Health, wellbeing and productivity in the workplace

A Britain's Healthiest Company summary report

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Abstract

This report aims to draw upon data collected during the 2014 Britain's Healthiest Company (BHC) competition in order to understand what drives productivity at work in the participating organisations and, in particular, to examine the relation between the health and wellbeing of staff and their resultant productivity. BHC is a project funded by VitalityHealth and academic support is provided by a research team from RAND Europe and the University of Cambridge.

To understand the relationship between health and wellbeing of staff and productivity, we look at the links between lost productivity in terms of presenteeism (being in suboptimal health at work) and absenteeism in association with a range of factors. These include:

- Job and work environment (e.g. stress and health-promotion interventions in the workplace)
- Personal (e.g. lifestyle risk-factors related to obesity, smoking and alcohol consumption)
- Health and physical risks (chronic conditions and mental health).

Using regression modelling techniques we establish associations between these factors and productivity loss in the workplace and compare our results to the wider literature.

The report is aimed at policymakers and practitioners and aims to contribute to the wider debate on the link between health, wellbeing and productivity at work.

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Summary

Over the last decades, accelerating technological changes and new forms of workplace organisation have led to workers assuming increased responsibilities and more autonomy than ever before (Appelbaum et al., 2000). Although this has increased overall productivity, flexible modern working practices have also increased daily job demands, requiring employees to multi-task and leading to increased levels of workplace stress and unrealistic time pressures (Bevan, 2012). These developments have not only led to increasing levels of sickness absence but also to the emergence of a phenomenon called 'presenteeism', when employees attend work while in suboptimal health. It is estimated that presenteeism driven by mental ill-health costs the UK economy £15bn per year (Centre for Mental Health, 2011). What is more, there is growing evidence that problems related to modifiable health behaviour are becoming more prevalent, driven by a lack of physical activity, by smoking, or by a rise in obesity levels in the wider population (Goetzel et al., 2012). This creates economic costs not only to society at large but also, more specifically, to businesses in the form of lost productivity. In light of such substantive costs due to absenteeism and presenteeism, we would expect there to be a strong case for companies to invest in the health and wellbeing of their employees. However, simple economics tells us that companies only find it profitable to invest in health promotion programmes when the benefits outweigh the cost of investment in the longer term. For companies it is crucial to understand the direct link between wellbeing and productivity. Without a clear evidence base, an optimal investment level will not be achieved.

This report based on data from the Britain's Healthiest Company (BHC)[1] Competition contributes to the evidence base on wellbeing and workplace productivity by exploiting a unique large employer–employee dataset. Our collected survey data include business information for 82 UK companies plus a thorough health assessment of their workforce, including a broad variety of physical- and mental-health indicators for individual workers. Altogether, the sample consists of 21,822 employees. Using multivariate regression techniques we look at the associations between a variety of health-risk and work-environment factors in association with workplace productivity lost due to absenteeism and/or presenteeism. We measure work productivity using the Work Productivity and Activity Impairment Questionnaire (General Health) or WPAI-GH, which assesses productivity based on self-reported general health and symptom severity.

Our findings suggest that **lack of sleep**, **financial concerns** and **giving unpaid care** to family members or relatives are negatively associated with productivity. **Mental-health** problems are also found to cause

[1] BHC is a project funded by VitalityHealth and academic support is provided by a research team from RAND Europe and the University of Cambridge.

significant productivity loss, especially in the form of presenteeism. In line with existing research we also find that employees with **musculoskeletal and other (chronic) health conditions** report higher rates of absenteeism and presenteeism than workers without such conditions.

When looking at work-environment factors we find that workers who are subject to workplace **bullying** report significantly higher levels of absenteeism and presenteeism than those who are not. We also find that more than 45 per cent of those studied reported being subject to **unrealistic time pressures**, which we find to be another significant cause of productivity loss. Other work-environment factors associated with relatively higher levels of presenteeism were **strained relationships** at work.

Beside the aforementioned significant associations between certain risk factors and productivity loss in the workplace, some of our findings are somewhat counterintuitive. For instance, smoking has not been found to be statistically significantly associated with productivity loss. Also, severe obesity has not been found to be related to absenteeism and presenteeism. Here we need to take into account the cross-sectional nature of our data. We are not in a position to follow individuals over a longer time period, where the evidence shows that smoking and obesity are associated with severe health conditions such as cardiovascular disease or cancer, both of which are associated with productivity loss. Therefore, our findings potentially capture more short-term effects, assessed at a given point in time. Similarly, in our analysis, work-environment factors such as a lack of control or insufficient peer or managerial support do not show any statistically significant associations with workplace productivity loss.

Our report should be useful to policymakers and practitioners in identifying the characteristics of employees who are more at risk of work impairment. Our analysis also indicates the importance of work-environment factors on productivity, something of relevance to companies looking to improve their working environment and reduce its negative effects on employees' health and wellbeing. Our analysis distinguishes in more detail between factors that determine absenteeism and presenteeism. Based on our (self-reported) data, we find that various factors are slightly differently associated with absenteeism compared to presenteeism, indicating that policymakers and companies may want to look more at presenteeism and its associated risk factors.

Knowledge about the effectiveness of workplace health interventions and programmes is still emerging and our report cannot make direct suggestions about what type of interventions policymakers or organisations should implement to improve employee health and wellbeing. Some of our findings suggest that companies which pay attention to health and wellbeing at board level report lower rates of absenteeism and presenteeism, although more research still needs to be done into the effectiveness of health interventions in the workplace.

Acknowledgements

The authors would like to thank the quality-assurance reviewers Charlene Rohr and Bryn Garrod at RAND Europe. We would also like to thank our sponsors, Shaun Subel and Adam Noach at VitalityHealth, who provided useful comments on this report. We also thank the wider Britain's Healthiest Company team at RAND Europe and the University of Cambridge, but emphasise that the views presented in this report are the authors'. Any remaining errors are also our own.

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Abbreviations

BHC	Britain's Healthiest Company
BMI	Body mass index
CBT	Cognitive behavioural therapy
HLQ	Health and labour questionnaire
HPQ	Health and work performance questionnaire
HR	Human resource
HSE	Health and Safety Executive
OLS	Ordinary least squares
NHS	National Health Service
GLM	Generalised linear model
MS	Management standards
SPS	Stanford presenteeism scale
WPAI-GH	Work productivity and activity impairment questionnaire (general health)
WPAI-SHP	Work productivity and activity impairment questionnaire (specific health)
WLQ	Work limitations questionnaire
WPSI	Work productivity short inventory
WHI	Work health interview

1. Background

1.1. Introduction

There is increasing public acceptance that health and wellbeing at work can have profound impacts on individuals, organisations and societies (European Commission, 2008). Dame Carol Black's review – *Working for a Healthier Tomorrow* – recognised that there is strong and growing evidence that work, health and wellbeing are closely and powerfully linked and need to be addressed together (Black, 2008). In the United Kingdom during 2013–2014 an estimated 1.2 million people who worked during the last year were suffering from an illness (long-standing as well as new cases) they believed was caused or made worse by their current or past work. Half a million of these appear to be new conditions which started during the year. Approximately, 28.2 million days were lost due to work-related ill health or injury (HSE, 2014). The recent Black and Frost (2011) report on the UK workplace highlights that 140 million working days are lost to sickness absence and 300,000 individuals leave the workplace each year due to ill-health. This puts the approximate cost of sickness absence to British business at approximately £15bn annually (Black and Frost, 2011). What is more, businesses face significant costs not only due to sickness absence but also from employees attending work while sick, which is referred to as 'presenteeism' (other related terms are 'sickness presence' or 'lost health-related productivity'). It is estimated that presenteeism due to mental ill-health costs the UK economy about £15bn per year (Centre for Mental Health, 2011)

There is therefore a strong business case for investing in staff health and wellbeing. The simple logic is that effective investment in health and wellbeing can save a company more in terms of lost productivity than the original investment, a principle established by several case studies, notably in some large UK employers (Hassan et al., 2009). RAND Europe's work for the Boorman Review (Boorman, 2009) on the health and wellbeing of National Health Service (NHS) staff gave a sense of the possible savings organisations might make by adopting more effective ways of managing health and wellbeing. That study estimated that bringing lost productivity in the NHS down to levels experienced by better public sector performers (essentially, by halving lost productivity) would save the NHS about £500m a year.

However, knowledge of the effectiveness of interventions and programmes – and of contextual factors which influence wellbeing – is still emerging. Our experience with organisations participating in the Britain's Healthiest Company competition shows that few measure returns on investment or understand the effectiveness of interventions. There is, in addition, a great deal of debate on how to measure outcomes such as productivity, although some evidence exists on a range of interventions. The systematic review by Cancelliere et al. (2011), for instance, finds that specific interventions such as occupational-health programmes, job-stress education for line managers and supervisors, lifestyle-guidance programmes

by email, and telephone-counselling sessions with mental-health clinicians appear to be effective in reducing levels of presenteeism (and, indirectly, absenteeism). In addition, a recent review (Stolk et al., 2014) for the UK government on mental health and employment reports that interventions based on cognitive behavioural therapy (CBT) seem to be effective not only in improving employability but also in keeping individuals with mental-health conditions at work and improving their productivity in the workplace. Similarly, there is a growing body of evidence relating to wellness programmes (Mattke et al., 2014), although the recent systematic reviews by Buseman-Williams (2014) and Osilla et al. (2012) show that the effectiveness of such programmes is mixed, and that they appear better at promoting individual wellbeing rather than wider organisational productivity. Some studies also shed light on the importance of multi-programme interventions (Hassan et al. 2009), while wider evidence also exists concerning the way in which the working environment, such as shift work or long hours (Waddell et al. 2006), and other factors (e.g. sleep) contribute to wellbeing.

Knowing what is (cost-)effective for a given population is important but may not be the only barrier stopping organisations from investing in staff health and wellbeing. There is a common perception that larger companies may find it easier to make such investments compared to smaller organisations, that overall employ the majority of workers (Mattke et al. 2014). However, a RAND Europe study looking at data across Europe suggests that in many countries small employers actually offer the same type of support as larger employers (Stolk et al., 2012). Regulatory and national contexts tend to be more important than the size and resources of an employer, emphasizing the importance of attitudes towards workplace health and wellbeing.

1.2. Policy relevance

Although downward trends in fatal and non-fatal injuries at work in many industrialised countries reinforce the perception that 'tough jobs' are declining, health and wellbeing in the workplace remain an issue thanks to factors including decreased job security, possibly worsening working conditions and reduced opportunities to combine work with other private and social responsibilities (European Commission, 2008). From 1990 to 2008, the rate of self-reported work-related illness – particularly due to stress and related conditions – doubled, jumping from 820 per 100,000 employed in 1990 to 1,620 in 2008 (Health and Safety Executive, 2009). The issue of workforce health and wellbeing is perhaps even more critical in the current climate given the perceived lingering effects of the economic crisis on the mental health of the working population (as recently reported in a study undertaken by the Institute of Education at the University of London[2]).

At the same time, there is increased evidence in the UK and other industrialised countries that problems related to modifiable health behaviour are becoming much more prevalent. According to the Health and Social Care Information Centre (2014) the proportion of adults having a normal body mass index (BMI) decreased between 1993 and 2001 (from 41 to 32 per cent for men and 49.5 to 41 per cent for women), whereas the proportion of adults classified as obese increased from 13 to 24 per cent for men and 16 to 25

[2] Institute of Education. As of April 2015 http://www.ioe.ac.uk/newsEvents/87219.html.

per cent for women over the same period. These factors result in costs to the economy and society at large. The economic costs of obesity to the NHS, for instance, rose from £479.3m in 1998 to £4.2bn in 2007 – a more than eightfold increase in less than a decade (National Obesity Observatory, 2010).

Improving health and wellbeing can therefore have real societal, economic and personal benefits above and beyond their value to business alone. Clearly, addressing wellbeing more effectively at work – with company programmes promoting health and wellness – may lead overall to increased life satisfaction, reduced healthcare utilisation and, potentially, a lower benefits bill.

It is right to recognise that being in work can be good for your health and wellbeing. Much of the academic evidence relating to labour-market status and health focuses on the damaging effects of unemployment (Waddell et al., 2006). Work can be beneficial, while unemployment is seen as a key driver behind mental ill-health (Pevalin and Goldberg, 2003; Paul and Moser, 2009) and returning to work appears to help to improve mental wellbeing (Paul and Moser, 2009; McManus et al., 2012). However, it's not just about keeping people in work. Studies also show that inappropriate working environments can exacerbate mental-health problems (Clayton et al., 2011; van Stolk et al., 2014; Waddell and Burton, 2006). It is therefore crucial to understand those factors which contribute to health and wellbeing in the workplace and, further down the line, to productivity outcomes.

1.3. Objectives of the study

VitalityHealth commissioned RAND Europe in collaboration with the University of Cambridge to conduct an employer and employee survey for the Britain's Healthiest Company competition. The competition seeks to give employers an assessment of the health of their workforce and of their current health-promotion interventions. To that end, RAND Europe collected a large-scale dataset which we use in this work to understand the relation between a broad set of health and lifestyle risk factors and workplace productivity.

Building on existing quantitative and qualitative evidence, this study seeks to:

1. Report on the prevalence of modifiable and other health risks among the large-scale study population including smoking, alcohol consumption, physical activity and nutrition, as well as mental-health conditions.
2. Identify determinants of workplace productivity loss due to sickness absence or presenteeism, with special focus on a set of health risks.
3. Identify recommendations to help businesses improve the effectiveness of their current health and wellbeing interventions.

Wherever necessary, we make the assumptions, limitations and potential caveats of our analytical approach explicit in our report.

1.4. Research approach

In order to address the research objectives formulated above, our research incorporates three strands:

1. We review the available literature in order to collect currently available evidence about the relation between various personal health risks, organisational factors and workplace productivity;
2. We use general descriptive statistics to highlight the prevalence of health risk factors among the employees in companies participating in the 2014 Britain's Healthiest Company competition;
3. We use multivariate regression approaches to investigate the determinants of workplace productivity loss. These analytical methods enable us to look at associations between the outcome of interest (productivity loss) and its determinants, such as personal health risk factors, work environment and other organisational characteristics.

1.5. Structure of this report

The report is structured as follows. Chapter 2 describes the 2014 Britain's Healthiest Company survey in more detail. Chapter 3 describes different ways to measure productivity loss and how its determinants are measured. Chapter 4 describes the results of our empirical analysis, and Chapter 5 outlines the conclusions of the report and discusses health and wellbeing in UK companies.

2. Britain's Healthiest Company survey and how it compares to other UK data sources

This chapter describes the data collection process for the 2014 Britain's Healthiest Company survey and discusses the representativeness of the collected employer and employee responses.

2.1. Britain's Healthiest Company survey data 2014

2.1.1. The search for Britain's Healthiest Company

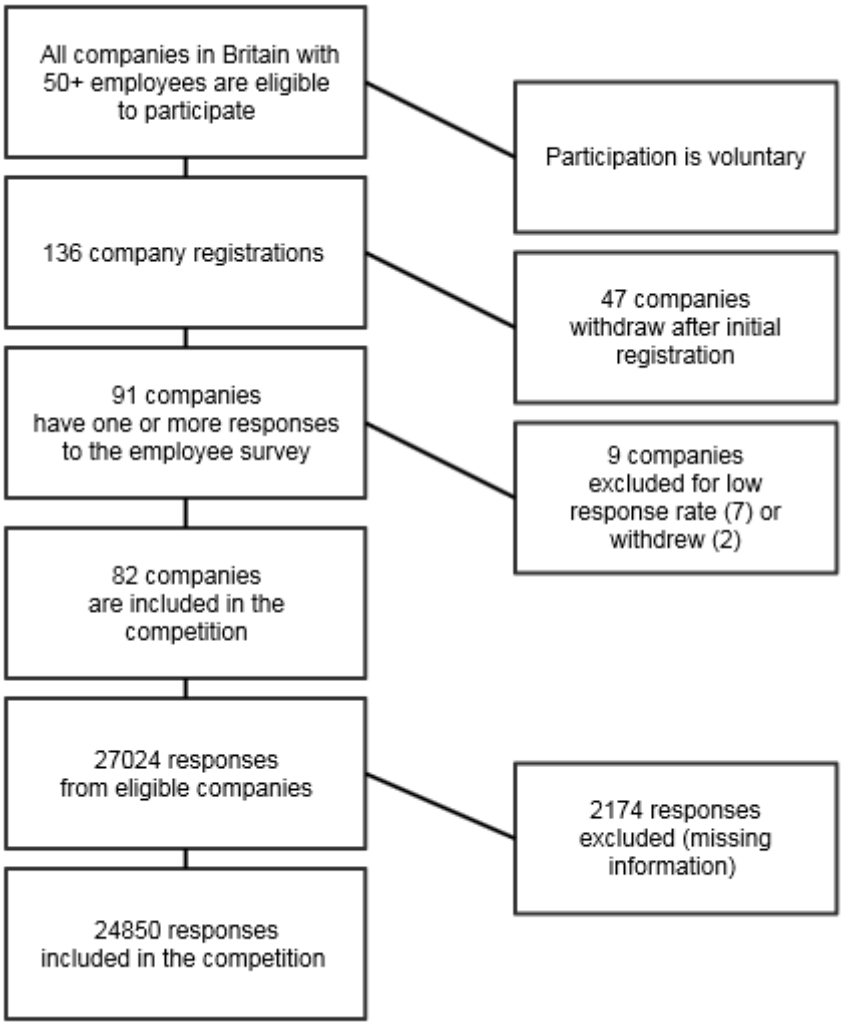
The Britain's Healthiest Company (BHC) competition was established by health insurer VitalityHealth. The competition seeks to find the UK's outstanding organisations with regard to best practice and innovative approaches towards workplace health and wellbeing. The BHC competition is one of the largest UK national studies, giving employers valuable insights into the wellbeing of their employees. All companies in Britain with 50 or more employees are invited to participate in the competition. After registering, participating companies return a corporate-health assessment, including general company characteristics such as the size of the organization and the industry it operates in as well as information on the organisation's approach to health promotion and wellbeing interventions. Subsequently, employees are invited to respond to an employee health-assessment survey which collects information on lifestyle, behavioural and clinical risk factors (including weight, diet, exercise, smoking, alcohol intake, stress, cholesterol and blood glucose levels and blood pressure) as well as asking how often people attend health screenings to monitor and understand their health. At the end, each participating company receives a confidential corporate health report which provides employers with a holistic view of employee wellbeing and benchmark information which can be used to plan future human resource (HR) strategies. The corporate report provides an effective way of measuring and managing health risks within an organisation and of understanding how these risks affect employee engagement and productivity levels. Participating employees receive a detailed health assessment providing information on their individual health and lifestyle risks. Both the corporate and employee reports include practical recommendations on how to manage particular lifestyle and health risks.

2.1.2. A brief description of the data collection process

To ensure the validity of comparisons between organisations, only companies meeting a minimum required employee survey response rate are included in the competition. Details of how respondents are included in the BHC competition are shown in Figure 2-1 below.

From 136 companies initially registered, 47 withdrew their application after registration. Initially responding companies were followed up, and encouraged to participate by VitalityHealth; withdrawals occurred for several reasons, for example, not being able to commit staff time to participation, or having other surveys running during the same time period. From the 91 companies that distributed the employee survey, 9 companies were excluded due to low response rates or voluntarily withdrew.

Figure 2-1: Flow chart: employees responding to Britain's Healthiest Company survey



The survey collected information from more than 27,000 UK employees about vital statistics including height, weight, lifestyle habits, mental health, chronic conditions, smoking, drinking and other demographic information; 2,174 responses were ineligible due to missing key information, leading to 24,850 employee responses overall. Both the employer and the employee survey can be linked through a unique company identifier.

To derive the final data sample we use for the analysis in this study, we discarded the full set of information for employees with missing information in our outcome variable of interest: work impairment due to absenteeism or presenteeism. This leaves us with a sample of 21,822 employees for the empirical analysis.

2.1.3. A note on the representativeness of the 2014 BHC survey

In the UK, 30.6 million people aged 16 and over were in work from April to June 2014, while in 2012 there were 448,905 companies with 50 or more employees. From March to May 2014 the 2014 Britain's Healthiest Company survey received 27,024 responses from employees at 82 companies with 50 or more employees from across the UK, with a combined total workforce of 204,143.

In order to understand the quality of the findings from analyses based on the survey data, it is important to understand how representative the survey is in terms of the participating companies and employees (i.e. the representativeness of the sample). It is also important to understand whether those companies which responded to the survey were systematically different from those which did not (i.e. whether there was a non-response bias).

First, we used responses to the employer and employee surveys to explore whether survey respondents were representative of all employees in participating companies. Participating companies report the age, gender and income profiles of their workforce in the employer survey, while individual employees report their age, gender and income in their survey responses. By comparing information from these two sources it is possible to explore which groups from participating companies are over- or under-represented among respondents. In detail, we measured the mean age, income and proportion of female employees in each participating company, using information reported in the employer surveys and assuming that responses in the top income and age-group survey-response categories (i.e. over £90,000 and 65 years old) were on average 68.5 years and £95,000 respectively. We then compared these with the information presented by the employees.

Second, we compared the characteristics of participating companies and participating employees with all companies and employees in Britain. To that end we estimated weights based on the response rate at each participating company, the age, gender and income of responders, and company size. We then explored whether using these weights changed the estimates obtained (i.e. weighting to all employees of responding companies, and to all companies in the UK). Specifically, we created inverse probability weights as follows: employee age responses were categorised into the same groups as presented in the employer survey; income survey option categories were consistent across both. Weights were estimated by group, separately for age, gender and income. Two additional company weights were estimated – a weight for response rate to weight to overall number of employees in that company, and for company size (number of employees) – to weight included companies to the same size profile as all companies in the UK.

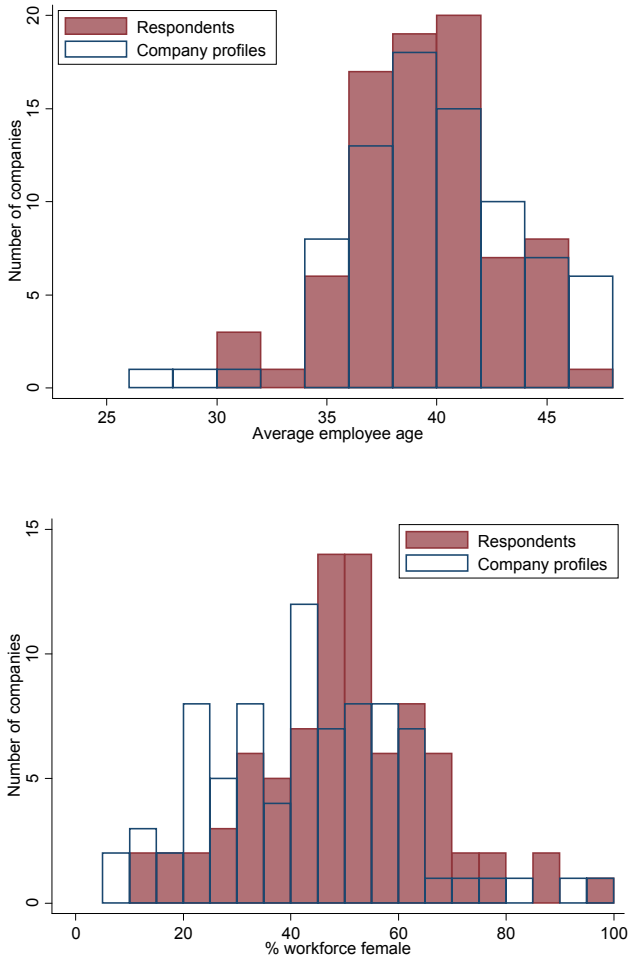
The weights were combined multiplicatively. Where employer survey responses on the income (2611 responses) or age (342 responses) profile for the company were missing, weighting on these characteristics was not performed for this company, and weights were set to 1. When combined weights were greater than 25 (43 responses) or less than 0.04, weights were replaced with 25. For a small number of employee

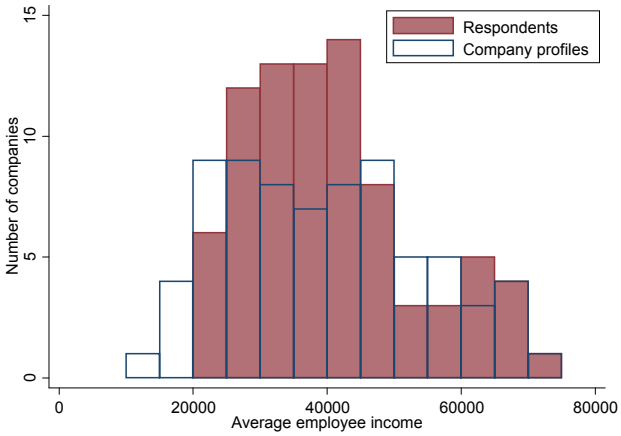
responses (769 out of 24,850) with characteristics (for example age or income) in groups where the employer reported no employees, weights of 'zero' were estimated; these were replaced as 0.04, i.e. 1/25 in this analysis.

Are respondents representative of all employees in participating companies?

The mean age of respondents as reported by companies who participated in the survey was 39.6; 50.9 per cent of respondents were female and the median reported income group was £30,000–39,999. Female respondents and companies where mean income and age of respondents fall into the middle range are over-represented among respondents compared with the company profiles (see Figure 2-2).

Figure 2-2: Average (mean) age, gender and income profiles of participating companies





Are participating companies representative of all companies in the UK?

BHC participating companies are dominated by financial and insurance activities. They made up 22 per cent of survey responses but only account for 2 per cent of all UK businesses. Manufacturing is over-represented. Companies in manufacturing made up 12 per cent of survey responses, but comprise only 6 per cent of UK businesses, while construction and real-estate companies are not represented at all, despite accounting for 20 per cent of all UK businesses. Respondents working in companies with 500–2499 employees are particularly over-represented (36 per cent of respondents compared with 0.2 per cent of employees nationally).[3,4]

How do respondents to the BHC survey compare with the rest of the UK?

Weighting makes minimal differences to the estimates of health measures from BHC (see Table 2-1).

Table 2-1: Weighted and unweighted estimates from BHC employee respondents

	unweighted	weighted
Mean age	39.6	38.9
Mean BMI	26.1	26
Men BMI > 30	15.9%	15.2%
Women BMI > 30	17.2%	17.7%
Hypertension	1.6%	1.7%

[3] Department for Business, Innovation and Skills. Business population estimates for the UK and Regions, 2013. As of April 2015 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/254552/13-92-business-population-estimates-2013-stats-release-4.pdf.

[4] Size of firms in London and UK by enterprise size 2001-12 http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=Enterprises+by+Size+and+Number.

However, this is slightly different from the national picture. For example, in the data from the Health Survey for England 2012,[5] 17.8 per cent of men and 18.3 per cent of women who are currently in employment have a self-reported a BMI larger than 30 compared with estimates from BHC of 15.2 per cent and 17.7 per cent respectively. Estimates from the non-working population (of interviewer measured, rather than self-reported BMI) are higher still, nationally 26 per cent of men and 24 per cent of women have a BMI larger than 30 (Health and Social Care Information Centre, 2014).

Discussion on representativeness

Overall, we find that there are differences between participating companies and all companies in the UK. We also find an over-representation of companies with greater average numbers of middle-income and middle-age employees, and/or with higher proportions of female employees. However, estimates of health measures such as BMI change little after weighting, and BMI estimates from respondents are only slightly different from a nationally representative group of employees.

Nevertheless, it is important to stress that in general response rates are typically lower among the very old, the very young, and those living in lower-income areas. It is also possible that employees with healthier lifestyles are more likely to respond than employees with less healthy lifestyles. The implications for this survey are that respondents may not be typical of all respondents within participating companies, nor participating companies of all companies in the UK. Healthier lifestyles, and 'healthier' companies, are likely to be over-represented.

However, the implications of these potential biases for the analyses presented in the rest of this report are low. All income, age and gender groups are represented among respondents, and in the analysis we also adjust for demographic and company characteristics such as size and industry.

[5] NatCen Social Research and University College London. Department of Epidemiology and Public Health, Health Survey for England, 2012 [computer file]. Colchester, Essex: UK Data Archive [distributor], April 2014. SN: 7480, http://dx.doi.org/10.5255/UKDA-SN-7480-1

3. How we measure workplace productivity and its determinants

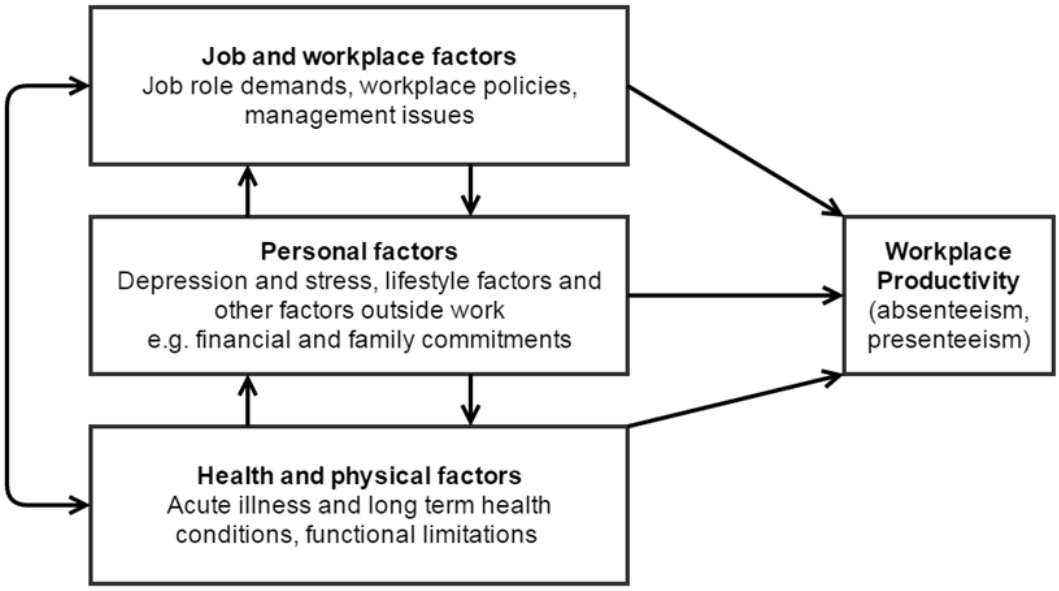
In this chapter we describe the measurement of workplace productivity used in this study. We also present factors that have been identified in the literature as being associated with productivity and describe how they are measured in the 2014 BHC survey.

Broadly, we can group such determinants of workplace productivity into three categories:

1. Job -and workplace related factors including aspects of the work environment such as work demands, work relationships, and corporate attitudes towards health and wellbeing;
2. Personal factors, which are related to personal attitudes to work and absence, and individual behaviour, such as lifestyle and mental-health factors;
3. Health and physical factors include existing (long-term) health conditions as well as physical factors such as blood pressure or cholesterol levels.

The relation between these factors and work productivity is depicted in Figure 3-1:

Figure 3-1: Determinants of workplace productivity



As Figure 3-1 highlights, all three factors are related to productivity but are interrelated in a dynamic manner as well. For instance, someone who is exposed to unrealistic time pressures or bullying in the workplace may develop mental-health problems over time. To capture such dynamic effects, however,

requires longitudinal data following that worker over a long period. Our data, by contrast, reflect the separate effects on productivity of both time pressure and mental-health problems at a given point in time only, and are thus cross-sectional in nature. We go into more detail below on the measurement of workplace productivity, the outcome in which we are particularly interested, and its determining factors.

3.1. Measuring productivity loss

In the literature on health and work productivity the measurement of 'ill health' is often divided into two categories: absenteeism and presenteeism. The former refers to the measure of days absent from work, the latter to reduced productivity while at work (Koopmanschap et al., 2013).

The BHC data measure work productivity using the Work Productivity and Activity Impairment Questionnaire (General Health) (WPAI-GH). The WPAI-GH was developed in 1993 to assess productivity loss by measuring the effect on work productivity of general health and symptom severity (Tang et al., 2011). It was originally established as a self-reported quantitative assessment of the amount of absenteeism, presenteeism and daily-activity impairment attributable to general health (WPAI-GH) or a specific health problem (WPAI-SHP). It has since been used in a wide range of applications and several versions for specific health problems are now available, as well as being available in different languages (Lofland et al., 2004).

The instrument consists of six questions with a recall time frame of seven days. The questions ask whether the respondent is employed; the number of hours missed from work; the number of hours actually worked; and the degree to which the respondent feels that a health problem has affected productivity while at work and affected their ability to do daily activities other than work. WPAI-GH outcomes are expressed as impairment percentages, where higher percentages indicate greater impairment and lower productivity. We use the following three work-related impairment percentages calculated on the basis of the WPAI-GH scale

- Per cent work time missed due to ill-health (absenteeism)
- Per cent impairment while working due to ill-health (presenteeism)
- Per cent overall work impairment due to ill-health (absenteeism and presenteeism).

Beside the different WPAI scales, a number of other scales of self-reported workplace-productivity measurement instruments have been created, including the Work Limitations Questionnaire (WLQ), the Health and Work Performance Questionnaire (HPQ), the Work Productivity Short Inventory (WPSI), the Stanford Presenteeism Scale (SPS-34 and SPS-13), the Work and Health Interview (WHI) and the Health and Labour Questionnaire (HLQ). A number of reviews have examined the advantages and disadvantages of each of the scale in more detail (Allen & Bunn 2003; Lofland et al. 2004; Stewart et al. 2003a).

In short, among the main advantages of the WPAI-GH, as noted in the literature, are the way it can be generalized across occupations and the ease with which it allows computations of productivity loss (Reilly et al., 2008). On the basis of the questions, the calculation of the impairment percentages is relatively straightforward and well documented. Prasad et al. (2004) highlight the validity of the WPAI scales,

which have been used in a number of studies, although in general it appears that WLQ and HPQ presenteeism scales are the most popular (Schultz and Edington, 2007).

There are drawbacks, however, concerning the lack of specificity with which the WPAI measures productivity loss and the fact that the self-administrated version is less accurate than the interviewer version. Regarding the former, Prasad et al. (2004) observe that the use of single items to obtain data on reduced productivity while at work and during non-work daily activities is a limitation of the WPAI scale. Therefore, the WPAI scale may be inadequate if a study intends to examine the impact on productivity for different tasks at work. A related criticism is raised by Loeppke et al. (2003), who note that no attempt to assess the level of work demand – whether cognitive, emotional, or physical – or the potential variability in this demand has been made. This lack of specificity is likely to be the result of the limited number of questions included in the WPAI-GH.

3.2. Measuring the determinants of productivity loss

3.2.1. Job- and workplace-related factors

Job-related factors driving absenteeism and presenteeism can be divided into two elements: workplace-design indicators, including the work environment, and wider organisational factors.

Workplace policies including sick pay and job stability can strongly influence the absenteeism and presenteeism of an individual worker (Johns, 2010). However, it is not just through organisational policies. The job role itself (e.g. manual labour or high-intensity public-facing roles), management issues (including perceptions of effort–reward balance) and the workplace environment can all influence productivity – directly through their influence on worker health (Black, 2008) or indirectly where sickness absence is a coping mechanism. There exists a direct relation between job design, family-friendly work-management practices, organisational change and employee health and wellbeing.

The 2014 BHC survey includes indicators to measure work-related stress using six items from the UK Health & Safety Executive (HSE) Management Standards (MS) Indicator Tool (Health and Safety Executive, 2015). Stress is measured along the following lines:

- Demands: unrealistic time pressures
- Control: choice in deciding what to do at work
- Managerial support: line manager encourages at work
- Peer support: respect at work from colleagues
- Relationships: those at work are strained
- Change: staff are always consulted about change at work

In line with Gerich (2015), the organisational factors associated with workplace productivity present in the 2014 BHC survey include further indicators showing the importance of employee health and wellbeing in measuring a company's success perceived by board members, as well as whether the organisation supports health-promotion programmes in the workplace.

Moreover, in order to investigate the relation between a company's provision of health and wellbeing interventions and productivity in the workplace we use information from both, the employer and

employee surveys, and construct an intervention index measuring the intensity with which a company offers health-promotion and wellbeing programmes to its employees. To generate the index we add up the number of interventions a company provides and weight it with the share of employees who reported actually using the provided intervention.[6] We then place companies into three groups of equal size according to their health-intervention index score: companies with low provision (*low*), companies with medium provision (*medium*) and companies with high provision (*high*).

3.2.2. Personal factors

Personal factors determining workplace productivity can be broadly categorised into three elements. Firstly, non-job factors such as work attitudes and financial or family priorities can influence an individual's absenteeism or presenteeism (Johns, 2010). Our data include, for instance, measures on whether an employee suffers financial pressure or provides unpaid care looking after an ill, frail or disabled family member.

Secondly, it has been found that lifestyle risk factors including obesity, diet and sedentary lifestyle habits influence workplace productivity (Alavinia et al. 2009; Boles et al. 2004; Cancelliere et al. 2011). A lack of physical activity has been associated with low workplace productivity. Burton et al. (2005a) compared those using a fitness centre with those who did not (using a logistic regression model adjusted for age, gender, location and health risks) and found that the latter were more likely to report higher levels of presenteeism. More recently, attention has turned to sleep as a determinant of productivity loss. Recent studies (Bolge et al. 2009; Dean et al. 2010; Kessler et al. 2011; Sarsour et al. 2011) show the relation between insomnia and workplace performance. Using the same productivity scale, the study by Katz et al. (2014) found that (accounting for factors such as demographics and other health risks) employees who slept less than seven to eight hours per night experienced significantly more productivity loss compared to employees who slept more than eight hours per night on average.

Thirdly, mild to severe mental-health conditions are found to be major predictors of productivity loss (Stewart et al., 2003b). Stress at work may increase ill health and productivity directly through biological stress pathways or indirectly through influencing individuals' health behaviours, such as alcohol consumption and smoking (Chandola et al., 2008). In the BHC survey, mental health is measured using the Kessler Psychological Distress scale, a six-item questionnaire intended to provide a measure of distress based on questions about anxiety and depressive symptoms a person has experienced in the most recent four-week period (Kessler et al., 2002). Poor scores on mental wellbeing can impact negatively on both mental and physical health.

3.2.3. Health and physical factors

Chronic and acute health conditions have been found to be linked to workplace productivity loss (Burton et al., 2004). For instance, a study at a British university showed that around 40 per cent of employees with a self-reported chronic illness reported limitations in their productivity when at work (Munir et al.,

[6] For example: company X provides on-site gym (20 percent of employees report they make use of it) and bicycle storage facilities (10 per cent of employees report they make use of it), leading to an overall index score for the company of 1*0.2 + 1*0.1 = 0.3.

2005). Generally, the existing literature measures the impact of co-morbidity by adding up the number of existing conditions for each individual. Lerner et al. (2003), for example, added up the number of conditions and found that each additional chronic condition gradually increases probability of work productivity loss due to presenteeism.

In addition to the literature on productivity loss, which shows a strong association between productivity and mental health, the link with musculoskeletal pain is also important. In a systematic review, Schultz and Edington (2007) highlight that only one study (Hagberg et al., 2002), which they identify as of moderate quality, looks at the association between musculoskeletal conditions and presenteeism. Using a relatively long one-month recall period for their productivity scale, Hagberg et al. (2002) show a productivity loss among Swedish computer workers with musculoskeletal problems. Some studies have also looked at the associations of biological risk factors, such as high blood pressure, glucose and cholesterol. However, the overall assessment is that the effect of these risk factors seems not to matter much as a driver of productivity loss (Burton et al., 2005b).

3.3. Modelling the determinants of workplace productivity

We begin the empirical analysis by reporting general descriptive statistics of our study sample of employees, including the total number of observations and corresponding proportions among the study sample for the measures and determining factors of productivity. To explore the associations between workplace productivity and health risk factors outlined above, such as work demands, health problems, lifestyle factors, sleep, and organisations' attitudes towards health and wellbeing, we primarily apply ordinary least squares (OLS) regression analysis. In general terms, a linear regression model is used to describe the relation between two or more variables in a set of data points with a line. OLS is a statistical approach to fitting a model to the observed data by finding the function which most closely approximates (or best fits) the data (Wooldridge, 2010). In technical terms, the OLS method is used to fit a straight line through a set of data-points so that the sum of the squared vertical distances (called residuals) from the actual data-points is minimised. Therefore, the best fit can be represented by the line that minimises the total distance between the actual data points and the predicted values.

A definition of all predictor variables included in the regression analysis can be found in Table A-1 in the appendix. In general, all predictor variables are included in the model as binary indicators. For interpretation purposes this means that they have to be interpreted relative to an omitted base category (for the variable financial concerns, for instance, the omitted category represents a worker who does not report any current financial concerns).

Please note that all analyses in this study are conducted with Stata 13.1[7] and all statistics are evaluated at the 1 per cent, 5 per cent and 10 per cent significance levels. For statistical significance we expect the p-value to be less than the significance level (α = 0,01 or 0,05 or 0,1 respectively). The concept of statistical significance is generally used to determine whether a null hypothesis is be rejected or retained. The null

[7] StataCorp. 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP.

hypothesis is the default statement that the true effect is zero. P-values represent the probability of observing an effect given that the null hypothesis is true (there is no real effect), whereas the null hypothesis is rejected if the p-value is less than the significance level. The significance level therefore represents the probability of rejecting the null hypothesis given that it is true (DeGroot et al., 1986).

Note that as our dependent variable is a share (of work impairment) and lies therefore between 0 and 1, it is important to stress that we also run sensitivity analyses and apply a fractional response estimator proposed by Papke and Wooldridge (1993). An issue that may arise with OLS is that it could predict values for the proportion of working time lost due to absenteeism and/or presenteeism which lie outside the interval between 0 and 1. The proposed fractional response estimator takes this into account and suggests that a generalised linear model (GLM) with a binomial distribution and a logit link function is appropriate in the case where the observed variable is continuous and bounded between 0 and 1. However, as long as the relative proportion of OLS predicted values that fall outside the unit interval is small, the OLS estimator is expected to be unbiased. OLS is our preferred estimator as fractional response models have not been applied widely in the literature and for practicality OLS delivers directly the marginal effects of our variables of interest without the need for conversion. We report the results from the OLS regression in section 3 and the sensitivity analysis using GLM in the appendix.

4. The determinants of workplace productivity loss: empirical findings

In this section we present the findings of our empirical analysis of the determinants of workplace productivity among employees in the 2014 BHC survey. We start by providing an overview of general descriptive characteristics of employees in our study sample. Subsequently we present the findings of the regression analysis, which models the relation between workplace productivity and the determinants thereof.

4.1. Descriptive characteristics of the study sample

Among the 2014 BHC employees the average work impairment due to absenteeism and presenteeism in the study population is 8.8 per cent. The average work impairment due to presenteeism is 7.7 per cent. The mean age of all employees in the sample is 36 years. Further information on descriptive characteristics of the employees in the study is presented in Tables 4-1 to 4-4. Table 4-1 reveals that the study population is relatively well educated, with about 52 per cent having completed a university degree (undergraduate or postgraduate). The majority of the employees are white-collar workers (72.9 per cent) from a white ethnicity background (91.6 per cent) with an average yearly income of about £40,000. About 26 per cent of respondents report that they have financial concerns at present, while 4.5 per cent state that they are providing unpaid care by looking after an ill, frail or disabled family member, friend or partner.

Table 4-2 shows that in general, employees in our sample are relatively content with their jobs (72 per cent), but almost 45.6 per cent report unrealistic time pressures at work. Over 25 per cent report that they lack a choice in deciding what they do at work and about 13.9 per cent report that relationships at work are strained. About 5 per cent report that they are subject to bullying at work. From an organisational point of view, the majority of employees report that their companies' leaders view the level of employee health and wellbeing as one important indicator of the organisations' success; that they are informed about the importance of health and wellbeing; and that the organisation's health benefits support health promotion. About 10.5 per cent of the population in the analysis sample are obese (BMI between 30 and 35), 4.8 per cent severely obese (BMI larger than 35), while at the lower end of the BMI distribution, 1.5 per cent of employees report a BMI below 18.5, which counts as underweight. About 11.2 per cent of employees currently smoke. Furthermore, 36 per cent do not perform the recommended weekly amount of physical activity (more than 150 minutes per week).

Table 4-1: Demographic characteristics BHC 2014 employees (n = 21,822)

Age	N	*Proportion*
less than 20 years	196	*0.9%*
20–29 years	5085	*23.3%*
30–39 years	7092	*32.5%*
40–49 years	5739	*26.3%*
50–59 years	3121	*14.3%*
60+ years	589	*2.7%*
Gender		
female	10889	*49.9%*
male	10933	*50.1%*
Education		
no formal education	22	*0.1%*
Primary education	65	*0.3%*
1st cycle secondary	2335	*10.7%*
2nd cycle secondary	3339	*15.3%*
Post-secondary	4212	*19.3%*
Undergraduate university	7856	*36.0%*
Postgraduate university	3622	*16.6%*
PhD	371	*1.7%*
Income		
less than £10,000	306	*1.4%*
£10,000–19,999	3208	*14.7%*
£20,000–29,999	5608	*25.7%*
£30,000–39,999	4103	*18.8%*
£40,000–49,999	2684	*12.3%*
£50,000–59,999	1746	*8.0%*
£60,000–69,999	1091	*5.0%*
£70,000–79,999	764	*3.5%*
£80,000–89,999	524	*2.4%*
£90,000 plus	1789	*8.2%*
Ethnicity		
White	19989	*91.6%*
Mixed	393	*1.8%*
Asian	1026	*4.7%*
Black	218	*1.0%*
Other	196	*0.9%*
Occupation		
Blue collar	5914	*27.1%*
White collar	15908	*72.9%*

Table 4-2: Job and workplace related factors (n = 21,822)

Work environment	N	*Proportion*
Job satisfaction	15734	*72.1%*
HSE: lack of control	5696	*26.1%*
HSE: bullying	1113	*5.1%*
HSE: strained relationships	3033	*13.9%*
HSE: unrealistic demands	9951	*45.6%*
HSE: lack of peer support	1571	*7.2%*
HSE: lack of change consultation	6547	*30.0%*
HSE: lack of managerial support	2117	*9.7%*
Organisational factors		
Health as company success indicator	14359	*65.8%*
Health promotion support	15952	*73.1%*
Informed of importance of wellbeing	16388	*75.1%*

Table 4-3: Personal factors (n = 21,822)

Non-job factors	N	*Proportion*
Financial concerns	5608	*25.7%*
Unpaid care	982	*4.5%*
Children	8052	*36.9%*
Lifestyle factors		
Sleep:		
less than 5 hours	114	*0.5%*
5 to 6 hours	818	*3.7%*
6 to 7 hours	4745	*21.7%*
7 to 8 hours	10222	*46.8%*
8 + hours	5923	*27.3%*
BMI:		
normal	17545	*80.4%*
underweight	327	*1.5%*
overweight	633	*2.9%*
obese	2269	*10.4%*
severely obese	1047	*4.8%*
Current smoker	2444	*11.2%*
Physical inactivity	7856	*36.0%*
Not healthy range: fruit and veg	19182	*87.9%*
Not healthy range: added fats	7027	*32.2%*
Not healthy range: sugary drinks	6830	*31.3%*
Not healthy range: added salt	1571	*7.2%*
Not healthy range: alcohol	4059	*18.6%*
Mental health		
Kessler score: mental health risk	851	*3.9%*

Table 4-4: Health and physical factors (n = 21,822)

Musculoskeletal	N	*Proportion*
0 condition	4,954	*22.7%*
1 condition	6088	*27.9%*
2 conditions	4495	*20.6%*
3+ conditions	6285	*28.8%*
Other chronic health conditions		
0 condition	16410	*75.2%*
1 condition	4146	*19.0%*
2+ conditions	1266	*5.8%*
Blood pressure		
Healthy range	14228	*65.2%*
No test, no recall	2008	*9.2%*
High	5586	*25.6%*
Cholesterol		
Healthy range	10540	*48.3%*
No test, no recall	10736	*49.2%*
High	546	*2.5%*
Glucose		
Healthy range	8489	*38.9%*
No test, no recall	13115	*60.1%*
High	218	*1.0%*

Looking at nutrition, remarkably 87.9 per cent of the study population does not follow the UK recommendations of five portions of fruit or vegetables per day, whereas about 32 per cent are not in the healthy ranges of salt and sugary drink consumption and 18.6 per cent of employees are not in the recommended UK healthy range of alcohol consumption (maximum of three to four daily units for men, two to three for women). With regard to mental health, 3.9 per cent of employees show a high risk of developing mental-health problems.

When looking at chronic conditions, about 28 per cent of employees report that they have at least one musculoskeletal condition (e.g. back or joint pain) and 19 per cent report having any other chronic health condition (e.g. diabetes or cancer). A total of 25.6 per cent of respondents state that their blood pressure is too high (9.2 per cent do not recall it or haven't tested it for a while); by contrast, the share of employees with high glucose and cholesterol levels is lower (2.5 and 1 per cent respectively), but with a higher number of people who cannot recall or have not been tested.

In what follows we investigate the relation between work impairment due to absenteeism and/or presenteeism and the different factors outlined above in more detail by presenting the results from the multivariate regression analysis.

4.2. What are the determinants of workplace productivity? Findings from our regression analysis

Columns (1) to (3) of Table 4-5 report the results from a multivariate OLS regression model using three different outcome variables measured by the WPAI-GH scale: the percentage share of working time lost due to absenteeism and presenteeism; the percentage share of working time lost due to absenteeism; and the percentage share of working time lost due to presenteeism. The regression model includes a set of predictor variables related to job and work environment, personal factors, and health and physical factors, and also adjusts for employee and company characteristics. Note that for ease of presentation, Panels A to C of Table 4-5 below report the findings separately for factors related to job and work environment, personal factors, and health and physical factors, although these predictors were all included simultaneously in the regression model.

4.2.1. Job and work-environment factors

When looking at factors determining workplace productivity which are related to the nature of the job, the work environment or the organisation (Table 4-5, Panel A), we find that employees who are satisfied with their job show less lost productivity due to absenteeism or presenteeism than employees that are unhappy with their current job. An employee who reports being content with his/her current job has on average 6.92 percentage points less work impairment due to absenteeism and/or presenteeism than an employee who is unhappy with his/her job.

Interestingly, in contrast with other studies our results suggest that a lack of control in deciding what to do at work is not (statistically significantly) associated with productivity loss. However, reporting being subject to bullying in the workplace is related to both absenteeism and presenteeism. An employee who is subject to bullying in the workplace reports a 2.93 percentage point higher work impairment due to presenteeism than an employee who is not exposed to any bullying. Moreover, strained relationships at work and unrealistic time demands are also predictors of work impairment due to presenteeism. At the same time, we find no direct associations between employee self-reported line-manager support and productivity.

When looking at determinants of productivity at the organisational level, our findings suggest that employees in companies which do not acknowledge health and wellbeing as an organisational success indicator report higher work productivity loss due to absenteeism and presenteeism. However, we do not find any statistically significant associations for an organisation's health promotion support. In addition, in companies where information about the importance of employee wellbeing is widely spread throughout the organisation, no direct statistically significant effect on productivity loss due to absenteeism or presenteeism can be identified. Furthermore, we do not find evidence for a positive (or negative) relation between a company's provision of health interventions or wellness programmes and productivity.

Table 4-5: Determinants of absenteeism and presenteeism

Panel A	(1)	(2)	(3)
	Outcome variable: % work impairment (WPAI-GH scale)		
	Absenteeism/Presenteeism	Absenteeism	Presenteeism
Job Factors			
Job satisfaction	-0.0692	-0.0090	-0.0601
	*(0.000)****	*(0.003)****	*(0.000)****
HSE: lack of control	-0.0017	-0.0016	-0.0001
	(0.498)	*(0.095)**	*(0.956)*
HSE: bullying	0.0308	0.0015	0.0293
	*(0.000)****	*(0.519)*	*(0.000)****
HSE: strained relationships	0.0119	-0.0008	0.0128
	*(0.003)****	*(0.554)*	*(0.000)****
HSE: unrealistic demands	0.0165	0.0001	0.0164
	*(0.000)****	*(0.919)*	*(0.000)****
HSE: lack of peer support	0.0055	0.0007	0.0048
	(0.317)	*(0.740)*	*(0.337)*
HSE: lack of change consultation	-0.0013	-0.0015	0.0002
	(0.622)	*(0.133)*	*(0.930)*
HSE: lack of managerial support	0.0018	0.0011	0.0007
	(0.696)	*(0.504)*	*(0.855)*
Health as company success indicator	-0.0089	0.0021	0.0068
	*(0.004)****	*(0.037)***	*(0.014)***
Health promotion support	0.0022	0.0012	0.0010
	(0.385)	*(0.232)*	*(0.661)*
Informed of importance of wellbeing	0.0004	0.0004	0.0000
	(0.889)	*(0.722)*	*(1.000)*
Intervention provision: medium	-0.0009	0.0002	-0.0011
	(0.859)	*(0.909)*	*(0.802)*
Intervention provision: high	0.0021	-0.0001	0.0022
	(0.568)	*(0.942)*	*(0.485)*
Observations:	21,822		

***Notes**: p-values in parentheses: *** p<0.01, ** p<0.05, * p<0.10. Regressions clustered for companies (company_id). Columns (1) to (3) report the results from an OLS regression with work productivity loss due to absenteeism and presenteeism, absenteeism or presenteeism as outcome variable. Omitted categories for the predictor variables are: no musculoskeletal condition, no other chronic health condition, low-risk blood pressure, low-risk cholesterol level, low-risk fasting glucose level, no financial concerns, no unpaid care, no children, more than eight hours of sleep, normal BMI, currently non-smoker, physically inactive, not in the healthy range of recommended nutrition intake (veg, salt, added fat, sugary drinks), non-risk drinker, low-risk for mental-health problems, satisfied with the job, not exposed to any of the HSE stress measures, indicates that the company cares about health and wellbeing, and low provision of health interventions. The regression model includes a full set of demographic control variables including age, income, gender, ethnicity, occupation. We also control for company characteristics such as size and industry.*

Employees in companies with a medium or high provision of health interventions do not show any statistically significantly different percentages of work impairment due to absenteeism or presenteeism

than employees in companies with a low provision of interventions. If anything, the coefficients are positive (although not significant) for companies with a high provision of interventions, suggesting that in such companies, work impairment due to absenteeism and presenteeism is higher than in companies with only low provision. This appears slightly counterintuitive at first glance. What we pick up here is probably the reverse causality problem that we cannot identify companies over time with our data and that probably companies with high absenteeism (and presenteeism) rates more likely invest in such interventions. However, given that our data are only cross-sectional we are not in a position to investigate this relationship further.

4.2.2. Personal factors

Non-Job Factors

Panel B of Table 4-5 shows that employees who report financial concerns have a higher productivity loss, with the effect driven by presenteeism. An employee with financial concerns reports on average a 2.33 percentage point higher work impairment due to presenteeism than an employee with no financial concerns. Unpaid care is a second personal factor statistically significant when related to productivity, increasing the impairment due to presenteeism by 1.47 percentage points on average (Column 3). One interesting finding is that employees who have children report on average fewer percentage shares of work impairment due to presenteeism than employees without children (although it is important to stress here that we do not have information on the age of the children).

Sleep

In line with existing studies, we find that sleep – or, more accurately, lack of sleep – is a predictor of workplace productivity. Employees sleeping fewer than five hours per night show an increased work impairment due to presenteeism of 6.93 percentage points compared to employees who sleep on average eight or more hours per night. Interestingly, the effect of sleep is solely on presenteeism. Our findings also suggest that the negative effect of lack of sleep on productivity gradually decreases the more sleep on average an employee gets, with the effect vanishing for employees who sleep between seven and eight hours per night.

BMI

Our study finds an association between BMI and workplace productivity. A BMI classified as underweight is associated with both absenteeism and presenteeism. An employee reporting a BMI below 18 has on average a 4.01 percentage point higher work impairment due to absenteeism and presenteeism than an employee in the normal BMI range (Column 1, Panel B of Table 4-5). Employees with a BMI classified as overweight report on average a 1.94 percentage point higher work impairment due to absenteeism and presenteeism than employees in the normal BMI range. This effect is smaller for employees with a BMI classified as obese. The work impairment for these employees is 0.79 percentage points higher than for employees in the normal BMI range. Somewhat puzzling, our findings suggest no statistically significant association between severely obese BMI values and productivity loss. This contradicts findings from the US which have found such an association (e.g. Katz et al., 2014).

Table 4-5 (cont'd): Determinants of absenteeism and presenteeism

Panel B	(1)	(2)	(3)
	Outcome variable: % work impairment (WPAI-GH scale)		
	Absenteeism/Presenteeism	Absenteeism	Presenteeism
Personal factors			
Financial concerns	0.0245	0.0012	0.0233
	*(0.000)****	*(0.212)*	*(0.000)****
Unpaid care	0.0149	0.0002	0.0147
	*(0.015)***	*(0.943)*	*(0.012)***
Children (yes/no)	-0.0056	-0.0009	-0.0046
	*(0.000)****	*(0.022)***	*(0.000)****
Sleep: less than 5 hours	0.0760	0.0067	0.0693
	*(0.000)****	*(0.342)*	*(0.000)****
Sleep: 5 to 6 hours	0.0379	-0.0023	0.0403
	*(0.000)****	*(0.350)*	*(0.000)****
Sleep: 6 to 7 hours	*0.0102*	*-0.0018*	*0.0120*
	*(0.005)****	*(0.183)*	*(0.001)****
Sleep: 7 to 8 hours	-0.0020	-0.0018	-0.0003
	(0.423)	*(0.189)*	*(0.906)*
BMI underweight	0.0401	0.0084	0.0317
	*(0.001)****	*(0.023)***	*(0.003)****
BMI overweight	0.0194	0.0087	0.0107
	*(0.005)****	*(0.035)***	*(0.100)**
BMI obese	0.0079	0.0016	0.0063
	*(0.052)**	*(0.293)*	*(0.049)***
BMI severely obese	0.0080	0.0002	0.0077
	(0.157)	*(0.934)*	*(0.138)*
Current smoker	0.0007	0.0001	0.0006
	(0.875)	*(0.954)*	*(0.877)*
Physical inactivity	0.0191	0.0028	0.0163
	*(0.000)****	*(0.005)****	*(0.000)****
Not healthy range: fruit and veg	0.0003	-0.0014	0.0017
	(0.936)	*(0.229)*	*(0.602)*
Not healthy range: added fats	0.0140	0.0006	0.0134
	*(0.000)****	*(0.541)*	*(0.000)****
Not healthy range: sugary drinks	0.0047	0.0006	0.0041
	*(0.092)**	*(0.556)*	*(0.096)**
Not healthy range: added salt	-0.0035	0.0013	-0.0048
	(0.432)	*(0.451)*	*(0.245)*
Not healthy range: alcohol	0.0005	-0.0022	0.0027
	(0.818)	*(0.130)*	*(0.211)*
Kessler score: mental health risk	0.1306	0.0172	0.1134
	*(0.000)****	*(0.000)****	*(0.000)****

*Notes: p-values in parentheses: *** p<0.01, ** p<0.05, * p<0.10. Regressions clustered for companies (company_id). Columns (1) to (3) report the results from an OLS regression with work productivity loss due to absenteeism and presenteeism, absenteeism or presenteeism as outcome variable. Omitted categories for the predictor variables are: no musculoskeletal condition, no other chronic health condition, low-risk blood pressure, low-risk cholesterol level, low-risk fasting glucose level, no financial concerns, no unpaid care, no children, more than eight hours of sleep, normal BMI, currently non-smoker, physically inactive, not in the healthy range of recommended nutrition intake (veg, salt, added fat, sugary drinks), non-risk drinker, low-risk for mental-health problems, satisfied with the job, not exposed to any of the HSE stress measures, indicates that the company cares about health and wellbeing and low health-intervention provision. The regression model includes a full set of demographic control variables, including age, income, gender, ethnicity, occupation. We also control for company characteristics such as size and industry.*

One explanation for this could be that our data is self-reported. Respondents state their weight and their height, and there is scope for errors in reporting. So the prevalence of severely obese employees in our sample could be partially driven by errors in reporting, or there might be a selection effect. Severely obese people who are employed are possibly healthier than severely obese people who are not in work.

Smoking

Our findings suggest no direct association between work impairment due to absenteeism or presenteeism and smoking. It is, however, well documented that smoking leads to chronic health conditions and it is therefore important to stress that the effect of smoking on workplace productivity may have to be interpreted from a dynamic perspective. Smoking might not have an immediate direct health or productivity effect, but in the longer term it has. The results from a 50-year UK study shows that half to two thirds of all lifelong smokers will die of illnesses linked to smoking (Doll et al., 2004). Among lifelong smokers death is usually caused by lung cancer, chronic obstructive lung disease and cardiovascular disease. These diseases are often accompanied with years of ill-health and corresponding loss of productivity. Our cross-sectional data do not pick up these long-term effects, for which a longitudinal study is preferable.

Physical activity, diet and alcohol

When looking at physical inactivity, in line with the wider literature (see Schultz amd Edington, 2007), we find a positive association between lack of physical activity and workplace productivity loss, both in terms of absenteeism and presenteeism. An employee not performing the recommended 150 minutes of exercise per week reports on average a 1.91 percentage point higher work impairment due to absenteeism and presenteeism compared to an employee who performs the recommended amount of physical activity.

Looking at nutritional risk factors (Panel B of Table 4-5), we find two factors associated with productivity loss. First, an employee who is not in the healthy range of consumption of added fats reports on average a 1.4 percentage point higher work impairment due to absenteeism and presenteeism than an employee in the healthy range. Second, an employee consuming sugary drinks outside the healthy range shows on average a 0.47 percentage point higher work impairment due to absenteeism and/or presenteeism than an employee in the healthy range.

We do not find a positive association between alcohol consumption and productivity loss. A similar issue here arises as with smoking: drinking above the recommended daily units might not have a detrimental productivity effect now, but is correlated with negative health conditions in the future.

Table 4-5 (cont'd): Determinants of absenteeism and presenteeism

Panel C	(1)	(2)	(3)
	Outcome variable: % work impairment (WPAI-GH scale)		
	Absenteeism/Presenteeism	Absenteeism	Presenteeism
Health and physical factors			
MSK: 1 condition	0.0114	0.0021	0.0094
	*(0.000)****	*(0.023)***	*(0.000)****
MSK: 2 conditions	0.0219	0.0025	0.0193
	*(0.000)****	*(0.030)***	*(0.000)****
MSK: 3+ conditions	0.0475	0.0033	0.0442
	*(0.000)****	*(0.002)****	*(0.000)****
Chronic: 1 condition	0.0375	0.0074	0.0300
	*(0.000)****	*(0.000)****	*(0.000)****
Chronic: 2 conditions	0.0608	0.0043	0.0565
	*(0.000)****	*(0.039)***	*(0.000)****
Blood pressure: no test, no recall	0.0028	0.0011	0.0016
	(0.504)	*(0.493)*	*(0.649)*
Blood pressure: high	0.0116	0.0025	0.0091
	*(0.000)****	*(0.014)***	*(0.000)****
Cholesterol: no test, no recall	-0.0015	-0.0010	-0.0006
	(0.550)	*(0.308)*	*(0.793)*
Cholesterol: high	0.0016	0.0055	0.0071
	(0.788)	*(0.125)*	*(0.206)*
Glucose: no test, no recall	-0.0093	-0.0021	-0.0072
	*(0.002)****	*(0.046)***	*(0.005)****
Glucose: high	0.0129	0.0028	0.0100
	(0.290)	*(0.588)*	*(0.340)*

***Notes**: p-values in parentheses: *** p<0.01, ** p<0.05, * p<0.10. Regressions clustered for companies (company_id). Columns (1) to (3) report the results from an OLS regression with work productivity loss due to absenteeism and presenteeism, absenteeism or presenteeism as outcome variable. Omitted categories for the predictor variables are: no musculoskeletal condition, no other chronic health condition, low-risk blood pressure, low-risk cholesterol level, low-risk fasting glucose level, no financial concerns, no unpaid care, no children, more than eight hours of sleep, normal BMI, currently non-smoker, physically inactive, not in the healthy range of recommended nutrition intake (veg, salt, added fat, sugary drinks), non-risk drinker, low-risk for mental-health problems, satisfied with the job, not exposed to any of the HSE stress measures and indicates that the company cares about health and wellbeing. The regression model includes a full set of demographic control variables, including age, income, gender, ethnicity, occupation. We also control for company characteristics such as size and industry.*

Mental health

With regard to mental health, our findings suggest a strong association between mental-health condition and workplace productivity loss for both absenteeism and presenteeism. Employees at risk of developing mental-health problems according to their Kessler scores have on average a 13 percentage point higher work impairment due to absenteeism and presenteeism than employees in the normal range of the Kessler

score (Panel B of Table 4-5). It is worth noting that this is the largest of all the effects detected in our analysis and is mainly driven by presenteeism (see Column 3).

4.2.3. Health and physical factors

In line with other studies (e.g. Alavinia et al., 2009), the findings for health and physical factors suggest that musculoskeletal and other chronic health conditions are associated with productivity loss in the workplace (Panel C of Table 4-5, Columns 1 to 3). Our results suggest that work impairment due to absenteeism and presenteeism gradually rises in line with increasing levels of musculoskeletal and other chronic conditions amongst employees. Hypertension (high blood pressure) is associated with productivity loss. An employee with hypertension reports on average a 1.16 percentage point higher work impairment due to absenteeism and presenteeism than an employee without (self-reported) hypertension. We do not find such an association between cholesterol and productivity loss and none of the point estimates is statistically significant. Looking at glucose we find, somewhat counterintuitively, that employees who either have not been tested or do not recall their glucose levels report lower average percentages of work impairment due to absenteeism and presenteeism than employees in the healthy range of glucose.

4.2.4. Are the findings robust with regard to the regression estimation method?

We run the same models for which we present the findings in the previous sections using a GLM estimator. The results can be found in Appendix Table A-2 (Panel A to Panel C). We detect hardly any major differences in the associations between the determining factors and workplace productivity loss between the OLS and the GLM estimator. This is not surprising. When we calculate the predicted values of work impairment from the model specifications highlighted in Columns 1 to 3 of Table 4-5, we find that none of them lies outside the unit interval.

4.3. Strengths and limitations of this analysis

This analysis of the 2014 BHC survey data has several strengths. The large sample size and comprehensive collection of data on personal, health, job and organisational factors allow an in-depth investigation of the determinants of productivity in the UK workplace.

However, there are some limitations to the empirical approach taken here. Firstly, healthier employees are likely to be more motivated in responding to the survey and people who are on long-term sick leave are likely to be under-represented in BHC as it is a workplace survey. There is also potential for selection bias of companies into the survey. For instance, 'healthier' companies probably have a greater incentive to register and compete in the Britain's Healthiest Company competition. In our analysis, however, this bias from individual participants would lead to our underestimating the effect of a set of risk factors on workplace productivity. So if selection bias is prevalent, our estimates represent a lower bound of the true effect. We further include in our analysis a variety of individual employee characteristics, such as age,

gender, education, occupation and a set of company characteristics including size and industry, to help adjust for and mitigate this issue.

Secondly, it is important to stress that the data are self-reported. This creates potential for under-reporting the real prevalence of bad lifestyle habits, such as smoking, alcohol consumption, or overstating good ones, physical activity for instance. It is important to stress, though, that this is a common issue in surveys of this nature. Again, if for instance an individual is under-reporting his or her real smoking habits, then our estimates would represent a lower bound of the true parameter value and we would underestimate the true effect rather than overestimating it.

Thirdly, when interpreting the results from the empirical analysis caution has to be applied with regard to causality. Our regression models capture associations and not necessarily causation. Firstly, there is a possibility that a 'third' variable not included in the regression model (e.g. management attitudes or management productivity) could, for example, predict the adoption of health interventions as well as productivity. To an extent, the inclusion of establishment-level predictors such as size and industry may help to mitigate these problems, but it is unlikely that they can be completely eradicated. In addition, as seen with the company intervention effects, we may have the issue of reverse causality. For instance, we find a positive relation between more health interventions and higher percentages of work impairment due to absenteeism and presenteeism. However, this might be driven by the fact that companies with high rates of absenteeism (and presenteeism) adopt more interventions and not that more interventions lead to productivity loss. The direction of this association is not clear *a priori*. To that end, longitudinal data, where companies are followed over a period of time, would help identify and mitigate the issue of reverse causality.

5. Discussion

This report finds a set of significant associations between certain risk factors and productivity loss in organisations. Though we cannot be completely certain about the direction of causality, these results add to a developing evidence base in this field, and many of these results are consistent with other studies.

The results are useful to policymakers and practitioners on five levels. Firstly, they allow us to identify the characteristics of employees who are more at risk of work impairment. This allows us to think about how their personal circumstances (e.g. whether they have caring responsibilities), their lifestyle (e.g. BMI) and potential health risks (e.g. musculoskeletal conditions and mental health) relate to productivity loss. It tells us more about who these individuals are and their problems. This knowledge may be useful in the targeting of interventions in areas most associated with work impairment. It is clear from our results that poor mental health is becoming the greatest reason for productivity loss. However, follow-up interviews with participating companies revealed that it is less clear to what extent mental-health issues are addressed in the wellness strategies of organisations. Understanding the factors that contribute to work impairment is helpful so that organisations can think through their portfolio of health intervention activities and look at where they are most likely to have an impact. Any positive impact will benefit both the wellbeing of individual employees and the bottom line of the organisation itself.

Secondly, the analysis provides information on how the work environment may contribute to work impairment. The results indicate the importance of relationships at work and the detrimental impact of bullying in the workplace. The issue here is not only seeing how the work environment can contribute to improved employee health and wellbeing but also, conversely, how it can directly contribute to poor health and wellbeing. This finding is of importance to organisations, helping them to examine their own working cultures and demonstrating how the workplace environment can affect employees both positively and negatively.

Thirdly, differentiating between presenteeism and absenteeism allows us to look at different dynamics of productivity loss. Our results suggest that different factors contribute to the reasons why some individuals come to work when unwell, while others stay away. One interesting result is the discovery that sleeping fewer hours is more associated with presenteeism than absenteeism. A similar conclusion applies for bullying. This indicates that policymakers and organisations may want to look more at presenteeism, an outcome which is more difficult to capture than absenteeism and which organisations generally focus on less.

Fourthly, the interplay between factors is also interesting. Going back to our observation concerning the association between sleeping fewer hours and presenteeism, this finding may also point to aspects of the

work environment and their interplay with productivity loss (for instance, working shift patterns or extremely long or irregular hours). In this way, encouraging employees to get sufficient sleep may also warrant looking at working practices and flexible working more specifically.

Finally, some of our results are somewhat counterintuitive. Employees with extremely high BMI do not seem to have higher work impairment than merely obese employees. Similarly, those who consume a lot of alcohol show little difference in work impairment than an average employee. Here, we perhaps need to understand the dynamic better and delve deeper into the data, or support data analysis with more qualitative work. Is this a function of a 'party hard and work hard' culture? Is this perhaps a specific subgroup of our population that is strangely distinct? Are we perhaps capturing short-run effects in our model while some health risks take longer to play out and only then influence work impairment? Is it the case that a larger group of individuals will not show an anticipated impact on health and wellbeing despite having certain health risks (see also Mattke et al., 2014)? Similarly, work environment factors such as a lack of control, peer support or direct managerial support do not show any statistically significant associations with workplace productivity loss.

Based on the findings of the report we cannot make suggestions directly on what type of interventions policymakers or organisations should put in place to improve employee health and wellbeing, and by association reduce work impairment. In contrast, our findings suggest that health interventions as reported to us by organisations seemed to have little impact on overall productivity loss. Indeed if anything, companies having more interventions in place also appeared to have higher levels of work impairment. This finding may indicate that companies are reacting to work impairment issues related to absenteeism and/or presenteeism. However, the lack of a positive relationship may simply be driven by the fact that we cannot observe companies over time, and recent evidence (Osilla et al., 2014; Hassan et al., 2009) suggests that multi-programme or more comprehensive strategies are likely to effective in tackling health and wellbeing in the workplace. A further finding is that line-manager support is not strongly associated with better work productivity. This is perhaps surprising given the importance attached to line-manager support in the Boorman Review (Boorman, 2009) and in the Black and Frost review (2011). However, there is perhaps a difference between having a good relationship with a line manager and this line manager being able to take decisions which affect employee health and wellbeing.

This leads to a final interesting finding. Organisations that see health and wellbeing as an indicator of organisational success have lower levels of work impairment due to absenteeism and presenteeism. This finding suggests perhaps that what gets measured gets done. Steve Boorman (2009) in his review on health and wellbeing in the NHS also found that organisations that discuss health and wellbeing at board level were more likely to manage productivity loss more effectively. This point goes directly to the problem of changing culture. It is perhaps not just about understanding what is driving work impairment in an organisation, but also making it an organisational priority at all levels that will really help improve the health and wellbeing of staff.

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Appendix

Table A-1: A short description of the variables used in the analysis

Variable	Description
Non-job factors	
Financial concerns	Employee reports financial concerns at present (yes/no)
Unpaid care	Employee reports he gives unpaid care to family members or friends at present (yes/no)
Children	Indicates whether employee has children. The original question asks for number of children.
Lifestyle factors	
Sleep:	Original question asks for the number of hours an employee sleeps on average. Grouped into five categories. Assumed that more than 7 hours of sleep is the healthy range
less than 5 hours	
5 to 6 hours	
6 to 7 hours	
7 to 8 hours	
8 + hours	
BMI	
BMI underweight	BMI defined as: mass / height^2. BMI normal (18.5-25); BMI underweight (<18.5); BMI overweight (>25-30); BMI obese (>30-35); BMI severely obese (>35).
BMI overweight	
BMI obese	
BMI super obese	
Smoking	
Current smoker	Smoking status: currently smokes cigarettes (past smokers not included).
Physical activity	
Physical inactivity	Less than 150 minutes of physical activity per week
Nutrition	
Not healthy range: fruit and veg	Less than five servings of fruit or veg per day
Not healthy range: added fats	Adding butter, margarine, cream or gravy to food after cooking usually, almost always or always (measured on a six-point scale)
Not healthy range: sugary drinks	More than two sugared hot or cold beverages (including non-diet soda, sugared tea, coffee or hot chocolate) per day

Not healthy range: added salt	More than a level of teaspoon added while preparing food or at the table while eating per meal.
Not healthy range: alcohol	More than three to four daily units for men, more than two to three for women.
Mental health	
Kessler score: mental health risk	Kessler score above 13 on a total score of 24.
Musculoskeletal	
1 condition	Number of reported musculoskeletal health problems during the last 12 months
2 conditions	
3+ conditions	
Other chronic health conditions	
1 condition	Number of reported other health conditions diagnosed by a GP during the last 12 months (including allergy, asthma, heart attack, diabetes, cancer, migraine and others)
2+ conditions	
Blood pressure	
No test, no recall	High risk: systolic or diastolic blood pressure above 120/80mmHg; 'no test or no recall' combines respondents who either do not recall the value or haven't had it tested during the last 12 months.
High	
Cholesterol	
No test, no recall	High risk: cholesterol level 6.1mmol/l or higher; 'no test or no recall' combines respondents who either do not recall the value or haven't had it tested during the last 12 months.
High	
Glucose	
No test, no recall	High risk: non-fasting glucose level 11.1mmol/l or higher; 'no test or no recall' combines respondents who either do not recall the value or haven't had it tested during the last 12 months.
High	
Work environment	
Job satisfaction	Measured on a five-point scale (strongly disagree to fully agree). Satisfied with job converted into binary measure including items 'agree' and 'fully agree'.
HSE: lack of control	Measure on a five-point scale work-related stress using the seven items from the UK Health & Safety Executive (HSE) Management Standards (MS) Indicator Tool. Converted into binary indicators using the 'agree' or 'strongly agree' items.
HSE: bullying	
HSE: strained relationships	
HSE: unrealistic demands	
HSE: lack of peer support	
HSE: lack of change consultation	
HSE: lack of managerial support	

Organisational factors	
Health as company success indicator	Company leaders view level of employee health and wellbeing as important factor of success. Measured on five-point scale. Converted into binary indicator using 'agree' and 'strongly agree' items.
Health-promotion support	Company's health benefits and insurance programmes support health promotion. Measured on five-point scale. Converted into binary indicator using 'agree' and 'strongly agree' items.
Informed of importance of wellbeing	All levels of employees are informed about the importance of staff health and wellbeing. Measured on five-point scale. Converted into binary indicator using 'agree' and 'strongly agree' items.
Intervention provision	Intervention index measuring the intensity with which a company offers health-promotion and wellbeing programmes to their employees. Generated by adding the number of interventions a company provides and weighing it with the share of employees who report that they are actually using the provided interventions. Companies then grouped into three categories of equal size according to their health intervention index score: companies with low provision (low), companies with medium provision (medium) and companies with high provision of health interventions (high).

Table A-2: Determinants of absenteeism and presenteeism

Panel A	(1)	(2)	(3)
	Outcome variable: % work impairment (WPAI-GH scale)		
	Absenteeism/Presenteeism	Absenteeism	Presenteeism
Job Factors			
Job satisfaction	-0.0653***	-0.0085***	-0.0566***
	(0.000)	*(0.001)*	*(0.000)*
HSE: lack of control	-0.0026	-0.0016*	-0.0011
	(0.266)	*(0.085)*	*(0.616)*
HSE: bullying	0.0174***	0.0012	0.0159***
	(0.000)	*(0.450)*	*(0.000)*
HSE: strained relationships	0.0084***	-0.0007	0.0090***
	(0.004)	*(0.561)*	*(0.000)*
HSE: unrealistic demands	0.0176***	0.0001	0.0175***
	(0.000)	*(0.895)*	*(0.000)*
HSE: lack of peer support	-0.0003	0.0003	-0.0009
	(0.937)	*(0.864)*	*(0.810)*
HSE: lack of change consultation	-0.0005	-0.0014	0.0009
	(0.843)	*(0.166)*	*(0.691)*
HSE: lack of managerial support	0.0009	0.0009	0.0001
	(0.805)	*(0.515)*	*(0.978)*
Health as company success indicator	-0.0078***	-0.0020**	-0.0058**
	(0.006)	*(0.037)*	*(0.024)*
Health-promotion support	0.0018	0.0010	0.0008
	(0.456)	*(0.283)*	*(0.709)*
Informed of importance of wellbeing	0.0004	0.0003	0.0002
	(0.857)	*(0.791)*	*(0.934)*
Intervention provision: medium	-0.0015	0.0003	-0.0016
	(0.782)	*(0.831)*	*(0.719)*
Intervention provision: high	0.0016	-0.0000	0.0018
	(0.672)	*(0.999)*	*(0.587)*
Observations:	**21,822**		

***Notes**: p-values in parentheses: *** p<0.01, ** p<0.05, * p<0.10. Regressions clustered for companies (company_id). Columns (1) to (3) report the results from a GLM regression with work productivity loss due to absenteeism and presenteeism, absenteesim or presenteeism as outcome variable. Omitted categories for the predictor variables are: no musculoskeletal condition, no other chronic health condition, low-risk blood pressure, low-risk cholesterol level, low-risk fasting glucose level, no financial concerns, no unpaid care, no children, more than eight hours of sleep, normal BMI, currently non-smoker, physically inactive, not in the healthy range of recommended nutrition intake (veg, salt, added fat, sugary drinks), non-risk drinker, low risk for mental-health problems, satisfied with the job, not exposed to any of the HSE stress measures, indicates that the company cares about health and wellbeing and low health-intervention provision. The regression model includes a full set of demographic control variables including age, income, gender, ethnicity, occupation. We also control for company characteristics such as size and industry.*

Table A-2 (cont'd): Determinants of absenteeism and presenteeism

Panel B	(1)	(2)	(3)
	Outcome variable: % work impairment (WPAI-GH scale)		
	Absenteeism/Presenteeism	Absenteeism	Presenteeism
Personal factors			
Financial concerns	0.0216***	0.0011	0.0204***
	(0.000)	*(0.188)*	*(0.000)*
Unpaid care	0.0116**	0.0001	0.0112***
	(0.011)	*(0.961)*	*(0.009)*
Children (yes/no)	-0.0065***	-0.0011**	-0.0054***
	(0.000)	*(0.019)*	*(0.000)*
Sleep: less than 5 hours	0.0420***	0.0018	0.0385***
	(0.000)	*(0.593)*	*(0.000)*
Sleep: 5 to 6 hours	0.0266***	-0.0020	0.0280***
	(0.000)	*(0.316)*	*(0.000)*
Sleep: 6 to 7 hours	*0.0104****	*-0.0016*	*0.0121****
	(0.002)	*(0.185)*	*(0.000)*
Sleep: 7 to 8 hours	-0.0017	-0.0018*	0.0004
	(0.551)	*(0.082)*	*(0.882)*
BMI underweight	0.0306***	0.0055***	0.0244***
	(0.000)	*(0.005)*	*(0.001)*
BMI overweight	0.0152***	0.0057***	0.0081
	(0.005)	*(0.007)*	*(0.137)*
BMI obese	0.0069*	0.0014	0.0056*
	(0.056)	*(0.290)*	*(0.054)*
BMI severely obese	0.0057	0.0003	0.0054
	(0.195)	*(0.891)*	*(0.177)*
Physical inactivity	0.0186***	0.0028***	0.0158***
	(0.000)	*(0.002)*	*(0.000)*
Current smoker	0.0004	0.0001	0.0003
	(0.922)	*(0.914)*	*(0.937)*
Not healthy range: fruit and veg	0.0007	-0.0014	0.0022
	(0.843)	*(0.220)*	*(0.517)*
Not healthy range: added fats	0.0136***	0.0006	0.0130***
	(0.000)	*(0.558)*	*(0.000)*
Not healthy range: sugary drinks	0.0043	0.0005	0.0039
	(0.111)	*(0.627)*	*(0.115)*
Not healthy range: added salt	-0.0038	0.0010	-0.0050
	(0.337)	*(0.463)*	*(0.185)*
Not healthy range: alcohol	0.0011	-0.0021*	0.0030
	(0.655)	*(0.055)*	*(0.151)*
Kessler score: mental-health risk	0.0578***	0.0081***	0.0480***
	(0.000)	*(0.000)*	*(0.000)*

*Notes: p-values in parentheses: *** p<0.01, ** p<0.05, * p<0.10. Regressions clustered for companies (company_id). Columns (1) to (3) report the results from a GLM regression with work productivity loss due to absenteeism and presenteeism, absenteeism or presenteeism as outcome variable. Omitted categories for the predictor variables are: no musculoskeletal condition, no other chronic health condition, low-risk blood pressure, low-risk cholesterol level, low-risk fasting glucose level, no financial concerns, no unpaid care, no children, more than eight hours of sleep, normal BMI, currently non-smoker, physically inactive, not in the healthy range of recommended nutrition intake (veg, salt, added fat, sugary drinks), non-risk drinker, low risk for mental-health problems, satisfied with the job, not exposed to any of the HSE stress measures, indicates that the company cares about health and wellbeing and low health-intervention provision. The regression model includes a full set of demographic control variables including age, income, gender, ethnicity, occupation. We also control for company characteristics such as size and industry.*

Table A-2 (cont'd): Determinants of absenteeism and presenteeism

Panel C	(1)	(2)	(3)
	Outcome variable: % work impairment (WPAI-GH scale)		
	Absenteeism/Presenteeism	Absenteeism	Presenteeism
Health and physical factors			
MSK: 1 condition	0.0166***	0.0026**	0.0143***
	(0.000)	*(0.021)*	*(0.000)*
MSK: 2 conditions	0.0298***	0.0031**	0.0272***
	(0.000)	*(0.013)*	*(0.000)*
MSK: 3+ conditions	0.0487***	0.0036***	0.0452***
	(0.000)	*(0.002)*	*(0.000)*
Chronic: 1 condition	0.0331***	0.0061***	0.0267***
	(0.000)	*(0.000)*	*(0.000)*
Chronic: 2 conditions	0.0445***	0.0039***	0.0402***
	(0.000)	*(0.007)*	*(0.000)*
Blood pressure: no test, no recall	0.0039	0.0013	0.0026
	(0.338)	*(0.438)*	*(0.447)*
Blood pressure: high	0.0110***	0.0025***	0.0085***
	(0.000)	*(0.008)*	*(0.000)*
Cholesterol: no test, no recall	-0.0013	-0.0010	-0.0003
	(0.598)	*(0.263)*	*(0.885)*
Cholesterol: high	-0.0007	-0.0063*	0.0042
	(0.898)	*(0.061)*	*(0.368)*
Glucose: no test, no recall	-0.0094***	-0.0021**	-0.0074***
	(0.001)	*(0.041)*	*(0.003)*
Glucose: high	0.0085	0.0019	0.0064
	(0.278)	*(0.531)*	*(0.328)*

*Notes: p-values in parentheses: *** p<0.01, ** p<0.05, * p<0.10. Regressions clustered for companies (company_id). Columns (1) to (3) report the results from a GLM regression with work productivity loss due to absenteeism and presenteeism, absenteeism or presenteeism as outcome variable. Omitted categories for the predictor variables are: no musculoskeletal condition, no other chronic health condition, low-risk blood pressure, low-risk cholesterol level, low-risk fasting glucose level, no financial concerns, no unpaid care, no children, more than eight hours of sleep, normal BMI, currently non-smoker, physically inactive, not in the healthy range of recommended nutrition intake (veg, salt, added fat, sugary drinks), non-risk drinker, low risk for mental-health problems, satisfied with the job, not exposed to any of the HSE stress measures, indicates that the company cares about health and wellbeing and low health-intervention provision. The regression model includes a full set of demographic control variables, including age, income, gender, ethnicity, occupation. We also control for company characteristics such as size and industry.*