



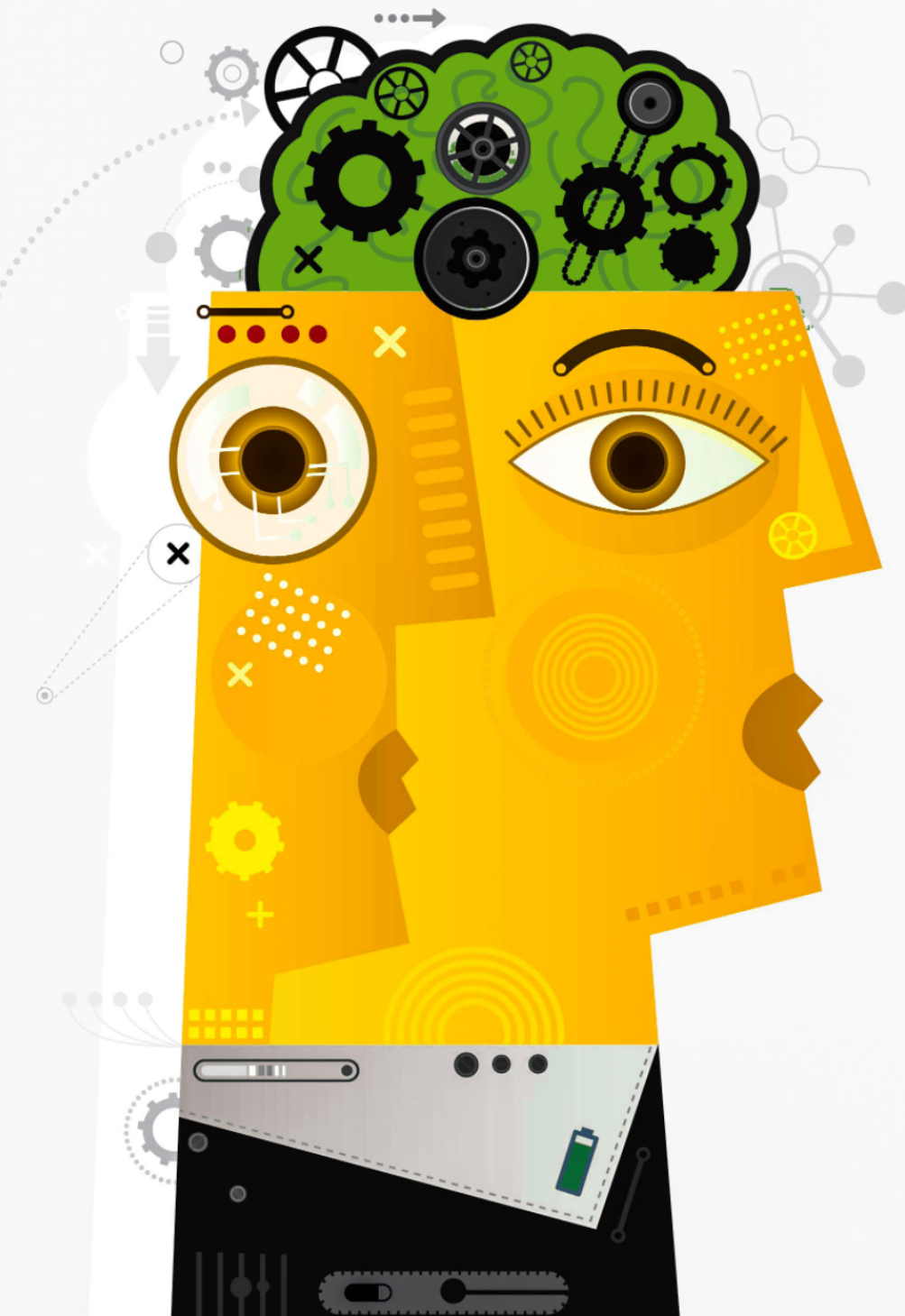
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Wellbeing and productivity: a review of the literature

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Wellbeing & Productivity

A REVIEW OF THE LITERATURE



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Executive Summary

The UK is currently facing two inter-related socio-economic challenges. One is the now well-documented ‘productivity puzzle’; the crisis of persistent low productivity growth across the economy. The other is low levels in the mental and physical health of the working population, in particular. Wellbeing has been considered as a driver of higher levels of productivity and thus a means of solving the productivity puzzle. However, the relationship between productivity growth and wellbeing is complex and involves many moderating or mediating factors.

This report reviews the relationships between the different aspects of wellbeing, productivity, and productivity growth. It is the culmination of a desk-based evidence review, survey, and a mapping workshop held with experts from backgrounds including psychology, sociology, economics, and design. The focus is on wellbeing and labour productivity, although resource productivity and multi-factor productivity are also touched upon at relevant points within the report. Key findings and recommendations for further research are summarised below.

Key finding 1

Wellbeing is linked to higher levels of labour productivity.

- Individuals who have been diagnosed with a chronic physical health problem and those who engage in risky health behaviours (e.g. smoking, unhealthy diet, and lack of exercise) in the absence of any formal diagnosis both tend to report reduced labour productivity through presenteeism and absenteeism.
- Poor mental health appears to be more strongly linked with lost productivity through presenteeism (relative to absenteeism), as people are often reluctant to disclose that they are suffering from mental health problems.
- Higher levels of subjective wellbeing has been linked to greater labour productivity, and the causal nature of this link has been demonstrated in experimental studies.
- High levels of stress can lead to burnout and reduced labour productivity, but training resilience has been shown to produce positive effects on wellbeing and productivity.
- Case studies demonstrate that workplace wellness programmes can deliver benefits in terms of enhanced productivity, but this seems to be

reliant on certain conditions being met (e.g. tailoring to the specific organisation and senior management support).

Key finding 2

Certain factors may be able to explain the positive relationship between levels of wellbeing and labour productivity.

- Human capital is an asset that is considered to enhance an individual's or organisation's productivity. At the same time, it can enhance wellbeing by facilitating the satisfaction of psychological needs, greater health status and greater social mobility.
- Social capital allows for voluntary cooperation and the effective sharing of human capital, thus heightening productivity. At the same time, it is considered to be a determinant of higher levels of wellbeing in the workplace and everyday life.
- Certain environmental factors have been linked to both greater wellbeing and greater labour productivity. These include air quality, greenery and temperatures.
- Information and communication technology (ICT) has been considered as a key driver of productivity growth and has the potential to support wellbeing in that it facilitates communication, autonomy, and more flexible working conditions.

Key finding 3

Productivity growth may have detrimental effects on wellbeing.

- Attempts to reduce costs and increase labour productivity within the healthcare sector can lead to poorer quality care being provided and thus poorer health outcomes.
- The pursuit of productivity growth in the workplace can heighten a number of workplace factors such as job demands and job insecurity, both are associated with poorer wellbeing.
- Although the adoption of ICT can promote productivity growth, it can also blur the boundaries between work and home life and facilitate sedentary lifestyles, hence reducing wellbeing.
- Sustained productivity growth may increase carbon emissions, raise average temperatures, and deplete forms of natural capital that have been shown to be beneficial for wellbeing.

We conclude that, although wellbeing may be a determinant of higher levels of productivity, the way in which we pursue productivity growth also appears to have the potential to undermine wellbeing. Our key

recommendation is therefore for research that takes a critical approach to understanding how wellbeing and productivity growth may influence each other over time and across contexts. Numerous suggestions for specific areas for future research have been made throughout the review and these are summarised in Table 1. Once we have a more nuanced understanding of the relationship between these two factors we will be better able to decide upon the value we assign to productivity growth and if and how we wish to pursue it.

Table 1 | Recommended areas for further research.

Research area	Recommended topics for further research
Physical and mental health and productivity	<ul style="list-style-type: none"> • Establishment of the specific pathways through which physical and mental health problems influence productivity, including disentangling of their relative effects. • Exploration of the most effective strategies for accommodating the requirements of informal caregivers in the workplace. • Thorough examination of the differential impacts of a wider range of mental health conditions on productivity. • Longitudinal research testing the theory that short-term productivity growth in the healthcare sector can undermine productivity growth in the long term by reducing the levels of care provided.
Subjective wellbeing and productivity	<ul style="list-style-type: none"> • Comparison of whether targeting health problems or subjective wellbeing is a more effective means of boosting individual and organisational productivity. • Examination of how 'eudaimonic' aspects of wellbeing link to labour productivity. • Further use of experimental studies to infer the nature of any direct, causal relationships between aspects of subjective wellbeing and productivity.
Stress and productivity	<ul style="list-style-type: none"> • Examination of how an organisation's rate of productivity growth impacts upon staff stress levels. • Location of further individual difference factors that may reduce or increase an individual's susceptibility to work-related stress. • Evaluation of the relative effectiveness of a wider range of interventions intended to reduce the effects of work-related stress on productivity.
Workplace wellness programmes	<ul style="list-style-type: none"> • Examination of individual difference factors that may make employees more or less responsive to the aims of workplace wellness programmes. • Use of longitudinal designs spanning longer time frames to map the trajectory of any productivity gains achieved from workplace wellness programmes. • Qualitative work with employees to gain an in-depth understanding of their view of workplace wellness programmes.

Social and human capital	<ul style="list-style-type: none"> • Investigation of how increases in productivity may impact upon levels of social capital. • Examination of the potential causal nature of links between human capital, social capital, well-being, and productivity. • Longitudinal research to determine whether there are limits to the extent to which further increases in human and social capital are beneficial for productivity.
Workplace factors	<ul style="list-style-type: none"> • Examination of whether workplace factors have a direct, undermining effect on productivity, or instead, if this effect occurs through indirect influences on wellbeing and stress. • Systematic or meta-analytical approaches to reviewing different workplace factors to determine which have the most substantial effects on both wellbeing and productivity. • Empirical exploration of the relationship between resource productivity and labour productivity.
ICT	<ul style="list-style-type: none"> • Exploration of how the adoption of ICT relates to other factors shown to have implications for productivity and wellbeing, for example social and human capital. • Examination of how the impact of ICT on productivity and wellbeing differs across industries. • Investigations of how emerging forms of ICT, in particular artificial intelligence, are able to enhance or undermine our productivity and wellbeing in the same ways or to a greater extent than earlier forms of ICT.
Natural capital	<ul style="list-style-type: none"> • Further work aiming to specify the exact effects of natural capital on multi-factor productivity, building on recent work using OECD data. • Examination of if and how natural capital can be substituted by technological innovations, and the impact this has on both wellbeing and productivity growth. • Exploration of regional differences in productivity and wellbeing, and how this may relate to regional levels of natural capital.

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1 | Introduction

The UK currently has both declining productivity growth rates and declining wellbeing. Productivity growth has been falling in the UK for several decades since a peak in the 1960s and has been particularly weak since the 2008 financial crisis (Jackson, 2019). For the last quarter of 2018, real GDP per hour worked was only 2% above the pre-crisis peak in the last quarter of 2007, and 18.3% lower than if the pre-crisis growth trend had been sustained (Crafts & Mills, 2019; Office for National Statistics, 2019). Meanwhile, wellbeing in the UK also appears to be declining. For example, the Office for National Statistics (2018) noted that the number of sick days taken due to mental health conditions is rising, particularly among young people (ages 25 to 34). Per year, it is estimated that one in six workers in England and Wales is affected by anxiety, depression, or unmanageable stress (The Sainsbury Centre for Mental Health, 2008; Mind, 2014). In this report we explore whether the wellbeing, productivity, and productivity growth could be linked.

1.1 Potential Links Between Productivity and Wellbeing

Declining productivity growth rates are typically considered a problem because they are thought to be linked to income levels, and, through this, to wellbeing (Banting, Sharpe, & St-Hilaire, 2002; Kuegler, Schoenberg, & Schreiner, 2018). For example, it is widely believed that wages are set by labour productivity. So an increase in labour productivity should directly translate to higher wages (Clark, 1908; Franklin, 2018), and faster productivity growth should mean faster wage growth. However, in practice this relationship has not always held (Bivens & Mishel, 2015; Jackson, 2019).

This is because of the way that class relations impact the productivity-income relation.

For example, it has been noted that although increases in productivity in the United States has been accompanied by strong increases in corporate profits, growth in real wages for workers was sluggish (Willis & Wroblewski, 2007). When examining changes in labour compensation in the US during a period of increased productivity between 1996 and 2005, Willis and Wroblewski found that income growth was most concentrated within the highest wage earners. Low-income households had seen no increase in real income in this time. Pessoa and Reenen (2013) reported that similarly in the UK there has been growing wage inequality since the late 1970s. This reflects the fact that financial gains from increased productivity are not always distributed equally.

This is explained by considering factors that mediate the labour productivity growth-income relation. Labour productivity growth can increase incomes either by reducing prices or by increasing wages. However, prices are impacted not just by cost but also by the market power of firms (Daskin & Wu, 2004). Likewise, labour productivity growth increases the potential wages of workers, but their ability to capture that additional wage is a function of their relative bargaining power. So the link between income and productivity is at best disputed. But how does this effect the productivity-wellbeing link?

Although a direct link between productivity and wellbeing has received considerable attention, much of this attention has been granted to the so-called 'happy-productive worker' thesis (Christensen, 2017; DiMaria, Peroni, & Sarracino, 2019; Zelenski, Murphy, & Jenkins, 2008). Here, employee wellbeing is considered as a positive determinant of greater levels of employee and firm-level labour productivity. So productivity levels are determined by wellbeing, rather than the other way around. Under this perspective we may consider the slowdown of productivity growth in the UK to reflect declining levels of mental health and wellbeing. Indeed, improving levels of employee wellbeing has been suggested by some as a means of solving the productivity puzzle (Austin, 2019; Bevan, 2018; The Work Foundation, 2015). This perspective can tell us little, however, about whether increasing productivity or productivity growth might boost wellbeing. Indeed it has been argued that the pursuit of productivity growth may reduce wellbeing by placing pressure on public services and worsening working conditions (Jackson, 2017; Mair, Druckman, & Jackson, 2018). Productivity and wellbeing have therefore often been explored from a fairly narrow perspective.

This report takes a broad interdisciplinary perspective on questions of productivity and wellbeing. At a workshop held in September 2019, we hosted discussions with researchers from backgrounds including psychology, sociology, economics, and design. Across these discussions a wide range of factors were considered to have relevance for understanding the relationship between wellbeing and productivity. These factors often went beyond individual characteristics or capabilities and touched upon broader workplace or societal features. What was also interesting was that the practices and outcomes promoted by the pursuit of productivity growth were often deemed to have differential consequences for wellbeing. This means that the relationship between productivity and wellbeing may be bi-directional and positive or negative across different contexts. In this report we explore these in more depth.

1.2 Measures of Productivity

Before proceeding, it is worth clarifying a few points of measurement/terminology. Throughout this report we principally focus on labour productivity. This is because the productivity puzzle is most often discussed in terms of labour productivity growth. Labour productivity is typically measured as the market value of output per hour worked or per person employed. It is a key productivity indicator for policy, and one of the most widely used measures of productivity across the social sciences. For instance, the UK Government industrial strategy frames its discussion of productivity in these terms (Department for Business Energy & Industrial Strategy, 2017). However, labour productivity is not the only way to measure productivity.

The core concept of productivity is the ratio of inputs to outputs. Almost any measure can be used as an input or an output. The specific of productivity metric is a function worldview that underlies the analyst's view of productivity. It is at the level of this worldview that analysts choose input measures (based on what they think is an important driver of productivity) and an output measure (based on what they consider to worth measuring).what This review is interdisciplinary. As a result, although we focus on labour productivity, we make reference to a number of alternative measures.

Notably, we discuss both resource productivity and multi-factor productivity. References to the former mean market value per unit of natural resource (e.g. energy or physical materials) (Bleischwitz, 2001). Multi-factor productivity is derived from marginalist economic theories of value. Multi-factor productivity defines productivity growth as the change in outputs

that cannot be accounted for by increases in the use of a variety of inputs, which are usually restricted to labour and capital (Franklin, 2018).

It is also worth noting here that although the productivity puzzle is usually discussed in terms of growth rates, we have thrown our net wider than this and also discuss the relation between wellbeing and productivity levels. This is in part because most of the literature on wellbeing and productivity considers level effects rather than growth effects, and in part because productivity levels may be important in and of themselves for understanding wellbeing (Banting et al., 2002).

1.3 This Report

In this report we aim to highlight the broad range of factors that have implications for our understanding of the relationship between wellbeing and productivity. Our pivotal contribution is to show that, although wellbeing may be a positive determinant of levels of productivity in the workplace, the various ways in which we seek productivity growth can have both positive and negative effects on our wellbeing. A more nuanced understanding of the interactions between productivity, productivity growth and wellbeing therefore needs to be developed.

Section 2 reviews the literature which relates physical and mental health to productivity in the workplace. Section 3 explores the relationships between subjective wellbeing (SWB) and workplace productivity. Section 4 examines the links between work-related stress and productivity. Section 5 explores the literature on the effectiveness of workplace wellness programmes on improving productivity. These literatures seem to show that, on the whole, when individuals are experiencing deficits in their health and wellbeing, then they tend to also report lower levels of productivity.

Sections 6 to 9 are dedicated to exploring the wider range of factors that have the potential to impact both productivity and wellbeing. Section 6 explores social and human capital; Section 7 examines workplace factors that affect wellbeing and productivity; Section 8 examines the particular importance of ICT; and Section 9 introduces the importance of natural capital in both productivity and in relation to wellbeing.

We conclude the report by summing up our current understanding of the relationships between productivity, productivity growth and well-being. Throughout the report we have aimed to highlight areas for further research. Specific suggestions related to each chapter are listed in the chapter conclusions.

2 | Ill health and productivity

When individuals are experiencing deficits in their physical or mental health, this can have detrimental consequences for their productivity in the workplace. Black and Frost (2011) noted that sickness absences cost the UK economy around £15 billion each year and that this was predominantly due to lost output. Whilst the number of sickness days taken each year by UK workers is falling, in 2017, each worker still lost an average of 4.1 days due to sickness absence (ONS, 2018). Therefore, one way in which ill-health may influence productivity is through greater absenteeism. Alternatively, people may choose to attend work when ill, but experience reductions in their performance and productivity on the job due to their health condition. Ill-health may therefore also influence productivity through greater “presenteeism” – a phenomenon in which people are present at work but operating at less than their full capacity. In comments made to The Guardian, Sir Cary Cooper of Manchester Business School noted that sickness absence may be dropping because people are afraid to be off sick, fearing that it may make them vulnerable to job losses and worsen their future prospects. Therefore, whilst absenteeism may be dropping, presenteeism may be on the rise (Collinson, 2018).

2.1 Physical health and productivity

A number of studies have looked at the impact of poor physical health on productivity. Findings consistently document a negative relationship between these two factors (Ford, Cerasoli, Higgins, & Decesare, 2011; Meerding, IJzelenberg, Koopmanschap, Severens, & Burdorf, 2005). Research investigating the effects of physical health on productivity typically tends to assess either 1) the impact of pre-existing health conditions or 2) the impact of engagement in behaviours that increase the likelihood of individuals developing a physical health condition. The impact of physical health upon productivity is becoming increasingly important as an ageing workforce means that people are continuing to work into older age when physical health is expected to decline (Black & Frost, 2011; Clements-Croome, 2006; Price Waterhouse Coopers, 2008)

2.1.1 Chronic Health Conditions Negatively Impact Productivity

A vast range of health conditions have been linked to reduced productivity. Hafner, Stolk, Saunders, Krapels, and Baruch (2015) distributed a survey to the employees (N = 21822) of 82 UK companies participating in the 2014 ‘Britain’s Healthiest Company’ competition. By asking participants to report how often their health had led them to be absent from work (absenteeism)

or hindered their productivity whilst at work (presenteeism), they found that a number of ill-health conditions including musculoskeletal disorders and hypertension were associated with greater productivity impairments. The degree to which productivity was impaired increased with the extent of the health problem.

Other chronic health conditions linked to poorer workplace productivity include severe asthma (Chen et al., 2008), arthritis (Burton et al., 2006), chronic obstructive pulmonary disease (Britton, 2003), and Type 1 and Type 2 diabetes (Hex, Bartlett, Wright, Taylor, & Varley, 2012). In their systematic review, Gordois et al. (2016) highlighted that cardiovascular disease was linked to higher levels of absenteeism and presenteeism. Further, as the leading cause of death worldwide, cardiovascular disease is also linked to lost productivity through premature mortality (Liu, Maniadakis, Gray, & Rayner, 2002). Cancer patients lose productivity through absenteeism due to treatment or sickness (Bradley, Oberst, & Schenk, 2006). When cancer survivors return to work they can also suffer from productivity losses. Lavigne, Griggs, Tu, and Lerner (2008) found that over a 2 week period, breast cancer survivors reported a productivity loss of approximately 2.48 hours of work relative to the healthy worker norm. The higher levels of fatigue and hot flashes experienced by the survivors partly accounted for their work performance losses. Likewise, when conducting interviews and focus groups with users of cancer support groups in the Midlands, Kennedy, Haslam, Munir, and Pryce (2007) found that tiredness and fatigue were the most frequent side effects that individuals felt disrupted their work performance. Also mentioned by participants in this study was the increased susceptibility to infections, which often meant that they were absent due to minor illnesses more often.

2.1.2 Wider effects of Physical Health and Productivity: Caregivers

It is not only the people with chronic health conditions who can experience productivity losses, but also the people who care for them. The physical health of caregivers is often compromised by their care duties, leading to reduced productivity at work. Family caregivers of cancer patients have been shown to report a number of physical health problems such as fatigue and sleep disruption (Stenberg, Ruland, & Miaskowski, 2009). Likewise, individuals who cared for their spouses with severe impairments in daily self-care activities were more likely to fail to find time to exercise, not get enough rest, and forgot to take prescription medications, in comparison to non-caregivers (Burton, Newsom, Schulz, Hirsch, & German, 1997). A six-year longitudinal study of caregivers of women with ovarian cancer in Australia found that 56% of the 101 caregivers studied reported one or more negative changes in terms of their physical health since becoming a

caregiver, such as gaining weight or reducing their amount of physical exercise (Beesley, Price, & Webb, 2011). These negative effects on their physical health have the potential to impact upon the productivity of carers in the same way as it does for the patients.

A number of studies have examined the relationship between caregiving responsibilities with workplace productivity. By interviewing 30 informal caregivers for people diagnosed with cancer, Swanberg (2006) noted that respondents felt stressed about meeting work demands which impacted upon their ability to work effectively. Individuals also reporting missing time from work in order to provide informal care, being less able to concentrate on the job, and having to spend time at work on the phone to family members or medical providers. In a study of individuals who cared for older adults, Giovannetti, Wolff, Frick, and Boult (2009) found that caregiving was associated with an overall loss of just over 20% in work-place productivity, and that this was accounted for by both greater absenteeism and presenteeism. Mazanec, Daly, Douglas, and Lipson (2011) administered surveys to unpaid caregivers of patients with pancreatic, lung, gastrointestinal, or gynaecologic cancer over a 15 month period. Caregivers reported a productivity loss of around 15% while working due to their caregiving and 28% reported missing work in the past week (a mean of 17 hours) because of their caregiving. Individuals reported greater negative impacts on their work productivity when they spent more hours caregiving and their patient was at a higher cancer stage. Grunfeld et al. (2004) also found that caregivers were more likely to incur lost productivity through absenteeism when their patient is in the terminal phase of their illness.

2.1.3 Health Risk Behaviours Leading to Reduced Productivity

Health risk behaviours are those that have the potential to raise the probability of adverse health outcomes (WHO, 2009). Examples of these types of behaviours are smoking and having a poor diet. Individuals displaying these risk factors have been shown to be less productive, highlighting how the impacts of physical health on productivity precede the point of diagnosis of a disease or injury.

It is generally considered that the greater the number of health risks displayed by an individual, the more likely they are to report reductions in their productivity. For example, Burton et al., (2005) noted that the number of employees reporting presenteeism (considered as the extent to which each individual felt that their health made it difficult for them to complete a range of workplace tasks) rose as the number of self-reported health risk factors also increased. Using a survey distributed to employees in seven locations throughout the US, Boles, Pelletier, and Lynch (2004) reported

similar findings. Here, the more health risks present for an individual the higher their self-reported presenteeism *and* absenteeism. Although, this effect was most pronounced in terms of presenteeism.

Amount of sleep is one health risk behaviour that has been linked to poorer productivity. Hafner et al., (2015) found that individuals who slept for less than five hours per night reported 6.93% greater productivity losses due to worse performance when at work. Using data from health assessments obtained from over 18,000 US employees, Katz, Pronk, and Lowry (2014) also demonstrated that employees who slept less or more than 7-8 hours per night experienced significantly more productivity loss. Therefore, too little or too much sleep both appear to impact worker productivity.

Physical exercise is another health risk behaviour linked to productivity. Hafner et al. (2015) reported that engaging in less than 150 minutes of physical exercise per week was associated with greater productivity losses through both absenteeism and presenteeism. Boles, Pelletier, and Lynch (2004) also found that the odds of employees in the US reporting any absenteeism due to health problems was significantly greater when individuals did not engage in moderate to vigorous physical exercise for at least 30 minutes four times per week. In this case, individuals were 1.64 times more likely to report absenteeism in comparison to employees who did engage in a sufficient amount of physical exercise. By examining employees from three healthcare organisations and an airline, Pronk et al. (2004) found that engagement in moderate physical exercise was positively related to overall job performance.

Employees have been shown to report greater presenteeism due to health problems associated with a poor diet (Boles et al., 2004; Hafner et al., 2015). Relatedly, employees classified as obese (BMI > 35) have been shown to report higher productivity losses. In their survey of employees at eight manufacturing companies in Kentucky, Gates, Succop, Brehm, Gillespie, and Sommers (2008) discovered that obese individuals incurred 4.2% higher productivity losses than those of a healthy weight. This was primarily through levels of presenteeism. In this study, obese individuals reported having greater difficulties with completing physical tasks and getting work done on time. Pronk et al. (2004) also found obese employees to incur a higher number of work-loss days but, in this instance, obesity was associated with significantly greater difficulties in working effectively and getting along with co-workers. This suggests that BMI can influence work performance beyond physical tasks alone.

Cigarette smoking has been shown to cost businesses in terms of lost productivity (Alavinia, Molenaar, & Burdorf, 2009). Smoking cessation has

been linked to lower levels of absenteeism, presenteeism, and overall work impairment in comparison to those still trying to quit (Baker, Flores, Zou, Bruno, & Harrison, 2017). Smoking breaks add to the productivity losses on top of absenteeism and presenteeism (Berman, Crane, Seiber, & Munur, 2014). Although, Hafner et al., (2015) failed to find a convincing association between smoking and productivity losses so the finding is not always replicated.

2.2 Mental health and productivity

Mental health describes ‘a state of wellbeing in which the individual realises his or her abilities, can cope with the normal stresses of life, work productively and fruitfully, and is able to make a contribution to his or her community’(WHO, 2007). Mental health problems cover conditions such as depression, anxiety, obsessive-compulsive disorder, and post-traumatic stress disorder (Kendrick & Pilling, 2012). Hafner et al., (2015) found that individuals identified as being at risk of developing mental-health problems had 13% greater productivity losses than those individuals not at risk. This was the largest sized effect across all of the factors examined (including workplace environments, job factors, and physical health) in their survey study. Likewise, Mind's (2014) survey of 2,006 employed adults in England and Wales in 2011 found that stress and mental health disorders were one of the largest causes of long-term absence from the workplace.

2.2.1 Stigma and Presenteeism

Stigma or discrimination means that presenteeism is particularly important in the case of mental ill health (The Sainsbury Centre for Mental Health, 2008). The fear of stigma and discrimination may mean that workers choose to work even if unwell. The NHS Attitudes to Mental Health Survey conducted in 2011 found that 43% of employees would be reluctant to disclose mental health issues at work (NHS Information Centre, 2011). Similarly, Mind (2013) highlighted that whilst 1 in 5 people reported taking a day off work due to stress, 90% of these people cited a different reason for their absence. This fear of disclosure is well founded: a survey of 2,006 adults in employment, carried out for the charity ‘Mind’ found that 22% of individuals who had disclosed a mental health problem to their employers had either been sacked or forced out of their jobs (Mind, 2014). Likewise, Farmer and Stevenson (2017) noted that people with long-term mental health conditions lose their jobs at twice the rate of those without such condition.

It is unsurprising, then, that research shows that productivity losses due to mental health problems are more often related to presenteeism than absenteeism. Goetzel et al., (2004) found that the productivity losses of presenteeism linked to mental health problems were 5.1 times larger than the losses resulting from absenteeism. Stewart, Ricci, Chee, Hahn, and Morganstein (2003) provided similar estimates, suggesting that presenteeism accounts for 4.6 times as many hours lost as absenteeism for US employees with depression. Likewise, Stewart et al., (2003) reported that 82.1% of the lost productivity time among depressed individuals in the Depressive Disorders Study was accounted for by presenteeism. In a study of Canadian employees, Dewa and Lin (2000) reported that psychiatric disorders led to 23 times as many cases of presenteeism compared to absenteeism. When considering the average loss of productivity in an instance of presenteeism and absenteeism, they concluded that the scale of presenteeism associated with mental health problems was 2.3 greater than the scale of absenteeism. The proportion of losses due presenteeism relative to absenteeism may be particularly high in certain occupations. For example, over 75% of productivity losses due to mental health are in the form of presenteeism for executive roles whereas less than 50% is due to presenteeism in sales and labour type roles (The Sainsbury Centre for Mental Health, 2008).

2.2.2 Depression

Depression have been granted significant attention within the existing literature. It tends (along with anxiety) to be the most frequently reported chronic illness amongst employees. In their examination of the effects of various chronic conditions (e.g. asthma, migraine, diabetes) on work limitations, Munir, Jones, Leka, and Griffiths (2005) reported that depression and anxiety were the only conditions to be significantly linked to all of physical, cognitive, and social work limitations. Further, Wells et al's. (1989) study of 11242 outpatients in health care provision systems across three US states found that the size of the association between major depression and performance impairment at work was at least similar to, or greater than, the size of the association between other chronic health problems and work impairments. For example, patients with major depression had significantly more self-reported absence days due to their condition than patients with hypertension, diabetes, gastrointestinal problems, angina, back problems, or arthritis.

Several researchers have reviewed the evidence concerning the effects of employee depression on business outcomes (e.g. Goetzel, Ozminkowski, Sederer, and Mark, 2002; Simon et al., 2001; Stewart et al., 2003). Findings tend to show that employees with depression display greater rates of

absenteeism (approximately $\frac{1}{4}$ day more per month) in comparison to workers with no psychiatric issues (Kessler, Greenberg, Mickelson, Meneades, & Wang, 2001). Likewise, individuals are suggested to lose around 20% of their self-reported productivity when at work if they were suffering from depression. This may be due to factors such as fatigue, low self-confidence, memory lapses, and poor concentration (Greenberg, Stiglin, Finkelstein, & Berndt, 1993). Burton, Pransky, Conti, Chen, and Edington (2004) assessed the domains of work that 16,651 employees of a large financial services corporation felt impaired in. After controlling for demographic factors and coexisting conditions, depression was strongly associated with experienced limitations in terms of time management, keeping concentrated on work, communicating effectively with colleagues, and achieving the required output. 77.1% of individuals with depression reported some absenteeism or presenteeism during the 2-week recall period in Stewart et al's., (2003) analysis of data from the Depressive Disorders study in the US. Using data taken from a 1997 national survey of employees in the US, Kessler et al., (2001) report that major depression was one of the five health conditions associated with the greatest work absenteeism and presenteeism. Of these top five conditions (depression, panic, ulcers, chronic sleep problems, and autoimmune diseases), depression is the most prevalent.

Many of the above studies use self-reported productivity measures. However, the association between depression and impaired work performance also appears to arise using non-self-report methods. Ormel et al., (1994) analysed data from the World Health Organization Collaborative Study of Psychological Problems in General Health Care. This study distributed surveys to over 25,000 primary care patients in 14 countries as well as conducting interviews with a subsample of these. They found that 48% of respondents with a current diagnosis of major depression also had interviewer-rated moderate or severe occupational role impairment.

The effective treatment of depression coincides with improvements productivity. Productivity gains have been found in terms of self-reported worker performance (Finkelstein et al., 1996) and reductions in lost workdays (Claxton, Chawla, & Kennedy, 1999; Katzelnick, Kobak, Greist, Jefferson, & Henk, 1997). Wells et al., (2000) found that depressed patients allocated to a quality improvement program involving antidepressant or psychotherapy treatment were more likely to maintain paid employment over a 12-month period than those patients assigned to the control group. Likewise, Von Korff, Ormel, Katon, and Lin (1992) and Mintz, Mintz, Arruda, and Hwang (1992) both found that improvements in the severity of depressive symptoms over time were associated with reductions in the

number of work impairment days (considered as any absenteeism, reduced productivity, interpersonal problems at work, or unemployment). When individuals showed no improvement in the depressive symptoms, there was no change in their levels of work impairment and symptom relapse was related to a return of serious work impairment. One further interesting finding from Mintz et al's., (1992) study is that the size of the relationship between depressive symptom severity and the risk of serious work impairment was greatest for moderate-to-high levels of depression. This implies that complete depressive symptom remission may not be necessary to achieve significant improvements in work impairment.

Relatedly, Judd et al., (2000) examined 10-year longitudinal data of 371 patients with major depressive disorder from the National Institute of Mental Health Collaborative Depression Study. They discovered that patients reported more psychosocial impairment in employment during months where their depressive symptoms were also more severe. When their symptoms subsided, their psychosocial functioning at work improved. Psychosocial functioning refers to an individual's ability to effectively engage in everyday activities and relationships that are both gratifying and meet the demands of the organisation or community (Mehta, Mittal, & Swami, 2014).

2.2.3 Other Mental Health Conditions

Research into the effects of other mental health conditions on workplace productivity has revealed similar trends to the findings surrounding depression and productivity. Marciniak, Lage, Landbloom, Dunayevich, and Bowman (2004) used a case-control study to examine the impact of a diagnosis of anxiety on the official absenteeism records for employees working for six Fortune 200 U.S. employers. They found that individuals in the anxiety group had a higher number of days officially absent from work compared to the control group, and that they were also more likely to have made a short-term disability claim. Using telephone interviews, Esposito, Wang, Williams, and Patten (2007) demonstrated that 75% of individuals reporting comorbid mood and anxiety disorders stated that they had experienced presenteeism at work compared to 13.1% of individuals not reporting a mood or anxiety disorder. Further, Haslam, Atkinson, Brown, and Haslam (2005) conducted focus groups with individuals who had personal experience of anxiety or depression in the previous 2 years. These individuals were from a variety of occupational sectors including health care, education, engineering, manufacturing, and retail. Participants highlighted that their anxiety and depression often meant that they were unable to concentrate or make decisions at work. The symptoms of their mental health problem as well as the side-effects of their medication also often led them

to experience confusion, nausea, dizziness, and sleep disturbance; factors which may impact upon productivity themselves.

Relatively little research has examined the role of obsessive-compulsive disorder (OCD) in hampering or hindering productivity, although the available evidence does still point to a negative association. The disorder is suggested to mainly affect young adults, an age group who should be highly active in the labour force (Srivastava & Bhatia, 2008). Ogundipe (2004) outlined a case report of a woman suffering from OCD, highlighting how compulsions such as repetitively checking that doors are locked lead her to often be late for work. By studying Spanish OCD patients, Bobes et al. (2001) concluded that OCD was most strongly associated with impairments in social and occupational life domains. Ruscio, Stein, Chiu, and Kessler (2010) conducted face-to-face interviews with a nationally representative sample of individuals with OCD in the US. They found that 41.7% of individuals classified as having moderate OCD reported any impairment in fulfilling their role at work in the previous 12 months. When considering those individuals classified as having severe OCD, this percentage rose to 79.9%, with 56.7% of individuals with severe OCD reporting severe workplace impairments due to their condition.

Research examining the effect of post-traumatic stress disorder (PTSD) on productivity is, similarly, sparse in comparison to that examining depression and more generalised anxiety. Belleville, Marchand, St-Hilaire, Martin, and Silva (2012) conducted structured interviews with convenience store employees who had been victim of armed robbery within days of the incident occurring as well as one and three months after. Individuals displaying signs of PTSD following the robbery reported more days absent from work than those employees who did not show signs of PTSD. Zatzick et al. (2008) reported similar findings when examining over 5000 trauma patients treated for moderate to severe injuries in hospitals in the US. Injured patients who developed PTSD were 3 times more likely to have not returned to work 12 months after their injury than those patients who did not develop PTSD. Results from the World Health Organization (WHO) World Mental Health (WMH) surveys also highlighted that PTSD had one of the strongest individual-level effects on days out of role, being associated with an average of an additional 15.2 days of absence per year per person (Alonso et al., 2011). When assessing the economic impact of PTSD in Northern Ireland, Ferry et al. (2015) found that an estimated 2,283,130 working days were lost in 2008 due to PTSD and other acute stress disorders. In addition, individuals who met the diagnostic criteria for PTSD had a higher rate of presenteeism than those individuals who did not have PTSD

(2% higher in the case of males, and 5.5% higher in the case of females). PTSD therefore appears to influence both absenteeism and presenteeism.

2.2.4 Linking Physical and Mental Health

Intuitively, we see that both poor physical health and poor mental health lead people to take time off work and limit their ability to perform at a high level on the job. So far we have considered the effects of these two types of ill-health separately. However, they may also be related to each other. Individuals suffering from physical health conditions, especially chronic, long-term problems are suggested to be at an increased risk of also suffering from poor mental health (Naylor et al., 2012). As such, part of the reason why individuals experiencing poor physical health often report reduced productivity could be because of they are also experiencing mental health problems.

There is a large literature demonstrating co-morbidities between physical and mental health problems. It is conservatively estimated that at least 30% of all people with a long-term physical health condition also have a mental health problem (Cimpean & Drake, 2011). Depression has been shown to be more common in individuals with cardiovascular disease (Hare, Toukhsati, Johansson, & Jaarsma, 2014), musculoskeletal pain (Linton et al., 2011), and diabetes (Vamos, Mucsi, Keszei, Kopp, & Novak, 2009). Likewise, individuals with cardiovascular disease (Goodwin, Davidson, & Keyes, 2009), asthma, arthritis, and chronic headache (Scott et al., 2007) have been demonstrated to have a greater likelihood of displaying the symptoms of anxiety. Physical inactivity has been indicated to be a risk factor for the onset of depression (Farmer et al., 1988), whilst habitual exercise has often been linked to reduced symptoms of depression and greater emotional wellbeing (Ohta, Mizoue, Mishima, & Ikeda, 2007; Schuch et al., 2016; Ströhle, 2009). A meta-analysis of 104 studies found that partaking in physical exercise was associated with reductions in anxiety, although findings did not indicate a direct causal effect (Petruzzello, Landers, Hatfield, Kubitz, & Salazar, 1991).

As well as our physical health being able to impact upon our mental health, our mental health can impact upon our physical health (Bell, 2017; De Hert et al., 2011). For example, Ormel et al., (1999) analysed data from the World Health Organization Collaborative Study of Psychological Problems in General Health Care. This study distributed surveys to over 25,000 primary care patients in 14 countries as well as conducting interviews with a subsample of these. They found that the presence of depression at baseline assessment was linked to a 1.5-fold increase in the risk of physical functioning problems (defined as limited in performing everyday physical

activities) at three months follow-up. There was a 1.8-fold higher risk of physical functioning problems at twelve months follow-up. These associations remained when controlling for the severity of co-morbid medical conditions.

Similarly, a longitudinal study of individuals in New Zealand found that adolescents with low self-esteem went on to display poorer cardiorespiratory health and higher waist-to-hip ratios in adulthood when controlling for demographic variables and childhood BMI (Trzesniewski et al., 2006). Further, Stepanek, Jahanshahi, and Millard (2019) used data from the 2017 wave of the Britain's Healthiest Workplace survey (31,950 employees across 173 participating organizations) to show that mental health had an indirect effect on workplace productivity, that was mainly mediated through physical health (86% of total indirect effect). By conducting mediational analyses with data from The English Longitudinal Study of Ageing, Ohrnberger, Fichera, and Sutton (2017) demonstrated that the positive relationship between past mental health on present physical health was significantly mediated by higher levels of physical activity. This suggests that mental health may have an impact on lifestyle factors which can then impact upon physical health. This potential bi-directional relationship between physical and mental health can make it difficult to determine the exact mechanisms through which each health factor is able to impact upon productivity.

2.3 Joining the dots on Health and Productivity

The evidence reviewed so far suggests that higher levels of both physical and mental health can facilitate greater levels of labour productivity. However, productivity growth within the healthcare sector could lead to poorer quality care (and thus poorer health and well-being) and therefore reduce productivity levels and growth rates. It is well established that certain sectors, are less amenable to productivity growth than others. In these sectors, wages must rise faster than labour productivity in order to maintain a workforce. Consequently, the cost of these sectors rises faster than sectors with faster labour productivity growth rates. This is known as Baumol's Cost Disease, and healthcare is a notable example (Baumol, 2012).

Ever rising healthcare costs lead to attempts to 'marketise' the sector, often with little success. For example, Elkomy, Cookson, and Jones (2019) found that contracting out cleaning services within the NHS in order to cut costs resulted in lower patient-evaluated cleaning standards and higher MRSA rates. Moffatt, Martin, and Timmons (2014) examined the impact of trying to improve healthcare productivity in the UK's National Health Service (NHS)

on professionals working within the service. Since the 1980s, private-sector management practices have increasingly been introduced in the NHS. Healthcare professionals have tended to view this managerialism as an intrusion on their professional practice and ethics of care. Further, by assigning healthcare professionals with the additional responsibility of making sure that the healthcare system is increasingly productive, a 'new professionalism' has been created whereby, as well as being a practitioner, health professionals must also act as a partner in care delivery with accountability for the efficiency of the care provided (Department of Health, 2008). These increasing demands as well as poor staffing heighten difficulties healthcare staff face when caring for patients. Maben, Adams, Peccei, Murrells, and Robert (2012) reported that healthcare staff often seek to alleviate the negative impact of difficulties in providing high quality care by tending more towards those patients they enjoy caring for ('the poppets'). This results in the less favoured, and often more complex patients, receiving less personalised or intensive care. Together these results highlight how attempts to cut costs and grow productivity within the healthcare sector can lead to poorer quality care services being provided.

It is notable that the cost disease affects both public sector and private sector led healthcare systems (Bates & Santerre, 2013). The risk is that if healthcare systems fail or are underfunded, this will create a greater demand for non-professional carers (who have worse than average health outcomes, see section 2.1.2) and a less than optimal health situation in society at large.

Consequently, Baumol's cost disease suggests that productivity growth may undermine itself. Baumol's cost disease suggests that productivity growth will increase pressures on the healthcare system. Sections 2.1 and 2.2 suggest that productivity levels of individuals would be negatively impacted by lower quality healthcare. Assuming a link between the productivity levels of individuals, and productivity growth, then productivity growth in the short run is likely to reduce productivity growth in the long run.

2.4 Chapter Conclusions and Future Research

Poor physical health can cause people to spend more time absent from work as well as worsen their performance in the workplace. A range of physical health conditions have been linked to poorer productivity. These include heart disease, cancer, and asthma, amongst others. The degree of the productivity impairment may increase with the severity of the condition or the number of conditions present. The impact of physical health conditions on productivity can transcend the diagnosed individual, with research demonstrating that those individuals providing informal care for the unwell

can also experience reductions in their own health and productivity as a result of their caregiver role. As well as existing chronic health conditions, engaging in behaviours that increase the risk of future health conditions (e.g. lack of exercise, poor diet, and smoking) can also have detrimental effects on labour productivity. The greater number of these health risk behaviours present, the higher the likelihood that productivity will be reduced.

Mental health problems appear to be a growing problem in the UK workplace. Poor mental health can increase both levels of absenteeism and presenteeism, however impacts upon presenteeism appear to be more prominent as individuals are often reluctant to disclose mental health problems to employers through fear of stigma and discrimination.

It is hard to grow the productivity of the healthcare sector and the actions taken to increase productivity levels have sometimes been shown to lead to poorer quality care being delivered. If growing productivity within the healthcare sector leads to poorer quality care and thus worse patient health outcomes, then this means that short term productivity growth could undermine long term productivity growth as health has been shown to be a positive predictor of labour productivity levels.

Based on the current state of the literature, we suggest that the following areas would be appropriate for future research.

1. Due to the co-morbidities between physical and mental health, the pathway through which physical and mental health problems influence productivity is not always clear. Does poor physical health have detrimental effects upon productivity because physical health conditions are often associated with poorer mental health? Or does poor mental health have detrimental effects upon productivity because mental health problems are often linked to poorer physical health? Future research is needed to disentangle the extent to which the impacts of physical and mental health on productivity are distinct or intertwined.
2. If informal caregivers experience deficits in their health and productivity, research should explore the most effective strategies for accommodating the requirements of informal caregivers in the workplace.
3. A large proportion of the research into the effects of mental health on productivity has focused on the (most prevalent) conditions of depression and anxiety. Whilst the relatively smaller amounts of research into conditions such as OCD and PTSD are revealing similar trends to the depression and anxiety work, more research is needed to

determine if there are differential effects on productivity across a more varied range of mental health conditions.

4. Most work exploring the links between health and productivity relies on assessing the relationship between scores on health questionnaires and productivity measures. This means that we know that various health factors are positively or negatively linked to productivity, but we do not necessarily know why or how. Future work may therefore want to locate the more specific mechanisms through which health can impact productivity. This may require the use of longitudinal, observational, or qualitative research methods.
5. Longitudinal research is needed to test the theory that short-term productivity growth in the healthcare sector can undermine productivity growth in the long term by reducing the levels of care (and thus health) provided.

3 | Subjective wellbeing and productivity

In the previous section, we focused on the impact of certain health conditions on productivity. However, there is also a growing amount of literature to suggest that higher levels of wellbeing, independent of any diagnosed health problems, are also linked to greater individual productivity. For example, Boorman (2009) highlighted that, for the NHS as a whole, enhancing the level of staff health and wellbeing from average to good could be associated with an extra 840,000 staff days per year and a saving in direct costs of £13.7 million a year.

Subjective wellbeing refers to an individual's own sense of how well their lives are going (Unanue-Manriquez, 2014). It can be considered as a state of mind (Haybron, 2008). It is frequently described using the following equation: SWB = satisfaction with life + high positive affect + low negative affect (Diener, Emmons, Larsen, & Griffin, 1985; Hefferon & Boniwell, 2011). Life satisfaction describes an individual's belief that they have the things they want in life (Waterman, 1993), that they like the life they lead, and that their life is of the standard that they deserve (Veenhoven, 1991). As well as satisfaction with life overall, it is recognised that people also make judgements of specific life domains such as work and their home life (Diener, Napa Scollon, & Lucas, 2009).

3.1 Job Satisfaction

Poor job satisfaction has been linked to poorer productivity (Burton, Chen, et al., 2005), but findings are not always consistent. Hafner et al's., (2015) survey study of UK companies demonstrated that when workers reported being satisfied with their job, this was associated with 6.92% less productivity impairment due to presenteeism and/or absenteeism. Arnold et al. (2016) also reported a significant, negative relationship between job satisfaction and presenteeism costs, but failed to find a significant association between job satisfaction and absenteeism costs. Other studies that have failed to find a significant, meaningful link between job satisfaction and productivity include Farrell and Stamm (1988). Their meta-analysis found that the overall correlation between job satisfaction and frequency of absence from work was small (corrected $r = -.16$). Across the 20 samples studied, varying correlations ranging from $-.38$, to $.23$ were reported. In a year-long study of electrical apprentices, Tharenou (1993) found that the correlation between job satisfaction and the frequency of absence at time 1 was $-.29$, but this size of the relationship reduced in the longitudinal analysis. Job satisfaction at time 1 was only correlated with frequency of absence at time 2 at a very small size ($r = -.16$).

The inconsistent findings surrounding job satisfaction and absenteeism may be occurring because this relationship is moderated by certain factors. For example, Schaumberg and Flynn (2017) found that the relationship between job satisfaction and the number of work days missed could be significantly moderated by factors such as guilt-proneness, agreeableness, and moral identity. In this case, job satisfaction was only linked with fewer absence days when an individual was low in guilt-proneness, agreeableness, and moral identity.

At the organisational level, employee job satisfaction has been linked to greater organisational productivity. For example, Bakotić (2016) surveyed over 5000 employees across 40 large- and medium-sized Croatian companies. Significant positive correlations were found between employee job satisfaction and several financial indicators of organisational performance. These included labour costs per employee, revenue per employee, return on equity, and business excellence index (BEX). All correlations were small in size ($r < .44$). By collecting data from 28 stores in a restaurant chain over a 2 year period, Koys (2001) also demonstrated that employee satisfaction in year 1 was positively correlated with store profit and customer satisfaction in year 2. In this case correlations were small to medium in size ($.35 > r < .61$). After finding that the size of the correlations between organisational performance in year 1 and employee satisfaction in

year 2 were smaller sized ($-.05 > r < .36$), Koys argued that the effect of employee satisfaction on organizational performance was greater than that of organisational performance on employee satisfaction.

Not all studies have supported Koys (2001) suggestion regarding the relatively smaller effect of organizational performance on employee job satisfaction. For example, Schneider, Hanges, Smith, and Salvaggio (2003) examined data concerning the employee satisfaction and market performance of 35 organisations over an 8 year period. Whilst they did find significant positive relationships (over varied time lags) from employee satisfaction to organisational return on assets and earnings per share, relationships running the other way (from organisational performance to employee job satisfaction) tended to be larger in size. Kampkötter (2017) supports the idea that employee performance can cause employee job satisfaction at the individual level. Using data from the 2004, 2008, and 2011 waves of the representative German Socio Economic Panel Study ($n = 12,609$ employed individuals), he demonstrated that receiving monetary benefits for high performance at performance appraisals was linked to increases in job satisfaction. Ford et al. (2011) also suggested that psychological wellbeing could be a result of strong job performance, with the positive feedback that high performing individuals often receive boosting their wellbeing.

A number of studies have failed to document significant associations between employee job satisfaction and organisational performance. Mohr and Puck (2007) studied the managers of several International Joint Ventures. They found no statistically significant relationship between the managers' job satisfaction and the performance of the International Joint Venture. In addition, Daily and Near (2000) mailed questionnaires to employees of family-run automobile dealers in two Midwestern states. They found no significant association between job satisfaction and sales per full-time employee. In fact, the size of the correlation between job satisfaction and total sales revenue was small and negative.

Potential explanations for a lack of link between job satisfaction and productivity come from the ways this relation is mediated by social and economic context. For example, efficiency wage theory predicts that worker productivity will respond to higher wages, but that this response is conditional on the context of the wage increase. Hannan (2005) finds that wage increases are more likely to motivate employees to work harder if the increase comes when firm profits are falling rather than if it comes when the firm profits are increasing. Similarly, Lee and Rupp (2007) argue that reductions in the wages of airline pilots did not affect their productivity

because pilot wages were already relatively high and so affected pilots concluded that their new wages were still “fair”. As wages are a component of job satisfaction, we can infer that other components of job satisfaction may also behave similarly. This implies that a worker can be very satisfied, but how much this effects their productivity will depend on how the components of their satisfaction sit within the wider social and economic context.

A specific example of the role of context impacts the job satisfaction-productivity link can be seen in the in the care sector. The care sector has high turnover rates which reduces productivity (Bukach, Ejaz, Dawson, & Gitter, 2017; Roberts, Parkes, Statham, & Rankin, 2019; Whitebook & Sakai, 2003). Yet care workers often report good reasonable levels of job satisfaction (Benson, Sladen, Done, & Bowman, 2019; Schwendimann, Dhaini, Ausserhofer, Engberg, & Zúñiga, 2016; E. M. White, Aiken, & McHugh, 2019). It has been argued that this is because workers in the sector derive intrinsic job satisfaction from the outputs of the work – the feeling of providing a social good. But their pay is too low to allow them to remain in the sector for long periods of time (Druckman & Mair, 2019; Morgan, Dill, & Kalleberg, 2013). The suggestion is that workers have good productivity whilst in the sector (because of their high job satisfaction), but overall productivity in the sector is low because productive workers are forced out of the sector by its low wages.

3.2 Life Satisfaction and Hedonic Wellbeing

The link between life satisfaction and productivity is unclear. Evers, Castle, Prochaska, and Prochaska (2014) surveyed 790 individuals from an online US national panel. Life Satisfaction was measured by the Life-Evaluation Index of the Gallup-Healthways Well-being Index, which asks participants to rate their satisfaction with their present and imagined future life. They demonstrated that individuals with higher life evaluations had lower levels of overall work impairment, absenteeism and presenteeism than those with poorer life evaluations. Sears, Shi, Coberley, & Pope (2013) studied over 11,000 employees at a large Fortune 100 company in the finance and insurance industry. They found that higher overall wellbeing (which included the same measure of life evaluation as employed by Evers et al.) at the baseline assessment in the summer of 2010 was positively associated with fewer unscheduled absence days, lower self-rated presenteeism, and higher supervisor performance ratings at a follow-up 1 year later. Although, as life evaluation was only one sub-domain of the overall wellbeing variable (which also included factors such as emotional health and healthy behaviour) and no analyses were reported concerning the individual influence of this

factor, we cannot be sure that life evaluation were driving all of these effects. In their study of employees at automobile dealers, Daily and Near (2000) found no significant association between life satisfaction and sales per full-time employee.

Describing subjective wellbeing as partly the mixture of high positive affect and low negative affect highlights how subjective wellbeing often understood as being composed of hedonic wellbeing. Hedonic wellbeing, is commonly considered to be what we think of as happiness (Haybron, 2008; Unanue-Manriquez, 2014; Waterman, 1993). It is concerned with the experience of pleasure. This pleasure need not be physical: it can also be psychological. For example, the experience of pleasant moods or emotions such as joy, delight, and elation whilst limiting unpleasant emotions such as sadness, misery, and distress (Argyle, 1987; Richard M. Ryan & Deci, 2001).

The most well-known study into the effects of hedonic wellbeing on productivity comes from Oswald, Proto, and Sgroi (2015). In an experimental study with undergraduate students, they tested whether inducing pleasant emotions would lead people to be more productive in a paid task. The students were required to complete a 5-question GMAT MATH-style test, but prior to this half of the participants had positive affect induced by watching a 10-minute comedy clip. They discovered that the group who viewed the comedy video were approximately 10% more productive in the GMAT test than those who had not watched the comedy video. In a second study, Oswald et al. (2015) reported similar findings when comparing students who had and had not experienced a bad life event (i.e. bereavement or illness in family) within the last 2 years. Those participants who had experienced a recent bad life event were again approximately 10% less productive on the maths task than those who had not experienced a recent bad life event. Oswald et al's. (2015) findings are supported by other studies.

Boles et al. (2004) also found that when US employees reported feeling unhappy or uncertain about their happiness in daily life, they were more likely to report presenteeism than individuals who did not report feeling unhappy in their daily lives (OR = 1.93). Shockley, Ispas, Rossi, and Levine's (2012) meta-analysis reported that the experience of positive emotions showed a medium-sized, positive relationship with task performance. At the same time, negative affect exhibited a negative relationship with performance, but the effect size here was small. Positive affect was also linked to enhanced performance by Miner and Glomb (2010) when examining the call times and emotions of call centre employees. Likewise,

Isen and Reeve (2005) found that priming positive affect (through a gift giving exercise) led participants to perform quicker on a fairly boring task in comparison to a neutral affect control group. The task in this case involved identifying strings of letters that were in correct alphabetical order within a larger grid of letter strings. However, a second study (Isen & Reeve, 2005) using a similar method failed to find any significant differences in work speed between the positive-affect and control groups.

The work of Wright and Staw (1999) suggests that people who are generally happier tend to show superior performance, but that temporary mood is not consistently associated with performance. Wright and Staw conducted two studies examining the effects of positive and negative affect using employees of a public sector, social welfare department in California. Affect was considered at both the state (momentary feelings) and dispositional (general tendencies) level and relationships were tested at the cross-sectional and longitudinal level. The first study found that state levels of negative affect were associated with poorer supervisor ratings of overall performance taken at the same time point. However, the correlations between state positive affect and supervisor ratings were not significant. The second study failed to find any significant relationships between state affect and performance. On the other hand, dispositional affect was significantly associated with supervisor ratings of global performance in the cross-sectional and longitudinal analyses.

Positive emotions have been linked to greater creativity and therefore may enhance productivity in occupations where this type of thinking is required. For example, Davis' (2009) meta-analysis reported that positive affective states were more positively linked to creativity in comparison to negative or neutral affective states. Baas, De Dreu, and Nijstad (2008) also found that positive affect was linked to a higher quality of creative ideas than neutral affective states in their meta-analysis. However, Baas et al. did not find the association between positive affect and creativity to be significantly different from that of the link between negative affect of creativity. Therefore, it may be that any deviance from a neutral affective state is able to benefit creative thinking.

Positive emotions have also been linked to enhanced analytical thinking. Graziotin, Wang, and Abrahamsson (2014) studied both creativity and analytical problem solving among software developers from the Faculty of Computer Science at the Free University of Bozen-Bolzano. Creativity was assessed by asking participants to generate captions for a set of six photographs. Analytical problem solving was assessed using the Tower of London game which requires participants to organise coloured discs in three

columns to match a target image. No significant effects of affective states on creativity were found in this study. However, the software developers reporting the most positive affect displayed superior performance on the analytical problem-solving task.

Wright and Staw (1999) outline a number of proposed theories for why affect and productivity may be linked. These include that the experience of positive affect can enhance self-efficacy and that this belief that one's effort can lead to positive outcomes encourages people to grant their effort to tasks. Equally, as people who are high in positive affect tend to interpret failure as only a temporary set-back often caused by external events rather than their own inabilities (Forgas, 1992), they should be more likely to persist on difficult tasks. Further, individuals displaying positive affect are more likely to be liked and hence offered support from other people within an organisation (Staw, Sutton, & Pelled, 1994); this extra support could enhance their own productivity relative to an employee without such support.

3.3 Chapter Conclusions and Future Research

Outside of any diagnosed physical or mental health condition, the extent to which we feel good and satisfied with our work and everyday lives is also suggested to have implications for productivity. In comparison to the research findings concerning the impacts of physical and mental health conditions on productivity outlined in Section 2, the current evidence base surrounding the relationship between subjective wellbeing and productivity is newer and less well-established. Certain studies show that higher levels of job satisfaction is linked to higher levels of individual and organisational productivity. However, other studies fail to replicate these findings and it appears that individual difference factors and the wider social and economic context may have moderating effects on the nature of these relationships. The experience of positive moods has been linked to superior performance on both creative and analytical thinking tasks, and some promising experimental studies are beginning to document causal relations between positive affect and task productivity and performance.

In light of our current understanding, we recommend that future research focus on the following areas.

1. What is more important in terms of facilitating productivity growth, reducing mental health problems or increasing general levels of happiness? Section 2 highlighted the detrimental effects of poor

physical and mental health on productivity, whilst Section 3 highlighted that experiencing high subjective wellbeing can have positive effects on productivity. Future research should compare whether targeting health problems or subjective wellbeing is a more effective means of boosting individual and organisational productivity.

2. The research outlined here focuses on the features of subjective wellbeing and productivity. However, theories of wellbeing also emphasize a 'eudaimonic' component of wellbeing that focuses more on purpose, meaning, and personal growth, rather than just feeling satisfied and happy. Future research is needed to determine whether eudaimonic wellbeing links to labour productivity in the same way as subjective wellbeing.
3. A few studies are beginning to use experimental designs to infer direct, causal relations between aspects of subjective wellbeing and productivity. It can be difficult to infer direct, causal relationships between mental and physical health and productivity because it is not always ethical or possible to experimentally manipulate levels of these health variables. Subjective wellbeing is more amenable to being experimentally manipulated and thus researchers should aim to make the most of the ability to test for causal relationships here.

4 | Work-related stress and productivity

In the year 2016/17, there were 526,000 cases of work-related stress, depression or anxiety reported in Great Britain. Work-related stress, in particular, was responsible for 40% of all cases of work-related ill health and accounted for 49% of all lost working days due to health problems (Health and Safety Executive, 2017). Using data gathered by the Labour Force Survey, Hassan et al. (2009) calculated that between 1990 to 2008, the rate of self-reported work-related illness due to stress and related conditions doubled. Work-related stress appears to be a rising problem for occupational health in the UK.

Stress describes the adverse reaction people have to excessive pressures or demands placed on them (Bhui, Dinos, Galant-Miecznikowska, de Jongh, & Stansfeld, 2016). Butler's (1993) definition of stress as a dynamic process emphasizes how both the characteristics of the person and the situations that they find themselves in interact to create stress. Whilst a number of workplace factors have been linked to greater stress, such as workload, relationships with colleagues and job insecurity (see workplace factors Section 7 of this review), these will not automatically induce stress in all

individuals. When an individual appraises a situation as exceeding his or her ability to effectively cope with it or to endanger his or her wellbeing, then stress should be more likely to be experienced.

4.1 Work-related Stress and Presenteeism

Higher levels of self-reported stress have been linked to greater presenteeism and impaired performance (Burton, Chen, et al., 2005). Motowidlo, Packard, and Manning (1986) administered questionnaires to nurses to assess the extent to which they found their job stressful whilst supervisors and co-workers completed measures of each nurse's performance on the job. They found significant, negative correlations between subjective stress and a number of performance variables including composure, quality of patient care, and interpersonal effectiveness. Jeon et al., (2014) reported similar findings when analysing data from the second Korean Working Conditions Survey (KWCS). In this case occupational stress was determined through items asking the extent to which employees felt that their work included a number of stressful factors such as high job demands, lack of rewards, and inadequate social support. Occupational stress scores had a significant association with presenteeism.

The effects of stress on presenteeism appear to be greater than the effects on absenteeism. Burton, Conti, Chen, Schultz, and Edington (1999) assessed the relationship between employee distress, which was considered as a combination of levels of stress, generalised dissatisfaction with life and malaise, and actual productivity (the number of calls handled and time spent connected to customers) for telephone customer service agents. They discovered that employees with high levels of distress levels lost on average 4.72 hours per week through presenteeism and 2/3 of an hour per week due to absenteeism. Elstad and Vabø (2008) replicated this finding using data collected by the NordCare project, which gathers information from researchers in Sweden, Norway, Denmark, and Finland. Questionnaires were mailed to random samples of lower-level care workers in each country in 2005. Higher levels of reported job stress were linked to both higher levels of presenteeism and absenteeism. However, higher levels of job stress were associated with greater increases in presenteeism than absenteeism.

4.2 Work-related Stress and Absenteeism

Although the impact of job stress on presenteeism may appear to be greater than its effect on absenteeism, this is not to say that the effects of job stress on absenteeism are insignificant. Westman and Etzion (2001) outline how

withdrawal is a normal response to trying to avoid stress, and that this is most obviously seen through more frequent or longer absence periods. In line with this, Neubauer (1992) found that nurses with high absenteeism rates rated their work environment as significantly higher in stress than those with lower absenteeism rates. Similarly, Jamal (2007) showed that overall job stress was positively related to the frequency of absenteeism for employees of a large multinational corporation in both Malaysia and Pakistan. The size of the relationship between work-related stress and absenteeism may also risk being underestimated because employees often seem reluctant to disclose when their absence days were due to stress. For example, findings have shown that 90% of individuals who reported taking a day off work due to stress gave an alternative reason for their absence (Mind, 2013).

4.3 Work-related Stress is Associated with Physical Health

The experience of chronic work-related stress is linked to a number of physical health risks and physical health-related behaviours (Giga, Noblet, Faragher, & Cooper, 2003). As these physical risks and behaviours have been shown to be negatively related to productivity in themselves (see Section 2.1 of this review), this could be one route through which work-related stress is able to have detrimental effects upon productivity. Belkic, Landsbergis, Schnall, and Baker (2004) outlined how high job stress is associated with high blood pressure, musculoskeletal disease, heavy alcohol use, low physical activity, smoking, and being overweight. Likewise, Chandola et al. (2008) described how the accumulation of work-related stress is associated with higher risks of metabolic syndrome, incident obesity and coronary heart disease (CHD). In fact, Belkic et al. estimated that work-related stress contributes to 10-30% of heart disease risk in working people.

As well as work stress increasing engagement in risky health behaviours, it is also able to have a direct effect on the body's physiology systems. Chandola et al. (2008) aimed to determine why stress at work was linked to an increased risk of coronary heart disease (CHD) by analysing data from the longitudinal (1985-2004) Whitehall II study of 10308 employees from 20 civil service departments in London. It was theorised that work stress could directly influence CHD via repeated activation of the autonomic nervous system (characterised by lower heart rate variability) or dysregulation of the hypothalamic-pituitary-adrenal axis (this system controls the cortisol circadian rhythm). Additionally, it was suggested that work stress could indirectly influence CHD through the promotion of unhealthy behaviours such as smoking or lack of exercise. The findings demonstrated that employees reporting greater levels of work stress also tended to display

poorer health behaviours in terms of eating less fruit and vegetables and less physical activity. Approximately 16% of the effect of work stress on CHD could be explained by its effect on these health behaviours. In addition, greater reports of work stress were associated with lower heart rate variability and an elevated morning rise in cortisol.

4.4 All Stress is Bad Stress?

The research findings outlined so far present a picture whereby any level of work stress is problematic for productivity, but this is contested. Muse, Harris, and Field (2003) outline how this negative linear theory is based on the presumption that any amount of stress consumes an individual's time, energy, and attention, therefore reducing the resources available to dedicate to the task at hand and consequently inhibiting performance. Other researchers have suggested, however, that poor performance may be attributable to either too much or too little stress (McGrath, 1970). Graphically, this theory is depicted as an inverted U-shape curve. When stress (along the x-axis) is moderate, performance (along the y-axis) is at its highest. This theory therefore suggests that some stress is needed in order to motivate performance. Low stress levels are suggested to be associated with boredom and low arousal, which are not supportive of high performance. Beyond the moderate, optimal level of stress, higher amounts of stress are linked to diminishing performance, as in the negative linear theory (Muse et al., 2003).

This inverted U-shape function between stress and human performance is commonly referred to as the Yerkes-Dodson Law (YDL). It was given this name following Yerkes and Dodson's (1908) experiments which demonstrated that Japanese dancing mice learned to discriminate between a black and white box more quickly when under the threat of moderate, in comparison to mild or extreme electric shocks. It was later suggested that the relationship between stress and performance would apply to humans in the same way by the likes of Eysenck (1955) and Hebb (1955).

There is evidence to support the idea that there is an optimal amount of stress needed for enhanced performance and that stress levels above or below this are associated with worse productivity. For example, Kay, Gmelch, and Lovrich (2015) separated the faculty of 40 public and 40 private universities in the US into quintiles based on their levels of work-related stress. They found that faculty members in the middle quintile reported the greater productivity of all groupings. In addition, faculty members in both the lowest and highest quintile reported the lowest levels of productivity. Anderson (1976) reported similar findings when conducting structured

interviews with owners and managers of 102 small businesses in central Pennsylvania. Using a subjective stress scale whereby the minimum possible score was 9 and the maximum 94, Anderson found that the highest levels of organizational performance occurred within the 40-80 stress score range. However, the validity of the inverted U-shape theory has been questioned.

Muse et al. (2003) highlighted that there has been a much greater amount of empirical support for the negative linear theory, and that a number of researchers believe that the inverted-U theory has only remained largely due to its intuitive appeal. Indeed, Latour (1990) proposed that when presented with a graphical theory, scientists feel under pressure to accept the theory if they cannot provide their own counter-evidence also in the form of a graph (Corbett, 2015). Yet, it is also important to remember that the current state of the literature may have not provided a fair test of the inverted-U theory. For example, Muse et al. noted that the majority of studies into the relationship between stress and performance have chosen to study populations that are likely to be in high-stress work environments and to also use measures that do not tap into the low-stress side of the inverted-U. Questions therefore still remain surrounding how differing degrees of stress may impact workplace performance and productivity across different workplace contexts.

4.5 Stress and Burnout

Burnout has been one of the most widely studied correlates of work-related stress (Lee & Ashforth, 1996). It is said to result from chronic, continuous exposure to work-related stress and is experienced as physical, mental and emotional exhaustion, cynicism, and impaired personal efficacy (Bakker, Demerouti, de Boer, & Schaufeli, 2003; Crawford, LePine, & Rich, 2010; Westman & Etzion, 2001). Shirom (1989) argued that exhaustion was the most important dimension in defining burnout, whilst Koeske and Koeske (1989) argued that reduced efficacy may constitute a consequence of burnout, rather than an inherent feature of the syndrome itself.

There is a body of research to support the notion that reduced efficacy, and lower productivity, is a common consequence of burnout. Bakker et al. (2003) analysed responses from questionnaires distributed among all 330 employees of a nutrition production company in The Netherlands. Using path analysis, they found that there was a positive relationship between employee burnout and the duration of their absence from work. In their systematic review of the relationship between physician burnout and productivity, Dewa, Loong, Bonato, Thanh, and Jacobs (2014) concluded that there is a negative relationship between burnout and productivity. This

negative relationship seemed to largely hold across measures of productivity including number of sick leave days, intent to continue practicing, intent to change jobs, and work ability. Halbesleben and Rathert (2008) even demonstrated that physician burnout had a detrimental effect on patient outcomes such as time taken to recover after discharge from hospital and patient satisfaction. Chronic burnout has also been linked to impaired performance in certain areas of cognition functioning such as nonverbal memory and auditory and visual attention (Sandström, Rhodin, Lundberg, Olsson, & Nyberg, 2005).

Demerouti, Le Blanc, Bakker, Schaufeli, and Hox (2009) conducted a longitudinal assessment of staff nurses in general hospitals in The Netherlands over an 18-month period. They discovered that initial levels of emotional exhaustion were positive predictors of presenteeism at later time points. At the same time, initial levels of presenteeism were positive predictors of later emotional exhaustion. This suggested that the relationship between presenteeism and burnout may be reciprocal. Demerouti et al. explain that this reciprocal relationship may arise because sickness presenteeism at work impairs physical and psychological recuperation, thus further exacerbating existing stress levels.

4.6 Resilience

When discussing responses to workplace stress it is important to mention the individual characteristic of resilience. Individuals possessing high resilience are said to display a greater capacity to cope with stressful work demands in comparison to other employees (Winwood, Colon, & McEwen, 2013). Resilience has been negatively related to burnout (Cooke, Doust, & Steele, 2013), positively related to job satisfaction (Zheng et al., 2017) and negatively related to productivity losses and likelihood of absence from work (Shatté, Perlman, Smith, & Lynch, 2017).

Whilst resilience can be conceptualised as a trait, it is also commonly considered as a process or capacity that can be developed over time (Howe, Smajdor, & Stöckl, 2012). Under this process conceptualisation, some workplaces have started to implement interventions to increase the resilience of their workforce. A systematic review (Robertson, Cooper, Sarkar, & Curran, 2015) revealed that the length of these interventions could vary from a single 90 minute session up to a 12 week programme and employ a variety of techniques such as skills-based coaching, mindfulness- and compassion-based practices, cognitive behavioural techniques (e.g. energy management and relaxation training).

Numerous case studies have documented positive outcomes from resilience training in terms of both productivity and wellbeing. Arnetz, Nevedal, Lumley, Backman, and Lublin (2009) demonstrated that newly qualified police officers who received imagery and relaxation training over an 11-week period went on to display lower stress levels and lower negative mood in comparison to a control group who did not receive the training. Those who received the training were also judged to have superior performance on a critical incident simulation by an independent police officer. Further, Pipe et al. (2012) found that nurses who completed a behavioural intervention that focused on enhancing self-regulation of the physiological aspects of the stress response showed significant improvements on measures of self-reported motivation, anxiety, depression, stress symptoms, and productivity from baseline to 7-month follow-up. Accordingly, it appears that organisations may choose to try to increase the ability of their staff to cope with stress in the workplace, rather than target the factors that may be causing the stress response.

4.7 Productivity Growth, Leisure Time and Recovery from Stress

One of the proposed benefits of productivity growth is greater amounts of leisure time (Sharpe, 2004). If less time is needed to produce the same amount of output, then this should theoretically mean that workers have more leisure time to use as they wish. Leisure time has been considered as important for recuperation from work stress and it can be an important determinant of health and wellbeing when used in the right ways (Rook & Zijlstra, 2006). For example, leisure time can afford us a sense of autonomy and provide the opportunity for engagement in more physical activities which are beneficial for health (Iso-Ahola & Mannell, 2004).

Kamerāde, Wang, Burchell, Balderson, and Coutts (2019) reported that individuals only needed to work eight hours per week in order to gain the wellbeing benefits of employment. Along similar lines, Bryan and Nandi (2015) highlighted that working long hours is associated with lower wellbeing, once work identity is controlled for (people who strongly identify with their work may be more resilient to longer working hours). This means that by allowing for reductions in working hours productivity growth may be able to support greater recovery from work-related stress and increased physical and psychological well-being.

A recent report from the New Economics Foundation (Stirling, 2019) highlighted that in the decades up to the 1970s productivity growth was associated with consistent increases in leisure time. However, since the 1980s, productivity gains have not been accompanied by equal gains in

leisure time for workers in the UK. It was suggested that without this apparent 'de-coupling' of leisure time and productivity growth, UK workers would now be working just under 13% less than they currently do. At present, workers may also feel pressure to work longer hours despite productivity growth in order to show commitment to their employer and reduce the risk of redundancy (Haworth, 2004). Accordingly, it appears that increased leisure time is not a common consequence of heightened productivity for workers in the UK today.

4.8 Chapter Conclusions and Future Research

Stress represents the adverse reaction to excessive perceived pressures and demands placed on the individual. The experience of stress has been shown to be associated with lost productivity through both presenteeism and absenteeism. The effect of stress on presenteeism is suggested to be greater than that on absenteeism, although absenteeism due to stress may be underestimated as employees appear to be inclined to give alternative reasons for their stress-related absence. One of the mechanisms through which stress reduces productivity may be through worsening physical health. Stress has been shown to have a direct effect upon our body's physiological systems and to promote engagement in risky health behaviours.

There is a debate within the existing literature surrounding whether all stress is bad for productivity or whether mild amounts of stress can promote superior performance. Chronic experiences stress are considered to be detrimental to productivity as they can lead to burnout. Certain individuals are suggested to be better able to cope with stress as they have higher levels of resilience. These individuals tend to be less likely to experience burnout or productivity losses. Consequently workplace interventions have been designed to promote the characteristic of resilience and case studies tend to show that such interventions can lead to reductions in stress symptoms as well as increases in productivity.

One of the proposed consequences of productivity growth is that individuals have more leisure time. In theory then, productivity growth could offer individuals a greater opportunity to recover from work-related stress. However, recent research suggests that productivity growth has been decoupled from increases in leisure time. As such, it is not clear whether productivity growth is able to have a negative effect on work-related stress.

Suggested areas for future research surrounding work-related stress, productivity, and productivity growth are as follows.

1. We highlighted how productivity growth may not be able to aid recovery from work-related stress by increasing leisure time. However, the more general relationship between productivity growth and work-related stress is unclear. Future research may want to determine whether working within an organisation with higher levels of productivity growth has a positive or negative (or null) effect on staff stress levels.
2. Resilience has been noted as a personal asset that can make individuals more resistant to the negative effects of stress. Future work could explore whether there are further individual difference factors that reduce or increase an individual's susceptibility to work-related stress. This work could form the basis of further interventions to reduce stress levels and increase productivity.
3. Resilience training has been shown to have positive effects on stress, productivity, and wider measures of well-being. But is promoting resilience preferable to identifying and eliminating the workplace factors (see Section that 7) that may be driving a stress response in the first place? Future work could evaluate the effectiveness of a wider range of interventions intended to reduce the effects of work-related stress on productivity.

5 | Workplace wellness programmes and productivity

Call, Gerdes, and Robinson (2009) noted that it was the 1950s when employers first started implementing employee assistance programmes (EAPs). Initially, these were often peer led and focused on addressing personal problems such as alcoholism and physical disability that could adversely affect work performance and wellbeing. For example, if an employee used a wheelchair but was required to copy files as part of their job, then the EAP would involve placing office machines at a lower level. Over time, wellness programmes were added to complement EAPs. Arising from around the 1980s, wellness programs focused less on supporting specific personal problems and instead were intended to modify employees' health risk behaviours such that this can have a positive impact upon their health (Buseman-Williams, 2014).

Wellness intervention programmes can be primary, secondary and/or tertiary prevention focused (Goetzel & Ozminkowski, 2008). Primary focused programmes are directed at employees who are generally healthy whilst secondary focused programmes target employees who have been

identified as demonstrating certain health risk-factors. Both primary and secondary programs are usually focused on managing certain lifestyle factors such as nutrition and physical activity. Tertiary focused programmes, on the other hand, are concerned with improving disease control in employees who already have a chronic health condition such as diabetes or heart disease. Tertiary focused programmes therefore more closely align with the goals of early EAPs.

Following the emergence of findings that healthier, happier employees tend to be more productive, many organisations decided to implement workplace wellness programmes. In many cases, the motives behind the implementation of these programmes may have been the financial gains from higher worker performance and lower sickness absences. Other reasons behind the implementation of workplace wellness programmes include corporate social responsibility and trying to attract and keep the best staff (Black, 2008). O'Donnell (2000) suggested that, as well as facilitating productivity growth, wellbeing and health promotion programmes can also improve the organizational climate, which may enhance morale, the desire to work, and employee relations.

The components of workplace wellness programmes vary, and a number of examples of UK case studies are given by Price Waterhouse Coopers (2008). In some cases employees are simply given information packs with guidance to help them eat healthily or quit smoking. Other companies have opted to provide staff with fitness memberships or access to on-site fitness facilities. Some organisations provide mental health awareness training whilst others offer one-on-one counselling services and individually tailored health and wellbeing management plans. Stress reduction workshops, mindfulness training, and on-site yoga have also been implemented across a number of programmes. Most often organisations choose to implement multifaceted programmes that combine a number of the different components just outlined.

5.1 Positive Outcomes of Workplace Wellness Programmes

A number of case studies have demonstrated positive outcomes as a result of participation in workplace wellness programmes. Burton, McCalister, Chen, and Edington (2005) highlighted that employees who participated in a worksite fitness centre were less likely to report health-related work productivity limitations involving time management, output, and physical work than those who did not participate in the fitness centre. In addition, involvement with the fitness centre was linked to 1.3 fewer days of absence linked to disability. A six-week stress reduction workshop offered by

Transport for London which teaches mindfulness alongside psycho-education and cognitive behavioural therapy has also demonstrated benefits in terms of wellbeing and productivity. For employees who attended the course, the number of absence days due to stress, anxiety and depression had fallen by 71% over the following three years. In addition, 80% of attendees reported improvements in their relationships, 64% improvements in sleep patterns, and 53% improvements in happiness when at work (Halliwell, 2010). When employees of a casino in Australia took part in a wellness programme that involved supervised aerobic exercise three times a week, five behaviour modification seminars, 1:1 counselling, and email reminders, they demonstrated greater improvements on measures of mental health, vitality, physical functioning, depression, and stress in comparison to wait-list controls after 24 weeks (Atlantis, Chow, Kirby, & Fiatarone Singh, 2004). The effectiveness of workplace wellness programmes in improving productivity helps to support the positive influence of wellbeing on productivity further.

By enhancing productivity, workplace wellness programmes are often able to deliver financial benefits that outweigh the cost of implementing the scheme. For example, a stress-reduction programme offered to employees of Transport for London was suggested to reduce costs incurred through absenteeism by over £600,000 in its first two years. This saving was eight times greater than the cost of implementing the scheme (McDaid et al., 2008). In the US, Henke, Goetzel, McHugh, and Isaac (2011) compared data from Johnson & Johnson with data from sixteen other large companies between 2002-2008. Johnson & Johnson had developed a number of workplace wellness interventions such as offering on-site fitness centres, online weight management tools, and coaching programs for tobacco cessation and blood pressure management. Their programs had been running over a long time period, whereas the other companies had only recently introduced such interventions. They found that Johnson & Johnson experienced a 3.7% lower average annual growth in medical costs compared to the comparison group, and that their employees had a lower average predicted probability of being at high risk for six of the nine health risks examined. Henke et al. estimated that Johnson & Johnson's program was delivering a positive return on investment estimated at \$1.88–\$3.92 for every dollar spent. Although we have examples of case studies that demonstrate significant, positive effects of workplace wellness programmes on wellbeing and productivity, not all interventions have been equally successful.

5.2 When Workplace Wellness Programmes Do Not Work

In some cases, interventions are only effective at improving certain measures of wellbeing and productivity, whilst in other cases they fail to display any significant benefits. For example, Hinman, Ezzo, Hunt, and Mays (1997) examined whether a computerized exercise program ("ExerciseBreak") could reduce stress levels in office workers who use computer screens. Employees in the intervention group were instructed to exercise twice a day for 15 minutes over an 8 week period. The control group received no exercise programme. Results demonstrated no significant differences in changes in stress levels across the two groups. In addition, Proper et al. (2004) found that Dutch civil servants who were offered seven counselling consultations aimed at improving diet and physical activity over a 9 month period displayed improved cardiorespiratory fitness and expended more kilocalories per day than a control group. However, the intervention did not have an effect on the proportion of employees meeting the public health recommendation for moderate-intensity physical activity.

Block et al. (2008) reported on the testing of the 'Alive!' behaviour change model, which uses weekly goal-setting, reminders, and promotion of social support to elicit healthy behaviours in participants. Employees of health care company Kaiser Permanente of Northern California were randomized to either the intervention group or the wait-list control group. Individuals in the intervention group were more likely to report improvements in self-assessed health status and reductions in the difficulty concentrating and accomplishing work tasks because of physical or emotional problems. However, this reduction was not significant when looking at certain specific health problems such as depression and anxiety and back pain. Similarly, Nurminen et al. (2002) examined an intervention whereby women engaged in physically demanding laundry work participated in worksite exercise training guided by a physiotherapist for 8 months. The proportion of workers with "good" or "excellent" work ability had increased more in the intervention group than in the control group at 12-months follow-up, but there were no significant differences across the two groups in terms of work ability for physical and mental demands, job satisfaction, stress, and sick leave.

Certain studies suggest that workplace wellness programmes may be able to have greater effects on subjective in comparison to objective measures. For example, Tveito and Eriksen (2009) ran a pilot study to assess if an Integrated Health Programme would reduce sick leave and subjective health complaints in a group of nurses in Norway. The programme was administered twice weekly and involved physical exercise, stress

management training, health information and an examination of the workplace. No significant effects were found in terms of reductions in sick leave. However, there were large and significant effects in terms of participants own perceptions of their health. The intervention group reported improvements in health, physical fitness, and muscle pain. A recent randomized control trial (Song & Baicker, 2019) assessed the effectiveness of a comprehensive wellness programme implemented at a large warehouse retail company in the US. The trial involved nearly 33,000 employees. The wellness programme included 8 modules (4-8 weeks each) implemented over 18 months which covered topics such as nutrition, stress reduction, and physical activity. Those who took part in the programme did have better self-reported health behaviours on certain variables (e.g. actively trying to manage weight and engaging in regular exercise). However, there were not significant differences in terms of clinical measures of health (cholesterol, hypertension, and obesity), health care spending, or employment outcomes (absenteeism, work performance, or job tenure) at 18 months follow-up.

5.3 Factors that Influence the Success of Workplace Wellness Programmes

Given that workplace wellness programmes do not consistently demonstrate improvements in employee productivity and/or wellbeing, it is important to consider some of the factors that may influence the success of such programmes (Bajorek, Shreeve, & Bevan, 2014; Goetzel & Ozminkowski, 2008). In her review, Black (2008) suggested that workplace interventions will be more successful when there is visible support and participation of senior management and that the programme is aligned with the overall business aims. It therefore appears that employee perceptions that the programmes are implemented out of genuine concern for their welfare, rather than just being an afterthought, may play a role in influencing their success. Cavill Associates Ltd (2014) conducted a literature review and interviews with employers in London in order to examine best practice in supporting the health needs of City workers, focusing on large financial and professional services companies. Echoing Black's (2008) suggestions they also proposed that wellness programmes were more likely to be effective when they were based on the specific needs of the staff, rather than adopting a 'one size fits all' approach. Both reports argued that employees should be involved in the design, delivery, and evaluation of any programme. Although at present most health and wellbeing programmes seem to be designed by HR or similar teams. A review of workplace health interventions across 12 Canadian organisations by the Canadian Labour and Business

Centre (cited in Bellew, 2008) also highlighted that visible investment from senior management and employee participation were critical in determining the success of a programme.

The target behaviour may also influence the success of a wellness programme. Cavill Associates Ltd (2014) reported that interventions focused on increasing physical activity tended to receive strong support in the literature. However, the evidence for the effectiveness of interventions aimed at altering diets was less convincing. In particular it seems that the current literature is only able to show that interventions can influence employee's weight in the short term. Less evidence is found concerning whether the weight loss can be sustained over longer time periods. Further, Rongen, Robroek, van Lenthe, and Burdorf (2013) conducted a meta-analysis into the effectiveness of workplace health promotion programmes, using only case studies that had utilised a randomized control trial design. The overall results demonstrated that the effectiveness of the health promotion programmes was only small across all outcome measures (including self-perceived health, sickness absence, productivity at work, and work ability). More importantly, they noted that the success of a programme depended on a number of factors. Interventions were found to be more effective when they were implemented on younger samples made up of predominantly white-collar workers. In addition, programmes were more effective when they were of a higher intensity, maintaining at least weekly contact with employees.

In her review of workplace health promotion programmes, Thesenvitz (2003, cited in Bellew, 2008) concluded that there were conditions that increased the likelihood of success of such programmes. These included participatory planning, primary focus on employees' needs, tailoring to the special features of each workplace environment, and long-term commitment. Weiner, Lewis, and Linnan (2009) proposed a 'theory of implementation' to explain and predict the effectiveness of comprehensive worksite health promotion programs. This theory states that programmes are more likely to be effective when the means, motives, and opportunities for employees to engage in the programme are greater. This means that effective programmes should be accessible, easy to use, and provide incentives for engagement. Based on a literature review and discussions with experts, Goetzel et al. (2007) developed an Inventory of Promising HPM (health and productivity management) Practices. Listed amongst this inventory was that programmes achieved high rates of engagement and participation, both in the short- and long-term. Cavill Associates Ltd (2014) noted that wellbeing interventions in the workplace are more likely to be taken up by employees who already practice healthy behaviours, therefore it is important to make

sure that a wider range of employees also feel incentivised to participate. Successful programmes were also suggested to operate at multiple levels; simultaneously addressing individual, environmental, policy, and cultural factors within the organization. Also mentioned was the fact that successful programmes were evaluated based upon clearly defined and agreed upon definitions of success and associated metrics.

A problem in the area of workplace wellness programmes seems to be that often the effects of the programmes are not sufficiently evaluated (Bajorek et al., 2014). Commissioned by Public Health England, Whitmore et al. (2018) reviewed the evidence surrounding the effectiveness of workplace wellbeing programmes. They made use of a 'Standards of Evidence' framework to determine the strength of the evidence for the effectiveness of such programmes. Using this framework level 1 corresponds to being able to articulate clear intervention logic whilst level 5 corresponds to being able to offer evidence of consistent, reliable results at scale. Their report concluded that few submissions scored above level 2 on this scale. Level 2 refers to documenting positive changes but not being able to confirm that your intervention caused this. Of the 117 evidence submissions received, only 31 had conducted one or more external evaluations of the programme. Cavill Associates Ltd (2014) also noted a general lack of standardised metrics used to support the effectiveness of workplace initiatives when interviewing individuals in the financial and professional services sector.

5.4 Chapter Conclusions and Future Research

Workplace wellness programmes are interventions designed to improve the health and wellbeing of an organisation. Their components can vary from fitness memberships to one-on-one counselling, and many are multifaceted. Numerous case studies have documented positive consequences of such interventions in terms of enhanced wellbeing and productivity, and some demonstrate positive financial returns on the investment. However, results are not always consistent. Given this, certain factors have been suggested to influence the effectiveness of wellness programmes such as visible support of senior management and alignment with overall business objectives, but it is tricky to always pin-point the hindering factors in specific unsuccessful case studies. The lack of extensive evaluations of such interventions also makes it hard to determine their full effects and the factors that contribute to these.

In order to develop our understanding of the effects on workplace programmes on productivity and wellbeing we recommend the following areas for further research.

1. Are certain individuals more responsive to workplace wellness programmes? In Section 4 we noted how individuals with high levels of resilience displayed fewer negative consequences in response to work-related stress. Future work may want to determine if there are certain individual difference factors that make employees more or less responsive to the aims of workplace wellness programmes. This will help to highlight in which populations workplace wellness programmes may produce the most positive effects.
2. Whilst a number of the case studies outlined in this section of the review have utilised longitudinal designs, most of these do not exceed more than a couple of years. In order to uncover the longevity of the effects of workplace wellness interventions a greater number of lengthier follow-up studies are needed. This will help to map the trajectory of any productivity gains achieved from workplace wellness programmes. Does productivity begin to decline once participation in a programme is ended and if so, at what rate?
3. Much of the qualitative work into the factors that affect the success of workplace wellness programmes has been conducted with employers or experts. Further work may wish to conduct interviews or focus groups with employees in order to gain an in-depth understanding of their view of workplace wellness programmes. Such studies would be able to support or contradict suggests that employee perceptions of wellness programmes may influence their success.

6 | The role of human and social capital

Human capital describes the skills, knowledge, and health possessed by the labour force. It is considered to be an asset that can enhance an individual's or organisation's productivity (Goldin, 2014). Whilst early definitions of human capital tended to equate the term with an individual's level of formal schooling (Brooks & Nafukho, 2006), today it is acknowledged that human capital can be developed through experiences both inside and outside employment, as well as through both formal and informal learning. Human capital increases through use and experience, but at the same time can also depreciate through lack of use (Healy & Côté, 2001). Researchers sometimes distinguish between different types of human capital, for example, firm-specific, industry-specific, and occupational. Firm-specific human capital

refers to knowledge and skills that are unique to a particular firm, such as specific company processes or technologies. Industry-specific human capital describes knowledge about the general domain in which an individual's job is situated, and thus it is useful across a limited set of firms. Further, occupational human capital is more general and refers to knowledge and skills required to work within a certain professional area; it is more easily transferred across industry and firm settings (Mayer, Somaya, & Williamson, 2012).

6.1 Human Capital and Productivity

Definitions of human capital therefore highlight how this is a resource that is considered to have beneficial effects for productivity and performance. A number of studies do show a positive relationship between human capital and organizational performance, but the relationship is sometimes weak and not always consistently documented. For example, in their meta-analysis, Quinones, Ford, and Teachout (1995) reported an overall correlation of .27 between the degree of work experience and job performance. Similarly, Bartel, Beaulieu, Phibbs, and Stone (2014) analysed data from the Veterans Administration (VA) hospital system. This dataset provides information surrounding the experience of nursing staff, including both their time worked in health care delivery organisations in general as well as on their specific unit. Results demonstrated that patients cared for in units that had higher levels of human capital (more experienced nurses) tended to have shorter residual length of stay (difference between actual and expected length of stay).

However, when Greve, Benassi, and Sti (2010) studied three organisations across Italy and Norway that were focused on research and development and consulting, they documented a positive effect of human capital on productivity in only one organisation. In this study human capital was considered at the individual level and operationalised using data on educational background, tenure, the number of different skills, and the level of expertise for each skill. Productivity was defined as the number of project that individuals completed as well as the number of publications produced. One reason Greve et al. proposed for the inconsistent findings was that there was a larger range of levels of human capital in the organisation where significant effects were found.

The relationship between levels of human capital and productivity may also not be linear. Hitt, Bierman, Shimizu, and Kochhar (2001) examined data from the 100 largest law firms in the U.S (based on total revenue) from the years 1987-1991. Human capital was considered as the quality of the law

school attended by partners and the total experience as partners in the firm. Results demonstrated a curvilinear relationship between human capital and firm performance (operationalized as the ratio of net income to total firm revenue). This was such that the effect of human capital on firm performance was initially negative but turned positive with higher levels of human capital. Hitt et al. explained that because partners with stronger educational backgrounds command a higher price, firms often pay more to these individuals than they initially gain from the productivity in their career, with the expectation that higher productivity will be achieved later down the line once individuals develop their firm-specific human capital.

6.2 Human Capital and Wellbeing

In addition, whilst human capital is generally framed as an asset to increase performance outcomes, higher levels of education and skills have also been outlined as a key contributor to personal wellbeing. The basic psychological needs theory was proposed as part of the self-determination theory (SDT) by Professors Richard Ryan and Edward Deci in 2000 at the University of Rochester. Ryan and Deci (2000) argue that a human being is at their best when they trying to learn new skills, master new challenges, and apply their talents where they can be of benefit. The basic psychological needs theory proposes three basic, psychological needs that facilitate ideal functioning, and whose satisfaction can help enhance wellbeing. If these basic needs are not satisfied, then this leads to handicaps and pathology. The three basic needs are autonomy, competence, and relatedness. The three basic needs are proposed to be innate and universal. For this reason they can be considered objective as even though somebody may believe that they can be happy on their own, the denial of a need will lead them to experience reduced wellbeing or development in some aspect of their life (Ryan & Deci, 2008).

The need for autonomy concerns needing to feel as though you are able to determine your own behaviour. One is self-governing and makes their own decisions without being coerced by internal or external forces. The need for competence concerns our wish to perceive ourselves as capable and able to carry out our actions effectively. Finally, the need for relatedness highlights our desire to feel connected to others and to perceive ourselves as belonging to, and being accepted by, a larger community. We need to feel as though others perceive us as a significant human being and are willing to take interest in, and care for, us (Ryan & Deci, 2008). Higher levels of knowledge and skills that enhance productivity and performance at work may therefore help to satisfy the need for competence.

In terms of the empirical evidence surrounding the link between human capital and wellbeing, we mainly have to look at investigations into the relationship between education and wellbeing. Here, some studies document a positive relationship between education and wellbeing. For example, Cuñado and Gracia (2012) reported a direct positive effect of education on happiness in Spanish individuals whilst Kemna (1987) reported a direct positive effect of schooling on health when examining U.S data. However, other research has suggested that a moderate level of education is most beneficial for wellbeing. Beyond this, further investments in education may not benefit wellbeing. Hartog and Oosterbeek (1998) analysed data for nearly 2000 Dutch individuals, data was collected for the same individuals in both 1952 and 1993. They found that all schooling beyond the minimum level improved health and life satisfaction. However, it was individuals whose highest educational level with general (secondary) education who reported the highest levels of health and life satisfaction of all. Stutzer (2004) reported similar findings when analysing survey responses for residents in Switzerland. In comparison to a low education reference group, individuals in the medium level education group demonstrated a larger, positive difference in life satisfaction scores than the high education group.

Education may also have indirect effects on wellbeing (Dolan, Peasgood, & White, 2008). When examining data from over 5000 Swedish individuals as part of the 'Level of Living Survey', Gerdtham and Johannesson (2001) found that both attending high school and attending college were associated with higher levels of life satisfaction. In addition, there was an indirect effect through health status. This means that more education individuals tend to have better health which increases their life satisfaction further. Graham and Pettinato (2001) analysed data from a survey of individuals from 17 Latin American countries from 1997-2000. They found a positive overall effect of education on happiness. However, this relationship appears to be accounted for by indirect effects through social mobility and satisfaction with one's relative economic standing. After examining data derived from the World Values Survey (WVS) and the European Values Study (EVS), Fleche, Smith, and Sora (2012) found that having a higher educational level had a significant association with country-level wellbeing, but only a small direct effect on wellbeing at the individual level. They explained this finding by suggesting that for individuals, education enhances wellbeing by improving income, access to employment, and increasing opportunities to take part in social and economic activities.

6.3 The Interrelatedness of Human and Social Capital

It is difficult to discuss the role of human capital in enhancing wellbeing and productivity without also considering the role of social capital. Social capital refers to the resources embedded within social networks that can be used by the members of the network in order to improve outcomes, both for themselves and the group as a whole (Lin, 2001). These resources may include relationships, norms, shared values, and trust (Putnam, 1995). Together, these resources make possible cooperative action (Cohen & Prusak, 2001). Similarly to human capital, levels of social capital depreciate with a lack of use (Ostrom, 2000).

Sabatini (2008) noted that social capital was a multifaceted concept and that distinctions had been made concerning the different types of social capital that exist. In particular, three types of social capital have been discussed in the literature (Hawkins & Maurer, 2010). Bonding social capital describes the relationships among similar members of a network (e.g. family ties). Bridging social capital refers to relationships amongst people who are dissimilar to each other in some way such as different ages or races, but still of a similar socioeconomic background (e.g. informal ties among neighbours). Finally, linking social capital describes the relationships between individuals and other individuals or institutions that have a relative amount of power over them (e.g. employers or service providers). At work then, we may expect bonding and bridging social capital amongst colleagues and linking social capital between employees and their managers/supervisors.

Human and social capital may be developed through similar processes and hence be positively associated. For example, Healy and Côté (2001) outline that social capital can be developed through families, schools, firms, and local communities. Dinda (2006) also emphasized that education was a key determinant of social capital in that schools help to socialise young people and communicate good standards of behaviour. As human capital is also built primarily through education and work experience, this means that the two types of capital can be inherently linked. In support of this idea, Bynner, Schuller, and Feinstein (2003) noted that, for a UK sample, higher levels of education were linked to higher levels of certain social skills such as organising and advising.

6.4 Social Capital and Productivity

There are a number of ways in which social capital is able to enhance productivity within organisations. Each way is enhanced when levels of

human capital are also high. Firstly, social capital allows for the effective sharing and diffusion of skills and information (human capital) amongst workers (Coleman, 1990; Healy & Côté, 2001). When analysing questionnaire responses from Chinese workers across a range of industries including manufacturing, financial services, and IT, Zhu and Wang (2009) found that social capital was positively associated with knowledge sharing and that knowledge sharing was positively linked to firm performance. Likewise, when surveying employees from 14 top tier five-star hotels in Seoul, Korea, Terry Kim, Lee, Paek, and Lee (2013) reported that social capital was linked to knowledge sharing processes (knowledge collecting and knowledge donating), which in turn were associated with organizational performance.

6.4.1 Trust as a Component of Social Capital

Perhaps the aspect of social capital that has been most widely studied in relation to organisational productivity is trust. Trust is the belief that an individual or organisation is fair and reliable (Appelbaum et al., 2004). Gould-Williams (2003) argued that, at the individual level, a lack of trust in one's employer can lead to unproductive outcomes such as cynicism, a lack of commitment to the organisation, and low motivation. In their meta-analysis, Dirks and Ferrin (2002) reported significant positive associations between trust in organisational leadership and a number of favourable outcomes that have been linked to higher levels of productivity. These included conscientiousness, job performance, organisational commitment, and intention to stay. Similarly, Costa, Roe, and Taillieu (2001) surveyed 396 individuals across 112 teams from 3 different social care institutions in the Netherlands. They found that the level of trust that an individual placed within their team was positively associated with the perceived team task performance, their commitment to their work, and their willingness to stay within their team.

Trust is an important facilitator of higher productivity and performance partly because it enables voluntary cooperation. This is increasingly important as employees start to work away from the office more often making it harder to continually monitor their effort and performance (Bijlsma & Koopman, 2003). When individuals trust their organisation and colleagues, they should be more willing to take a chance and exert extra effort on behalf of their organization without fear of being taken advantage of (Eddy, 1981). When studying teachers at public primary schools in Tehran, Zeinabadi and Salehi (2011) found that the teachers' trust in their colleagues, clients (students and parents) and the school principal was positively related to their organisational citizenship behaviour. Organisational citizenship

behaviour describes voluntary actions taken by individuals that are not necessarily expected given their formal role requirements.

A number of studies have documented a positive relationship between the degree of trust that an individual places in their work team or organisation and the performance of the individual, team or firm; although often these have relied on self-report measures of performance. For example, Erdem and Ozen (2003) found that when individuals felt that their team members were trustworthy, the team was more likely to be considered to get its work done on time, solve problems quickly, and continually improve the quality of their work, and less likely to make critical mistakes. McAllister (1995) examined the extent to which managers' trust in their peers was related to their supervisor's assessment of the managers' performance. He found that trust was related to performance related behaviours such as citizenship which in turn were related to higher performance ratings. Further, Tzafirir (2005) examined data from over 100 companies listed in the Duns Guide, Israel's list of the leading companies in the industrial, service, and trade sectors based on sales and operating revenue. They reported that organisations whereby managers placed greater trust in their employees had higher levels of organisational and market performance. Brown, Gray, McHardy, and Taylor (2015) analysed data from the 2011 wave of the Workplace Employment Relations Survey (WERS), which aims to provide nationally representative data on the state of workplace relations and employment practices in Britain. They highlighted that employees' average level of trust in managers was positively related to workplace labour productivity.

6.5 Social Capital and Wellbeing

In terms of the relationship between social capital and wellbeing, Putnam (2000) highlighted that social capital could be linked to more favourable outcomes across a number of factors related to wellbeing such as better health, greater happiness, lower crime, and greater child welfare. Using international data from 50 countries as part of the World Values Survey, Elgar et al. (2011) reported that higher levels of social capital were positively associated with self-reported health and life satisfaction. Winkelmann (2009) also showed a positive effect of social capital on life satisfaction using data from the German Socio-Economic Panel whilst Matsushima and Matsunaga (2015) found that overall levels of social capital were positively related to happiness using data from the Japan General Social Survey. Using data from the European Social Survey, Pichler (2006) examined whether social participation (number of social contacts and memberships in organisations) was related to young adults (aged 15–29) wellbeing. Having

fewer social contacts was associated with poorer life satisfaction whilst membership of a greater number of organisations was associated with higher life satisfaction.

Looking more specifically at the trust component of social capital, Dirks and Ferrin's (2002) meta-analysis found that trust in leadership at work was associated with higher levels of job satisfaction. Costa et al. (2001) similarly reported that the level of trust an individual placed within their work team was positively related to their satisfaction with their team. Using data from the Gallup World Poll, Helliwell and Wang (2011) found that individual's life satisfaction tended to be higher if, in a hypothetical situation, they felt that it was likely that their neighbours, police, or strangers would return a lost wallet with money in it (a measure of trust in the community). Within the workplace context, Helliwell, Huang and Putnam (2009) demonstrated that trust in managers was linked to greater life satisfaction when analysing data from the Canadian 'Equality, Security and Community Survey' and greater happiness when analysing data from the U.S 'Social Capital Benchmark Survey'.

Higher levels of social capital could also, like human capital, support the fulfilment of our psychological needs. The basic psychological needs theory proposes that there are three psychological needs that we need to satisfy if we are to experience high wellbeing (Ryan & Deci, 2000). One of these needs is that of relatedness, we want to feel connected to others and to perceive ourselves as belonging to, and being accepted by, a larger community (Ryan & Deci, 2008). Feeling as though we are connected to and can trust the individuals around us therefore helps to fulfil our psychological need for relatedness. Social capital may also be able to indirectly support the fulfilment of the need for autonomy, which involves wanting to feel in control of our own behaviour. Smith and Barclay (1997) noted that trust involved refraining from persistent controlling and monitoring of others. This means that when managers trust their employees, they feel the need to monitor them less, hence increasing employee perceptions of autonomy.

6.6 Productivity and Spending on Social and Human Development

Although most of the investigations into the relationship between human and social capital and productivity have been framed such that human and social capital are seen as predictors of levels of productivity, it may also be possible that the relationship operates in the opposite direction (Banting et al., 2002; Ranis & Stewart, 2005). That is, higher levels of productivity could facilitate the development of human and social capital.

Increases in productivity can lead to greater government fiscal balances, which in turn allow for greater investments in social development. All else equal, higher productivity can mean higher incomes which in turn lead to greater tax revenues (Sharpe, 2004). When governments choose to use this money to facilitate programmes that benefit outcomes such as health and education, greater productivity levels can have an indirect effect on human capital development. Ranis (2004) stated that government expenditures for social development should be distributed predominantly to low income groups and areas since this is where the greatest impact will be had. When examining data from 13 developing countries, Lustig (2015) noted that social spending increased with greater Gross National Income (GNI) per capita. In addition, social spending on health and education had a significant impact on reducing inequality in all countries examined.

Higher incomes can also allow for increases in consumption. Individuals are better able to consume goods and services that they believe will enhance their quality of life. However, it is important to consider that individual consumption may not always be directed towards goods that are beneficial for human capital development. It is suggested that the increased income from productivity growth will have a greater positive impact on development for poorer socioeconomic groups as these are more likely to use their increased income on goods and services that directly promote health (e.g. food expenditures) and education, rather than luxury, non-essential items (Ranis, 2004).

Further, a family's decision to invest in their child's education may be influenced by the extent to which they feel economically secure and able to do so. In this way, the consequences (higher incomes and economic security) of productivity growth may fuel investments in human capital which can then enhance productivity growth further. Similarly, Sharpe (2004) outlined how the decision to undertake post-secondary education may be associated with the perceived rate of return on this investment. Greater labour productivity growth means that wages can increase and thus the rate of pay (or compensation) for investing in human capital increases. Accordingly, individuals perceive greater long-term returns for pursuing higher education. This would be particularly true if the financial returns for occupations requiring higher educational levels exceed those for occupations with lower educational requirements. In addition, when governments are able to invest in health care, life expectancies increase. As a result, individuals may choose to invest more in their education as they have time to receive greater returns from it. Improved health of young children may also encourage reduced fertility and thus greater labour-force participation from women (Tompa, 2002).

6.7 Chapter Conclusions and Future Research

Human and social capital are two types of resources that are often developed through similar processes and can work together to enhance both productivity and well-being. Human capital describes the skills and knowledge possessed by each individual. Higher levels of human capital have tended to be linked to greater productivity, although it may be that time is needed to individuals to develop more firm-specific forms of human capital before productivity gains can be realised. Social capital describes the resources embedded within a group such as interpersonal relationships, shared norms, and trust that allow it to function effectively. High levels of social capital have been proposed to aid organisational productivity by facilitating voluntary co-operation and effective sharing and assimilation of knowledge (human capital). Empirical findings support a positive relationship between social capital and productivity.

Just as both human and social capital have been shown to enhance productivity, they have also both been shown to be linked to greater well-being. Higher levels of education, one of the main forms of human capital, have been shown to positively relate to the facets of subjective wellbeing and may help to fulfil our psychological need for competence. Although, it has been suggested that modest levels of education show the greatest link to wellbeing, so seeking continuous increases in human capital may not necessarily continue to enhance wellbeing. Social capital has also been positively linked to subjective wellbeing and may enhance wellbeing by creating a sense of connectedness and belonging. In that both human and social capital have been positively linked to wellbeing and productivity, we may consider these factors to be mediators or explanatory variables in the relationship between wellbeing and productivity levels.

Higher levels of productivity are suggested to increase individual incomes and government fiscal balances such that more money can be invested in services such as education that can support the development of human and social capital. Individuals are also suggested to be more likely to invest in their own or their family's education when they feel more economically secure or perceive the possibility for greater returns on the investment through higher wages. In this way, productivity growth may be able to encourage the development of human capital.

The following areas for future research are proposed in order to develop our understanding of the relevance of levels of human and social capital to the well-being, productivity, and productivity growth relationship.

1. We noted how increases in productivity may be able to promote the development of human capital. However, little is known about the extent to which increases in productivity may impact upon levels of social capital. Future research could investigate this. For example, we might expect that higher levels of organisational productivity promote greater social capital because employees feel as though they are achieving positive outcomes as a group.
2. Much of the research outlined within this section of the review is cross-sectional and correlational. Future work should aim to undertake assessments of the causal relationships outlined here. For example, is there any evidence of a causal link between levels of human and social capital? Do higher levels of social capital cause increases in productivity or are they a consequence of it?
3. Longitudinal research is also needed in this area. Moderate levels of human capital have been shown to be most beneficial for well-being. Longitudinal research will be able to determine whether there are also limits to the extent to which further increases in human and social capital are beneficial for productivity.

7 | Workplace factors, wellbeing, and productivity

Whilst work is beneficial for wellbeing in that unemployment is a key driver behind mental ill-health (van Stolk et al., 2014; Waddell & Burton, 2006), inappropriate workplace environments can have detrimental effects on wellbeing and productivity for those in employment (Cox, Leka, Ivanov, & Kortum, 2004). In this section of the review we discuss some of the workplace factors that have been suggested to have an influence on both employee wellbeing and productivity. These factors cover areas such as colleague relationships and job demands and control as well as the physical features of the working environment (Clements-Croome, 2006; Maslach & Leiter, 1997). Throughout this section of the review it is important to consider how each of the workplace factors described may be linked to attempts to increase productivity.

7.1 Job Demands

Starting with job demands, Corbett (2015) highlighted a trend whereby, in attempts to cut costs, many organisations have opted to downsize. As a result, fewer people are tasked with doing more and more work (Clements-Croome, 2006). Carter et al. (2011) conducted an investigation into the experiences of employees at HMRC following the 2004 governmental

announcement that over 80,000 jobs would be cut across the UK civil service (including 10,500 at HMRC). Using a combination of interviews and questionnaires they found over 80% of staff felt that the volume, pace, intensity and pressure of work had all increased since the introduction of job cuts. Sixty-three per cent of staff reported feeling 'very pressurised' in the work after the job cuts, compared to just one per cent before they were introduced.

High perceived job demands have been linked to both reduced productivity and poorer wellbeing. Hafner et al. (2015) reported that when employees perceived themselves to be subject to unrealistic time demands this was linked to higher levels of presenteeism. Hagberg, Tornqvist, and Toomingas (2002) discovered a similar relationship between high levels of work demands and presenteeism, but only for women. Alavinia et al. (2009) also found a positive relationship between perceived job demands and the amount of work performed on the last regular workday in a sample of workers across 15 different industries in the Netherlands. Using a sample of nearly 17,000 employees in Colorado, Jinnett, Schwatka, Tenney, Brockbank, and Newman (2017) demonstrated that employees whose jobs were considered as either physically or cognitively demanding were more likely to report higher levels of both absenteeism and presenteeism in comparison to employees whose work was not considered demanding or difficult.

Increased job demand is associated with a number of factors that reduce worker productivity. Warr (1990) conducted interviews with 1686 workers in the UK and discovered that the perception of higher job demands was associated with greater anxiety. Job dissatisfaction was also greater for individuals reporting higher levels of job demands. Lu, Gilmour, Kao, and Huang (2006) distributed questionnaires to employees from variety of sectors in both Taiwan and the UK. Individuals who perceived their workload to be high also reported lower levels of job satisfaction and poorer happiness which was examined using items that tapped into both positive emotions and global life satisfaction. High work demands have also been linked to work-to-family conflict. Using responses from the 1997 National Study of the Changing Workforce which includes telephone survey interviews with a nationally representative sample of over 3500 adults employed in the U.S, Voydanoff (2005) found that both job time pressure and workload pressure were positively related to work-to-family conflict. Work-to-family conflict was, in this instance, measured using items that assessed the extent to which people's jobs reduced the time and energy available for personal and family life, limited their ability to complete tasks at home, and negatively affected their mood at home.

Related to job demands is the growing body of research suggesting that reduced working hours may be associated with higher productivity with limited wellbeing impacts. As noted above, employment is key driver of good mental health. However, using data from the UK Household Longitudinal Study (2009–2018), Kamerāde, Wang, Burchell, Balderson, and Coutts (2019) report that the mental health benefits of employment appear to be binary – those working longer hours do not report higher wellbeing than those working fewer hours. The idea that reduced working hours could increase productivity is not new. For example, writing in 1977, Nanda and Browne, argue that long working hours contribute to presenteeism. However, it is increasingly noted in the popular media and appears to be gaining political traction in the UK (Ainge Roy, 2018; Elliott, 2019). In a recent report, the think tank Autonomy (Harper, Stronge, Guizzo, & Ellis-Petersen, 2019) review the literature on working hours and productivity and highlight a substantial number of examples of studies that find reduced working hours could increase productivity. Kallis, Kalush, O.'Flynn, Rossiter, and Ashford (2013) provide a comprehensive review of empirical and theoretical studies on the productivity impacts of reduced working hours, highlighting a number of conflicting arguments.

7.2 The Interaction between Job Demands and Resources

The job demands-resources model theoretical model has received significant attention in explaining the relationship between job demands and employee wellbeing and productivity. Demerouti, Bakker, Nachreiner, and Schaufeli (2001) proposed that high job demands lead to exhaustion, a component of burnout. At the same time low job resources (aspects of the job that support the achievement of work goals and help protect against the costs of job demands e.g. supervisor support, autonomy, and effective feedback) can lead to reduced motivation or disengagement; the reduced personal efficacy component of burnout. The effects of high job demands on exhaustion appeared to be greater when individuals also have low job resources, whilst the effects of a lack of resources on disengagement is greater when individuals also have high job demands.

The model was updated by Schaufeli and Bakker (2004) who incorporated the factor of engagement. Engagement was considered the antipode of burnout and defined as a “positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption.” (pp. 295). Employees with higher levels of job resources were predicted to have higher levels of engagement. The updated model highlighted that high work demands would negatively impact employee health and wellbeing partly through their association with burnout. Equally, higher levels of job resources would

influence organizational outcomes such as performance through their association with engagement. When looking at evidence from the Sunday Times' 'Best Companies to work for in the UK', Black (2008) reported that organisations with high levels of employee engagement consistently outperformed the FTSE 100 companies on the stock market.

The interaction between work demands and work resources to determine employee wellbeing and productivity has also been emphasized by other researchers. Karasek (1979) in particular proposed the importance of the interaction between 'job decision latitude', or job control/autonomy, and job demands. Karasek did not consider work demands to have detrimental effects in and of themselves, rather, it was only when high demands were accompanied by a lack of control that they could impact upon wellbeing. When both job demands and control were high, this was considered as an 'active' job whereby the demands presented a source of challenge rather than stress. Using data from the US and Sweden, Karasek (1979) found support for his proposal that job control interacted with job demands to predict levels of exhaustion, job dissatisfaction, life dissatisfaction, and depression. In all cases work demands only had negative effects on wellbeing under conditions of low control. Dwyer and Ganster (1991) reported similar findings after distributing questionnaires to employees of a large manufacturing plant in the Midwestern US. The company was chosen as a shortage of full-time workers meant that work demands on existing employees were high. High perceived workload was associated with lower absenteeism and higher task satisfaction under conditions of high control. When employees were experiencing low control, high perceived workload was instead associated with higher levels of absenteeism and lower task satisfaction. Accordingly, it is important to consider how different workplace factors (both demands and resources) may interact to influence wellbeing and productivity, rather than just considering each factor in isolation.

7.3 Job Control

As well as exacerbating the negative effects of workplace demands on productivity and wellbeing, job control (or autonomy) has received considerable attention as an independent factor in enhancing both productivity and wellbeing. Thompson and Prottas (2006) analysed data from the 2002 National Study of the Changing Workforce. They found that job autonomy was positively associated with all favourable outcomes tested. These included: job satisfaction, life satisfaction, and family satisfaction. At the same time, job autonomy was negatively associated with a number of unfavourable outcomes including stress and turnover intention.

Additionally, Bond and Bunce (2003) conducted a two-wave panel study with employees at call centres of a financial institution in the UK to test how factors such as job control could predict wellbeing and job performance one year later. They found that higher levels of job control at Time 1 predicted greater levels of mental health, job performance, and job satisfaction at Time 2. Effects were small to medium in size. Ganster, Fox, and Dwyer (2001) also conducted a longitudinal study, this time over a 5-year period with full-time nurses at a medium-sized private hospital in Midwestern US. They also found that high job control at Time 1 predicted better mental health and lower use of medical services over the five-year period. High job control therefore seems to benefit physical and mental health as well as work performance. However it is worth noting that Hafner et al's. (2015) survey failed to document a significant association between perceived control in the workplace and productivity losses.

One theory that could be useful to consider when trying to understand how a lack of job control can undermine employee wellbeing and performance is the basic psychological needs theory (Ryan & Deci, 2000; outlined previously in Section 6.2). One of the three basic psychological needs is that of autonomy (needing to feel as though you are able to determine your own behaviour). Low levels of job control therefore hinder the satisfaction of this psychological need, thus leading to poorer wellbeing and human functioning.

7.4 Workplace Relationships

Given that relatedness is one of the three proposed psychological needs (Ryan & Deci, 2008), it is not surprising that the nature of relationships with colleagues and managers have also been shown to have impacts upon employee productivity and wellbeing. The experience of workplace bullying has been shown to be related to 2.93% greater productivity losses due to presenteeism in UK company employees (Hafner et al., 2015). Berry, Gillespie, Gates, and Schafer (2012) also found a negative relationship between the perception of being subject to workplace bullying and productivity when studying novice registered nurses in the US. In this study, the negative impact of workplace bullying on productivity was greater when the perpetrator was in a more powerful position (e.g. leader or supervisor rather than other staff nurses) and when the bullying was considered as daily (rather than less frequent). In their study of employees across large-sized retail and wholesale organizations in the Bahamas, Devonish (2013) discovered that the negative effect of workplace bullying on task performance was significantly mediated by job satisfaction. This means that higher levels of workplace bullying can undermine wellbeing factors, such

as job satisfaction, which in turn can have negative effects on employee performance. Poor job satisfaction has been linked to supervisor incivility (Spence Laschinger, Leiter, Day, & Gilin, 2009) and reduced productivity in a number of studies (e.g. Black, 2008; Burton, Chen, et al., 2005).

As well as relationships with specific colleagues, the overall organisational culture can also have implications for employee productivity and wellbeing. Of particular importance is the extent to which employees feel that their organisation acknowledge the importance of their employee's health and wellbeing. When employees feel that their health and wellbeing is not considered as an indicator or organisational success, they have been shown to report higher levels of both absenteeism and presenteeism (Hafner et al., 2015). Further, after conducting focus groups with employees who had suffered from anxiety and depression, Haslam et al. (2005) outlined how individuals felt that organisations needed to recognise anxiety and depression as genuine illness as they often felt stigmatised due to a lack of understanding. The majority (over 75%) also noted that ineffective management had contributed to development of their mental health problems, highlighting that managers were often dismissive when approached with problems because other employees were able to cope with the work. Workplaces that recognise high mental health as an important goal and act accordingly should therefore have higher productivity and employee wellbeing.

7.5 Job Insecurity

The shift in focus from a manufacturing to a service-based economy, as well as the economic recession, have resulted in job losses and job insecurity for a number of individuals in the UK (Clements-Croome, 2006). Children who grow up with parents who do not work are more likely to suffer from poor mental health and to be workless once they reach adulthood themselves (Black, 2008). We are also seeing an increase in part-time and temporary work. Part-time employees made up over 30% of the UK workforce in 2001, despite accounting for only 15% of the workforce in 1971 (Clements-Croome, 2006). When there are less secure, full-time jobs available this can lead to greater rivalry and competition, which would be expected to impact upon relationships between colleagues.

Research has shown that job insecurity is linked to poorer workplace productivity. Van den Heuvel, Geuskens, Hooftman, Koppes and Van Den Bossche (2010) administered questionnaires to nearly 23,000 employed individuals as part of the Dutch working population database of Statistics Netherlands. They found that individuals on temporary contracts or who

engaged in frequent shift work had lower levels of self-reported job performance. Kinnunen, Mauno, Natti, and Happonen (2000) conducted a longitudinal study with employees in Finland which demonstrated that high job insecurity at Time 1 was predictive of poorer quality relationships with co-workers and superiors at Time 2 (one year later). High job insecurity was also predictive of lower perceived organisational efficiency. Probst, Stewart, Gruys, and Tierney (2007) demonstrated that job insecurity can also impair creative problem-solving abilities. They conducted an experimental, laboratory study with students in the US. Participants were told that they had been selected for a copy editor position at simulated national on-campus college newspaper. Half were also informed that due to low sales and declining advertising revenues, 50% of the editors would be laid off after a second work period. This was intended to induce feelings of job insecurity. It was found that those participants in the job insecurity condition subsequently performed poorer on a task requiring creativity. Probst et al. also replicated this finding using survey measures distributed to employed adults. Higher job insecurity was significantly associated with lower creativity. As we previously noted in this review that positive emotions have been linked to greater creativity (Baas et al., 2008; Davis, 2009), then lower levels of wellbeing may be able to explain why job insecurity has negative effects on creativity.

Similar findings emerge surrounding the relationship between job insecurity and employee wellbeing. As job insecurity refers to employees' perceptions about the possibility of involuntary job loss, its definition implies feelings of powerlessness which may undermine the need for autonomy. Silla, De Cuyper, Gracia, Peiró, and De Witte (2009) distributed questionnaires to 639 Belgian employees across six different organisations. They found that job insecurity was positively related to psychological distress (e.g. symptoms of depression and anxiety) and negatively related to life satisfaction. Likewise, De Witte, Pienaar, and De Cuyper (2016) conducted a review of 57 longitudinal studies on the consequences of job insecurity for health and wellbeing. They concluded that there was strong evidence for an effect of job insecurity on health and psychological wellbeing over time. The most consistent evidence was found for the outcome variables of burnout, self-rated health, and general mental/psychological wellbeing.

The workplace factors reviewed so far have mainly been considered with individuals' perceptions, i.e. do people feel that they are subject to high job demands or supervisor incivility etc. However, the more objective, physical aspects of the work environment have also been shown to be important for employee productivity and wellbeing.

7.6 Physical Aspects of the Workplace Environment

Air quality is one aspect of the physical environment that has been shown to influence productivity. Wargocki, Wyon, Baik, Clausen, and Fanger (1999) found that when female students completed sets of tasks from the Walter Reed performance assessment battery under conditions when a polluting source was present their performance was poorer in comparison to when the same tasks were completed when the polluting source was absent. Federspiel et al. (2004) also reported that ventilation had a significant impact on the performance of call centre workers but suggested that the size of this effect was smaller than that of other factors such as understaffing and long shifts. The detrimental effect of air quality on productivity may vary depending on the job/task type. For example, Kosonen and Tan (2004) concluded that the effect of air quality on productivity loss was greater for thinking tasks than typing tasks.

Another environmental factor is workplace temperature. Gohara and Iwashita (2003) conducted an experimental study in which participants were instructed to complete a proof-reading task at different levels of air temperature. They found that performance on the proofreading task was highest in the when the air temperature was between 22 to 24°C. This is in line with Federspiel et al.'s (2004) finding that room temperatures above 25.4°C are detrimental to employee performance when studying call centre workers. Lan, Lian, and Pan (2010) also conducted an experimental study, this time including measures of participants' performance, mood, and general health and wellbeing. They found that participants indicated that a neutral temperature of 21°C was comfortable and reported the lowest negative mood scores, highest health and wellbeing scores, and greatest motivation to do work at this temperature. A high temperature of 28°C was considered too warm and associated with experiencing more negative moods, lower health and wellbeing scores, and poorer motivation to do work. The neutral condition, however, did not significantly differ from the cooler condition (17°C) on the wellbeing and motivation measures. Therefore, it seems that higher temperatures are more problematic for worker productivity and wellbeing.

Lamb and Kwok (2016) administered longitudinal surveys to employees in Wellington, New Zealand across an 8 month period. They noted that when both noise annoyance and lighting that was judged to be too bright or too dark this was negatively related to self-reported work performance. Environments considered to be too dark had a larger negative association with performance than those considered to be too bright. Viola, James, Schlangen, and Dijk (2008) also examined the effect of light on worker

productivity. They conducted an experiment in which participants were exposed to a blue-enriched white light for four weeks and a white light for four weeks. Compared to the white light, under blue-enriched white light conditions participants reporting higher ratings of alertness, concentration and performance. They also reported lower irritability and evening fatigue. One particularly interesting finding from Lamb and Kwok's (2016) study was that the effect of environmental stressors such as poor light or noise annoyance on performance was often indirect. In particular, environmental stressors were linked to poorer mood, headaches, and feeling 'off'. These factors were able to reduce performance by reducing motivation and increasing tiredness and distractibility.

Green buildings are considered as those that rely on resource efficient structures and processes throughout a building's lifecycle. Green buildings will therefore use resources efficiently, ensure occupant health and increasing productivity, and reduce the impact of outputs on the environment (Thatcher & Milner, 2014). Certain case studies have shown that moving to a green building can enhance employee wellbeing and productivity. For example, Dunckley (cited in Miller, Pogue, Gough, and Davis, 2009) reported that after an Australian law firm moved its office to a 5 green star rated building, sick days reduced by 39% overall. Likewise, Singh, Syal, Grady, and Korkmaz (2010) reported on two cases studies of companies moving from conventional office buildings to LEED-rated buildings (judged to have high indoor environmental quality) in Michigan. Comparison of pre- to post-move surveys demonstrated that there were significant reductions in self-reported absenteeism due to asthma and respiratory allergies and depression and stress-related conditions following the move to the green building. There were also significant improvements in employees' perceived productivity. Results are not always consistent, however. Thatcher and Milner (2014) conducted a longitudinal (1 year), comparison group study using employees at a financial institution in South Africa. Employees in the treatment group were moved to a new 'green' building whilst those in the control group stayed in their existing (non-green) building. Results failed to find consistent, significant patterns whereby wellbeing and productivity increased as a result of moving to the green building for those in the treatment group.

7.7 Chapter Conclusions and Future Research

This section of the review has discussed how different workplace factors may influence both employee wellbeing and productivity. Workplace factors can typically either be considered as demands or resources. Workplace demands are aspects of the job that require physical or psychological effort and may

therefore bring physiological or psychological costs. They have been empirically linked to poorer employee wellbeing and productivity. Workplace resources are aspects of the job that support the achievement of work goals and help protect against the costs of job demands e.g. supervisor support and autonomy. High levels of job resources can motivate greater productivity, but when these resources are absent then individuals tend to display poorer wellbeing and productivity. As with human and social capital then, workplace factors may be considered as mediating or explanatory variables in the positive relationship between wellbeing and productivity levels.

The physical characteristics of the work environment have been implicated as predictors of individual productivity and well-being, for example temperature, ventilation, and 'green' buildings. If more environmentally friendly buildings are linked to greater worker wellbeing and productivity, then this may suggest a positive association between resource productivity (the efficiency of using natural resources to produce goods and services within the economy) and labour productivity. Whilst both resource and labour productivity are considered as important determinants of determinants of economic growth, how these two factors interact has rarely been explored (Stocker et al., 2015).

Certain workplace factors may be the result of efforts to grow productivity, although this is not always explicitly acknowledged in the literature. For example increasing workloads and the use of short-term contracts may both be used to boost productivity, but can induce burnout and job insecurity which can then undermine both productivity and wellbeing. We therefore see a similar pattern to that described when discussing productivity growth in the healthcare sector in Section 2.3. Productivity growth in the short term may undermine long term productivity growth by increasing workplace demands which are linked to lower employee wellbeing and productivity.

Recommended areas for further research relating to workplace factors, wellbeing and productivity are as follows.

1. As with much of the research covered in this review, most of the studies examining the relationship between workplace factors, productivity and wellbeing are correlational. Future work may want to determine whether workplace factors are able to have a direct, undermining effect on productivity, or instead, if this effect occurs through indirect influences on wellbeing and stress. If the effects on productivity are explained by reductions in wellbeing then this may suggest that workplace wellness

programmes could offer a means of increasing wellbeing and productivity without having to alter existing workplace factors.

2. Many different workplace factors have been shown to have implications for levels of wellbeing and productivity. Future work may want to take a more systematic or meta-analytical approach to reviewing all of these different factors to determine which have the most substantial effects on both wellbeing and productivity.
3. We noted that more resource efficient work environments have been linked to higher levels of labour productivity. This suggests that resource productivity and labour productivity may be positively linked, but more empirical work is needed to confirm this.

8 | ICT, wellbeing, and productivity

Information and communication technology (ICT) covers computers, software, telecommunications equipment, and semiconductors (Oulton, 2001). It is considered to be a general purpose technology, meaning that it can affect the entire economy by facilitating the creation of new goods, services, and modes of operation (Jalava & Pohjola, 2007). Whilst early perceptions (before 1990s) were that there was a lack of a significant relationship between ICT and productivity growth, this was mostly due to inappropriate measurement (Spiezia, 2012) and today it is generally considered that investments in ICT have a positive effect on productivity growth (Miller & Atkinson, 2017).

8.1 ICT and Productivity Growth

In the UK, increasing adoption of ICT has been linked to increases in overall output (and therefore productivity) as well as heightened labour productivity. Oulton (2001) examined UK macroeconomic data spanning the 1979-98 period. They found that ICT output had grown at a far quicker rate than non-ICT output within this time. The proportion of labour productivity growth that can be accounted for by ICT capital deepening (the increase of ICT capital per unit of labour) also rose within the testing period, having accounted for 23% of the growth of output per hour in 1989-98 but 39% in 1994-98. Oulton and Srinivasan (2005) then analysed a dataset containing annual data for 34 industries spanning across the UK economy, for the period 1970 to 2000. They too reported that ICT capital was accounting for an increasing amount of productivity growth. In the market sector, ICT capital accounted for 13% of productivity growth in 1970-79 and this percentage rose to 47% in 1995-2000. The contribution of ICT capital to

productivity equalled that of non-ICT capital in 1990-2000, despite only making up a small proportion of total capital stock. Labour productivity growth was found to be more strongly linked to growth of ICT (in comparison to non-ICT) capital.

Similar findings were reported by O'Mahony and Vecchi (2005) when examining data from the United States and the UK. They analysed industry panel data, comprising information from 55 sectors (covering the entire non-agricultural market economy) from the years 1976 to 2000. Findings demonstrated that in industries whereby ICT is used intensively, growth in labour productivity and total factor productivity had been higher than in those industries whereby ICT is used less intensively. Indeed, Timmer et al. (2011) suggested that the slow rate of productivity growth in Europe, compared to the United States, was partly due to Europe's failure to invest in ICT to the same extent. Likewise, when Spiezia (2012) analysed data across 26 industries (covering the whole business sector) from 18 OECD countries for the period 1995-2007 he found that ICT-producing industries accounted for two-thirds of the total factor productivity growth in Germany, Slovenia, and the UK.

As well as macroeconomic evidence, there is also research into the relationship between the adoption of ICT and productivity growth at the firm level. However, whilst at the macroeconomic level the relationship between ICT and productivity growth seems to be largely positive, at the microeconomic level it appears more complex. In particular, it appears that in order for ICT to have a positive impact on productivity growth at the firm level, concurrent investments in training, human capital, and organizational change are needed (Corrado, Haskel, & Jona-Lasinio, 2017; Spiezia, 2012). When exploring why Europe has lagged behind the US in making productivity gains through ICT, Miller and Atkinson (2017) argued that one reason was because US firms are better at employing management styles that facilitate the necessary concurrent organisational redesign. Díaz-Chao, Sainz-González, and Torrent-Sellens (2015) outline how the return rates from digital investments are often shown to be higher than those for physical investments. They propose that the reason for this is because digital investments often occur alongside changes in organizational structure and human capital. For this reason, ICT is often suggested to be able to enhance productivity indirectly via 'spillovers' in the form of these concurrent changes (Miller & Atkinson, 2017)

Although the adoption of ICT appears to have had a positive impact upon productivity growth, the productivity of the ICT industry itself has been shown to be impacted by economic factors. For example, Oulton (2001)

noted that the increase in ICT output growth observed in their examination of data from 1979-98 had been volatile and affected by recessions in 1980-81 and 1991-92. Tenreyro (2018) also highlighted that whilst ICT experienced a productivity boom in the late 1990s (with a growth rate of 6.4% per year in 1995-2000), productivity growth fell during and after the financial crisis (to a growth rate of 0.4% from 2009-2015). These drops in productivity growth for the ICT sector were proposed to be largely due to slower capital deepening by Tenreyro.

Further, when ICT is not functioning as it should be, this can hinder productivity. Forester and Morrison (1994) argued that computer malfunctions cost society billions each year in terms of abandoned systems and lost time due to ICT malfunctions. In support of this, van Deursen and van Dijk (2014) surveyed over 2700 Dutch workers who used a computer for at least 2 hours on an average working day. They found that, on average, respondents lost 12 minutes and five seconds of labour time each day due to malfunctioning ICTs. This was equivalent to a loss of 3.4% of the total time working with ICT. When they added in the time that respondents had to use helping colleagues who were experiencing malfunctioning ICTs, this percentage of lost time increase to 4.5%. Likewise, Hagberg et al. (2002) found that, for women, computer problems were associated with greater levels of presenteeism.

Accordingly, investment in ICT appears to be a strong driver a productivity growth, given that certain conditions are met. The relationship between greater use of ICT and wellbeing, however, is slightly more complex. In many ways, ICT can enhance workers wellbeing, yet at the same time, it can also have detrimental effects.

8.2 ICT Can Have a Positive Effect on Wellbeing

One of the key ways in which ICT can have positive effects on employee wellbeing is by fostering higher levels of autonomy. Lee et al. (2017) define task autonomy as the extent to which a job allows for freedom and independence for the employee to schedule and complete the work. As information needed to complete a task can easily be searched for online, this means that employees feel less dependent on others to complete a job. In their study of Japanese workers, Fujimoto, Ferdous, Sekiguchi, and Sugianto (2016) found that usage of mobile technologies was linked to greater levels of job autonomy, which in turn was linked to higher levels of work engagement. However, it is worth noting that Clements-Croome (2006) highlighted that the rise in computer-led tasks have made it easier for organisations to monitor performance (e.g. through the number of

keystrokes or error rates), giving individuals less discretion and leading to feelings of a lack of autonomy. Therefore, the effect of ICT on workplace autonomy may differ according to employee perceptions of how their performance is being monitored.

Innovations in ICT have also increased flexibility, allowing many employees to work at any time and in any location (Bordi, Okkonen, Mäkinemi, & Heikkilä-Tammi, 2018). The term 'telecommuting' is often used to describe arrangements that allow an employee to perform work tasks outside of an organisation, using ICT to interact with other individuals in and outside of the organisation (Gajendran & Harrison, 2007). As well as increasing autonomy (Standen, Daniels, & Lamond, 1999), this flexibility has been suggested to help employees better synchronize demands presented by their work and family life. If a child has a doctor's appointment, telecommuting allows a parent to easily alter their working schedule for the day so that they can attend. In support of this idea, Gajendran and Harrison (2007) reported a negative relationship between telecommuting and work – family conflict in their meta-analysis. Further, lower levels of work – family conflict appeared to partially mediate the relationships between telecommuting and greater job satisfaction, as well as between telecommuting and lower levels of role stress. However, increased flexibility has not always been shown to lead to improvements in wellbeing. Blok, Groenesteijn, Schelvis, and Vink (2012) distributed questionnaires to employees at an organisation that was implementing a 'new way of working' that involved providing laptops, mobile phones, and access to the business network in order to enable employees to work anywhere throughout the department as well as at home. Questionnaires were distributed both when the new way was being introduced as well as six months later. Results demonstrated no significant increases in employee satisfaction from the baseline assessment to the six-month follow-up.

ICT also allows for easier communication between workers. In cases whereby tasks require co-ordination between team members, ICT could therefore reduce stress levels by facilitating more effective information sharing and job allocation. In this way, ICT can also reduce role ambiguity as employees are able to more easily communicate with each other surrounding who bears which responsibilities (Lee et al., 2017). Ninaus, Diehl, Terlutter, Chan, and Huang (2015) conducted interviews with individuals working in advertising, public relations, or journalism in Hong Kong and Austria who were active users of ICT in their everyday work. Almost all interviewees stated that ICT has helped to enhance internal communication and information exchange between employees as well as to accelerate coordination processes, both with colleagues and customers. This

easier communication between colleagues can also make it easier for each individual to seek support from others. Miller, Ellis, Zook, and Lyles (1990) reported that the communication of social support was associated with greater job satisfaction and lower workplace stress when studying employees at a private psychiatric hospital.

8.3 ICT Can Have a Negative Effect on Wellbeing

However, this increased ease of communication provided by ICT can also come at a price. Through technology, employees become accessible to their supervisors and colleagues outside of the office. Ayyagari, Grover, and Purvis (2011) argued that this increased accessibility of workers through ICT can increase work-related stress via four routes. The first is heightened work – home conflict. Being able to work from home blurs the boundaries between work and home life, and can sometimes lead employees to believe that they are expected to work from home (Middleton & Cukier, 2006). Grant-Vallone and Donaldson (2001) conducted a longitudinal survey with non-professional employees in Los Angeles and found that the experience of work – home conflict was a significant predictor of poorer employee wellbeing six months later. In this case wellbeing was considered as the extent to which individuals felt happy, satisfied, and pleased with their personal and work lives, and was measured using both self-reports and co-worker reports.

The second route concerns an invasion of privacy. Individuals worry that data concerning their online activity may be harnessed, traced, and exploited by external sources. When surveying Israeli individuals over the age of 60, Nimrod (2018) found that concerns about privacy when using ICT was one of five factors that contributed to ‘technostress’. Higher technostress scores were then related to poorer life satisfaction. The third route involves work overload. Enhanced connectivity between employees works to speed-up workflow which can increase expectations for greater productivity (Clark & Kalin, 1996). Trying to work under tighter deadlines and be more productive can lead employees to perceive themselves to be under (see Section 8.1) we covered literature demonstrating that higher perceived work demands can be linked to job dissatisfaction, lower happiness, and burnout (Demerouti et al., 2001; Lu et al., 2006; Warr, 1990).

Finally, frequent interruptions from calls and emails can lead individuals to experience role ambiguity as they struggle to determine which tasks to prioritise. When observing and interviewing employees at an Australian telecommunications company, Wajcman and Rose (2011) noted that interruptions from communication media such as emails often caused task

fragmentation as individuals tried to balance the perceived pressure to respond to communications quickly whilst still fulfilling their primary job role. Using questionnaire measures distributed to employees across a range of sectors, Ayyagari et al. (2011) demonstrated that the greater accessibility provided by ICT was significantly associated with higher levels of work – home conflict, invasion of privacy, work overload, and role ambiguity. Each of these factors, with the exception of invasion of privacy, were related to higher levels of job strain (feeling drained and burnt out from work).

Whilst ICT may allow individuals to work more efficiently (Stadin et al., 2019), technology is not infallible. When technology fails to work, this becomes a factor that can increase work-related stress (Day, Scott, & Kevin Kelloway, 2010). Hudiburg, Ahrens, and Jones (1994) demonstrated that computer hassles were associated with higher ratings of anxiety in college students. Further, Stadin et al. (2019) analysed data from the Swedish Longitudinal Occupational Survey of Health (SLOSH). SLOSH is a longitudinal cohort study employing biennial questionnaires. The data from the years in 2006, 2008, 2010 and 2012 were used by Stadin et al. In this study, failure of ICT equipment to work as required was considered to be a factor that contributes to high ICT demands at work (alongside constant availability, interruptions, needs to reply quickly to calls and emails). At the cross-sectional level, repeated exposure to high ICT demands at work was linked to lower subjective ratings of general health. When looking at the relationship over time, the analysis revealed that high ICT demands at work were associated with increased risk of developing poorer self-rated health at follow-up, but this relationship was only significant for men.

The increasing use of computers in the workplace may also lead to musculoskeletal symptoms. Hagberg, Tornqvist, and Toomingas (2002) conducted a survey of 1283 employees who used computers as part of their work and found that most respondents (87% of females and 76% of males) reported at least one musculoskeletal symptom during the preceding month. Musculoskeletal symptoms were considered as pains or aches in various body parts as well as numbness in the hands/fingers. Likewise, Eltayeb, Staal, Kennes, Lamberts, and de Bie (2007) found that 54% (61% of females and 48% of males) of computer office workers at a National Social Security Institution in the Netherlands reported musculoskeletal complaints of arm, neck and/or shoulder when surveyed over a 1-year period. The trend for female computer users to have a higher prevalence of musculoskeletal symptoms/disorders compared to men was again replicated by Gerr et al. (2002) in their study of newly-hired computer-using employees across eight large companies in Atlanta. Of those individuals who did not display neck/shoulder symptoms upon entering the company, 34% went on to develop such symptoms within

the first year of work. Female gender was associated with a greater risk of developing neck/shoulder symptoms. At 6 months follow-up, 42% of women, compared to 27% of men, had experienced neck/shoulder symptoms.

Therefore, it appears that ICT has the potential to act both as a demand and as a resource in the workplace. It can act as a resource to assist with achieving objectives, for instance by facilitating communication transfer and providing flexibility in location. At the same time, ICT can act as a demand by creating a norm of constant availability, blurring the boundary between work and home life, increasing workloads, and disrupting workflow. Bordi et al. (2018) conducted workshops with female employees across three organisations: an industrial company, an insurance company, and a financial administration services company. From these workshops, six themes emerged surrounding the employees' perceptions of the relationship between ICT and wellbeing at work. Five of these themes involved ICT being viewed as a workplace demand, referring to factors such as technical problems and expectations of constant connectivity, whilst only one constituted ICT being a resource in the workplace by allowing for flexibility in communication.

8.4 Social Media

Whilst on the topic of ICT, it is important to acknowledge the implications of social media for productivity and wellbeing. Social media represents a specific form of ICT. Social media platforms are designed to allow users to construct a (usually public) profile, communicate with other users, and view content made by other users within the platform (Boyd & Ellison, 2007). As with ICT more generally, social media has both pros and cons in terms of its relation to wellbeing and productivity (Aguenza, Al-kassem, & Mat Som, 2012). Certain researchers have warned that the use of social media in the workplace increases the risk of lost employee productivity (Wilson, 2009). However, Coker (2011) reported that leisurely browsing of social media for a short time at work (less than 12% of work time) actually had a positive effect on employee productivity. Short periods of social media use at work were suggested to provide a short break in which concentration could be restored.

Social media is also being used to facilitate the recruitment process (Broughton, Foley, Ledermaier, & Cox, 2013). Social media can be used as a marketing tool to attract new recruits and as a screening tool when selecting employees (Davison, Maraist, & Bing, 2011). It is considered to be a cost-effective means of recruitment in comparison to more traditional strategies (e.g. newspaper advertisements) (Broughton et al., 2013). However, there

are questions surrounding to what extent online behaviour should be incorporated into hiring decisions. Brown and Vaughn (2011) noted that often hiring managers may use information gathered from social media profiles that is not specifically job-related, and displayed behaviours such as alcohol consumption can reduce the chances of an individual being hired (Bohnert & Ross, 2010). Information displayed on social media profiles may also not be accurate. Employers often assume that information displayed on social media sites will be more accurate as individuals do not necessarily expect it to be viewed by their employer. Yet on social media sites people may still be ‘faking it’ to some extent in that they are trying to impress their friends and family (Davison et al., 2011). Along with concerns about the privacy implications of social media as a selection tool, it is therefore also unclear to what extent it supports the hiring of the most qualified and effective individuals.

The relationship between social media use and personal wellbeing is highly debated. Some studies suggest that reducing social media use can improve symptoms of loneliness and depression (Hunt, Marx, Lipson, & Young, 2018). Other suggest that abstaining from social media has no significant effects on personal wellbeing (Hall, Xing, Ross, & Johnson, 2019). Numerous reviews have already been conducted into the relationship between social media use and wellbeing, especially among adolescents (Baker & Algorta, 2016; Best, Manktelow, & Taylor, 2014; Keles, McCrae, & Grealish, 2019). These tend to report differential effects of social media use on wellbeing depending upon the way in which the platforms are used. For example, passive viewing is suggested to have negative effects on wellbeing because it promotes social comparisons. Active usage may be able to have positive effects on wellbeing by increasing feelings of social connectedness (Verduyn, Ybarra, Résibois, Jonides, & Kross, 2017). In terms of job satisfaction, some studies are beginning to show that time spent on Facebook with co-workers is positively linked to job satisfaction (Robertson & Kee, 2017), but there is still more work to be done to fully understand how social media usage may influence levels of job satisfaction.

8.5 Chapter Conclusions and Future Research

At the macroeconomic level, the adoption of information and communication technology (ICT) has been shown to be a determinant of both labour productivity and multi-factor productivity growth. At the microeconomic level, similar patterns emerge, however it seems that concurrent investments in training and organisational change are needed in order to reap the labour productivity benefits of ICT within each firm.

Although ICT therefore may enhance productivity it also runs the risk that of disrupting productivity when it is malfunctioning. Further social media as a specific form of ICT has been proposed to increase the risk of lost employee productivity when used within the workplace. The use of social media as a recruitment tool also raises concerns about whether this method leads to the recruitment of the most effective individuals.

Just as ICT has both benefits and risks for increasing productivity, it also can have both positive and negative effects on individual well-being. On the one hand ICT can allow for easier communication between employees, location flexibility, and greater job autonomy due to easier access to information. On the other hand, the use of ICT can create expectations of constant availability, blur the boundaries between work and home life, and increase the risk of musculoskeletal problems.

Altogether, it appears that greater adoption of ICT has the potential, when functioning and used in the right ways, to boost both productivity and wellbeing and therefore to partly explain the documented positive relationships between wellbeing and productivity levels. However, it also has the potential to undermine our wellbeing and therefore suggests that productivity growth in the short term could undermine wellbeing (and thus productivity) over time.

Recommended areas for further research in this area include:

1. This section has demonstrated how ICT may impact upon productivity and well-being, but further research could test how it relates to some of the other explanatory factors we have covered in this review. For example, does the adoption of ICT enhance both human and social capital by allowing easier access to information and easier communication between individuals? It is likely that all of the factors covered in this review may interact in a dynamic model and further research testing the interrelations between these different concepts would help to map such model.
2. Future would may also want to assess how the impact of ICT on productivity and wellbeing differs across industries. Certain sectors may benefit more from ICT than others with certain types of work more easily replaced or supported by ICT than others. It is important to determine the extent to which the productivity gains from ICT may (or may not) be reaped across different sectors of the economy.

3. The research outlined here has focused on ICT in the form of computers, software, and telecommunications equipment. However, the emergence of artificial intelligence (AI) is likely to transform the ICT industry. Future work will be needed to track how these new forms of ICT are able to enhance or undermine our productivity and wellbeing in the same ways or to a greater extent than other earlier forms of ICT.

9 | Natural capital, wellbeing, and productivity s

Natural capital refers to those aspects of the environment that can provide goods and ecosystem services which benefit people. This includes species, freshwater, land, minerals, and air, plus natural processes and functions such as pollination and climate regulation (Guerry et al., 2015). Whilst income and consumption generated through the depletion of natural capital may be captured by the Gross Domestic Product (GDP), the value of natural capital in itself is typically not considered by most indicators of economic progress (Brandt, Schreyer, & Zipperer, 2017). Of particular importance for this review, natural capital has typically been ignored as an input factor in traditional Multi-Factor Productivity (MFP) growth measures (Bowen, 2016; Brandt et al., 2017; Hamilton, Naikal, & Lange, 2019). However, research indicates that natural capital may be able to influence levels of labour productivity.

9.1 The Consideration of Natural Capital as a Determinant of (Multi-factor) Productivity

Early economists did acknowledge the importance of the natural environment for economic outcomes. One of the earliest schools of economic thought, the French Physiocrats, believed that all value derived from land, and that agriculture was the only 'productive' sector of the economy. Francois Quesnay (1767), a leading Physiocrat, makes this explicit, writing: *"the earth is the sole source of all riches, and ...it is agriculture which multiplies riches"*. The logic here follows from the belief that value is inherently tied to the production of material goods (Burkett, 2003). Agriculture is taken to be the only producer of raw materials, all other sectors take the outputs of agriculture and rework them (Schumpeter, 1954/2006, p. 229). Even labour, the Physiocrats argued, can be understood in terms of agricultural outputs, because labourers ultimately use agricultural products to sustain themselves whilst working.

The importance associated with land was picked up by the classical economists, many of whom were influenced by the Physiocrats (Schumpeter, 1954/2006, Skinner, 1997). Adam Smith (1776, 1976) included land as a key element of production. David Ricardo (1817) raised concerns surrounding the impact of the limited availability of agricultural land on productivity. William Stanley Jevons (1866) was worried about the implications of the depletion of coal deposits for economic progress. Likewise, although Marx believed exchange value was a function of socially necessary labour time, he is clear that use value derives from natural inputs (Bleischwitz, 2001; Marx, 1873/2013).

Modern mainstream theories of economic growth and productivity have tended to stress the importance of labour and manufactured capital over the natural environment (Bowen, 2016; Brandt et al., 2017). Robert Solow's (1956) production function stated that output depended on the quantity of labour and capital, whilst land and natural resources did not matter as inputs. Accordingly, aside from their value as man-made capital stock, natural resources and environmental services are not typically accounted for in conventional models of productivity and economic growth (Bleischwitz, 2001).

Given this, Brandt et al. (2017) set out to test how the recognition of domestic natural capital as an input may change measurements of multi-factor productivity growth. In their analysis, they treat natural capital in the same way as labour and produced capital. Natural capital is valued using its user cost to companies that extract it or use it to generate income. Brandt et al. therefore appreciate that their analysis does not incorporate the social costs of using natural capital such as effects on biodiversity and climate stability. The analysis was conducted using aggregate economy data for 23 OECD countries as well as Russia and South Africa. The results demonstrated that countries including the United Kingdom and United States experienced a decline in natural capital inputs over the 1985-2008 testing period, potentially because of declining oil and gas reserves. Multi-factor productivity growth was therefore considered to be higher in these countries when the measurement included natural capital as an input, as not accounting for declining natural capital leads to an overestimation of aggregate factor input growth. Despite this, Brandt et al. concluded that the contribution of natural capital input to multi-factor productivity growth was small in comparison to the effects of labour and produced capital. In the UK, the growth contribution of natural capital input was -.04% whilst that of labour and produced capital input was 0.46% and 0.94%, respectively.

Although economic theories and research tend to only indicate a minor role of natural capital in influencing multi-factor productivity growth, there are a number of reasons why more significant effects of natural capital may be easy to miss. The first is the difficulty in quantifying the full role of natural capital in enhancing or reducing productivity growth. Indeed, Brandt et al. (2017) highlighted that because it was near impossible to account for the full contribution of ecosystem resources and services, the theory would likely remain that labour and produced capital are the largest contributions to multi-factor productivity growth. Similarly, Squires, Reid, and Jeon (2008) noted that although industries such as agriculture, mining, and forestry are affected by environmental changes such as precipitation, temperatures and long-term climate change, these changes are unpriced. As such they require different treatment when being included in multi-factor productivity measures than priced inputs and outputs.

It is also important to be aware that small role assigned to natural capital in most modern productivity analyses is at least partly a function of *a priori* assumptions. The choice of productivity analysis framework is heavily influenced by assumptions made before the analysis itself starts. In many cases natural capital is difficult to include in the analysis, and this impacts the narrative constructed by the analyst.

Further, many eco-systems are complex and do not always operate in a predictable manner. Certain eco-systems are thought to be subject to tipping points whereby small changes in one moment in time lead to larger, long-term consequences for the eco-system (Lenton, 2011). In certain cases, resources that we normally considered to be renewable may disappear because of being harvested at a rate that is greater than that at which they can renew (Clapp, 1998). Eco-systems are also highly interrelated and hence changes in one system can cause further alterations in another system. For example, deforestation leads to increased carbon dioxide in the atmosphere, changes in precipitation, and species extinction, amongst others (Brook, Sodhi, & Ng, 2003; Lawrence & Vandecar, 2015). The effects of eco-system changes on productivity growth may therefore often be delayed and it can be hard to determine which aspect of the eco-system has been the primary cause of any effects on productivity growth (Bowen, 2016).

The effects of natural capital on productivity growth may also be largely indirect. For example, Bowen (2016) noted that the environment can affect the depreciation of manufactured capital in two ways. On the one hand, it can erode the manufactured capital itself (e.g. rain eroding machinery or earthquakes damaging roads). On the other hand, the changing nature of the environment can alter the tasks that need to be undertaken and hence

lead to obsolescence of existing manufactured capital (e.g. sea level rises mean that existing sea defences are no longer sufficient).

9.2 Industry-specific effects and the Role of Technology

When considering natural capital as a determinant of multi-factor productivity it may also be useful to look at the industry level, rather than aggregate, country-level data. Brandt et al. (2017) noted that there were clear sectors such as mining and forestry where the contributions of natural capital to productivity growth were likely to be much higher than when considering the economy as a whole. In these sectors, the depletion of natural capital may have the potential to hinder productivity growth (Bowen, 2016). The larger economic consequences on this would depend on whether natural capital can be effectively substituted by some other resource, or its use made less intensive. The role of technology and technological processes has been granted particular attention here.

The role of technology in off-setting the depletion of natural capital could take many forms. Technology could help to make production processes more efficient such that fewer natural capital inputs are needed to produce the same level of output. Alternatively, it could enhance processes such as recycling so that the supply of limited resources is increased. It could also help to reduce harmful by-products of production such as pollution that can degrade the quality of aspects of natural capital (Atkinson, 2015; Bowen, 2016). With regards to whether technology could ever replace ecosystem services, Fitter (2013) noted that it is considered rare for the natural mechanisms of an ecosystem service to be completely replaced by technology. If replacement is going to occur, then this is more likely to happen at the local level. For example, in parts of China farmers choose to hand pollinate their fruit crops due to a lack of sufficient floral pollination (Partap, Partap, & Yonghua, 2001).

9.3 Natural Capital and Labour Productivity

Although natural capital is rarely considered as a contributor to multi-factor productivity growth, there are a handful of studies that have looked at the relationship between aspects of natural capital and labour productivity more specifically. When discussing workplace factors and productivity (Section 7.6), we mentioned that temperatures above 25°C were associated with poorer performance and productivity (Federspiel et al., 2004; Gohara & Iwashita, 2003). Air quality has also been linked to labour productivity. Graff Zivin and Neidell (2012) examined panel data concerning the daily

productivity of agricultural workers in California. These workers were paid through piece rate contracts (paid per unit of creation), hence giving a clear picture of each worker's daily productivity. They found that ambient ozone concentrations had a significant effect on worker productivity such that a 10 ppb (parts per billion) increase in ozone concentrations reduces worker productivity by 5.5%.

Greenery can also influence individual performance and productivity. Bakker and van der Voordt (2010) reviewed the findings of a number of studies examining the influence of the presence of plants on productivity. They conclude that the majority of studies document a positive effect of plants on individual functioning and productivity. For example, Shibata and Suzuki (2004) found that female undergraduate students performed better on a word association task when the task was completed with a plant in the room in comparison to when there was a magazine stand or no object in the room. Similarly, Lohr, Pearson-Mims, and Goodwin (1996) reported that participants' reaction times on a computer-based task were 12% quicker (and they made fewer errors) when there were plants present in the laboratory compared to when they were absent.

As with multi-factor productivity, the influence on natural capital on labour productivity could also be largely indirect. For example, natural capital has been linked to levels of human capital, which we saw in Section 6.1 to be linked to higher levels of labour productivity. A number of studies have documented an effect of ecological factors on educational outcomes, one of the key means of developing human capital. Ransom and Pope (1992) examined the relationship between school absenteeism (from kindergarten through to sixth grade) and particulate pollution (PM10) in Utah Valley over a six-year period from 1985 to 1990. They found a significant, positive association between absenteeism and PM10 pollution levels. Similarly, Currie, Hanushek, Kahn, Neidell and Rivkin (2009) mapped administrative data concerning schooling attendance for 1512 elementary and middle schools in Texas onto information about air quality from monitors maintained by the Environmental Protection Agency (EPA). Using longitudinal panel data spanning the 1996-2001 period, Currie et al. demonstrated that increases in carbon monoxide levels, even when these are below the regulatory threshold set by the EPA, coincided with increases in school absenteeism.

As well as school absenteeism, environmental factors can also influence school test scores. Zweig, Zweig, Ham, and Avol (2009) examined data from the Children's Health Study (CHS), a longitudinal study of Southern California school children that contains information about pollution levels,

along with the test score data from the children's schools. They found that decreases in pollution levels were associated with increases in math and reading test scores. In particular, a 10% decrease in PM2.5 levels (a marker for fine particulate matter) raises math test scores by 0.34% and reading scores by 0.21% percent. Lavy, Ebenstein, and Roth (2012) reported similar findings when looking at data from Israeli high school students. Prenatal exposure to environmental stressors can also impact upon schooling outcomes. Almond, Edlund, and Palme (2009) noted that prenatal exposure to the radioactive fallout from the 1986 Chernobyl accident was associated with significant decreases in math test scores and graduation rates for Swedish children.

9.4 Health and Wellbeing as Mediating Factors between Natural Capital and Labour Productivity

Environmental quality is also an important determinant of individual health and wellbeing, which we now know have a mostly positive influence on labour productivity, in particular (see Sections 2-3). Currie, Neidell, and Schmieder (2009) highlighted that maternal exposure to carbon monoxide in the last trimester of pregnancy increases the risk of low birth weight when examining data from New Jersey. Increases in carbon monoxide levels in the first two weeks after birth were also linked to increases in the risk of infant mortality. The health consequences of rising ambient temperatures are also a concern. High temperatures have been linked to heat exhaustion, heat stroke, and mortality (Hajat, O'Connor, & Kosatsky, 2010).

For wellbeing, Brereton, Clinch, and Ferreira (2008) mapped Geographical Information Systems (GIS) data onto survey data from 1500 Irish men and women. They found that a number of spatial environmental and climate variables were significantly linked to individual life satisfaction. For example, wind speed was negatively related to life satisfaction whilst higher maximum temperatures in January and July were positively related to life satisfaction. Additionally, proximity to the coast was positively linked to life satisfaction whilst proximity to landfill was negatively linked to life satisfaction. At the macro-level, Engelbrecht (2009) examined international data from the World Values Survey alongside data on natural capital per capita (NatCpc) from the World Bank's Millennium Capital Assessment. This measure of natural capital takes into account a range of non-renewable and renewable resources covering energy (oil, coal, natural gas...), minerals, timber, agricultural land, and protected areas. The analysis revealed that even when controlling for factors such as GNI, trust, and the Gini coefficient, NatCpc remained a statistically significant predictor of life satisfaction.

The importance of access to green space for wellbeing is becoming increasingly acknowledged. As such we are beginning to see the adoption of ‘green prescribing’ by health practitioners, whereby individuals are encouraged to carry out physical activities in green spaces in order to improve their mental health (Jepson, Cameron, & Robertson, 2010). A recent meta-analysis (Twohig-Bennett & Jones, 2018) has reviewed 143 studies looking into the relationship between access to green space and health outcomes. This revealed that, overall, statistically significant associations were found between greater access to green space and a range of positive health outcomes including lower cortisol levels, lower diastolic blood pressure, lower HDL cholesterol, reduced incidences of type II diabetes, and reduced all-cause mortality. There was also a greater proportion of people reporting good health when access to green space was high (compared to low). Green space may enhance health and wellbeing via a number of routes such as ameliorating air pollution and encouraging people to be more physically active (Tzoulas et al., 2007).

9.5 How Productivity Growth may Undermine Natural Capital

Whilst we have outlined how natural capital may be able to impact levels of productivity through its effects on labour productivity, human capital, and health and wellbeing, it is also possible that productivity growth may undermine natural capital. Our complementary review, “Between the physical and the economic: linking energy and productivity”, outlines how energy use would be expected to rise as a consequence of trying to grow productivity. As current energy systems are mainly reliant on fossil fuels (Mair, 2018), this means that carbon emissions would also grow thus contributing to climate change.

Climate change has the potential to negatively impact productivity and productivity growth in a number of ways. We highlighted earlier that high temperatures can lead to lower levels of labour productivity (Federspiel et al., 2004; Lan et al., 2010) and macroeconomic evidence supports the view that increases in temperature negatively impact upon labour productivity growth (Kahn et al., 2019). Transitioning away from the use of fossil fuels may also mean that capital in the form of fossil fuels and power plants are under-utilised. Climate change may also negatively impact wellbeing in accordance with the studies outlined in Section 9.4.

Accordingly, the process of productivity growth appears to have the ability to undermine existing forms of natural capital in ways that have the potential to negatively impact productivity levels and wellbeing. In this way we can think of the relationship between productivity, productivity growth,

natural capital, and wellbeing as a negative feedback loop. Increasing productivity growth has the potential to negatively impact upon natural capital which in turn can lower levels of wellbeing and productivity. These lower levels of productivity make it harder to achieve further productivity growth.

9.6 Chapter Conclusions and Future Research

Whilst classical economists acknowledged the importance of natural capital for economic outcomes, natural capital is typically not included in modern measures of multi-factor productivity. There may be a number of reasons for the difficulty in accounting for the role of natural capital in multi-factor productivity, such as the fact that environmental changes are often unpriced, the complex nature of eco-systems or that fact that many of the influences of natural capital on multi-factor productivity may be indirect.

The evidence surrounding the impact of natural capital on labour productivity is stronger. Evidence shows that temperatures and greenery can influence productivity and this is corroborated by the work outlined in Section 7.6. Further, natural capital may be able to positively affect labour productivity indirectly through its associations with greater educational attainment (higher levels of human capital) and greater health and wellbeing. Higher levels of natural capital may therefore be an explanatory variable that can account for the positive association between levels of labour productivity and wellbeing.

However, greater productivity growth may also be able to deplete or negatively impact existing forms of natural capital due to the higher levels of energy use and carbon emissions. Here then again we are seeing a pattern whereby productivity growth may negatively impact upon those factors that we have identified to be important facilitators of higher levels of wellbeing and productivity.

Suggested areas for further research in this area are as follows.

1. We have outlined a number of reasons why the contribution of natural capital to multi-factor productivity may be hard to locate. More work is needed in order to try to specify the exact effects of natural capital on multi-factor productivity, building on recent work using OECD data.
2. If certain forms of natural capital are in decline then a priority for future work would be to consider whether natural capital can be substituted by technological innovations, and the impact this has on both wellbeing

and productivity growth. Emerging research in the field of environmental psychology, for example, is exploring whether exposure to scenes of nature through virtual reality headsets can provide the same wellbeing benefits as actually being in nature (Calogiuri et al., 2018; White et al., 2018).

3. Future work may benefit from exploring regional differences in productivity and wellbeing and relating this to regional levels of natural capital. Recent work from the University of Warwick used data from smartphone apps to show that people tend to be happier in more scenic environments (Seresinhe, Preis, MacKerron, & Moat, 2019). Work of this kind could be extended to assess whether the productivity of organisations is higher when they are located in different types of environments also.

10 | Summing Up and Final Reflections.

In this report we have aimed to illustrate the complex nature of the relationship between wellbeing and productivity. Our evidence is drawn from a range of perspectives including economic, organisational, and psychological science. Falling productivity growth is considered a problem due to the conventional economic view that productivity growth is linked to standards of living (and thus wellbeing). Further, increasing the wellbeing of the workforce has been proposed as a means of boosting productivity growth in the UK. The underlying assumption here is that there exists a positive link between worker wellbeing and (labour) productivity. However, it is not clear just how strong the link between wellbeing and productivity actually is, nor the extent to which it is bi-directional or stable across different contexts.

10.1 Wellbeing is Linked to Higher Labour Productivity

Sections 2 – 4 of this review examined the evidence surrounding the link between the different aspects of personal wellbeing and productivity. Research in this area tends to support the assumption that individuals displaying higher levels of wellbeing will also report higher levels of labour productivity.

Poor physical health (Section 2.1) appears to be associated with lower productivity, both when an individual has a diagnosed health problem and when they engage in risky health behaviours such as smoking or lack of exercise. With an ageing workforce and signs of job polarization (Clements-

Croome, 2006; Salvatori, 2018), longitudinal research will be useful moving forward in order to determine whether systematic changes in society are exacerbating the effects of poor physical health on productivity.

Poor mental health (Section 2.2) has been shown to often occur alongside poor physical health, making it hard to always disentangle the relative impacts of these two factors on productivity. Mental health appears to be more strongly linked with lost productivity through presenteeism (relative to absenteeism), but it will be interesting to see if this pattern changes as charities and Public Health England continue to campaign to normalise mental health problems (Fleming, 2019).

Subjective wellbeing (Section 3) describes our experience of positive emotions and satisfaction with our life circumstances. Experimentally manipulating levels of subjective wellbeing has been shown to influence productivity, demonstrating a causal link between these two variables. However, this causal link has only been established in one direction and current work largely ignores eudaimonic perspectives on wellbeing, which emphasize the importance of purpose, growth and meaning in life. Future studies need to uncover whether these facets of wellbeing are linked to productivity in the same way as subjective wellbeing.

Stress (Section 4) describes the adverse reaction to excessive perceived pressures and demands placed on the individual. When experiencing stress individuals often report symptoms of poor physical health and burnout. Although small amounts of stress have sometimes been suggested to be a motivator for superior performance, high levels of stress are related to lower productivity. Certain individuals are said to be more resilient to the negative effects of stress and training resilience has been shown to produce positive effects on wellbeing and productivity. However, future work will be needed to determine whether promoting resilience or reducing the demands that lead to stress is a better strategy for boosting both wellbeing and productivity.

Workplace wellness programmes (Section 5) are interventions designed to improve the health and wellbeing of an organisation. In many ways these interventions provide an experimental test of whether boosting employee wellbeing can cause increases in productivity. Case studies demonstrate that these programmes can deliver benefits in terms of enhanced productivity, but this seems to be reliant on certain conditions being met. The literature demonstrates a need for better evaluation of workplace wellness programmes and work also needs to be done to determine the longevity of improvements in productivity once participation in programmes has been terminated.

10.2 Factors that Enhance Wellbeing and Labour Productivity

From Sections 6-9 of the report we focus on the wider range of factors that have been linked to both productivity and wellbeing, and thus have the potential to be explanatory or moderating variables in the relationship between these two factors. Together, high levels of human and social capital (Section 6) facilitate the development and sharing of skills and knowledge, thus enhancing productivity. Both factors can also raise wellbeing, partly by satisfying our psychological needs for competence and relatedness.

When reviewing workplace factors (Section 7) we see that a handful of factors are positively linked to both wellbeing and productivity. These mainly concern the physical aspects of the workplace environment, for example, optimal office temperatures. In line with this, Section 9 outlines how certain forms of natural capital such as air quality, greenery and temperatures are positively linked to higher levels of both productivity and well-being. Further, information and communication technology (ICT, Section 8) has been considered as a key driver of productivity growth and has the potential to support wellbeing in that it facilitates communication, autonomy, and more flexible working conditions. Accordingly, from this review we can see that there are a number of personal, organisational, and environmental factors that can support both higher levels of labour productivity and higher levels of well-being. These factors may be able to partly explain the documented positive relationship between wellbeing and labour productivity levels.

10.3 Productivity Growth May Undermine Wellbeing and Productivity

Whilst the evidence base clearly supports a positive relationship between wellbeing and levels of productivity, throughout this review a second key trend has emerged. That is that factors related to productivity growth have the potential to undermine well-being.

In Section 2.3 we noted that attempts to reduce costs and increase labour productivity within the healthcare sector can lead to poorer quality care being provided. Further, many of the workplace factors (Section 7) that have been shown to undermine employee wellbeing such as job insecurity and high job demands may be heightened by the pursuit of productivity growth. The adoption of ICT (Section 8) has been considered to be a key driver of productivity growth, however its use can also have detrimental effects on wellbeing by creating a perceived need for constant availability, blurring the boundaries between work and home life, and promoting sedentary lifestyles. In addition, by increasing carbon emissions, productivity growth may have

detrimental effects upon natural capital which we know to be linked to greater well-being.

If short term productivity growth has the potential to undermine wellbeing in the long-run, and if wellbeing is a determinant of levels of labour productivity, then this means that productivity growth also has the potential to undermine itself over time. If the pursuit of productivity growth can undermine not only wellbeing but also productivity itself then this may suggest that we need new critical perspectives on the inherent value of productivity growth and the way in which it is pursued.

10.4 Moving Forward

If we acknowledge that productivity growth has the potential to undermine wellbeing then this may prompt two questions: 1) Can we alter our current practices such that productivity growth can be achieved in the absence of detrimental effects to well-being? And, 2) should we continue to pursue productivity growth?

One area that is currently addressing the first question is work into the possibility of a shorter working week. In Section 9 we highlighted that the higher output caused by productivity growth has the potential to damage natural capital by increasing carbon emissions. However, boosting productivity without increasing output can threaten full employment if work is not spread more evenly (Jackson, 2017). If fewer people are needed to produce the same amount of output then this means that some people are going to lose their jobs (Jackson & Victor, 2011). One way to counteract this problem would be to lessen the hours worked by each individual (Coote & Franklin, 2013; Victor, 2008). Indeed, we noted in Section 7.6 that one of the proposed benefits of productivity growth should be increased leisure time, but that recent research suggests that this isn't being realised by individuals in the UK.

A number of organisations are currently calling for a four-day working week (Stronge, 2019). Supporters of this call argue that shorter working weeks would allow for greater individual health and wellbeing, reduce carbon emissions, and help create jobs for groups (e.g. women) who might otherwise be excluded from work due to greater caring responsibilities etc. (Dengler & Strunk, 2018; Harper et al., 2019; Hayden & Shandra, 2009; Knight, Rosa, & Schor, 2013).

A number of case studies show that transitioning to shorter working hours is possible. For example, when experiencing over-capacity problems, the German works council of Volkswagen chose to reduce the working week

from 36 to 28.8 hours in order to prevent redundancies (De Spiegelaere & Piasna, 2017). In addition, Royal Mail began the transition from a 39 hour to 35 hour work week in September 2018 in order to distribute the productivity gains from the implementation of an automated parcel sorting system more evenly among workers and shareholders (The Communications Union, 2018). A number of case studies are also documenting positive effects on employee wellbeing and productivity as a result of adopting the shorter working week. For example, when Microsoft implemented a 4-day working week in its Japan offices in August 2019 the company reported that labour productivity was 40% greater than in August 2018 and that 92% of employees reported feeling happy with the shorter week (Paddison, 2019). Future work will want to assess what other societal changes may be able to offer a complementarity between productivity growth, productivity levels, and wellbeing.

With regards to the second question, there are a number of sectors whereby theorists have argued that productivity growth is not a valuable goal. These sectors tend to be service-based and thus offer fewer opportunities for productivity growth as their activities are often highly labour intensive (Jackson & Victor, 2011). Activities within these sectors tend to rely on time and attention in order to function well and thus pursuing productivity growth within these activities may change their character and undermine their value. In Section 2.3 we highlighted how healthcare may be one sector whereby the value of activities is undermined by productivity growth, and researchers have suggested that the same may be true for the areas of social work, education, and craft (Jackson, 2017; Klitgaard, 2017).

The difficulty in pursuing productivity growth in service-based sectors does not necessarily have to be seen as problematic. A number of theorists believe that the change to a service-based economy offers the potential for greater sustainability, as services have the possibility to be less materially and energy-intensive than products. The slower productivity growth within these sectors also reduces threats to employment (Baumol and Bowen 1966, Jackson 2017, Jackson & Victor, 2011). Further, an emphasis on the quality of work rather than quantity of goods produced can mean that work is more meaningful and in some cases, even pleasurable, for employees (Mair et al., 2018). Research in the fields of 'degrowth' and 'postgrowth' is exploring how we might live in a society whereby productivity and economic growth are not at the heart of prosperity (Büchs & Koch, 2017; Jackson, 2019; Jackson & Victor, 2018, 2019; Kallis, 2011; Rosa & Henning, 2018).

10.5 Final Remarks

Overall this review highlights a need for critical reflections on our current understanding of the link between wellbeing and productivity. We consider wellbeing to be a driver of individual productivity. This is well documented in the existing literature and we have outlined a number of factors that could partly explain this positive link. However, more work could be done to further quality for this relationship. For example, are there tipping points in this relationship? Exactly what level of wellbeing is needed to produce higher levels of productivity? Further, whilst productivity growth is considered to be able to improve living standards and thus wellbeing, we find that the pursuit of productivity growth also seems to involve certain factors that have been shown to have detrimental effects on wellbeing (and thus potentially productivity levels). In order to generate a more nuanced understanding of the effects of productivity growth on wellbeing future work will want to test how this relationship changes from the short to long-term, across different levels of economic development, and as our expectations of what constitutes a good life and good work might also change.

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