



Contents lists available at ScienceDirect

Ecological Economics

journal homepage: www.elsevier.com/locate/ecocon

Worker wellbeing and productivity in advanced economies: Re-examining the link

Amy Isham^{a,*}, Simon Mair^b, Tim Jackson^a

^a Centre for the Understanding of Sustainable Prosperity (CUSP), University of Surrey, Guildford GU2 7XH, United Kingdom

^b School of Management, University of Bradford, Bradford BD7 1SR, United Kingdom

ARTICLE INFO

Keywords:

Health
Wellbeing
Productivity
Productivity growth
Workplace factors

ABSTRACT

Labour productivity is a key concept for understanding the way modern economies use resources and features prominently in ecological economics. Ecological economists have questioned the desirability of labour productivity growth on both environmental and social grounds. In this paper we aim to contribute to ongoing debates by focusing on the link between labour productivity and worker wellbeing. First, we review the evidence for the happy-productive worker thesis, which suggests labour productivity could be improved by increasing worker wellbeing. Second, we review the evidence on ways that productivity growth may undermine worker wellbeing. We find there is experimental evidence demonstrating a causal effect of worker wellbeing on productivity, but that the relationship can also sometimes involve resource-intensive mediators. Taken together with the evidence of a negative impact on worker wellbeing from productivity growth, we conclude that a relentless pursuit of productivity growth is potentially counterproductive, not only in terms of worker wellbeing, but even in terms of long-term productivity.

1. Introduction

Labour productivity is a key concept in the work of many ecological economists (Dávila-Fernández and Sordi, 2020; Jackson and Victor, 2011; Mair et al., 2020; Stratford, 2020). Typically, labour productivity describes the amount of market value (e.g. GDP or gross output) that can be generated from a given amount of labour (e.g. hours worked) in the economy. Labour productivity plays a key role in both understanding and driving the way in which our economies use and distribute resources. Our concern in this paper is to explore the relationship between labour productivity growth and worker wellbeing.

The dominant view outside ecological economics is that labour productivity growth is central to improving worker wellbeing. Amongst its proposed benefits are increased leisure time (Sharpe, 2004) and higher wages (Clark, 1908; Franklin, 2018; Kuegler et al., 2018). These claims can be ambiguous when the benefits are not equally distributed across society. For example, since the 1980s, productivity gains have not been accompanied by equal gains in leisure time for workers in the UK (Stirling, 2019). Likewise, in the US, recent increases in productivity have been accompanied by strong increases in corporate profits, but sluggish growth in real wages for workers, especially amongst low-

income households (Willis and Wroblewski, 2007). Ecological economists have raised additional concerns. For instance, labour productivity growth has been questioned on the grounds that it may harm the wellbeing of workers directly (by degrading work) and indirectly (by harming the environment) (Hardt et al., 2020; Jackson, 2017; Klitgaard, 2017; Mair et al., 2020).

For some ecological economists, labour productivity growth is a materially and energetically intensive process that drives environmental impact. One line of argument comes from the fact that economic sectors characterised by high labour productivity growth, also tend to exhibit high environmental impacts, and conversely low labour productivity growth sectors tend to have lower environmental impacts (Baumol, 2012; Hardt et al., 2020; Jackson, 2017). It has also been argued that labour productivity growth has historically required increases in high quality fossil energy use (Cleveland et al., 1984; Debeir et al., 1991; Wrigley, 2016). There is still debate over the quality of renewable energies, raising questions as to their ability to deliver future labour productivity growth (Brockway et al., 2019; Cleveland et al., 1984). Finally, labour productivity growth has been implicated in the overall growth of production, which is linked to energy and material use (Jackson and Victor, 2018; Mair et al., 2020; Stratford, 2020). Each of these

* Corresponding author at: Centre for the Understanding of Sustainable Prosperity (CUSP), University of Surrey, Guildford GU2 7XH, United Kingdom.

E-mail addresses: a.isham@surrey.ac.uk (A. Isham), s.mair1@bradford.ac.uk (S. Mair), t.jackson@surrey.ac.uk (T. Jackson).

<https://doi.org/10.1016/j.ecolecon.2021.106989>

Received 1 December 2020; Received in revised form 2 February 2021; Accepted 3 February 2021

Available online 24 February 2021

0921-8009/© 2021 The Author(s). Published by Elsevier B.V. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

arguments implies that having labour productivity growth as a goal either requires or causes an increase in environmental impacts.

Ecological economists have also engaged with labour productivity-wellbeing dynamics in the context of work in a post-growth society. Reductions in labour productivity have been proposed as a way to reduce the output of society and simultaneously improve the wellbeing of workers. The argument is that reducing labour productivity growth enables workers to take more time, to focus on the process of work and find joy in producing an object for its use rather than its market value (Mair et al., 2020; Norgård, 2013). On the other hand, discussions of reduced working hours in a post-growth context have suggested that we might use productivity gains to deliver greater wellbeing through increased leisure time (Schor, 2015; Victor, 2008). Key to these debates is the economic role of labour productivity growth: how does labour productivity growth shape our wellbeing at and through our work?

In this paper we aim to inform discussions of labour productivity in ecological economics by reviewing the literature on two key aspects of the labour productivity-worker wellbeing relationship. The themes and ideas presented in the paper are born out of a multi-stage review and mapping process conducted as part of the 'Powering Productivity' project (Boehnert et al., 2019). This process involved sending online questionnaires to researchers and practitioners working in the areas of labour productivity and worker wellbeing asking for key themes, references and research groups. In addition, we conducted a participatory mapping workshop with experts from fields such as organisational psychology, economics and management in the UK. Here, participants used systems mapping approaches to create both individual and collaborative visual maps demonstrating the current understandings and knowledge gaps in the relationship between productivity and worker wellbeing. Systems mapping approaches make use of visual strategies to graphically display the relationships between different ideas, actors and spaces such that the dynamic nature of the relationships can be revealed. Both of these stages guided the literature search process.

The paper presents and discusses key themes that emerged from that process of review and participatory mapping. Our starting point (Section 2) is to outline evidence for the so-called 'happy-productive worker' thesis. This thesis posits that worker wellbeing is a key determinant of labour productivity. If correct, it suggests a potentially low energy, low material way of raising labour productivity by increasing worker wellbeing, representing a potential win-win from an ecological economics perspective. Next (Section 3), we outline the potential negative relationships between productivity and worker wellbeing. Here we synthesise a broad range of literatures and identify four key ways in which the pursuit of labour productivity growth may negatively affect worker wellbeing. We consider how changes in working patterns can heighten job demands and insecurity, how greater utilisation of information and communication technology can create tension between work and home life and promote poor health behaviours, and finally how a focus on market aspects of production can drive worker alienation. We conclude in Section 4 by considering what these two areas of review may mean for debates on labour productivity in ecological economics.

2. The happy-productive worker thesis: can wellbeing drive productivity growth?

The 'happy-productive worker' thesis (Christensen, 2017; DiMaria et al., 2019) states that employee wellbeing is a positive determinant of greater levels of employee and firm-level labour productivity. Indeed, improving levels of employee wellbeing has been suggested by some as a means of solving the current period of slow productivity puzzle (Austin, 2019; Bevan, 2018). The happy-productive worker thesis is largely drawn from the literature in organisational psychology. Wellbeing is a multifaceted construct and includes many subcomponents covering physical health to life satisfaction. Here we review several key facets of wellbeing that this literature has linked to productivity (sections 2.1–4), and then evaluate the evidence for these links (section 2.5–6).

2.1. Physical health and productivity

A vast range of physical health conditions have been linked to reduced productivity, with the degree of the impairment tending to increase with the severity of the health condition (Hafner, van Stolk, Saunders, Krapels, & Baruch, 2015). These include severe asthma (Chen et al., 2008), cardiovascular disease (Gordoio et al., 2016), and Type 1 and Type 2 diabetes (Hex et al., 2012).

Physical health conditions can impair productivity through both absenteeism and presenteeism. Absenteeism is when poor wellbeing causes people to take time away from work. Presenteeism is when people are present at work but operating at less than their full capacity. For example, cancer patients lose productivity through absenteeism due to treatment or sickness (Bradley et al., 2006). When cancer patients and survivors return to work they report poorer levels of on-the-job productivity, partly because of higher levels of fatigue and hot flashes (Lavigne et al., 2008).

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. This leads to physical health problems such as fatigue, sleep disruption, and reductions in physical activity (Beesley et al., 2011; Stenberg et al., 2009). These negative effects on their physical health have the potential to impact upon the productivity of carers. Caregivers report being less able to concentrate on the job, having to spend time at work on the phone to family members or medical providers, and missing time from work in order to provide informal care (Giovannetti et al., 2009; Swanberg, 2006).

There are a number of behavioural traits that can put health at risk, and in this way reduce worker productivity. Known as 'health risk behaviours', these are actions that have the potential to raise the probability of adverse health outcomes (World Health Organisation, 2009). These include inadequate sleep, lack of exercise, poor diet and cigarette smoking. Individuals displaying these risk factors have been shown to be less productive (Baker et al., 2017; Katz et al., 2014). This highlights how the impacts of physical health on productivity precede the point of diagnosis of a disease or injury.

2.2. Mental health and productivity

Mental health problems cover conditions such as depression, anxiety, and obsessive-compulsive disorder (Kendrick and Pilling, 2012). Mental health has been shown to be one of the greatest causes of lost productivity. In the UK, 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 study of companies participating in Britain's Healthiest Company competition.

Research shows that productivity losses due to mental health problems are more strongly related to presenteeism than absenteeism (Goetzel et al., 2004; Stewart et al., 2003). This may be because fear of stigma and discrimination mean that workers choose to work even if unwell. The NHS Attitudes to Mental Health Survey found that 43% of employees would be reluctant to disclose mental health issues at work (NHS Information Centre, 2011). This fear of disclosure is well founded: a survey of 2006 adults in employment 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).

Depression is probably the most widely studied mental health condition in relation to productivity. It tends (along with anxiety) to be the most frequently reported chronic illness amongst employees (Munir et al., 2005). Findings demonstrate that employees with depression display greater rates of absenteeism (approximately ¼ day more per month) in comparison to workers with no psychiatric issues (Kessler et al., 2001). They are also said to lose around 20% of their self-reported

productivity when at work (Greenberg et al., 1993), reporting difficulties in time management, keeping concentrated on work, communicating effectively with colleagues, and achieving the required output (Burton et al., 2004). The effective treatment of depression coincides with productivity gains in terms of self-reported worker performance (Finkelstein et al., 1996) and reductions in lost workdays (Claxton et al., 1999).

2.3. Subjective wellbeing and productivity

Higher levels of wellbeing, independent of any diagnosed health problems, have also been linked to greater individual productivity. Subjective wellbeing (SWB) refers to an individual's own sense of how well their lives are going. It is frequently described using the following equation: $SWB = \text{satisfaction with life} + \text{high positive affect} + \text{low negative affect}$ (Diener et al., 1985). Life satisfaction describes an individual's belief that their life is of the standard that they deserve. As well as satisfaction with life overall, it is recognised that people also make judgements of specific life domains such as work (Diener et al., 2009).

High job satisfaction has been linked to higher individual and organisational productivity (Bakotić, 2016; Edmans, 2012; Hafner et al., 2015), but findings are not always consistent (Daily and Near, 2000; Mohr and Puck, 2007). The inconsistent findings may occur because this relationship is moderated by certain factors. Schaumberg and Flynn (2017) found that job satisfaction was only linked with fewer absence days when an individual was low in guilt-proneness, agreeableness, and moral identity. The social and economic context could also be important. For example, wage increases (one component of job satisfaction) have been shown to be more likely to motivate higher employee productivity if the increase comes when firm profits are falling rather than when they are increasing (Hannan, 2005). 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".

The mixture of high positive affect and low negative affect highlights the hedonic wellbeing component of subjective wellbeing. Hedonic wellbeing is commonly considered to be what we think of as happiness (Haybron, 2008). It is concerned with the experience of pleasant moods or emotions such as joy, delight, and elation whilst limiting unpleasant emotions such as sadness, misery, and distress (Ryan and Deci, 2001).

The most well-known study into the effects of hedonic wellbeing on productivity comes from Oswald et al. (2015). In an experimental study with undergraduate students, they demonstrated that inducing pleasant emotions using a comedy video led participants to be 10% more productive on a math test in comparison to when the comedy video had not been viewed. A natural experiment, again with students, then showed that when individuals had experienced a recent shock to their happiness (in the form of a family bereavement or illness) they were also 10% less productive on the math test in comparison to those who had not experienced such bad event. The finding that people who experience more positive emotions are more productive has been replicated (Miner and Glomb, 2010; Shockley et al., 2012), with the experience of positive emotions being linked to greater productivity across various task types including creativity (Baas et al., 2008; Davis, 2009) and analytical thinking (Graziotin et al., 2014). Indeed, further studies have also employed experimental methods to show that inducing positive feelings can enhance productivity. For example, Isen and Reeve (2005) documented that inducing positive affect by gifting participants candy led them to be faster (but still as accurate) when identifying letter strings that were in alphabetical order amongst a larger group of strings in comparison to a control group. However, this effect was only identified in one of their two studies.

2.4. Work-related stress and productivity

Stress describes the adverse reaction people have to perceived excessive pressures or demands placed on them (Butler, 1993). The experience of work-related stress has been linked to both higher levels of presenteeism (Jeon et al., 2014) and absenteeism (Jamal, 2007). The effects of stress on presenteeism have been shown to be larger than those on absenteeism (Elstad and Vabø, 2008). However, the size of the relationship between work-related stress and absenteeism may risk being underestimated because employees often seem reluctant to disclose when their absence days are 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).

The experience of chronic stress is linked to a number of physical health risks and physical health-related behaviours, including high blood pressure, heavy alcohol use, low physical activity, and smoking (Belkic et al., 2004; Giga et al., 2003). Poorer physical health may therefore be one route through which work-related stress is able to have detrimental effects upon productivity. Stress can also have a direct effect on the body's physiology systems. Using data from the Whitehall II longitudinal study of civil servants in London, Chandola et al. (2008) showed that work-related stress could directly influence CHD via repeated activation of the autonomic nervous system (characterised by lower heart rate variability) and dysregulation of the hypothalamic-pituitary-adrenal axis (this system controls the cortisol circadian rhythm).

Chronic, continuous exposure to work-related stress can lead to burnout (Lee and Ashforth, 1996). Burnout is characterised by physical, mental and emotional exhaustion, cynicism, and impaired personal efficacy (Bakker et al., 2003). As burnout is characterised by reduced efficacy, it is commonly shown to be linked to lower productivity across measures such as absenteeism, presenteeism and intent to change jobs (Dewa et al., 2014). 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.

2.5. Workplace wellness programmes and productivity

Workplace wellness programmes are intended to modify employees' health and wellbeing such that this can have a positive impact upon their health, wellbeing and productivity (Buseman-Williams, 2014). Their components can vary, ranging from fitness memberships and counselling services to mindfulness training and on-site yoga. Increases in productivity as a result of engaging in workplace wellness programmes helps to support the case that wellbeing is a direct determinant of productivity levels. Indeed, many programmes have been shown to reap rewards in terms of enhanced organisational productivity (Atlantis et al., 2004; Burton et al., 2005; Halliwell, 2010), often gaining financial rewards that outweigh the cost of implementing the scheme (Henke et al., 2011; McDaid et al., 2008; PricewaterhouseCoopers, 2008).

2.6. Evidence for causality or indirect effects?

We have seen that various components of wellbeing have been positively associated with higher levels of productivity. Some of the evidence here indicates a direct, causal effect of wellbeing on productivity. For example, Oswald et al.'s (2015) and Isen and Reeve's (2005) work experimentally manipulates levels of positive affect and then tests the consequences for task productivity. Longitudinal studies, although less powerful at detecting causality than experiments, can also indicate more than a simple correlation. For example, Edmans (2012) documented that employee job satisfaction was linked to greater future stock returns for the organisation. If productivity was a driver of job satisfaction (rather than vice versa) then the stock price should have already been high at the time when job satisfaction was measured. Successful

workplace wellness programmes could also indicate direct effects on productivity, providing that extraneous variables are controlled for.

However, much of the work is also largely correlational. This means that as well as a direct effect of wellbeing on productivity, there may be factors that can promote both high levels of wellbeing and productivity, hence giving rise to the documented positive associations between these two variables. A number of potential explanatory variables can be identified. Here we provide some examples, but this is by no means an exhaustive list. Firstly, the greater adoption of information and communication technology (ICT) has been linked to heightened labour productivity across OECD countries (O'Mahony and Vecchi, 2005; Oulton and Srinivasan, 2005; Spiezia, 2012). At the same time, ICT can have positive effects on employee wellbeing by allowing for flexibility in working patterns and greater autonomy (Bordi et al., 2018; Lee et al., 2017).

Another possible explanatory variable is natural capital (those aspects of the environment that can provide goods and ecosystem services which benefit people (Guerry et al., 2015). High temperatures (Federpiel et al., 2004), poor air quality (Graff Zivin and Neidell, 2012) and the absence of greenery (Bakker and van der Voordt, 2010) have all been linked to lower levels of labour productivity. Equally, high temperatures have been linked to heat exhaustion, heat stroke, and mortality (Hajat et al., 2010) whilst access to green space has been linked to a range of positive health outcomes including lower HDL cholesterol, reduced incidences of type II diabetes, and reduced all-cause mortality (Twohig-Bennett and Jones, 2018).

Managers may also have a role to play in promoting both the wellbeing and productivity of the workers they supervise. High quality bosses promote higher levels of productivity because they can teach and enhance the motivation of their supervisees (Lazear et al., 2015) and facilitate feelings of trust (Brown et al., 2015). At the same time, employees' job satisfaction tends to be higher when they have a competent supervisor (Artz et al., 2017). For example, Kuroda and Yamamoto (2018) found that supervisors' level of competency and communication was positively related to employees' mental health even after controlling for factors such as job strain and number of hours worked.

3. Productivity growth may undermine wellbeing

So far, we have focused on how levels of individual wellbeing may be able to promote or hinder labour productivity. Now we will consider the effects of higher levels of productivity and productivity growth on the wellbeing of workers. As discussed at the outset (Section 1), the received wisdom is that labour productivity growth increases worker wellbeing. However, there is also evidence to the contrary, namely to the effect that labour productivity growth may actively harm the wellbeing of workers. It is to this evidence that we now turn.

3.1. Workplace factors, wellbeing, and productivity

The pursuit of productivity growth can result in a number of workplace factors that directly impact worker wellbeing. Here we point to two such factors. First heightened job demands, that result from downsizing in an attempt to cut costs (Corbett, 2015) and second, job insecurity, justified as flexible labour market policy intended to make it easier for firms to innovate (Bartelsman et al., 2016; Sverke et al., 2002).

Heightened job demands result from fewer people being tasked with more and more work (Clements-Croome, 2006). When investigating the experiences of employees at HMRC following the 2004 governmental announcement that over 10,500 jobs would be cut in the department, Carter et al. (2011) found that 63% of staff reported feeling 'very pressurised' in their work after the job cuts, compared to just 1% before they were introduced. The perception of higher job demands has been associated with greater anxiety, lower happiness and job dissatisfaction (Lu et al., 2006; Warr, 1990). It can also lead to work-to-family conflict (Voydanoff, 2005) as workers struggle to find enough time and energy to

complete tasks at home. Further, high job demands are considered as a precursor to the exhaustion component of burnout (Schaufeli and Bakker, 2004).

The threat of job losses has resulted in job insecurity for a number of individuals. Governments use policies such as laws on anti-competitive behaviour and merger control legislation to increase competition within markets in the belief that this can raise productivity (Buccrossi et al., 2013). But increased competition ultimately means that less productive organisations are forced to leave the market resulting in job losses for their employees (CMA, 2015). 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). Job insecurity has been positively related to psychological distress (e.g. symptoms of depression and anxiety) and negatively related to life satisfaction (Silla et al., 2009). Longitudinal evidence also concludes that there is strong evidence for an effect of job insecurity on health and psychological wellbeing over time (De Witte et al., 2016).

3.2. ICT and wellbeing

We previously noted that the adoption of ICT is a strong driver of productivity growth and has the potential to positively impact employee wellbeing, for example by increasing the ease of communication and allowing for flexible working patterns. However, there are also a number of ways in which ICT is able to have detrimental effects on employee wellbeing.

Through technology, employees become accessible to their supervisors and colleagues outside of the office. This increased accessibility of workers is argued to increase work-related stress via several routes (Ayyagari, Grover, and Purvis, 2011). Firstly, it can heighten work-to-home conflict. Being able to work from home blurs the boundaries between work and home life, and can lead employees to believe that working from home is expected (Middleton and Cukier, 2006). Greater work-to-home conflict has been shown to predict poorer employee wellbeing (happiness and life/job satisfaction) six months later (Grant-Vallone and Donaldson, 2001). In addition, concerns around privacy are a factor that contributes to 'technostress' which has been shown to be related to poorer life satisfaction (Nimrod, 2018).

Frequent interruptions from calls and emails can lead individuals to experience role ambiguity as they struggle to determine which tasks to prioritise (Wajcman and Rose, 2011). This, in turn, has been related to higher levels of job strain (feeling drained and burnt out from work) (Ayyagari et al., 2011). Technology is not infallible and when it fails to work, this becomes a factor that can increase work-related stress and anxiety (Stadin et al., 2019). The use of computers in the workplace may also lead to musculoskeletal symptoms such as aches, pains, and numbness (Eltayeb et al., 2007; Hagberg et al., 2002), with women appearing to be at a greater risk of developing musculoskeletal symptoms/disorders as a consequence of using ICT compared to men (Gerr et al., 2002).

3.3. Alienation, wellbeing and the pursuit of productivity

Alienation can be understood as a dissociative state within a worker provoked by conditions of work (Nair and Vohra, 2009). The term's popularity owes much to Marx (1844/2009), who defined alienation as a dissociation between the worker and 1) the product they produce, 2) the process of production and, as consequence of the previous two, 3) society at large. Marx argues that all of these aspects of alienation are the result of the pressures of capitalist production which forces workers to produce goods that are divorced from their own needs, and in a process over which they have no control.

Alienation is linked to productivity because both Marx and contemporary writers see alienation as tied to the need to produce for the market. For example, Chatterton and Pusey (2020) describe

increasing alienation that comes from the expansion of markets into new areas of life. This is notable as marketisation of low labour productivity growth sectors (like health) is a strategy intended to boost productivity (Collyer and White, 2011; Lobo et al., 2018). Indeed, since Adam Smith, productivity has principally been defined in market terms (Abbott, 2018; Foster, 2016). And as feminist economists have made clear, work outside the market is not considered productive by mainstream economics or economic institutions (Waring, 1990). We see this today in the most common labour productivity measures, such as GDP per hour worked. When workplaces and governments strive to improve labour productivity, they are striving to produce more market value.

Research suggests that alienation is negatively related to worker wellbeing. In an early study, Coburn (1979) reports that measures of alienation are weakly but robustly correlated with both psychological and physiological wellbeing measures. Using data from 685 workers, Van Den Bosch and Taris (2014) report that feelings of authenticity at work are related to wellbeing. Shantz et al. (2014) use a structural model to analyse data from 227 manufacturing employees in the UK. They find that alienation at work causes emotional exhaustion and reduces wellbeing. In their meta-analysis, Chiaburu et al. (2014) find that alienation is predictor of employee drinking (albeit with a small effect size) and for health symptoms. Finally, Conway et al. (2018) study 1455 public sector employees in the UK and Ireland and find that alienation is positively correlated with emotional exhaustion and negatively correlated with job satisfaction.

4. Conclusions

Two prominent aspects of the labour productivity-worker wellbeing

relation considered important by ecological economists are the way labour productivity impacts on the environment, and the way it mediates our experiences of work. In this paper we have reviewed two aspects of the literature that speak to these issues.

First, we reviewed the happy-productive worker thesis. Represented in the lower half of Fig. 1, by suggesting that worker wellbeing might impact worker productivity, the happy-productive worker thesis hints at the possibility of labour productivity growth that does not require further direct input of materials or energy. Our review does suggest that individuals displaying higher levels of wellbeing tend to report higher levels of labour productivity. This link appears to operate across areas such as physical and mental health, subjective wellbeing and stress. Some evidence implies a direct, causal link from wellbeing to productivity, meaning that targeting improvements in worker wellbeing should lead to rises in labour productivity. On top of this, the literature suggests that there may be factors (e.g. high-quality supervisors and natural capital) that can promote both higher levels of wellbeing and productivity. These factors mean that there may also be indirect links between worker wellbeing and productivity which could explain some of the positive correlations documented between the two variables. When the mediating factors are not resource intensive this presents no problems from an ecological economics perspective. Training supervisors to be more effective, for example, would not necessarily have negative impacts in terms of sustainability. But when the mediating factors do turn out to be resource intensive, for example the production and powering of ICT would of course have environmental impacts, then we must be more cautious. Trying to improve wellbeing and productivity through these routes could lead to increases in environmental impact and ultimately be unsustainable.

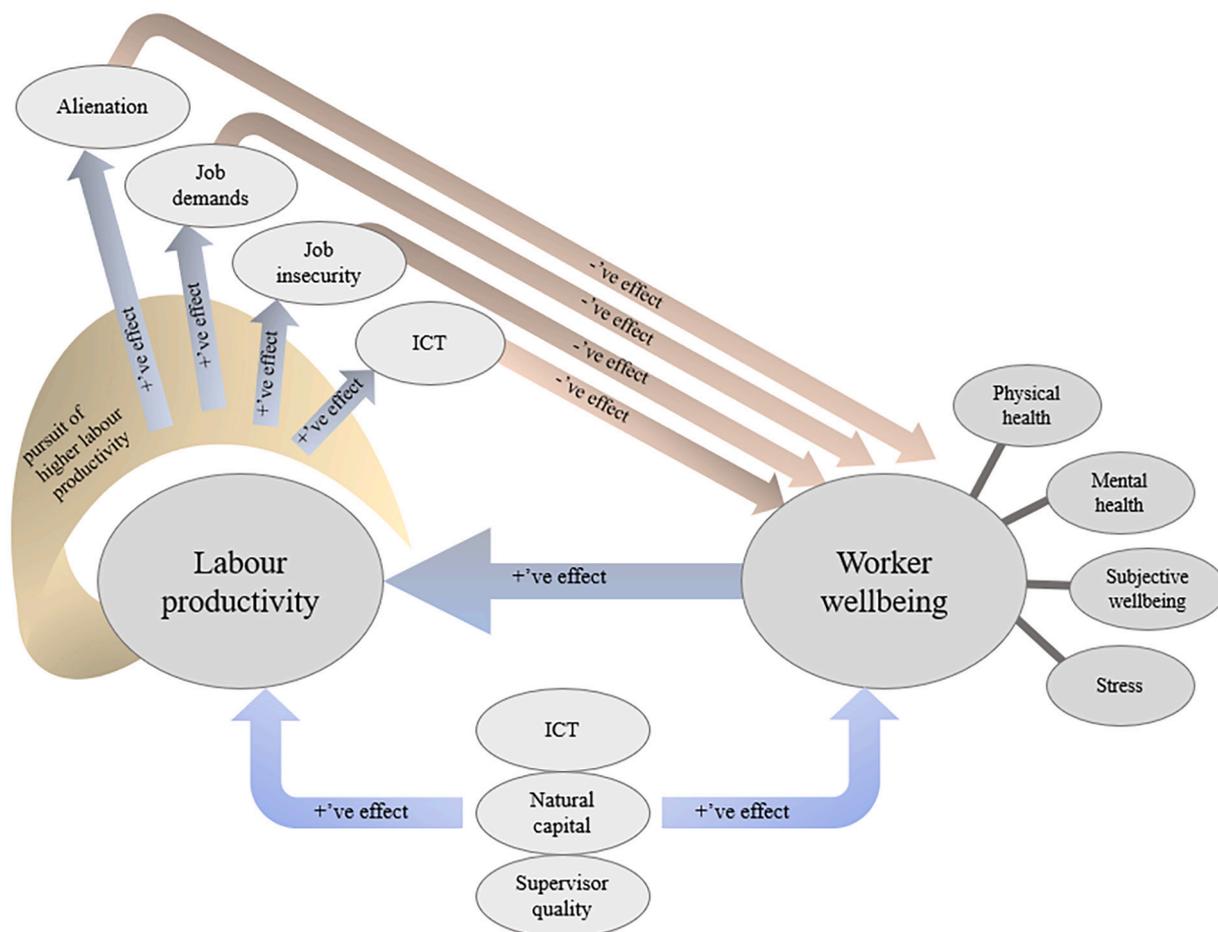


Fig. 1. Visualisation of the nature of the relationship between labour productivity and worker wellbeing discussed.

Next, we reviewed evidence on the potential negative relationship between labour productivity growth and worker wellbeing. This is represented in the top half of Fig. 1. We argued that high job demands and job insecurity have been shown to undermine employee wellbeing and that the use of ICT can 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. Further, by pushing market aspects of production, productivity growth may also increase alienation, which is negatively correlated with wellbeing. This literature therefore suggests that there may be positive benefits to worker wellbeing from a slowing down in the pursuit of labour productivity growth.

Together our findings present a paradox inherent in the labour productivity-worker wellbeing relationship. Increases in productivity growth may negatively contribute to worker wellbeing. Yet at the same time, reductions in worker wellbeing may reduce productivity growth. So, increases in productivity growth may reduce productivity growth. This paradox suggests that labour productivity growth may be both undesirable because it reduces worker wellbeing and unsustainable because ultimately it tends to undermine itself.

These findings underline arguments made extensively in ecological economics that economic progress should be measured not by GDP growth or even labour productivity growth, but rather by indicators that emphasise wellbeing and quality of life (Corlet Walker and Jackson, 2019; Easterlin, 1974; Easterlin et al., 2010). Labour productivity may turn out to be higher as a consequence – if the happy-productive worker hypothesis is correct. But as growth is no longer the primary aim, any gains from this increased labour productivity could be used to support wellbeing and more sustainable lifestyles rather than further growth, for example by increasing leisure time (Coote and Franklin, 2013; Harper et al., 2019; Kameråde et al., 2019; Victor, 2008).

The work also highlights perhaps the need to propose alternative definitions of productivity. We noted in the introduction that labour productivity is typically considered as the market value of outputs produced for a given amount of labour. But the market tends to prioritise efficiency and exchange value, rather than taking a more holistic view to include social value. This means that there are various types of work that are highly valuable in a social sense (e.g. care and education) but that are not considered to perform well in terms of exchange value productivity. The fact that these more socially valuable occupations are often service-based highlights how reconsidered definitions of labour productivity will become increasingly important as advanced economies such as the UK continue to transition away from manufacturing towards an increasingly service-based economy. We need new definitions and measurements of productivity that encompass both social and ecological care.

This is especially true when considering productivity associated with the non-market provision of goods and services. Here, it is hard to construct appropriate output measures and as such the output is often based on the value of the inputs (for example the amount spent on providing the service). But this is problematic as if, for example, the efficiency of a health care system reduces, then inputs go up. It also means that non-market goods and services are often undervalued in terms of their productivity in comparison to goods and services with a market value. For instance, a private healthcare firm can consider its output as a function of their inputs plus their profit. But a nationalised healthcare system such as the NHS does not have any profits as such and therefore its output is measured to be smaller (Stiglitz et al., 2009). In these cases, it has been argued that measures of productivity need to incorporate an output value that captures the non-monetary quality/value added. For example, the success of hospital surgeries (rather than the number carried out) and increases in skills and knowledge (rather than number of students educated).

It is also important to consider that the relationships we have documented between worker wellbeing and labour productivity may not operate in the same way across all sectors of the economy. The happy-

productive worker thesis may be particularly applicable to those sectors that have typically tended to show higher levels of labour productivity growth (so-called fast or progressive sectors, Baumol, 2012). Indeed, in research such as Hafner et al.'s (2015) survey, financial and manufacturing sectors were overrepresented, and many examples of successful workplace wellbeing programmes are also found in pharmaceutical (Henke et al., 2011) and manufacturing (PricewaterhouseCoopers, 2008) organisations. However, in slow or 'stagnant' sectors labour itself is often the end-product and constitutes the principal value of a service or activity (Baumol, 2012). Sectors such as healthcare, education, and social care for instance, rely intrinsically on the time spent by doctors, nurses, teachers and care workers in the service of others (Jackson, 2017). Such sectors are less amenable to labour productivity growth because there are distinct limits to the extent to which labour can be substituted (Atkinson, 2005). Accordingly, we might expect that, although serious deficits (e.g. diagnosed mental and physical health conditions) in our wellbeing will cause reductions in productivity, in these sectors improvements in worker wellbeing may not continue to deliver increases in productivity.

As well as effects being dependent on the extent to which a sector relies on the intrinsic value of human labour, the happy-productive worker thesis could also be impacted by the economic context of a sector. For example, the care sector has high turnover rates which reduces productivity (Bukach et al., 2017). Yet care workers often report high levels of job satisfaction because they feel that their work provides a social good and is thus worthwhile (Benson et al., 2019). In this case their wellbeing is good, but their pay is too low to allow them to remain in the sector for long periods of time (Druckman and Mair, 2019). In these sectors, it will be particularly important that there are policies in place to retain staff and enable people to continue work that, although perhaps less productive under current market-based definitions, is rewarding for the worker and provides a social good. Examples of such policies include a universal basic income, which has been suggested to allow individuals freedom to shift from often demeaning high-productivity jobs to those focused on care, craft and community work (Standing, 2020).

These types of policies will also be important for securing work in slow sectors that are likely to be hit hard by attempts to grow labour productivity across the economy. Baumol (1967) highlights how, as wages in the two sectors typically grow together, rises in productivity in fast sectors increases costs in slow sectors. But higher prices in those slow sectors considered as less essential by consumers means that the goods or services produced have to become luxury with a much smaller market, or worse, disappear completely. Examples of where this might happen are the theatre and handmade crafts. Workers in these sectors may be particularly at risk of experiencing job insecurity and poor wellbeing as a result of attempts to grow labour productivity, should policies to maintain employment not be in place.

This paper has focused specifically on the area of worker wellbeing. However, it should be noted that labour productivity growth could also impact negatively on the wellbeing of the wider population. For example, it has been documented that market deregulation (a tactic employed to boost competition and thus productivity) is partially responsible for increased fast food consumption and BMI (De Vogli et al., 2014). Accordingly, the negative effects of pursuing labour productivity growth on wellbeing could be more far-reaching than the present paper has covered. This could be an area for future reviews.

In summary, 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 worker wellbeing. Abandoning the pursuit of labour productivity growth (as it is currently defined) within post-growth economies may therefore present a way for us to not only build more sustainable societies, but also ones that are potentially less detrimental to worker wellbeing. A more critical approach to the relationship is needed to understand how wellbeing and productivity growth may influence each other over time and across

contexts, and to map out the practicalities for transitioning to a post-growth society.

Data availability statement

This manuscript is a narrative review and does not involve any new, primary data.

Declaration of Competing Interest

The authors gratefully acknowledge financial support from the UK Economic and Social Research Council (ESRC) in particular through grant no: ES/M010163/1 which supports the Centre for the Understanding of Sustainable Prosperity and ES/S015124/1 which supported the project “Powering Productivity”.

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- Abbott, M., 2018. Productivity: a history of its measurement. *History of Economic Thought and Policy* 18 (1), 57–79. <https://doi.org/10.3280/SPE2018-001003>.
- Artz, B.M., Goodall, A.H., Oswald, A.J., 2017. Boss competence and worker well-being. *ILR Rev.* 70 (2), 419–450. <https://doi.org/10.1177/0019793916650451>.
- Atkinson, T., 2005. *Atkinson Review: Final Report. Measurement of Government Output and Productivity for the National Accounts*. Palgrave Macmillan, Basingstoke, Hampshire.
- Atlantis, E., Chow, C.-M., Kirby, A., Fiatarone Singh, M., 2004. An effective exercise-based intervention for improving mental health and quality of life measures: a randomized controlled trial. *Prev. Med.* 39 (2), 424–434. <https://doi.org/10.1016/j.ypmed.2004.02.007>.
- Austin, P., 2019. Could improving employee wellbeing solve the UK's productivity puzzle? [Blog post]. Retrieved November 8, 2019, from: <https://www.hrreview.co.uk/analysis/phil-austin-could-improving-employee-wellbeing-solve-the-uks-productivity-puzzle/118140>.
- Ayyagari, Grover, Purvis, 2011. Technostress: technological antecedents and implications. *MIS Q.* 35 (4), 831. <https://doi.org/10.2307/41409963>.
- Baas, M., De Dreu, C.K.W., Nijstad, B.A., 2008. A meta-analysis of 25 years of mood-creativity research: hedonic tone, activation, or regulatory focus? *Psychol. Bull.* 134 (6), 779–806. <https://doi.org/10.1037/a0012815>.
- Baker, C.L., Flores, N.M., Zou, K.H., Bruno, M., Harrison, V.J., 2017. Benefits of quitting smoking on work productivity and activity impairment in the United States, the European Union and China. *Int. J. Clin. Pract.* 71 (1), e12900 <https://doi.org/10.1111/ijcp.12900>.
- Bakker, A.B., Demerouti, E., de Boer, E., Schaufeli, W.B., 2003. Job demands and job resources as predictors of absence duration and frequency. *J. Vocat. Behav.* 62 (2), 341–356. [https://doi.org/10.1016/S0001-8791\(02\)00030-1](https://doi.org/10.1016/S0001-8791(02)00030-1).
- Bakker, I., van der Voordt, T., 2010. The influence of plants on productivity. *Facilities* 28 (9/10), 416–439. <https://doi.org/10.1108/02632771011057170>.
- Bakotić, D., 2016. Relationship between job satisfaction and organisational performance. *Economic Research-Ekonomska Istraživanja* 29 (1), 118–130. <https://doi.org/10.1080/1331677X.2016.1163946>.
- Bartelsman, E.J., Gautier, P.A., De Wind, J., 2016. Employment protection, technology choice, and worker allocation. *Int. Econ. Rev.* 57 (3), 787–826. <https://doi.org/10.1111/iere.12176>.
- Baumol, W.J., 1967. Macroeconomics of unbalanced growth: the anatomy of urban crisis. *Am. Econ. Rev.* 57 (3), 415–426.
- Baumol, W.J., 2012. *The Cost Disease: Why Computers Get Cheaper and Health Care Doesn't*. Yale University Press, London.
- Beesley, V.L., Price, M.A., Webb, P.M., 2011. Loss of lifestyle: health behaviour and weight changes after becoming a caregiver of a family member diagnosed with ovarian cancer. *Supportive Care in Cancer* 19 (12), 1949–1956. <https://doi.org/10.1007/s00520-010-1035-2>.
- Belkic, K.L., Landsbergis, P.A., Schnall, P.L., Baker, D., 2004. Is job strain a major source of cardiovascular disease risk? *Scand. J. Work Environ. Health* 30 (2), 85–128. <https://doi.org/10.5271/sjweh.769>.
- Benson, T., Sladen, J., Done, J., Bowman, C., 2019. Monitoring work wellbeing, job confidence and care provided by care home staff using a self-report survey. *BMJ Open Quality* 8 (2), e000621. <https://doi.org/10.1136/bmjopen-2018-000621>.
- Bevan, S., 2018. Is wellbeing a missing link in our search for productivity growth? [Blog post]. Retrieved November 8, 2019, from: <https://www.employment-studies.co.uk/news/wellbeing-missing-link-our-search-productivity-growth>.
- Boehner, J., Mair, S., Landa-Avila, C., 2019. Mapping Method Report—Exploring the Links between Energy, Wellbeing and Productivity. Centre for the Understanding of Sustainable Prosperity (CUSP), Guildford. Online at: <https://www.cusp.ac.uk/wp-content/uploads/pp-mapping-report.pdf>.
- Bordi, L., Okkonen, J., Mäkinen, J.P., Heikkilä-Tammi, K. (2018). Communication in the digital work environment: implications for wellbeing at work. *Nord. J. Work. Life Stud.* 8 (S3), 29–48. doi:10.18291/njwls.v8is3.105275.
- Bradley, C.J., Oberst, K., Schenk, M., 2006. Absenteeism from work: the experience of employed breast and prostate cancer patients in the months following diagnosis. *Psycho-Oncology* 15 (8), 739–747. <https://doi.org/10.1002/pon.1016>.
- Brockway, P.E., Owen, A., Brand-Correa, L.L., Hardt, L., 2019. Estimation of global final-stage energy-return-on-investment for fossil fuels with comparison to renewable energy sources. *Nat. Energy* 4 (7), 612–621. <https://doi.org/10.1038/s41560-019-0425-z>.
- Brown, S., Gray, D., McHardy, J., Taylor, K., 2015. Employee trust and workplace performance. *J. Econ. Behav. Organ.* 116, 361–378. <https://doi.org/10.1016/j.jebo.2015.05.001>.
- Buccrossi, P., Ciari, L., Duso, T., Spagnolo, G., Vitale, C., 2013. Competition policy and productivity growth: an empirical assessment. *Rev. Econ. Stat.* 95 (4), 1324–1336. https://doi.org/10.1162/REST_a.00304.
- Bukach, A.M., Ejaz, F.K., Dawson, N., Gitter, R.J., 2017. Turnover among community mental health workers in Ohio. *Adm. Policy Ment. Health Serv. Res.* 44 (1), 115–122. <https://doi.org/10.1007/s10488-015-0706-1>.
- Burton, W.N., Pransky, G., Conti, D.J., Chen, C.-Y., Edington, D.W., 2004. The Association of Medical Conditions and Presenteeism. *J. Occup. Environ. Med.* 46 (6), S38–S45. <https://doi.org/10.1097/01.jom.0000126687.49652.44>.
- Burton, W.N., McCalister, K.T., Chen, C.-Y., Edington, D.W., 2005. The Association of Health Status, worksite fitness center participation, and two measures of productivity. *J. Occup. Environ. Med.* 47 (4), 343–351. <https://doi.org/10.1097/01.jom.0000158719.57957.c6>.
- Buseman-Williams, A., 2014. *A Systematic Review of the Health Impact of Employer-Sponsored Wellness Programs*. Master's thesis, Georgia State University.
- Butler, G., 1993. Definitions of stress. *Occas. Pap. R. Coll. Gen. Pract.* 61, 1–5. Retrieved from: <http://www.ncbi.nlm.nih.gov/pubmed/8199583>.
- Carter, B., Danford, A., Howcroft, D., Richardson, H., Smith, A., Taylor, P., 2011. ‘All they lack is a chain’: lean and the new performance management in the British civil service. *N. Technol. Work. Employ.* 26 (2), 83–97. <https://doi.org/10.1111/j.1468-005X.2011.00261.x>.
- Chandola, T., Britton, A., Brunner, E., Hemingway, H., Malik, M., Kumari, M., Marmot, M., 2008. Work stress and coronary heart disease: what are the mechanisms? *European Heart Journal* 29 (5), 640–648. <https://doi.org/10.1093/eurheartj/ehm584>.
- Chatterton, P., Pusey, A., 2020. Beyond capitalist enclosure, commodification and alienation: Postcapitalist praxis as commons, social production and useful doing. *Prog. Hum. Geogr.* 44 (1), 27–48. <https://doi.org/10.1177/0309132518821173>.
- Chen, H., Blanc, P.D., Hayden, M.L., Bleecker, E.R., Chawla, A., Lee, J.H., 2008. Assessing productivity loss and activity impairment in severe or difficult-to-treat asthma. *Value Health* 11 (2), 231–239. <https://doi.org/10.1111/j.1524-4733.2007.00229.x>.
- Chiaburu, D.S., Thundiyil, T., Wang, J., 2014. Alienation and its correlates: a meta-analysis. *Eur. Manag. J.* 32 (1), 24–36. <https://doi.org/10.1016/j.emj.2013.06.003>.
- Christensen, M., 2017. Healthy individuals in healthy organizations: the happy productive worker hypothesis. In: Christensen, M., Saksvik, P.Ø., Karanika-Murray, M. (Eds.), *The Positive Side of Occupational Health Psychology* (pp. 155–169). https://doi.org/10.1007/978-3-319-66781-2_13.
- Clark, J.B., 1908. *The Distribution of Wealth: A Theory of Wages, Interest and Profits*. Macmillan, New York.
- Claxton, A.J., Chawla, A.J., Kennedy, S., 1999. Absenteeism among employees treated for depression. *J. Occup. Environ. Med.* 41 (7), 605–611.
- Clements-Croome, D., 2006. *Creating the Productive Workplace*. Oxford: Taylor & Francis.
- Cleveland, C.J., Costanza, R., Hall, C.A.S., Kaufmann, R., 1984. Energy and the U.S. economy: a biophysical perspective. *Science* 225 (4665), 890–897. <https://doi.org/10.1126/science.225.4665.890>.
- Coburn, D., 1979. Job Alienation and Well-Being. *Int. J. Health Serv.* 9 (1), 41–59. <https://doi.org/10.2190/L743-W4EV-2F8J-C1K0>.
- Collyer, F., White, K., 2011. The privatisation of Medicare and the National Health Service, and the global marketisation of healthcare systems. *Health Sociol. Rev.* 20, 238–244. <https://doi.org/10.1080/14461242.2011.11003086>.
- Competition and Markets Authority, 2015. *Productivity and Competition: A Summary of the Evidence*. Report retrieved from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/909846/Productivity_and_competition_report_.pdf.
- Conway, E., Monks, K., Fu, N., Alfes, K., Bailey, K., 2018. Reimagining alienation within a relational framework: evidence from the public sector in Ireland and the UK. *Int. J. Hum. Resour. Manag.* 1–22. <https://doi.org/10.1080/09585192.2018.1460859>.
- Coote, A., Franklin, J., 2013. *Time on our Side: Why we all Need a Shorter Working Week*, 1st ed. New Economics Foundation, London.
- Corbett, M., 2015. From law to folklore: work stress and the Yerkes-Dodson law. *J. Manag. Psychol.* 30 (6), 741–752. <https://doi.org/10.1108/JMP-03-2013-0085>.
- Corlet Walker, C., Jackson, T., 2019. *Measuring Prosperity—Navigating the Options*. CUSP Working Paper No. 20. Guildford: Centre for the Understanding of Sustainable Prosperity. <https://www.cusp.ac.uk/themes/aetw/measuring-prosperity/>.
- Daily, C.M., Near, J.P., 2000. CEO satisfaction and firm performance in family firms: divergence between theory and practice. *Soc. Indic. Res.* 51 (2), 125–170. <https://doi.org/10.1023/A:1007099301884>.
- Dávila-Fernández, M.J., Sordi, S., 2020. Attitudes towards climate policies in a macrodynamic model of the economy. *Ecol. Econ.* 169, 106319. <https://doi.org/10.1016/j.ecolecon.2019.04.031>.
- Davis, M.A., 2009. Understanding the relationship between mood and creativity: a meta-analysis. *Organ. Behav. Hum. Decis. Process.* 108 (1), 25–38. <https://doi.org/10.1016/j.OBHDP.2008.04.001>.

- De Vogli, R., Kouvonen, A., Gimeno, D., 2014. The influence of market deregulation on fast food consumption and body mass index: a cross-national time series analysis. *Bull. World Health Organ.* 92, 99–107A. <https://doi.org/10.2471/BLT.13.120287>.
- De Witte, H., Pienaar, J., De Cuyper, N., 2016. Review of 30 years of longitudinal studies on the association between job insecurity and health and well-being: is there causal evidence? *Aust. Psychol.* 51 (1), 18–31. <https://doi.org/10.1111/ap.12176>.
- Debeir, J.C., Deléage, J.P., Hémeury, D., 1991. *In the Servitude of Power: Energy and Civilisation through the Ages*. Zed Books, London.
- Dewa, C.S., Loong, D., Bonato, S., Thanh, N.X., Jacobs, P., 2014. How does burnout affect physician productivity? A systematic literature review. *BMC Health Serv. Res.* 14 (1), 325. <https://doi.org/10.1186/1472-6963-14-325>.
- Diener, E., Emmons, R.A., Larsen, R.J., Griffin, S., 1985. The satisfaction with life scale. *J. Pers. Assess.* 49 (1), 71–75. <https://doi.org/10.1207/s15327752jpa490113>.
- Diener, E., Napa Scollon, C., Lucas, R.E., 2009. The evolving concept of subjective well-being: The multifaceted nature of happiness. In: Diener, E. (Ed.), *Assessing Well-Being: The Collected Works of Ed Diener*. Springer, Dordrecht, pp. 67–100.
- DiMaria, C.H., Peroni, C., Sarracino, F., 2019. Happiness matters: productivity gains from subjective well-being. *J. Happiness Stud.* 1–22. <https://doi.org/10.1007/s10902-019-00074-1>.
- Druckman, A., Mair, S., 2019. Wellbeing, Care and Robots: Prospects for good work in the health and social care sector. CUSP Working Paper No. 21. In: Centre for the Understanding of Sustainable Prosperity (CUSP), Guildford. <https://www.cusp.ac.uk/wpcontent/uploads/WP21—2019-Wellbeing-Care-and-Robots.pdf>.
- Easterlin, R.A., 1974. Does economic growth improve the human lot? Some empirical evidence. In: David, P.A., Reder, M.W. (Eds.), *Nations and Households in Economic Growth*. Academic Press, New York, pp. 89–125.
- Easterlin, R.A., McVey, L.A., Switek, M., Sawangfa, O., Zweig, J.S., 2010. The happiness-income paradox revisited. *Proc. Natl. Acad. Sci.* 107 (52), 22463–22468. <https://doi.org/10.1073/pnas.1015962107>.
- Edmans, A., 2012. The link between job satisfaction and firm value, with implications for corporate social responsibility. *Acad. Manag. Perspect.* 26 (4), 1–19. <https://doi.org/10.5465/amp.2012.0046>.
- Eldstad, J.I., Vabø, M., 2008. Job stress, sickness absence and sickness presenteeism in Nordic elderly care. *Scandinavian J. Public Health* 36 (5), 467–474. <https://doi.org/10.1177/1403494808089557>.
- Eltayeb, S., Staal, J.B., Kennes, J., Lamberts, P.H., de Bie, R.A., 2007. Prevalence of complaints of arm, neck and shoulder among computer office workers and psychometric evaluation of a risk factor questionnaire. *BMC Musculoskelet. Disord.* 8 (1), 68. <https://doi.org/10.1186/1471-2474-8-68>.
- Federspiel, C.C., Fisk, W.J., Price, P.N., Liu, G., Faulkner, D., Dibartolomeo, D.L., Lahiff, M., 2004. Worker performance and ventilation in a call center: analyses of work performance data for registered nurses. *Indoor Air* 14 (8), 41–50. <https://doi.org/10.1111/j.1600-0668.2004.00299.x>.
- Finkelstein, S.N., Berndt, E.R., Greenberg, P.E., Parsley, R.A., Russell, J.M., Keller, M.B., 1996. Improvement in subjective work performance after treatment of chronic depression: some preliminary results. *Chronic depression study group. Psychopharmacol. Bull.* 32 (1), 33–40. Retrieved from: <http://www.ncbi.nlm.nih.gov/pubmed/8927672>.
- Foster, K.R., 2016. *Productivity and Prosperity: A Historical Sociology of Productivist Thought*. University of Toronto Press, London.
- Franklin, M., 2018. A simple guide to multi-factor productivity. Retrieved November 24, 2019, from Office for National Statistics website. <https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/methodologies/asimp/leguidetomultifactorproductivity>.
- Gerr, F., Marcus, M., Ensor, C., Kleinbaum, D., Cohen, S., Edwards, A., Monteilh, C., 2002. A prospective study of computer users: I. Study design and incidence of musculoskeletal symptoms and disorders. *American Journal of Industrial Medicine* 41 (4), 221–235. <https://doi.org/10.1002/ajim.10066>.
- Giga, S., Noblet, A., Faragher, B., Cooper, C., 2003. Organisational stress management interventions: a review of UK-based research. *Aust Psychol.* 38 (2), 158–164.
- Giovannetti, E.R., Wolff, J.L., Frick, K.D., Boulton, C., 2009. Construct validity of the work productivity and activity impairment questionnaire across informal caregivers of chronically ill older patients. *Value Health* 12 (6), 1011–1017. <https://doi.org/10.1111/j.1524-4733.2009.00542.x>.
- Goetzal, R.Z., Long, S.R., Ozminkowski, R.J., Hawkins, K., Wang, S., Lynch, W., 2004. Health, absence, disability, and Presenteeism cost estimates of certain physical and mental health conditions affecting U.S. employers. *J. Occup. Environ. Med.* 46 (4), 398–412. <https://doi.org/10.1097/01.jom.0000121151.40413.bd>.
- Gordois, A.L., Toth, P.P., Quek, R.G., Proudfoot, E.M., Paoli, C.J., Gandra, S.R., 2016. Productivity losses associated with cardiovascular disease: a systematic review. *Exp. Rev. Pharmacoeconomics & Outcomes Res.* 16 (6), 759–769. <https://doi.org/10.1080/14737167.2016.1259571>.
- Graff Zivin, J., Neidell, M., 2012. The impact of pollution on worker productivity. *Am. Econ. Rev.* 102 (7), 3652–3673. <https://doi.org/10.1257/aer.102.7.3652>.
- Grant-Vallone, E.J., Donaldson, S.L., 2001. Consequences of work-family conflict on employee well-being over time. *Work Stress.* 15 (3), 214–226. <https://doi.org/10.1080/02678370110066544>.
- Graziotin, D., Wang, X., Abrahamsson, P., 2014. Happy software developers solve problems better: psychological measurements in empirical software engineering. *PeerJ* 2, e289. <https://doi.org/10.7717/peerj.289>.
- Greenberg, P.E., Stiglin, L.E., Finkelstein, S.N., Berndt, E.R., 1993. The economic burden of depression in 1990. *J. Clin. Psychiatr.* 54 (11), 405–418. <https://psycnet.apa.org/record/1994-25558-001>.
- Guerry, A.D., Polasky, S., Lubchenko, J., Chaplin-Kramer, R., Daily, G.C., Griffin, R., Vira, B., 2015. Natural capital and ecosystem services informing decisions: From promise to practice. *Proceedings of the National Academy of Sciences of the United States of America* 112 (24), 7348–7355. <https://doi.org/10.1073/pnas.1503751112>.
- Hafner, M., van Stolk, C., Saunders, C., Krapsels, J., Baruch, B., 2015. *Health, Wellbeing and Productivity in the Workplace*. Rand Corporation, Cambridge, UK.
- Hagberg, M., Tornqvist, E.W., Toomingas, A., 2002. Self-reported reduced productivity due to musculoskeletal symptoms: associations with workplace and individual factors among White-collar computer users. *J. Occup. Rehabil.* 12 (3), 151–162. <http://search.proquest.com/docview/232168705/fulltextPDF/950F8CBB24C745D9PQ?accountid=17256>.
- Hajat, S., O'Connor, M., Kosatsky, T., 2010. Health effects of hot weather: from awareness of risk factors to effective health protection. *Lancet* 375 (9717), 856–863. [https://doi.org/10.1016/S0140-6736\(09\)61711-6](https://doi.org/10.1016/S0140-6736(09)61711-6).
- Halbesleben, J.R.B., Rathert, C., 2008. Linking physician burnout and patient outcomes. *Health Care Manag. Rev.* 33 (1), 29–39. <https://doi.org/10.1097/01.HMR.0000304493.87898.72>.
- Halliwell, E., 2010. *Mindfulness Report 2010*. Mental Health Foundation, London.
- Hannan, R.L., 2005. The combined effect of wages and firm profit on employee effort. *Account. Rev.* 80 (1), 167–188. <https://doi.org/10.2308/accr.2005.80.1.167>.
- Hardt, L., Barrett, J., Taylor, P.G., Foxon, T.J., 2020. Structural change for a post-growth economy: investigating the relationship between embodied energy intensity and labour productivity. *Sustainability* 12 (3), 962. <https://doi.org/10.3390/su12030962>.
- Harper, A., Stronge, W., Guizzo, D., Ellis-petersen, M., 2019. *The Shorter Working Week: A Radical and Pragmatic Proposal*. Autonomy, Crookham Village, Hampshire.
- Haybron, D.M., 2008. *The Pursuit of Unhappiness: The Elusive Psychology of Well-Being*. Oxford University Press, Oxford.
- Henke, R.M., Goetzal, R.Z., McHugh, J., Isaac, F., 2011. Recent experience in health promotion at Johnson & Johnson: lower health spending, strong return on investment. *Health Aff.* 30 (3), 490–499. <https://doi.org/10.1377/hlthaff.2010.0806>.
- Hex, N., Bartlett, C., Wright, D., Taylor, M., Varley, D., 2012. Estimating the current and future costs of type 1 and type 2 diabetes in the UK, including direct health costs and indirect societal and productivity costs. *Diabet. Med.* 29 (7), 855–862. <https://doi.org/10.1111/j.1464-5491.2012.03698.x>.
- Isen, A.M., Reeve, J., 2005. The influence of positive affect on intrinsic and extrinsic motivation: facilitating enjoyment of play, responsible work behavior, and self-control. *Motiv. Emot.* 29 (4), 295–323. <https://doi.org/10.1007/s11031-006-9019-8>.
- Jackson, T., 2017. *Prosperity without Growth: Foundations for the Economy of Tomorrow*, 2nd ed. Routledge, Abingdon.
- Jackson, T., Victor, P., 2011. Productivity and work in the 'green economy': some theoretical reflections and empirical tests. *Environ. Innov. and Soc. Trans.* 1 (1), 101–108. <https://doi.org/10.1016/J.EIST.2011.04.005>.
- Jackson, T., Victor, P., 2018. Confronting inequality in a post-growth world—Basic income, factor substitution and the future of work. In: CUSP Working Paper No. 11. Guildford. Centre for the Understanding of Sustainable Prosperity.
- Jamal, M., 2007. Job stress and job performance controversy revisited: an empirical examination in two countries. *Int. J. Stress. Manag.* 14 (2), 175–187. <https://doi.org/10.1037/1072-5245.14.2.175>.
- Jeon, S.H., Leem, J.H., Park, S.G., Heo, Y.S., Lee, B.J., Moon, S.H., Kim, H.C., 2014. Association among working hours, occupational stress, and presenteeism among wage workers: Results from the second Korean Working Conditions Survey. *Ann. Occup. and Environ. Med.* 26 (6), 1–8. <https://doi.org/10.1186/2052-4374-26-6>.
- Kamerade, D., Wang, S., Burchell, B., Balderson, S.U., Coutts, A., 2019. A shorter working week for everyone: how much paid work is needed for mental health and well-being? *Soc. Sci. Med.* 241, 112353. <https://doi.org/10.1016/J.SOCSCIMED.2019.06.006>.
- Katz, A.S., Pronk, N.P., Lowry, M., 2014. The association between optimal lifestyle-related health Behaviors and employee productivity. *J. Occup. Environ. Med.* 56 (7), 708–713. <https://doi.org/10.1097/JOM.0000000000000191>.
- Kendrick, T., Pilling, S., 2012. Common mental health disorders—identification and pathways to care: NICE clinical guideline. *Br. J. Gen. Pract.* 62 (594), 47–49. <https://doi.org/10.3399/bjgp12X616481>.
- Kessler, R.C., Greenberg, P.E., Mickelson, K.D., Meneades, L.M., Wang, P.S., 2001. The effects of chronic medical conditions on work loss and work cutback. *J. Occup. Environ. Med.* 43 (3), 218–225.
- Klitgaard, K., 2017. *The Struggle for Meaningful Work*. Retrieved August 20, 2019, from Great Transition Initiative website. <https://greattransition.org/publication/meaningful-work>.
- Kuegler, A., Schoenberg, U., Schreiner, R., 2018. Productivity growth, wage growth and unions. In: *Proceedings of ECB Forum on Central Banking*, pp. 215–247. <https://discovery.ucl.ac.uk/id/eprint/10069845/>.
- Kuroda, S., Yamamoto, I., 2018. Good boss, bad boss, workers' mental health and productivity: evidence from Japan. *Japan and the World Economy* 48, 106–118. <https://doi.org/10.1016/j.japwor.2018.08.002>.
- Lavigne, J.E., Griggs, J.J., Tu, X.M., Lerner, D.J., 2008. Hot flashes, fatigue, treatment exposures and work productivity in breast cancer survivors. *J. Cancer Surviv.* 2 (4), 296–302. <https://doi.org/10.1007/s11764-008-0072-z>.
- Lazear, E.P., Shaw, K.L., Stanton, C.T., 2015. The value of bosses. *J. Labor Econ.* 33 (4), 823–861. <https://doi.org/10.1086/681097>.
- Lee, D., Rupp, N.G., 2007. Retracting a gift: how does employee effort respond to wage reductions? *J. Labor Econ.* 25 (4), 725–761. <https://doi.org/10.1086/522906>.
- Lee, R.T., Ashforth, B.E., 1996. A meta-analytic examination of the correlates of the three dimensions of job burnout. *J. Appl. Psychol.* 81 (2), 123–133.
- Lee, S.-H., Shin, Y., Baek, S., Lee, S.-H., Shin, Y., Baek, S.I., 2017. Task characteristics and work engagement: exploring effects of role ambiguity and ICT Presenteeism. *Sustainability* 9 (10), 1855. <https://doi.org/10.3390/su9101855>.

- Lobao, L., Gray, M., Cox, K., Kitson, M., 2018. The shrinking state? Understanding the assault on the public sector. *Camb. J. Reg. Econ. Soc.* 11 (3), 389–408.
- Lu, L., Gilmour, R., Kao, S., Huang, M., 2006. A cross-cultural study of work/family demands, work/family conflict and wellbeing: the Taiwanese vs British. *Career Dev. Int.* 11 (1), 9–27. <https://doi.org/10.1108/13620430610642354>.
- Mair, S., Druckman, A., Jackson, T., 2020. A tale of two utopias: work in a post-growth world. *Ecol. Econ.* 173, 106653. <https://doi.org/10.1016/j.ecolecon.2020.106653>.
- Marx, K., 1844/2009. *Economic and Philosophic Manuscripts of 1844*. Progress Publishers, Moscow.
- McDaid, D., Zechmeister, I., Kilian, R., Medeiros, H., Knapp, M., Kennelly, B., 2008. Making the Economic Case for the Promotion of Mental Well-Being and the Prevention of Mental Health Problems (MHEEN II Policy Briefing 3). LSE, London.
- Middleton, C.A., Cukier, W., 2006. Is mobile email functional or dysfunctional? Two perspectives on mobile email usage. *Eur. J. Inf. Syst.* 15 (3), 252–260. <https://doi.org/10.1057/palgrave.ejis.3000614>.
- Mind, 2013. Mind assesses research linking work with stress. Retrieved July 17, 2019, from <https://www.mind.org.uk/news-campaigns/news/work-is-biggest-cause-of-stress-in-peoples-lives/>.
- Mind, 2014. We've Got Work to Do: Transforming Employment and Back-to-Work Support for People with Mental Health Problems. Mind, London.
- Miner, A.G., Glomb, T.M., 2010. State mood, task performance, and behavior at work: a within-persons approach. *Organ. Behav. Hum. Decis. Process.* 112 (1), 43–57. <https://doi.org/10.1016/j.OBHDP.2009.11.009>.
- Mohr, A.T., Puck, J.F., 2007. Role conflict, general manager job satisfaction and stress and the performance of IJVs. *Eur. Manag. J.* 25 (1), 25–35. <https://doi.org/10.1016/J.EMJ.2006.11.003>.
- Munir, F., Jones, D., Leka, S., Griffiths, A., 2005. Work limitations and employer adjustments for employees with chronic illness. *Int. J. Rehabil. Res.* 28 (2), 111–117. <https://doi.org/10.1097/00004356-200506000-00003>.
- Nair, N., Vohra, N., 2009. Developing a new measure of work alienation. *J. Work. Rights* 14 (3), 293–309. <https://doi.org/10.2190/wr.14.3.c>.
- NHS Information Centre, 2011. *Attitudes to Mental Illness - 2011 Survey Report*. The Health and Social Care Information Centre, Leeds.
- Nimrod, G., 2018. Technostress: measuring a new threat to well-being in later life. *Aging Ment. Health* 22 (8), 1086–1093. <https://doi.org/10.1080/13607863.2017.1334037>.
- Norgård, J.S., 2013. Happy degrowth through more amateur economy. *J. Clean. Prod.* 38, 61–70. <https://doi.org/10.1016/j.jclepro.2011.12.006>.
- O'Mahony, M., Vecchi, M., 2005. Quantifying the impact of ICT capital on output growth: a heterogeneous dynamic panel approach. *Economica* 72 (288), 615–633. <https://doi.org/10.1111/j.1468-0335.2005.0435.x>.
- Oswald, A.J., Proto, E., Sgroi, D., 2015. Happiness and productivity. *J. Labor Econ.* 33 (4), 789–822. <https://doi.org/10.1086/681096>.
- Oulton, N., Srinivasan, S., 2005. Productivity growth in UK industries, 1970–2000: Structural change and the role of ICT. In: *Bank of England, London*.
- PricewaterhouseCoopers, 2008. Building the case for wellness. PricewaterhouseCoopers LLP. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/209547/hwwb-dwp-wellness-report-public.pdf.
- Ryan, R.M., Deci, E.L., 2001. On happiness and human potentials: a review of research on hedonic and Eudaimonic well-being. *Annu. Rev. Psychol.* 52 (1), 141–166. <https://doi.org/10.1146/annurev.psych.52.1.141>.
- Schaufeli, W.B., Bakker, A.B., 2004. Job demands, job resources, and their relationship with burnout and engagement: a multi-sample study. *J. Organ. Behav.* 25 (3), 293–315. <https://doi.org/10.1002/job.248>.
- Schauberg, R.L., Flynn, F.J., 2017. Clarifying the link between job satisfaction and absenteeism: the role of guilt proneness. *J. Appl. Psychol.* 102 (6), 982–992. <https://doi.org/10.1037/apl000208>.
- Schor, J.B., 2015. Work sharing. In: D'Alisa, G., Demaria, F., Kallis, G. (Eds.), *Degrowth: A Vocabulary for a New Era*. Routledge, Abingdon.
- Shantz, A., Alfes, K., Truss, C., 2014. Alienation from work: Marxist ideologies and twenty-first-century practice. *Int. J. Hum. Resour. Manag.* 25 (18), 2529–2550. <https://doi.org/10.1080/09585192.2012.667431>.
- Sharpe, A., 2004. *Exploring the Linkages between Productivity and Social Development in Market Economies*. Centre for the Study of Living Standards, Ottawa.
- Shockley, K.M., Ispas, D., Rossi, M.E., Levine, E.L., 2012. A meta-analytic investigation of the relationship between state affect, discrete emotions, and job performance. *Hum. Perform.* 25 (5), 377–411. <https://doi.org/10.1080/08959285.2012.721832>.
- Silla, I., De Cuyper, N., Gracia, F.J., Peiró, J.M., De Witte, H., 2009. Job insecurity and well-being: moderation by employability. *J. Happiness Stud.* 10 (6), 739–751. <https://doi.org/10.1007/s10902-008-9119-0>.
- Spiezia, V., 2012. ICT investments and productivity. *OECD J.: Econ Stud.* 2012 (1), 199–211. https://doi.org/10.1787/eco_studies-2012-5k8xdhj4tv0t.
- Stadin, M., Nordin, M., Broström, A., Magnusson Hanson, L.L., Westerlund, H., Fransson, E.I., 2019. Repeated exposure to high ICT demands at work, and development of suboptimal self-rated health: findings from a 4-year follow-up of the SLOSH study. *Int. Arch. Occup. Environ. Health* 92 (5), 717–728. <https://doi.org/10.1007/s00420-019-01407-6>.
- Standing, G. (2020, Nov). The Case for a Basic Income. Great Transition Initiative, <https://greattransition.org/gti-forum/basic-income-standing>.
- Stenberg, U., Ruland, C.M., Miaskowski, C., 2009. Review of the literature on the effects of caring for a patient with cancer. *Psycho-Oncology* 19 (10), 1013–1025. <https://doi.org/10.1002/pon.1670>.
- Stewart, W.F., Ricci, J.A., Chee, E., Hahn, S.R., Morganstein, D., 2003. Cost of lost productive work time among US Workers with depression. *JAMA* 289 (23), 3135. <https://doi.org/10.1001/jama.289.23.3135>.
- Stiglitz, J., Sen, A., Fitoussi, J.P., 2009. *The Measurement of Economic Performance and Social Progress Revisited: Reflections and Overview*. Commission on the Measurement of Economic Performance and Social Progress, Paris.
- Stirling, A., 2019. UK workers could be owed a significant holiday: increases in leisure time have decoupled from productivity increases. New Economics Foundation, London. <https://neweconomics.org/2019/09/increases-in-leisure-time-have-decoupled-from-productivity-increases>.
- Stratford, B., 2020. The threat of rent extraction in a resource-constrained future. *Ecol. Econ.* 169, 106524. <https://doi.org/10.1016/j.ecolecon.2019.106524>.
- Sverke, M., Gallagher, D.G., Hellgren, J., 2002. Alternative work arrangements. In: Isaksson, K., Hogstedt, C., Eriksson, C., Theorell, T. (Eds.), *Health Effects of the New Labour Market*. Springer US, pp. 145–167.
- Swanberg, J.E., 2006. Making it work. *J. Psychosoc. Oncol.* 24 (3), 1–18. https://doi.org/10.1300/J077v24n03_01.
- Twhig-Bennett, C., Jones, A., 2018. The health benefits of the great outdoors: a systematic review and meta-analysis of greenspace exposure and health outcomes. *Environ. Res.* 166, 628–637. <https://doi.org/10.1016/J.ENVRES.2018.06.030>.
- Van Den Bosch, R., Taris, T.W., 2014. The authentic worker's well-being and performance: the relationship between authenticity at work, well-being, and work outcomes. *J. Psychol.: Interdisc. Appl.* 148 (6), 659–681. <https://doi.org/10.1080/00223980.2013.820684>.
- Victor, P.A., 2008. *Managing without Growth: Slower by Design, Not Disaster*. Edward Elgar, Cheltenham.
- Voydanoff, P., 2005. Work demands and work-to-family and family-to-work conflict. *J. Fam. Issues* 26 (6), 707–726. <https://doi.org/10.1177/0192513X05277516>.
- Wajcman, J., Rose, E., 2011. Constant connectivity: rethinking interruptions at work. *Organ. Stud.* 32 (7), 941–961. <https://doi.org/10.1177/0170840611410829>.
- Waring, M., 1990. *If Women Counted: A New Feminist Economics*. Harper Collins, New York.
- Warr, P.B., 1990. Decision latitude, job demands, and employee well-being. *Work Stress* 4 (4), 285–294. <https://doi.org/10.1080/02678379008256991>.
- Willis, J.L., Wroblewski, J., 2007. What happened to the gains from strong productivity growth? *Econ. Rev. Q I*, 5–23. Retrieved from <https://ideas.repec.org/a/fip/fedker/y2007iqip5-23nv.92no.1.html>.
- World Health Organisation, 2009. *Global Health Risks*. WHO Press, Geneva.
- Wrigley, E., 2016. *The Path to Sustained Growth: England's Transition from an Organic Economy to an Industrial Revolution*. Cambridge University Press, Cambridge, UK.