

## Uncovering the link between well-being and factory performance among workers in China: a longitudinal study

### Abstract

*Purpose.* Brands and retailers are concerned about the well-being of workers in their supply chains. Unfortunately, conventional audits not only fail to uncover critical problems but also tend to present well-being as a cost rather than a benefit to companies. Yet, if the ‘*happy worker – productive worker*’ thesis is correct, it would benefit factories in developing countries to ensure the well-being of their workers. We therefore set out to better understand the drivers of worker well-being in Chinese factories, and to examine any relationship to factory performance.

*Approach.* To understand more about workers’ well-being concerns, we collected digital diaries over twelve months from 466 workers in four Chinese factories. Using this substantial longitudinal data, we identified common root causes of their work frustration then designed targeted training interventions and tested these in the factories.

*Findings.* Our experiments showed that training to improve working relationships and workers’ skills in the factories improved not just worker well-being, but also factory performance and worker retention. Thus, it brought benefits not only for the workers and the factory owners, but also for their customer companies.

*Originality.* While there is a significant body of research investigating the *happy worker – productive worker* thesis, this has not been conducted in Chinese factories so far. Our work demonstrates that in environments where workers’ *eudaimonic* well-being is important, there is a relationship between well-being and performance which can be practically addressed, moving us closer to UN SDG8’s “decent work” while allowing for further “economic growth”.

**Keywords:** worker well-being, digital diaries, CSR audits, supply chain factories, factory operational performance, factory productivity, SDG8, decent work

## 1. Introduction

SDG8 of the UN's Sustainable Development Goals promotes "decent work and economic growth". While China has significant economic growth – particularly in manufacturing for western supply chains – there is less evidence in the country on the promotion of decent work. Indeed, there continue to be reports of poor social conditions in supply chains, which has led to pressure on Western brands to audit conditions in their suppliers' factories.

However, while factory audits have become quite widely adopted, there is little evidence that they are actually improving people's well-being at work (Sinkovics *et al.*, 2016; Anner, 2017). This may be because they tend to focus on physical factors, rather than the nature of the work (Bellingan *et al.*, 2020). Auditing regimes also tend to position well-being as a business cost, suggesting a trade-off between decent work and economic growth. In this paper, we explore this apparent tension, asking whether improving workers' well-being can also improve the performance of a Chinese factory.

There is little empirical evidence from China that workers' well-being boosts a factory's performance. The many studies exploring the *happy worker – productive worker* thesis were not conducted in Chinese factories, and have tended to use methods ineffective in this complex setting. By using a combination of diary analysis, factory-level data and experiments, we were able to demonstrate that decent work is not incompatible with economic growth in China. In this article we show that it is possible to simultaneously improve both the performance of a factory and its workers' well-being.

We show that the way in which a factory's clients typically measure the well-being of workers does not promote the improvements actually needed, but that transparency is possible. We apply an innovative method for measuring worker well-being and suggest what should be measured in factories to monitor it. The study also involved training interventions, whose outcomes showed that they not only improved some workers' eudaimonic well-being in particular, but also boosted elements of their factory's performance.

The study has significant implications for practice. It provides the basis for a business, whether the factory or its client company, to invest in social sustainability and workers' well-being while directly addressing factory performance, all with the same simple intervention. In settings where eudaimonic well-being is important, we demonstrate that finding ways to reduce work frustration by improving factory effectiveness leads to outcomes which benefit all concerned.

The article proceeds as follows. In Section 2, we examine what is known about Chinese factory workers and their well-being, raising the question of whether happy workers are more productive. In Section 3, we present our method for collecting and analysing the data, and for developing and testing the proposed interventions. In Section 4, we present our findings in two parts: first, the drivers of workers' well-being, and second, the relationship between workers' well-being and factory performance. In Section 5 we contextualise these findings. In Section 6 we discuss the research limitations and offer conclusive thoughts.

## 2. The well-being of Chinese factory workers

### 2.1 Are audits promoting decent work in Chinese factories?

In the largest, most rapid urbanisation in history (Hamnett, 2020), millions of China's rural workers have migrated for factory work. Meanwhile, western consumers, increasingly conscious of global working conditions, urge brands to ensure factory workers' well-being. Their concerns are not unfounded. Risks to well-being may be physical: a lack of regulations can allow for workplace injuries or illness (Pun Ngai, 2005). They can also be social, as low wages and long hours lead to adversarial behaviour in a struggle for promotion (Jacka, 2014; Siu, 2017).

Media interest in these issues has grown, with many reports of unsafe working conditions or unethical labour practices. High-profile global scandals have included the tragic collapse of the Rana Plaza factory complex in Bangladesh. Tabloids in China or the west may portray Chinese migrant factory workers as victims, mentioning suicides, long hours, management abuses, inhumane conditions and workplace injuries (Woon, 2000; Chan, 2001; Jacka, 2014). In January 2019, Amazon faced global reports of poor well-being among schoolchildren pressured into working overnight at a Chinese factory owned by Alexa supplier Foxconn (Chamberlain, 2019), a story which re-emerged in 2022 when the 43-year-old whistleblower demanded an apology from Amazon after his subsequent torture and imprisonment by Chinese authorities (Chamberlain, 2022). This same manufacturer had seen multiple worker suicides in 2010 and 2011 (Dean and Ting-I, 2010; Mozur, 2012). It is clear that in China, rapid economic growth has not consistently produced SDG8's decent work.

These media stories also pose a risk to the reputations of a factory's client brands (Glendon, 2013; Rogers, 2016). Yet some companies know little about working conditions in their global supply chains. They usually seek reassurance about the well-being of workers through self-regulation based on third-party audits. However, audits have not been particularly successful in improving workers' well-being. Studies suggest they can fail to produce even adequate transparency (Sinkovics *et al.*, 2016; Anner, 2017). Factories in Rana Plaza, for example, had been audited weeks before its fatal collapse (Sinkovics *et al.*, 2016).

Well-being matters for everyone in manufacturing – workers' lives can be improved, factories made more productive and reputational damage to brands reduced (Avey *et al.*, 2010; Luthans *et al.*, 2010; Locke, 2013) – yet the type of evidence which would be needed to effectively monitor it is not usually sought. Current auditing tends to focus managerial attention on the aspects of the factory that are measured in the audit, rather than on issues that might be key to improving well-being or performance (Adler *et al.*, 2017). This culture of compliance fails to reduce a brand's reputational risk, to improve workers' well-being, or to add value for the factory (Egels-Zandén, 2014; Sinkovics *et al.*, 2016; Anner, 2017). Thus, audit becomes just another cost of doing business, when it could be an opportunity to improve.

Chinese factories have a compelling reason to wish to improve their workers' well-being. Their workforce is ageing and shrinking. While former migrants can now afford to stay closer to family, young adults reject factory jobs in favour of education (Cheng, 2021). Factories making everything from everyday consumables to world-famous branded electronics are

struggling to keep production roles filled. Their workers' well-being is therefore more important than ever.

## 2.2 Well-being and performance

The idea that happy workers are more productive is intuitively appealing, and many western studies have investigated the relationship. A recent meta-analysis (Krekel *et al.*, 2019) found a strong correlation between “job satisfaction” and company performance. Fisher (2003) found 92% of Australasian employees believed *a happy worker is likely to be a productive worker*, a belief also driving the growth of a western corporate wellness sector.

Collaborating to ensure Chinese factory workers' well-being might be assumed to be win-win for brands and their suppliers.

Researchers, however, face three particular challenges in testing the *happy worker – productive worker thesis* in China. First, well-being is a complex, ambiguous concept (Fisher, 2014). Fisher identifies three types of well-being: *hedonic* (pleasurable), *eudaimonic* (developmental) and *social* (relational). Each has its own sub-categories, constructs and indicators, any of which can act in combination (Gallagher *et al.*, 2009). Some aspects of well-being, such as job satisfaction, have proved relatively easy to measure, but the many available indicators are used by different academics in different combinations and contexts, generating a confusing overall picture. There is currently no standard well-being model for use by researchers or auditors (Vogel, 2010; O'Rourke, 2003; Locke, 2013). Because hedonic elements such as temperature and noise are simple to measure, these form the basis of most of the labour standards monitored through audits (Cottini *et al.*, 2011; Schwarz *et al.*, 2016; Adler *et al.*, 2017). This focus may omit other well-being aspects that are important to Chinese factory workers (Bellingan *et al.*, 2020). It is difficult to be confident that any efforts to ensure decent work are actually monitoring well-being.

Second, although several studies identify a correlation, causality has remained unclear (Warr and Nielsen, 2018; Krekel *et al.*, 2019). Any connection may not be straightforward (Warr and Nielsen, 2018). A confounding variable – such as the quality of management – might explain both phenomena (Warr and Nielsen, 2018). Factory workers operate within a broader system, and the data companies collect (e.g. sales numbers) are outputs of that system rather than of an individual. Analysing a relationship between factors without understanding the overall system makes it difficult to distinguish cause from effect. It could be that happy workers are more productive, that productive workplaces are enjoyable, or that a dynamic interaction between worker and environment creates a “virtuous circle” of well-being (Warr and Nielsen, 2018). The lack of a clear link has made it difficult to evaluate any improvement interventions.

The third obstacle is that Chinese factory environments are not easy sites for research (Bellingan *et al.*, 2020). It can be difficult to conduct interviews or surveys in a factory, which may be noisy or overcrowded. In a typical Chinese factory, workers speak multiple dialects, have variable literacy, and may find it difficult to be honest with auditors or researchers (whom they tend to regard as similar) given the extreme power imbalance they may face at work (Anner, 2012; Chan, 2013; Egels-Zandén, 2014).

The only previous studies attempting to measure the well-being of Chinese migrant factory workers in relation to their performance (i.e. Luthans *et al.*, 2005; Luthans and Youssef,

2007; and Luthans *et al.*, 2008) showed a promising connection but there were significant limitations to the methods used. First, their well-being data was collected at a single point in time, while well-being is likely to change over time. Second, the researchers used supervisor surveys to gauge individual workers' performance, an approach known to be susceptible to bias (Short *et al.*, 2014). A supervisor being held responsible for a worker's performance is likely to overstate it. We therefore wanted to create a more robust method for testing this implied relationship.

In our earlier qualitative study, primarily testing our new longitudinal data-collection method, we had initially identified some well-being drivers in a small group of workers at a single Chinese factory (Bellingan *et al.*, 2020). This had given rise to two viewpoints which we considered worthy of investigation. First, we perceived that the prevailing focus on *hedonic* well-being is misplaced: our participants' well-being appeared to depend more on *eudaimonic* factors such as a sense of achievement or purpose. Second, we felt that targeted training interventions might improve some aspects of their well-being by way of addressing their frustrations at work. We therefore set out, first to test these viewpoints empirically at significant scale, and then to explore the possible link between their well-being and the efficiency of their workplaces. In this context, the following questions are central to the study: 1. *What are the drivers of well-being in Chinese factories?* and 2. *Does improved well-being drive improvements in performance?*

### **3. Methodology**

#### *3.1 Research approach*

The study comprised a longitudinal qualitative multiple case study approach combined with action research through pilot interventions conducted in the base cases. Fieldwork was developed at four Chinese factories over 12 months (from January 2019 to January 2020), comprising three phases. The first phase (January to May) established key baseline worker well-being factors and factory performance metrics. We used these constructs base to specify a theoretical model for improving well-being, to develop hypotheses about well-being connections to performance, and to design two training interventions to test the hypothesized connections. In the second phase (May and June) we tested our interventions in two of the factories. Data collection continued until January 2020. In the final phase we tested our hypotheses using longitudinal (before-and-after) data comparisons.

#### *3.2 Data sources*

Our host factories produce final-assembly consumer products for global brands, all in relatively clean industries (i.e. no painting, injection molding or hazardous chemicals). All were recruited by the lead author, who already had established relationships with their management. All are routinely audited and had shown no significant issues such as safety violations, allowing us to focus on their workers' well-being rather than physical safety. In these factories, a typical production team comprises around 10-20 workers plus a team leader. A line supervisor assigns their tasks and training and monitors the line's operational performance, and a production manager oversees several such lines.

In our initial study, at one of these factories, we had created a longitudinal method which appeared to enable our subjects to share easily and openly without anxiety or fear of

repercussions (Bellingan *et al.*, 2020). We therefore elected to adopt this approach to data-gathering for this experimental longitudinal study.

Qualitative data was provided by 466 workers, each keeping a digital daily diary which was collected in the form of voice messages. Although not all workers are fully literate, all have smartphones. 55% of our 466 diarists were women, and 76% had children. 87% were migrants, most separated from families and living in factory dormitories. Some were from minority religious or ethnic groups and some spoke regional dialects, making communication with colleagues and supervisors challenging. 43% were aged under 30 and 71% had attended school until aged 15. 178 of the 466 would continue to actively keep daily diaries over the full 12 months. On average, workers left us a total 2,000 entries per week, generating a substantial dataset in the authentic voices of Chinese factory workers.

A second dataset, monthly performance data, was provided by the factory managers, who supplied the researchers with their key performance indicators (KPIs) over the data collection period. We chose factory-level data as potentially less biased than personal evaluations, and requested four typical standard operational metrics which are comparable between factories. These were:

1. rework rate (total number of units / reworked units)
2. product attrition rate (% of total units discarded [i.e. cannot be reworked])
3. order delay rate (% of orders failing to ship on confirmed date)
4. worker attrition rate (% of total workforce who left their jobs).

*Table 1: Data types*

Source	Type of data	Use in the study
<b>Diaries</b>	Voice messages left by workers daily, captured as text and translated	Evidence of impacts on workers' well-being Comparison of sentiment and subject focus before and after intervention
<b>Factory-level metrics</b>	Data to be collected from factories monthly: <ul style="list-style-type: none"> <li>• rework rate</li> <li>• product attrition rate</li> <li>• order delay rate</li> <li>• worker attrition rate</li> </ul>	Understanding impacts of well-being on performance and retention before and after interventions

### 3.3 Data analysis

Our largest dataset comprised qualitative data in the form of 16,390 digital diary entries, left as voice messages in a range of the various dialects of Mandarin or Cantonese, and captured as text. Two volunteers, native Chinese-speakers who had fluency in English, translated the collected data applying the Brislin (1980) guidelines on retranslation to minimize misinterpretation.

During Phase 1 of the study (January to May 2019) we began to analyze this very large volume of diary data in two ways. First, through a grounded approach, we used it qualitatively to identify drivers of the workers' well-being in the factories. Since we also needed to quantitatively measure their well-being (to assess any changes over time) we also developed a method for scoring worker sentiment in a factory, as explained next.

**3.3.1 Qualitative analysis.** To better understand these workers' lives and impacts on their well-being, we coded all new entries daily for subject matter, using open coding (Glaser and Strauss, 1967). This qualitative approach was adopted to allow the content, important to answering the research questions, to be better understood so that we could develop a theoretical model for testing. Many entries concerned experiences such as meals or recreation, providing a fascinating glimpse of life for a Chinese migrant factory worker. However, since a manager can have little impact on a worker's personal life, we judged identifying steps they could take within the workplace to improve well-being as potentially more constructive. These entries were therefore excluded from our analysis. The codes concerning work were then grouped into themes and aggregate dimensions (Glaser and Strauss, 1967; Corbin and Strauss, 2008; Gioia *et al.*, 2013) and used to generate a theoretical model of how conditions at their factory shaped these workers' well-being.

**3.3.2 Developing the sentiment scores.** Although this qualitative analysis enabled us to start developing our hypotheses and interventions, we needed quantitative data to assess the impacts of our interventions. We therefore classified entries for sentiment (Glaser and Strauss, 1967) using the standard Naïve-Bayes multinomial classification model in Python. We manually classified 1,405 early entries from the diaries, then used these to build a classification model. To improve its accuracy, some relevant publicly-available datasets were also located and added. One was the Primary Emotions of Statements dataset, which comprises 2,524 sentences, manually classified based on Plutchik's Wheel of Emotions (Plutchik, 1980; Williams, 2015). We grouped its original 18 emotions into our four sentiments, *happy*, *neutral*, *a little down*, and *unhappy*, as shown in Table 2, below.

*Table 2: Sentiments as translated from the Primary Emotions of Statements dataset*

Emotions in Williams (2015)	Translated sentiment
Awe, joy, love, optimism, trust	4 (Happy)
Ambiguous, anticipation, neutral, surprise	3 (Neutral)
Disapproval, fear, remorse, submission	2 (A little down)
Aggression, anger, contempt, disgust, sadness	1 (Unhappy)

The same procedure was applied to the Sentiment Analysis: Emotion in Text dataset, which contains 40,000 tweets manually classified into 13 emotions (Figure Eight, 2016). These groupings are shown in Table 3, below.

*Table 3: Sentiments as translated from the Sentiment Analysis: Emotion in Text dataset*

Categories in Figure Eight (2016)	Translated sentiment
Fun, happiness, love	4 (Happy)
Empty, enthusiasm, neutral, surprise, boredom, relief	3 (Neutral)
Worry	2 (A little down)
Anger, hate, sadness	1 (Unhappy)

After pre-processing – to remove prepositions, pronouns, conjunctions, and other words not useful for identifying sentiment, and to replace similar words of the same part of speech with a common equivalent (e.g. *loved* or *loving*, both verbs, with the verb *love*) – we used this combined dataset to create a Naïve-Bayes classifier. 80% of the data was randomly extracted and used to train a model. This was then used to test-classify entries in the remaining 20%. When the resulting sentiment for an entry was compared with its manually

assigned sentiment, accuracy was 80%. We used this classifier to assign sentiment, on our four-point scale, to all the digital diary entries. We also manually audited these assignments in both Chinese and English to ensure workers' voices were represented accurately.

### 3.4 Designing and delivering the interventions

Phase 2, in May and June 2020, was to design some interventions based on these insights, and test them in working factories. Daily work-skills training (including all workers) was provided at two factories for two months. A supervision training day for managers was held at the same factories. The two factories not receiving our training served as a control group.

*Table 4: The training interventions*

Item	Worker training	Manager training
Start date	23 May 2019	5 July 2019
End date	6 July 2019	5 July 2019
Frequency	Daily	One-off
Training protocol	<p>A daily session tailored to the day's specific task on the production line</p> <ol style="list-style-type: none"> <li>1. <i>Work skills training</i> (10 minutes): On each line the leader demonstrated how to sew different parts of the bag, for example, or to complete item assembly</li> <li>2. <i>Q&amp;A</i> (5 minutes): If individuals had difficulty with a certain task, a manager then trained each separately</li> </ol>	<p>An in-depth all-day session</p> <ol style="list-style-type: none"> <li>1. <i>Benefits of using supportive communication with workers</i> (30 minutes): Expert explanation of how supportive communication can help to improve work performance</li> <li>2. <i>Goal setting</i> (2 hours): How to set clear goals and deliverables and to communicate those to a team</li> <li>3. <i>Coaching and developing workers</i> (1 hour): Expert illustration of using communication to achieve better motivation and engagement from workers</li> <li>4. <i>Recap</i> (30 minutes): Role play, discussion, advice</li> <li>5. <i>Q&amp;A</i> (30 minutes): The expert or a factory owner answered any questions</li> </ol>

To ensure we were able to see any sustained effects of our training interventions, we continued to gather diary data for a further five months. Overall, our research produced the following outputs: confirmation of the key drivers of well-being in a Chinese factory; a theoretical model for well-being improvement; and a correlation of worker sentiment with performance. These findings are discussed in the following section.

## 4. Research findings

### 4.1 The nature of well-being in a Chinese factory

In our first analytical stage we worked with pre-intervention diary entries to examine what contributed to (or detracted from) our diarists' well-being at work. The workplace well-being concepts to emerge are listed in Figure 1, below. These we grouped into second-order



themes and aggregate dimensions (Corbin and Strauss, 2008; Gioia *et al.*, 2013). The three main aggregate dimensions were:

1. Social displacement and long- and short-term motivations;
2. Hard work without meeting targets is demotivating; and
3. Workplace relationships.

Struggles with separation from family, inability to meet factory targets due to operational issues, and workplace relationship strain were all mentioned in significant proportions.

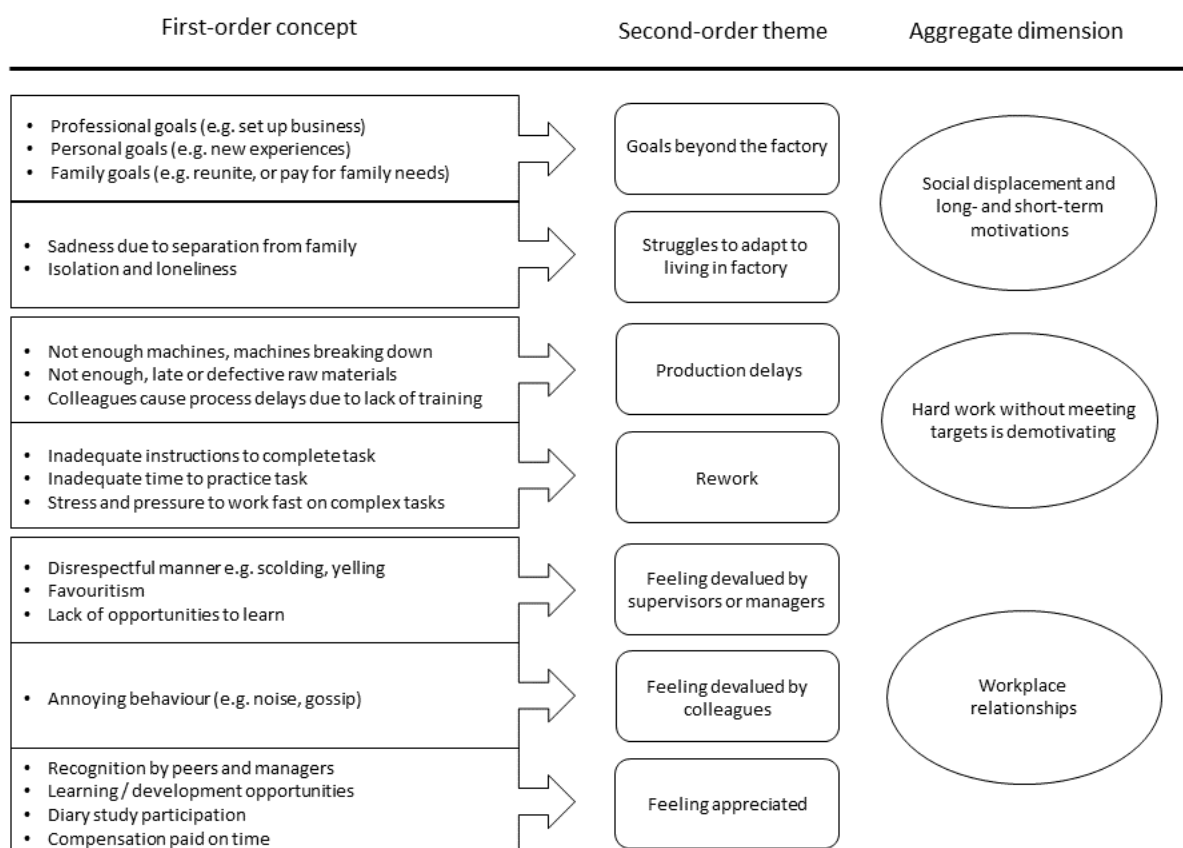


Figure 1: Data structure developed from early diaries (Bellingan *et al.*, 2020)

This data structure was used to classify subsequent diary entries by subject matter. (We presented a similar structure in Bellingan *et al.*, 2020.)

**4.1.1 Dimension 1: Social displacement and long- and short-term motivations.** Social displacement arising from migration was a prominent theme. We saw separation from their hometown community, family and friends impacting diarists' social well-being. 87% had travelled for work from a remote province (i.e. more than five hours' drive away). The Chinese New Year break was the only time many could confidently hope to go home. Some were afraid to ask for a leave long enough to allow them to travel. One diarist said:

*"There was an earthquake near my family's home. I'm really worried but I know my supervisor won't approve a request for days off in peak season. I'm depressed!"*

Visiting home once a year means missing family on other national holidays. Another told us:

*“Tomorrow is mid-autumn festival! I’m sad that I can’t celebrate in my hometown. As I miss another holiday with them, I realize my children are growing up fast.”*

We also saw some social isolation and struggles to fit in to factory life. Many diarists were particularly young (at least 43% aged under 30), and living alone in dormitories. Unused to being away from family, some seemed extremely lost, with no one to tell if they had been treated unfairly or witnessed an upsetting incident. One diarist said:

*“I miss my parents so much [...] Working in the factory is hard. I’m always alone.”*

A predominant proportion of diarists were motivated by goals like providing an education for their children or building a family home. Most felt they were investing time spent living at a remote factory to finance improving life for those they had left behind. One diarist said:

*“I had the medical today. I hope my body is in good shape so I can work here for few more years. Once the mortgage is paid off, I can then go home to be with my kids.”*

We saw workers compromising family relationships, a source of social well-being, in hopes of improving all their lives longer-term. Many told us how guilty they felt to not be around for parents or children. One diarist described struggling with this trade-off:

*“I work here to pay for my kids’ education. They deserve a better life than we have. My mum called: my son’s had a fight with a classmate. The school may record him a demerit. I want to be there to speak up for him, but it’s far away and the flight’s expensive. I know money’s important, but isn’t family connection? What a dilemma!”*

These workers, and many others like them, are accepting a degree of suffering in the interests of parents or the next generation. This means their ability to make the most of their time at the factory is key.

Measures to directly mitigate social displacement issues were beyond the practical scope of our study, but some other concepts indicated by early diaries would be addressed through intervention. Pre- and post-intervention diaries are therefore referenced in the sections below.

**4.1.2 Dimension 2: Hard work without meeting targets is demotivating.** Migrant workers care about their work. Each short-term goal to perform well in a task is linked to financing their longer-term aspirations. Because their remuneration is linked to productivity targets, obstacles to meeting those targets impact their life goals, undermining their eudaimonic well-being. Missing targets due to operational problems beyond their influence demotivated many, who often aired the frustration of the same issues repeatedly occurring. They could lose hope, feeling their efforts to be fruitless. One told us:

*“I’m working to save for a car and a driving licence, so I can work as a taxi-driver nearer to my children and parents. Work is so frustrating, though – we keep missing our targets. Every day there are delays I can’t control! I’ll never achieve my dream.”*

Late or defective raw materials could keep a whole production line waiting. Workers questioned management’s rationale as they stood idle while simultaneously under pressure:

*“On one hand, they push us to work fast to catch up for shipment; on the other, we’re kept waiting for materials. This is a big order but we keep having to stop and switch to another style. It makes it almost impossible to achieve our performance targets.”*

We saw no processes to ensure the correct raw materials were delivered on time. Machine breakdowns could also create delays.

A worker did not always know how to make their product. Neither work-skills training nor supervisors' training on ensuring workers could perform their tasks seemed part of any of the factories' processes. One diarist said:

*"After a day off I came back to a new task which I find very difficult. A few days on, I still can't do it both well and quickly. There's lots of rework. I'm keeping others waiting! I wish someone would give me some tips or show me how to do it better."*

Held to high quality standards, workers repeatedly reported the frustration and disappointment of being asked to rework products. Often the result of insufficient training or support, this could also result in overtime. A diarist said:

*"Our target was increased, making the strict quality requirements hard to meet. Not everyone has the skills. We're reworking every day 'til late at night. We're all tired!"*

Workers desperately want to complete their tasks well. Some shared their understanding of the systemic problems they faced, and a willingness to help address them. One suggested:

*"Some pre-production checks, a few days before the main schedule, would ensure all teams always had enough work, increasing our output. I want to share this, but no one listens to us workers."*

Those doing the work are the most aware of production problems yet our diarists seemed rarely consulted, or even heard, by management. Powerlessness to resolve the problems they perceived increased many workers' frustration. When such problems lead to rework and overtime, long hours and the strain of working into the night can also impact physical well-being.

**4.1.3 Dimension 3: Workplace relationships.** When people live at their workplace, relationships there are key to their well-being. A diarist described being sustained by friendships at work:

*"I work here to pay my kids' tuition fees. I love it, it's well paid and I've made friends. If there's overtime, I don't mind, as my co-workers are so nice. We chit-chat while working and eat together; it makes time fly. I do get tired, but I need to stay strong!"*

Diarists described some unsatisfactory interactions with supervisors. For example:

*"I asked my leader to check my work. He curtly said, 'Fine'. My work then got rejected downstream. I had to rework all the bags I'd done. It took me all morning!"*

Concerningly, diarists also described managers shouting at them or colleagues. One described being scolded while struggling, untrained, on a new task:

*"The supervisor suddenly moved us to a new line, to stick pockets onto bags. I'd never been told how to do it and kept making mistakes. Because I kept asking the person next to me, I then got yelled at. What a horrible day!"*

Relationships are important to these workers and such treatment impacts their social well-being. They may feel shamed, losing self-esteem.

Seeing colleagues shouted at impacts a whole team. A diarist said:

*"We're on a new process and no one's quite sure how to do it. The managers just kept shouting. I was afraid to ask for help. Tonight we will rework it all and there will be more shouting."*

Fear of asking for help generates mistakes and rework, which then leads to tiredness due to overtime.

Poor peer relationships were also seen to undermine well-being. Operational issues and time pressure could create workplace friction. For example, a diarist told us:

*“Every day there are arguments. The upstream team can’t provide enough work for us downstream. We waste a lot of time waiting. Why are they so slow?!”*

Diarists also mentioned feeling devalued by machine mechanics, as in this example:

*“Today the mechanic couldn’t find a problem, so he said I’d misused my machine!*

*Then he tried to show me how to sew! I burst into tears and went to the rest room.”*

Workers become irritable as they work in close proximity daily, under pressure on complex tasks with inadequate training. This is exacerbated by long hours and operational problems. Throughout the study, diarists mentioned wanting to leave their jobs, and also reported colleagues resigning.

There were, however, also examples of workers appreciating each other:

*“Tonight, everyone from my workshop went to do some packing. We don’t usually get to chat much while working, but we were all sat around a big table, talking and laughing. Soon it was 10pm and we’d done lots of work! It was lovely to see everyone tired but happy.”*

These workers were energised by the sense of belonging gained from working together. Workers also felt appreciated by management when selected for training or development:

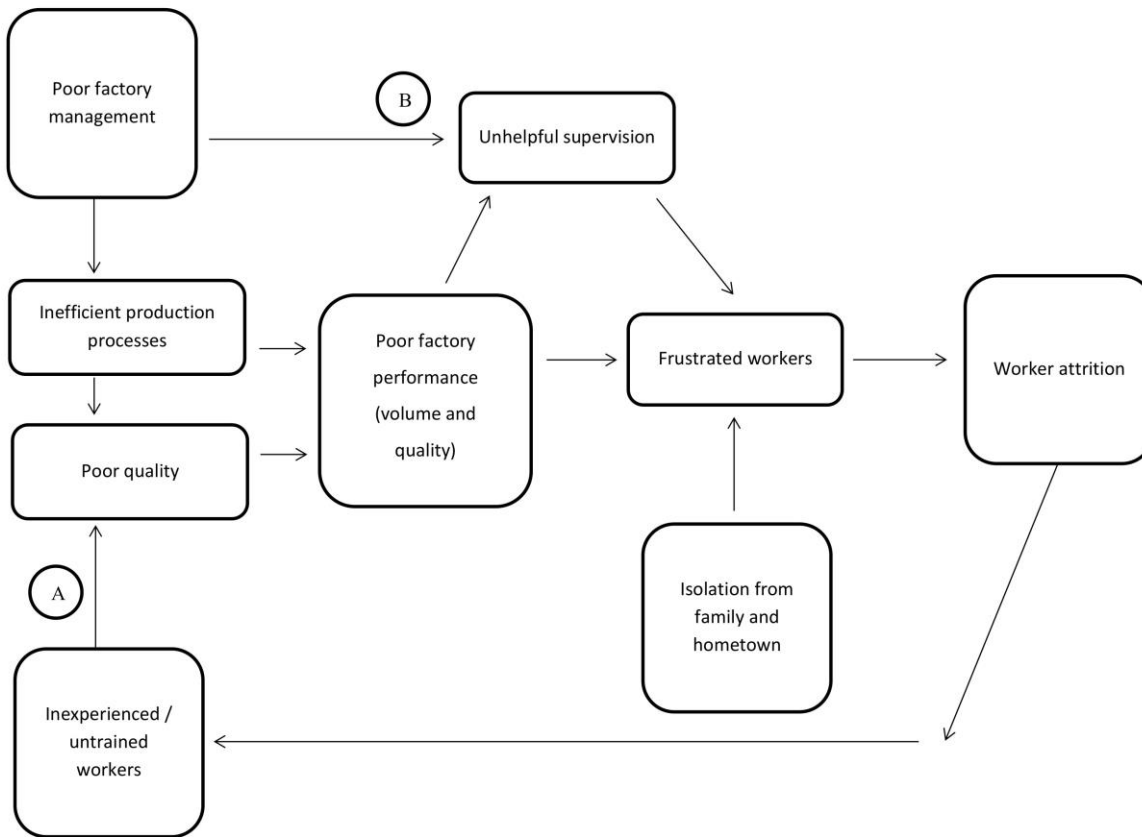
*“Today we learned a new stitching technique. I’m so glad I was chosen!”*

Some felt appreciated by our research. Most workers know what is wrong in their factories but are not asked for input. They perceived the aim was to improve things for them, suggesting they and their work were valued. This motivated them to improve.

#### *4.2 Building a model for well-being improvement*

Our pre-intervention findings had addressed our first research question: *What are the drivers of well-being in Chinese factories?* We observed a complex web of linked factors influencing workers’ hedonic, eudaimonic and social well-being (Bellingan *et al.*, 2020). These dimensions were not independent: operational problems could impede a worker’s efforts to achieve their life goals, in turn undermining their working relationships. Production delays outside the worker’s control were seen to block them from achieving productivity targets, negatively impacting their remuneration. By impeding their ability to work toward long-term life goals, this damaged their eudaimonic well-being. Social aspects of factory life also emerged as particularly important to these workers, and the resulting workplace friction could reduce their social well-being. These connections are shown in Figure 2, below.

We saw operational inefficiencies in factories, which we ascribed to poor overall management, negatively impacting both quality and output volumes. At the same time, workers unable to complete their tasks well contributed to these problems. Due to a lack of training provision and pressure to produce results, those supervising these workers, rather than addressing the problems they faced, would often simply scold them. Unable to meet their targets despite their best efforts, workers felt powerless to respond. Those who had migrated to work toward goals for their loved ones were also enduring the pain of separation. Frustration undermined their eudaimonic well-being, and added friction to their working relationships, impacting social well-being. Poor well-being could lead to resignations. Without even basic training and with no experience, new workers would then generate more quality issues.



*Figure 2: Observed negative impacts on well-being in factories*

While it shows the problem as systemic, and requiring a shift in approach from management, we were able to identify two points of potential well-being intervention, as shown.

**Intervention 1** (at point A): Work-skills training: a daily 10-minute demonstration of the day's production task.

**Intervention 2** (at point B): Managers' supervision training, addressing the identified problem of unsupportive communication from front-line supervisors.

We created four hypotheses based on these insights from the qualitative data. These were:

**Hypothesis 1.** Sentiment in a factory can be improved by providing training for workers and supervisors to address workplace inefficiency and friction.

**Hypothesis 2.** Improving these factors will shift the focus of workers' attention away from their work frustrations, reducing uncomfortable feelings.

**Hypothesis 3.** Reduced friction and inefficiencies will lead to improvements in (a) rework rates, (b) product attrition, and (c) order delays.

**Hypothesis 4.** Improvements in sentiment lead to improved worker retention.

These are mapped onto a theoretical model below.

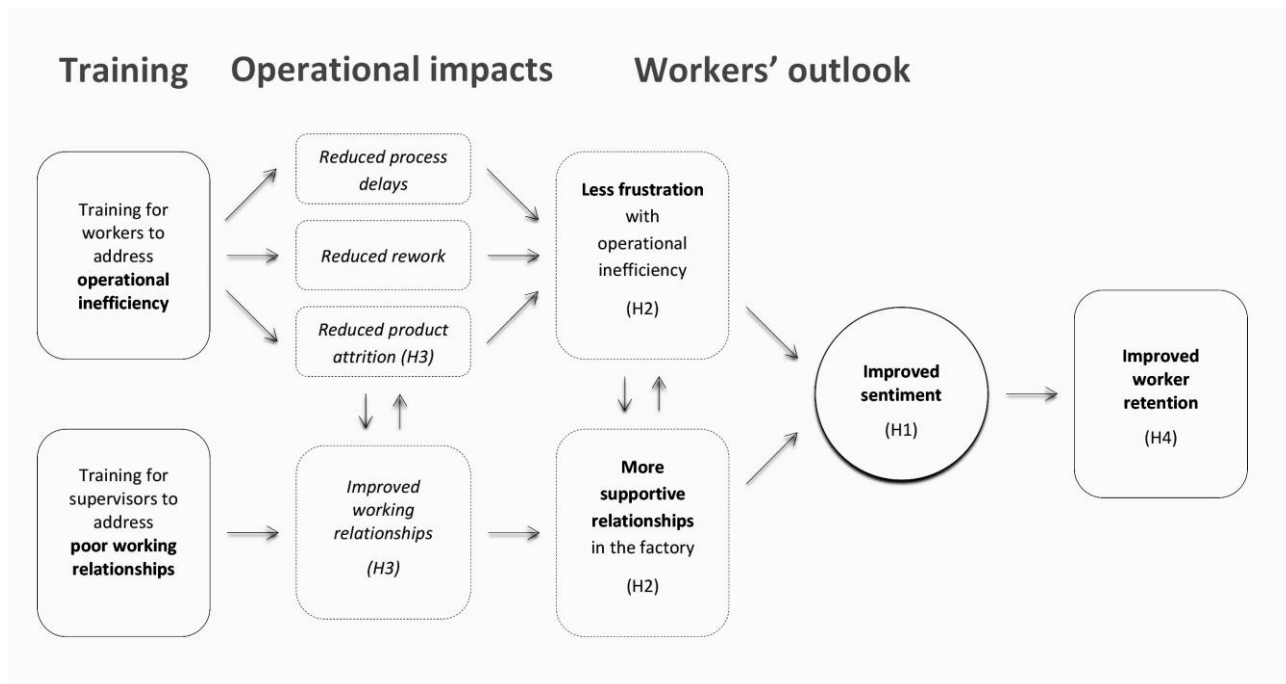


Figure 3: A model for improved well-being and performance

### 4.3 Testing the hypotheses

We tested each hypothesis by comparing diary data from before and after the interventions.

**H1:** *Sentiment in a factory can be improved by providing training for workers and supervisors to address workplace inefficiency and friction.* We reviewed the sentiments attached to diary entries to see whether any had trended up or down following intervention, and whether that change was significant. Findings are shown in Table 5, below:

Table 5: Impact of training on sentiment scores

Sentiment	Factories with interventions		Factories without interventions (Control)	
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
(% of entries)	n=3202	n=5993	n=221	n=272
<b>Happy</b>	36.9	38.4**	29.8	29.9
<b>Neutral</b>	29.7	38.8*	40	43
<b>A little down</b>	19.9	12*	10	11.4
<b>Unhappy</b>	13.4	10.7*	17.2	20

\*Difference is significant at  $p < .05$ . \*\*Difference is significant at  $p < .10$ .

While this showed a modest increase in entries coded as *happy*, the most significant change was a reduction in negative sentiment. We therefore accepted the hypothesis that the training would improve sentiment in factories.

**H2:** Improving these factors will shift the focus of workers' attention away from their work frustrations, reducing uncomfortable feelings. An underlying mechanism for this sentiment change was seen in the content of diary entries. Analysing how often each second-order theme was mentioned in diaries before and after training suggested significant changes in outlook. Findings are shown in Table 6, below.

*Table 6: Impact of training on second-order well-being themes*

Dimensions	Second-order themes	Factories with interventions		Factories without interventions (Control)	
		Before (Mar-May)	After (Jun-Dec)	Before (Mar-May)	After (Jun-Dec)
	(% of entries)	n=534	n=928	n=36	n=64
Operational inefficiency	Production delays	15.7	9.2*	13.8	25.0
	Rework	10.3	5.7*	0.0	0.0
Workplace relationships	Feeling appreciated	32.8	50.4*	38.9	20.3*
	Feeling devalued by supervisors	4.7	4.1	5.5	6.2
	Feeling devalued by colleagues	11.8	6.3*	10.8	9.4

\*Difference between before and after is significant at  $p < .05$

There were fewer references to production delays or rework or to feeling devalued by colleagues, and more reports of feeling appreciated. Thus, we accepted hypothesis 2.

**H3:** Reduced friction and inefficiencies will lead to improvements in (a) rework rates, (b) product attrition, and (c) order delays. To review factory performance, we compared rework, product attrition, and order fulfilment rates. Findings are in Table 7, below.

*Table 7. Impact of worker training and supervisor training on factory performance*

	Factories with interventions		Control factories	
	Before (Jan-May)	After (Jun-Dec)	Before (Jan-May)	After (Jun-Dec)
Performance (mean)	n=5	n=7	n=5	n=7
Rework rate	0.721%	0.610%*	0.421%	0.308%
Product attrition rate	0.091%	0.082%	1.237%	1.136%
Order delay rate	1.379%	1.173%	0.866%	0.728%

\*Difference between before and after is significant at  $p < .05$ .

This shows rework rates significantly improved after intervention. Product attrition and order-delay rates did not improve to a similar extent.

**H4: Improvements in sentiment lead to improved worker retention.** Data from intervention factories also showed significantly reduced worker attrition after the training, as shown below. We therefore accepted this hypothesis.

*Table 8. Impact of worker and manager training on worker attrition*

	Factories with interventions	
	<i>Before (Jan-May)</i>	<i>After (Jun-Dec)</i>
Performance (mean)	n=5	n=7
Worker attrition rate	3.870%	1.364%*
*Difference between before and after is significant at $p < .05$ . Equivalent data was not supplied by the control factories.		

Post-intervention diaries from the intervention factories indicated a general sentiment improvement which was not mirrored in the control factories. The extent to which specific second-order themes were mentioned had similarly changed. Fewer references to operational problems and more reports of feeling appreciated suggested the trainings had brought about significant changes in workers' outlook.

Factory-level metrics indicated that the training had also improved factory performance. The average rework rate was improved to a statistically significant extent, from 0.72% to 0.61%. (Product attrition and order delay rates also improved, but only from 0.09% to 0.08% and from 1.38% to 1.17% respectively.) Worker attrition had also improved significantly, from 3.87% to 1.36%.

*Table 9. Results of testing the hypotheses*

Hypothesis	Accepted
H1. Sentiment can be improved by providing training for workers and supervisors to address workplace friction and inefficiency.	Y
H2. Improving these factors will shift the focus of workers' attention away from their work frustrations, reducing uncomfortable feelings.	Y
H3. Reduced friction and inefficiencies will lead to improvements in (a) rework rates, (b) product attrition, and (c) order delays.	Y (Partially): (a) Y (b) N (c) N
H4. Improvements in sentiment lead to improved worker retention	Y

Our second research question was answered: our interventions had positively impacted workers' sentiment, factory performance and also worker retention.

## 5. Discussion

Overall, the research findings contribute revelatory insights into the nature of the links between well-being and factory performance. Where literature has demonstrated a failure to understand what to monitor to improve workers' well-being, and audits and SSCM remain focused on hedonic aspects, we confirm the key importance of eudaimonic and social factors. Concerning the *happy worker – productive worker* thesis, we uncover a



complex relationship between these two dimensions, showing that where eudaimonia is a key driver of well-being, the inverse direction of causality is that productive workers are happier.

In this article we also demonstrate that well-targeted interventions can simultaneously improve both worker well-being and performance in a Chinese factory. Our practical training interventions did influence some aspects of each. Because eudaimonic well-being concerns development and improvement, our interventions set out to improve workers' well-being via both the quality of their front-line supervision and their individual skills. This, perhaps counter-intuitive, approach reveals that addressing some aspects of an individual's work performance can also reduce their frustration, improving their eudaimonic and social well-being. We therefore demonstrate, not that a happy worker is automatically more productive, but that a productive worker is more likely to be happy. By improving their ability to be productive, and their relationships with supervisors, we reduced workers' frustration and conflict at work, allowing them to think more about their achievements for themselves and their families and to enjoy each other's company. This was reflected in a shift of subject-matter in their diaries. We believe the encouraging reduction in worker attrition levels seen in the intervention factories is an outcome of our success in improving workers' general well-being.

This study also empirically confirms our initial insights regarding the motivations and concerns of Chinese factory workers. While such a worker's well-being is undoubtedly closely tied to life at their factory, the issues they chose to discuss in their diaries did not reflect the hedonic factors typically measured by audits. Because most have migrated to raise money, their main source of well-being is eudaimonic. Productive work, paid well, is paramount. Our research indicates that working relationships and daily operational issues were hindering these workers' productivity, preventing them from achieving their targets and damaging their eudaimonic well-being. We also saw frustration caused by process failures leading to friction with colleagues and managers. For many, social isolation made these feelings difficult to escape.

Of the more direct outcomes of our combined training interventions, we saw product-attrition and order-delay rates less-improved than rework rates. This is because our interventions could not address a factory's process failures, which, as seen in the diaries, continued throughout the study. Sustainable change would require systemic interventions and universal employee engagement over time. We were not in a position to attempt to improve any factory processes or the management above shopfloor level. While we did not attempt to address the isolation arising from social displacement, either, this was less prominent in diaries from the only factory allowing workers to go home for holidays other than Chinese New Year. The obvious intervention – more long holidays – would also have had to be made by the factory.

## **6. Conclusions and limitations**

We regard this study as transformational, particularly in terms of practice. We are able to show that companies could stop viewing the support of workers' well-being as an inescapable business cost, concerned only with fixing hedonic workplace issues, and begin to regard it instead as an investment in improved work performance and staff retention.

SDG8's "decent work" and "economic growth" are not conflicting demands on a company's resources – they can be addressed together, and comparatively inexpensively. Our results could change the way brands think about their interactions with their supplier factories and the data they collect on them.

We confirm that current audits fail to consider important factors. The presence of procedures like regular machinery servicing and ensuring raw materials quality might easily be checked through existing monitoring regimes, as could HRM processes which ensure regular training for everyone in the company. Our success with a novel diary method suggests a new direction for addressing how to collect the information required to monitor workers' well-being.

There were inevitably factors beyond our control. The factories lacked routines for assembling the performance data we needed, and did not all contribute complete metrics for the whole period. We were therefore unable to compare the statistically significant reduction in worker attrition seen in our intervention factories with meaningful control data. While our trainings were successful, by reviewing only their combined impacts, we may have limited our insights into specific causality. Separate testing might reveal interesting detail. We also faced the issue with translation accuracy seen in most cross-cultural research. The diary data was subjective but required consistent coding. To avoid human variation, we applied automatic sentiment assignment. After manual checks revealed some questionable assignments, a full audit showed ambiguous entries without strong language tending to be assigned the *neutral* sentiment. While people may be variable, automation had not provided complete accuracy, either.

While all our host factories faced typical issues including short order lead-times and pricing pressures, one manager told us that worker attrition, which had increased by about 15% year-on-year, had become a major concern which was significantly affecting that factory's financials. As the Chinese economy develops, retaining and developing staff and improving manufacturing performance will continue to gain importance (Luthans, *et al.*, 2008). To improve retention, workers' well-being will need to be prioritised (Luthans *et al.*, 2008). We propose that, in the interest of ensuring "decent work" in which workers will choose to stay and develop, western clients could address supplier factories' systemic operational problems. This might be achieved by encouraging training in management and operational planning techniques through their supplier management and monitoring regimes.

We believe the use of digital diaries has given Chinese workers a genuine voice for the first time. Our work contributes to the well-being literature by shedding much-needed light on the nature of the complex link between a factory's performance and its workers' well-being. For the first time we clarify that, at least in this Chinese context, while the posited link between workers' happiness and productivity holds true, many factors impacting their well-being can actually be addressed by taking steps to improve their ability to be productive. This could provide a new avenue of exploration for *happy worker – productive worker* studies. Direction notwithstanding, the proof of a causal link which can be practically addressed, comparatively simply, on the factory floor, offers tangible benefits which go beyond the theoretical. While ensuring the workers themselves are engaged in "decent work", factory owners and clients alike would be investing in improved yields as well as better social sustainability scores.

## References

- Adler, P., Brown, D., Dehejia, R., Domat, G. and Robertson, R. (2017), "Do factory managers know what workers want?", *Asian Development Review*, Vol. 34 No. 1, pp. 65-87, [https://doi.org/10.1162/adev\\_a\\_00081](https://doi.org/10.1162/adev_a_00081)
- Anner, M. (2012), "Corporate social responsibility and freedom of association rights", *Politics and Society*, Vol. 40 No. 4, pp. 609-644, <https://doi.org/10.1177/0032329212460983>
- Anner, M. (2017), "Monitoring workers' rights: the limits of voluntary social compliance initiatives in labor repressive regimes", *Global Policy*, Vol. 8 S3, pp. 56-65, <https://doi.org/10.1111/1758-5899.12385>
- Avey, J. B., Luthans, F., Smith, R. M. and Palmer, N. F. (2010), "Impact of positive psychological capital on employee well-being over time", *Journal of Occupational Health Psychology*, Vol. 15 No. 1, pp. 17-28, <https://doi.org/10.1037/a0016998>
- Bellingan, M., Tilley, C., Batista, L., Kumar, M. and Evans, S. (2020), "Capturing the psychological well-being of Chinese factory workers", *International Journal of Operations and Production Management*, Vol. 7/8, pp. 1269-1289, <https://doi.org/10.1108/ijopm-06-2019-0492>
- Brislin, R. (1980), "Translation and content analysis of oral and written material", in Triandis, H. C. and Berry, J.W. (Ed.s), *Handbook of cross-cultural psychology*, Vol. 2, pp. 389-444, Allyn & Bacon.
- Chamberlain, G. (2019), "Schoolchildren in China work overnight to produce Amazon Alexa devices", *Guardian*, Aug 8, 2019, <https://www.theguardian.com/global-development/2019/aug/08/schoolchildren-in-china-work-overnight-to-produce-amazon-alexa-devices>
- Chamberlain, G. (2022), "Alexa whistleblower demands Amazon apology after being jailed and tortured", *Observer*, Jan 30, 2022, <https://www.theguardian.com/technology/2022/jan/30/alexa-factory-whistleblower-i-was-tortured-and-jailed-now-amazon-should-apologise>
- Chan, A. (2001), "Globalization, the social clause, and China's workers", *Chinese Economy*, Vol. 34 No. 6, pp. 12-31, <https://doi.org/10.2753/ces1097-1475340612>
- Chan, J. (2013), "A suicide survivor: the life of a Chinese worker", *New Technology, Work and Employment*, Vol. 28 No. 2, pp. 84-99, <https://doi.org/10.31219/osf.io/dzsa2>
- Cheng, E. (2021), "China's factories automate as worker shortage looms", CNBC, April 9, 2021, <https://www.cnbc.com/2021/04/09/chinas-factories-automate-as-worker-shortage-looms.html>
- Corbin, J. and Strauss, A. (2008), *Basics of Qualitative Research, 3rd edn.*, Sage, <https://doi.org/10.4135/9781452230153>
- Cottini, E., Kato, T., Westergaard-Nielsen, N. and Forschungsinstitut zur Zukunft der Arbeit (2011), "Adverse workplace conditions, high-involvement work practices and labour turnover", *Labour Economics*, Vol. 18 No. 6, pp. 872-880, <https://doi.org/10.2139/ssrn.1515134>
- Dean, J. and Ting-I, T. (2010), "Suicides spark inquiries", *Wall Street Journal*, May 27, 2010, <https://www.wsj.com/articles/SB10001424052748704026204575267603576594936>
- Egels-Zandén, N. (2014), "Revisiting supplier compliance with MNC codes of conduct: recoupling policy and practice at Chinese toy suppliers", *Journal of Business Ethics*, Vol. 119 No. 1, pp. 59-75, <https://doi.org/10.1007/s10551-013-1622-5>
- Figure Eight (2016), "Sentiment Analysis: Emotion in Text", <https://www.figure-eight.com/data-for-everyone/>
- Fisher, C. D. (2003), "Why do laypeople believe that satisfaction and performance are correlated? Possible sources of a commonsense theory", *Journal of Organisational Behaviour*, Vol. 24, pp. 753-777, <https://doi.org/10.1002/job.219>
- Fisher, C. D. (2014), "Conceptualising and measuring wellbeing at work", in Chen, P. Y. and Cooper, C. (Ed.s.), *Work and Wellbeing*, Wiley & Sons, <https://doi.org/10.1002/9781118539415.wbwell018>

- Gallagher, M. W., Lopez, S. J., and Preacher, K. J. (2009), "The hierarchical structure of well-being", *Journal of Personality*, Vol. 77 No. 4, pp. 1025-1050, <https://doi.org/10.1111/j.1467-6494.2009.00573.x>
- Gioia, D. A., Corley, K. G. and Hamilton, A. L. (2013), "Seeking qualitative rigor in inductive research", *Organizational Research Methods*, Vol. 16 No. 1, pp. 15-31, <https://doi.org/10.1177/1094428112452151>
- Glaser, B. G. and Strauss, A. L. (1967), *The Discovery of Grounded Theory: Strategies for qualitative research*, Aldine Transaction, <https://doi.org/10.4324/9780203793206-1>
- Glendon, L. (2013), "Winners and losers in the complex web of global supply chains", *Journal of Business Continuity and Emergency Planning*, Vol. 6 No. 4, pp. 322-328.
- Hamnett, C. (2020), "Is Chinese urbanization unique?", *Urban Studies*, Vol. 57 No. 3, pp. 690-700, <https://doi.org/10.1177/0042098019890810>
- Jacka, T. (2014). *Rural women in urban China: Gender, migration, and social change*, Taylor & Francis, <https://doi.org/10.4324/9781315701028>
- Krekel, C., Ward, G. and De Neve, J.-E. (2019), "Employee wellbeing, productivity, and firm performance", *SSRN Electronic Journal*, <https://doi:10.2139/ssrn.3356581>
- Locke, R. M. (2013), *The Promise and limits of private power: promoting labor standards in a global economy*, Cambridge University Press, <https://doi.org/10.1017/cbo9781139381840.002>
- Luthans, F., Avolio, B. J., Walumbwa, F. O., and Li, W. (2005), "The psychological capital of Chinese workers: exploring the relationship with performance", *Management and Organization Review*, Vol. 1 No. 2, pp. 249-271, <https://doi.org/10.1111/j.1740-8784.2005.00011.x>
- Luthans, F. and Youssef, C.M. (2007), "Emerging positive organizational behavior", *Journal of Management*, Vol. 33 No. 3, pp. 321-349, <https://doi.org/10.1177/0149206307300814>
- Luthans, F., Avey, J. B., Clapp-Smith, R., and Li, W. (2008), "More evidence on the value of Chinese workers' psychological capital: a potentially unlimited competitive resource?", *The International Journal of Human Resource Management*, Vol. 19 No. 5, pp. 818-827, <https://doi.org/10.1080/09585190801991194>
- Luthans, F., Avey, J., Avolio, B. and Peterson, S. (2010), "The development and resulting performance impact of positive psychological capital", *Human Resource Development Quarterly*, Vol. 21 No. 1, pp. 41-67, <https://doi.org/10.1002/hrdq.20034>
- Mozur, P. (2012), "Life Inside Foxconn's Facility in Shenzhen", *Wall Street Journal*, Dec 19, 2012, <https://www.wsj.com/articles/BL-CJB-17008>
- O'Rourke, D. (2003), "Outsourcing regulation: analyzing nongovernmental systems of labor standards and monitoring", *Policy Studies Journal*, Vol. 31 No. 1, pp.1-29, <https://doi.org/10.1111/1541-0072.00001>
- Plutchik, R. (1980), "A general psychoevolutionary theory of emotion", in Plutchik, R. and Kellerman, H. (Ed.s.), *Emotion: Theory, Research and Experience – Theories of emotion*, pp. 3-33, Academic Press, <https://doi.org/10.1016/b978-0-12-558701-3.50007-7>
- Pun Ngai (2005), "Global production, company codes of conduct, and labor conditions in China: a case study of two factories", *China Journal*, Vol. 54, pp.101-113, <https://doi.org/10.2307/20066068>
- Rogers, Z. S. (2016), "*The impact of supply chain CSR performance on firm value*", Arizona State University thesis.
- Schwarz, U. v. T., Hasson, H. and Tafvelin, S. (2016), "Leadership training as an occupational health intervention", *Safety Science*, Vol. 81, pp. 35-45, <https://doi.org/10.1016/j.ssci.2015.07.020>
- Siu, K. (2017), "Labor and domination: worker control in a Chinese factory", *Politics and Society*, Vol. 45 No. 4, pp. 533-557, <https://doi.org/10.1177/0032329217714784>
- Short, J. L., Toffel, M. W. and Hugill, A. R. (2014), "Monitoring the monitors: how social factors influence supply chain auditors", *SSRN Electronic Journal*, <https://doi.org/10.2139/ssrn.2469953>

- Sinkovics, N., Hoque, S. F. and Sinkovics, R. R. (2016), "Rana Plaza collapse aftermath", *Accounting, Auditing and Accountability Journal*, Vol. 29 No. 4, p. 617, <https://doi.org/10.1108/aaaj-07-2015-2141>
- Vogel, D. (2010), "The private regulation of global corporate conduct: achievements and limitations", *Business and Society*, Vol. 49 No. 1, pp. 68-87, <https://doi.org/10.1177/0007650309343407>
- Warr, P. and Nielsen, K. (2018), "Wellbeing and work performance", in Diener, E., Oishi, S., and Tay, L. (Ed.s.), *Handbook of Well-being*, DEF Publishers.
- Williams, L. (2015), "Primary Emotions of Statements", *Figure Eight*, <https://www.figure-eight.com/data-for-everyone/>
- Woon Y-F. (2000), "Filial or rebellious daughters? Dagongmei in the Pearl River Delta region, South China, in the 1990s", *Asian and Pacific Migration Journal*, Vol. 9 No. 2, pp. 137-169, <https://doi.org/10.1177/011719680000900201>