***	-3.17
Drinking	0.10	0	1	0.16	0.08	0.08***	6.12
No physical activity	0.14	0	1	0.13	0.14	-0.01	-0.4
No fruit&vegetab.	0.23	0	1	0.18	0.25	-0.07***	-3.85
N. Observations	2,898			706	2,192		

Notes: The unconditional difference is a t-test of the difference in means between 50 plus and 25 – 49 years old employees. The t-stat measures the statistical significance of that difference. Significance levels: * = 10%; ** = 5%; *** = 1%.

Table 2 – Estimates of health equations – Random Effects model on the overall sample

<u>Variables:</u>	<u>Self-assessed health</u>		<u>Mental health</u>		<u>Vitality</u>		<u>Musculoskeletal health</u>	
	<u>Coef.</u>	<u>z</u>	<u>Coef.</u>	<u>z</u>	<u>Coef.</u>	<u>z</u>	<u>Coef.</u>	<u>z</u>
Age 50 plus	-0.074**	-2.01	2.380***	4.16	2.434***	3	-2.737**	-2.45
<i>Working conditions</i>								
Hazard	-0.004**	-2.4	-0.130***	-4.56	-0.233***	-6.42	-0.239***	-6.13
No influence	0.001	0.77	-0.025**	-2.45	-0.041**	-2.82	-0.005	-0.31
Repetitiveness	-0.003***	-3.12	-0.044**	-2.74	-0.078***	-3.69	-0.096***	-3.91
No social support	-0.004***	-4.59	-0.142***	-9.82	-0.152***	-7.65	-0.102***	-4.47
Job worries	-0.132***	-4.61	-3.153***	-6.43	-4.479***	-6.52	-3.726***	-4.98
<i>Lifestyles</i>								
Smoking	-0.079**	-2.41	-0.434	-0.83	-1.385*	-1.93	-1.897**	-2.11
Drinking	-0.070	-1.64	-2.063**	-2.6	-1.153	-1.19	-0.498	-0.44
No physical activity	-0.129***	-3.19	-1.568**	-2.36	-4.774***	-5.05	-0.751	-0.7
No fruit&vegetables	-0.055	-1.63	-0.583	-1.12	-1.356*	-1.87	-0.765	-0.89

Notes: The model is estimated with 2,898 observations. All the regressions include a constant and additional controls for: gender, education, hourly wage, occupation, sector and size number of children, marital status and a dummy for 2005. Statistical significance: * = 10%; ** = 5%; *** = 1%.

Table 3 – Estimates of health equations with random effects. Separate estimates for 50 plus and 25 – 49 years old employees

Variables:	Self-assessed health				Mental health				Vitality				Musculoskeletal health			
	Age 50 plus		Age 25-49		Age 50 plus		Age 25-49		Age 50 plus		Age 25-49		Age 50 plus		Age 25-49	
	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z	Coef.	z
<i>Working condit.</i>																
Hazard	-0.011***	-3.02	-0.002	-1.12	-0.078	-1.52	-0.138***	-4.18	-0.223**	-2.92	-0.237***	-5.58	-0.327***	-3.14	-0.211***	-5.11
No influence	0.001	0.43	0.001	0.94	-0.045**	-2.23	-0.018	-1.55	-0.092***	-3.12	-0.022	-1.28	-0.009	-0.22	-0.003	-0.14
Repetitiveness	-0.001	-0.32	-0.004***	-3.41	-0.066**	-2.23	-0.037**	-1.96	-0.065	-1.46	-0.086***	-3.47	-0.094	-1.6	-0.092***	-3.4
No social support	-0.003**	-2.39	-0.004***	-4.06	-0.134***	-5.76	-0.151***	-8.39	-0.173***	-5.21	-0.150***	-6.32	-0.076*	-1.72	-0.123***	-4.61
Job worries	-0.186***	-3.24	-0.118***	-3.56	-3.402***	-4.14	-3.049***	-5.18	-4.735***	-3.77	-4.392***	-5.57	-3.708**	-2.21	-3.616***	-4.38
<i>Lifestyles</i>																
Smoking	-0.063	-0.8	-0.087**	-2.44	-0.690	-0.61	-0.286	-0.47	-1.805	-1.15	-1.352	-1.62	-3.025	-1.32	-1.484	-1.57
Drinking	-0.079	-1.01	-0.063	-1.23	-2.441*	-1.8	-1.818**	-1.95	-1.584	-0.87	-1.061	-0.95	0.561	0.27	-1.112	-0.84
No physic. activ.	-0.278***	-3.29	-0.082*	-1.84	-4.351**	-2.94	-0.734	-0.96	-10.568***	-4.9	-3.046**	-2.91	-4.821*	-1.78	0.587	0.55
No fruit&veget.	-0.161**	-2.13	-0.028	-0.76	-2.460**	-2.12	-0.059	-0.1	-2.904*	-1.81	-0.930	-1.13	-1.270	-0.56	-0.518	-0.57

Notes: The model for the group of individuals with 50 years of age or more is estimated with 706 observations; that for individuals in the age interval 25 – 49 with 2,192 observation. All the regressions include a constant and additional controls for: gender, education, hourly wage, occupation, sector and size number of children, marital status and a dummy for 2005. Statistical significance: * = 10%; ** = 5%; *** = 1%.

Table 4 – Oaxaca decomposition of health differences: 50 plus vs 25–49 years old employees

	<u>Self-assessed health</u>		<u>Mental health</u>		<u>Vitality</u>		<u>Musculoskeletal health</u>	
Panel a) Overall decomposition								
Raw difference	-0.100**	-2.65	1.693**	2.92	2.012**	2.34	-3.175**	-2.82
- Endowments	-0.014	-0.62	-0.549	-1.39	-0.381	-0.66	0.433	0.67
- Coefficients	-0.073*	-1.91	2.450***	4.19	2.468**	2.95	-2.402**	-2.12
- Interaction	-0.012	-0.52	-0.209	-0.52	-0.075	-0.14	-1.206*	-1.83
Panel b) Detailed decomposition: disaggregated contribution of working conditions and lifestyles								
<u>Endowments:</u>								
<i>Working conditions</i>								
Hazard	0.029**	2.73	0.209	1.48	0.603**	2.66	0.883**	2.82
No influence	-0.001	-0.41	0.076	1.25	0.156	1.36	0.014	0.22
Repetitiveness	-0.001	-0.31	-0.085	-1.33	-0.084	-1.09	-0.122	-1.15
No social support	-0.009**	-1.96	-0.356**	-2.94	-0.459**	-2.86	-0.200	-1.54
Job worries	-0.025**	-2.88	-0.455***	-3.46	-0.634***	-3.23	-0.496**	-2.08
<i>Lifestyles</i>								
Smoking	0.004	0.78	0.043	0.6	0.113	1.08	0.190	1.22
Drinking	-0.006	-1	-0.195	-1.7	-0.127	-0.86	0.045	0.27
No phys. activ.	0.002	0.4	0.026	0.4	0.063	0.4	0.029	0.4
No fruit&veget.	0.011*	1.89	0.173*	1.88	0.204*	1.66	0.089	0.55
<u>Coefficients:</u>								
<i>Working conditions</i>								
Hazard	-0.093**	-2.26	0.632	0.99	0.139	0.15	-1.217	-1.04
No influence	-0.004	-0.06	-1.205	-1.12	-3.215**	-2.05	-0.277	-0.14
Repetitiveness	0.090	1.29	-0.849	-0.83	0.610	0.41	-0.073	-0.04
No social support	0.018	0.42	0.393	0.56	-0.550	-0.56	1.138	0.92
Job worries	-0.031	-1.03	-0.159	-0.35	-0.155	-0.23	-0.041	-0.05
<i>Lifestyles</i>								
Smoking	0.006	0.28	-0.102	-0.32	-0.114	-0.25	-0.389	-0.62
Drinking	-0.003	-0.17	-0.101	-0.38	-0.085	-0.25	0.272	0.68
No phys. activ.	-0.026**	-2.01	-0.482**	-2.13	-1.001***	-3	-0.720**	-1.83
No fruit&veget.	-0.024	-1.58	-0.429*	-1.82	-0.352	-1.09	-0.134	-0.31
Panel c) Overall contribution of Working conditions and Lifestyles								
<u>Endowments:</u>								
Working condit.	-0.007	-0.47	-0.611**	-2.26	-0.418	-0.98	0.080	0.18
Lifestyles	0.011	0.9	0.047	0.26	0.254	0.92	0.352	1.14
<u>Coefficients:</u>								
Working condit.	-0.021	-0.22	-1.187	-0.85	-3.170	-1.59	-0.471	-0.18
Lifestyles	-0.046*	-1.68	-1.113**	-2.14	-1.553**	-2.35	-0.970	-1.2

Notes: The decomposition uses the random effects estimates of Table 3 and is computed using the 'oaxaca' command in Stata. In Panel a), the raw differential is the sum of the endowments, coefficients and interaction terms. Panel b) reports the detailed decomposition for the variables of interest. Panel c) summarises the overall contribution of working conditions and lifestyles, in terms of endowments and coefficients effects. The residual interaction effect is not included in the table. Statistical significance: * = 10%; ** = 5%; *** = 1%.

Table 5 – Estimates of health equations with fixed effects. Separate estimates for 50 plus and 25 – 49 years old employees

Variables:	<u>Self-assessed health</u>				<u>Mental health</u>				<u>Vitality</u>				<u>Musculoskeletal health</u>			
	<u>Age 50 plus</u>		<u>Age 25-49</u>		<u>Age 50 plus</u>		<u>Age 25-49</u>		<u>Age 50 plus</u>		<u>Age 25-49</u>		<u>Age 50 plus</u>		<u>Age 25-49</u>	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t
<i>Working condit.</i>																
Hazard	-0,013**	-2,53	0,003	1,29	-0,107	-1,4	-0,142**	-2,63	-0,024	-0,21	-0,283***	-4,45	-0,140	-0,86	-0,132**	-2,46
No influence	0,004*	1,69	0,001	0,63	-0,043	-1,28	-0,020	-1,03	-0,096**	-1,97	-0,017	-0,68	0,077	1,53	-0,006	-0,24
Repetitiveness	-0,001	-0,2	-0,004**	-2,76	-0,038	-0,88	-0,042	-1,61	-0,139**	-2,23	-0,052	-1,59	-0,062	-0,78	-0,082**	-2,34
No social support	-0,003	-1,38	-0,003**	-2,17	-0,087**	-2,58	-0,133***	-5,43	-0,143**	-3	-0,131***	-4,1	-0,044	-0,8	-0,118***	-3,79
Job worries	-0,132*	-1,65	-0,033	-0,74	-1,859	-1,59	-0,548	-0,66	-1,473	-0,82	-1,652	-1,5	-2,695	-1,26	-2,455	-2,42
<i>Lifestyles</i>																
Smoking	0,121	0,88	-0,063	-0,91	3,821*	1,9	-0,508	-0,37	2,900	1,28	-3,020*	-1,83	-3,103	-0,89	-1,196	-0,67
Drinking	0,059	0,52	-0,008	-0,12	-1,011	-0,55	-1,011	-0,76	5,644**	2,08	-0,187	-0,12	0,288	0,11	-0,412	-0,21
No physic. activ.	-0,265**	-2,37	-0,045	-0,78	-4,316**	-2,32	-0,586	-0,61	-9,456***	-3,5	-3,075**	-2,42	-4,083	-1,24	-0,622	-0,45
No fruit&veget.	-0,112	-1,02	-0,043	-0,88	-1,541	-1,02	0,611	0,7	-0,473	-0,2	0,055	0,05	0,526	0,18	-0,766	-0,64
corr(u_i, Xb)	-0,102		-0,006		-0,079		-0,032		-0,151		-0,008		-0,185		-0,015	

Notes: see Table 3. Corr(u_i, Xb) is the correlation between the estimated individual fixed effects u_i and the full set of regressors matched with their own coefficients.