Chapter 5

Employee Well-being, Productivity, and Firm Performance: Evidence and Case Studies

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Executive Summary

1. We estimate a positive correlation between employee well-being and productivity, and there is a growing evidence base documenting this being a causal effect. Recent experimental evidence suggests that a meaningful increase in well-being yields, on average, an increase in productivity of about 10%.
2. There is a large, positive correlation between employee well-being and aggregate, firm-level measures of performance across all types of industries. This relationship is particularly strong in terms of customer satisfaction and staff turnover – both of which drive overall profitability. Publicly traded companies with a happy workforce also perform better on the stock market.
3. This makes the case for a consistent measurement of employee well-being that should be widely reported upon, alongside productivity and firm performance outcomes.
4. Interventions aimed at raising employee productivity should target the key drivers of employee well-being. A good starting point are interventions identified in Krekel et al. (2018) that target *(a)* social relationships at work, especially with supervisors (for example, similar to the social recognition programme at LinkedIn or Butterfly AI's managerial feedback system described in our case studies), *(b)* making jobs more interesting (for example, through job crafting), and *(c)* improving work-life balance.
5. Intervention results should be rigorously evaluated (ideally by means of randomised controlled trials). Costs should be recorded to identify the most cost-effective interventions; results should be shared publicly to enable knowledge exchange and learning.

1. Introduction

The well-being of employees is a good in itself. But an important question frequently arises as to whether there are any objective benefits to making the subjective well-being of workers a priority. Clearly, implementing policies that promote worker well-being can be resource-intensive. And in times of limited budgets and competing priorities, the issue often boils down to the question: is it worth it? Ultimately, businesses and policy-makers alike want to know: are there any objective returns to – or, more generally, is there a compelling business case for – spending scarce resources to ensure and enhance well-being in the workplace?

It is on this key question that this paper is focused. We attempt to shed light on the issue in three different ways: first, we review the most recent and robust empirical evidence from the academic literature on the links between well-being and performance. Second, we present practice-oriented, hands-on case studies from specialists working in the field.[1] Finally, as the main contribution of this paper, we conducted a meta-analysis of research studies done by the Gallup Organization for their clients investigating the nexus between employee satisfaction and various firm performance outcomes. Taken together, the evidence very much suggests the answer to the overarching question is "yes" – there is a strong business case for promoting the well-being of workers.[2]

The data accumulated by Gallup in their client work over the past few decades yields a rich seam of data on employee well-being and firm performance. In total, we study 339 independent research studies that have been accumulated by Gallup, including the well-being of 1,882,131 employees and the performance of 82,248 business units, originating from 230 independent organisations across 49 industries in 73 countries. We tabulate the correlations between employee well-being and various firm performance outcomes at the business-unit level, and then apply meta-analytic methods to obtain average correlations across studies, adjusted for differences in sample size, measurement error, and other statistical idiosyncrasies between the 339 original research studies.

Of course, correlation does not imply causation. The breadth and depth of the Gallup data provide

us with unique insights into the relationship between employee well-being and firm performance. But we also seek to enrich this evidence with supporting, complementary empirical evidence from the academic literature. In doing so, we focus on the "causal-design" literature, and in particular, identify studies using laboratory or field experiments as well as those exploiting 'natural' experiments occurring in the real business world. Our aim is to bring together the most recent and robust studies that credibly certify (or at least strongly suggest) causality of the effect of happiness on productivity, while paying attention at the specific mechanisms through which happiness may affect productivity.

This paper is structured as follows. In Section 2, we review the theoretical as well as empirical literature on the relationship between employee well-being and productivity at the individual level. We ask the question: do happier workers work better? Then, in Section 3, we move on to the firm-level, and attempt to assess the relationship between aggregate-level well-being and firm performance. Here, the key question is: do the insights at the individual-level translate into tangible benefits on the bottom line of business? We first leverage the Gallup client data to provide a correlational meta-analysis, and then supplement that evidence with more causal research designs from the academic literature. Finally, in Section 4, we conclude by providing an outlook on likely future developments in the area, by identifying key gaps to date, as well as fascinating research opportunities in the future.

2. Individual-Level Well-being and Productivity

2.1 Theoretical Background

Before assessing the evidence on the relationship between employee well-being and productivity, it is useful to first take one step back and reflect on why we might expect employee well-being to affect productivity in the first place.

Several different theories have been studied in the literature.[3] Perhaps the most long-running and widely-known is *Human Relations Theory*. Going back nearly a century, the human relations movement has hypothesised that higher employee well-being – typically measured in terms of job satisfaction (a cognitive, evaluative judgement) – is associated with higher morale, which, in turn, leads to higher productivity (see Strauss (1968), for example). This framework is in line with research showing that positive attitudes towards a particular life domain carry with them positive behavioural implications (Fishbein and Ajzen, 1975). Following this reasoning, higher job satisfaction, with presumably more favourable attitudes towards work and the workplace, should be associated with less absenteeism or staff turnover, among other important outcomes.[4]

More recently, there has been a more "emotional turn" to the research. *Emotion Theory* postulates that employees' emotional states can affect and drive their performance (see Staw et al. (1994), for example).[5] There are several different channels through which this may take place. First, positive affect – or "mood" – may itself lead to heightened motivation, and hence better job outcomes and organisational citizenship (Isen and Baron, 1991). A further channel is through positive, stimulating arousal, either directly (Russell, 2003) or indirectly via changes in attitudes or behaviour (Baumeister et al., 2007).[6]

A related stream of work stresses the positive effect of emotions on creativity, arguing that positive affect leads to what psychologists call *cognitive variation* (Clore et al., 1994). Here, three mechanisms are proposed in the psychological literature: first, positive affect increases the number of cognitive elements available for association. Second, it increases – through defocused attention – the breadth of these elements. Finally, it increases cognitive flexibility, and hence the probability that cognitive elements become associated with each other (Isen, 1999) – for example, helping people make connections between ideas for a new project. In other words, positive affect increases the number and diversity of our thoughts, helps us muse about them more intensively, and in doing so, helps us build relationships between thoughts that have previously been disconnected from each other – a perpetual, creative process bearing new thoughts and ideas.

2.2 Empirical Evidence

The nature, form, and temporal dynamics of the relationship between positive affect and creativity at work was studied by Amabile et al. (2005). The authors employed experience sampling

methods to collect – for several months – daily and monthly reports of affect and creativity from 222 employees in seven companies and three industries (chemicals, high-tech, and consumer products) working on 26 organisational projects that called for creativity. Using 11,471 daily reports of employees and peer ratings, and controlling for education level and company tenure, amongst other factors, the authors found that positive affect has a positive relationship with creativity, defined as production of novel and useful ideas and measured by asking peers to assess the creativity of employees' work.[7]

Is this just a case of 'reverse causality'? Amabile et al. (2005) showed that positive affect is an *antecedent* of creativity with an incubation period of up to two days.[8] Perhaps even more convincingly, the causal effect of affective states on creativity has been shown in the laboratory. Isen et al. (1987), for example, induced positive affect in participants – by showing them a few minutes of a comedy film or by giving them a small bag of candy – and then administered tasks generally regarded as requiring creative ingenuity. They found that participants in the experimental condition (i.e. those with more positive affect) performed better in creative tasks than participants in the control condition.[9] Interestingly, negative affect did not produce comparable improvements in creative performance.

Besides creativity, how do emotions relate to productivity more generally? Oswald et al. (2015) conducted a series of lab experiments that randomly allocated students into either an experimental condition in which they received a happiness-enhancing treatment (like watching a ten-minute comedy clip or receiving free chocolate, fruits, and non-alcoholic drinks) or a control condition (in which they watched a calm placebo clip or received nothing at all). The participants then performed a real effort task for which they were paid a piece-rate. Increases in happiness were strongly associated with increases in productivity of up to 12% on the task (they were asked to correctly sum up numbers for ten minutes). This is a large effect that can – due to the randomised experimental nature of the study – be interpreted as causal. Importantly, the authors showed that the happiness-productivity relationship goes beyond the artificial lab setting, by exploiting randomly occurring real-life shocks to well-being (bereavement or family illness): students who reported such shocks performed systematically worse on the task than their peers who did not.

Another piece of real-life evidence comes from De Neve and Oswald (2012). Using data on more than 10,000 young adults in the US, and comparing siblings from the same family while also controlling for a wide range of observables including education, intelligence, physical health, and self-esteem, the authors found that individuals who reported higher levels of positive affect and life satisfaction at ages 16, 18, and 22 have significantly higher levels of earnings later in life.[10] Important pathways were a higher probability of obtaining a college degree, getting hired and promoted, and higher levels of non-cognitive skills (more optimism and extraversion, less neuroticism).[11]

Interestingly, a significant stream of research on individual well-being and workplace performance has focused on call centres. This is perhaps unsurprising, given that many tasks in this setting can be easily quantified at high-frequency intervals, for example, the number of calls or sales per hour or day. This is not true of many other professions, where researchers are forced to instead study outcomes like quarterly or annual managerial reviews (which are more problematic to interpret).

Rothbard and Wilk (2011) studied affect and productivity of call centre agents in two call centres of a large insurance company. The authors were particularly interested in how start-of-workday mood affects how call centre agents see interactions with customers, how they feel subsequent to them, and how these feelings affect their (objective) work productivity and quality of work. Employing experience sampling methods, the authors recorded affect – covering positive mood such as being excited, enthusiastic, upset, or irritable – daily over a period of three weeks, at the start of the workday and subsequent to calls. The authors showed that start-of-workday mood, or mood before calls more generally, did indeed affect the productivity of call centre agents: *positive affect* subsequent to calls related to better quality of work, whereas *negative affect* was positively associated with quantity – that is, more calls in total.[12]

Coviello et al. (2017), using a simple daily questionnaire, tracked the mood of more than

2,700 call centre agents located in nine different call centres for over a year.[13] The authors found that better mood *decreases* the number of calls per hour, or average call duration in minutes. This finding held even after controlling for individual fixed effects (including, for example, the innate ability of call centre agents) as well as leveraging variation in local weather patterns that may affect mood. A potential mechanism they discuss is that better mood may lead to a heightened vulnerability to social distractions, i.e. call centre agents in better mood may talk more with each other than clients on the phone (Cunningham, 1988; Pacheco-Unguetti and Parmentier, 2016).[14]

Although call centres offer an interesting real-world laboratory to study well-being and performance, some of the performance metrics are difficult to interpret. This is especially true for the number of calls. In particular, Coviello et al. (2017) rightly note that the number of calls is not necessarily a good measure of productivity: to the extent that an increase in the number of calls comes at the expense of actual call quality (which may be the case for a call centre agent in bad mood), it is difficult to interpret an increase in the number of calls as an increase in productivity *per se* (in fact, it could be interpreted as a decrease).

Staw and Barsade (1993) tested the question of whether positive or negative affect leads to better performance at the management level. Contrary to call centre agents, the work of managers is less structured, and when it comes to decision-making, potentially more influenced by affect than routine tasks. The authors conducted managerial simulations (in which 111 first-year MBA students were required to run a fictitious production plant) as part of a weekend assessment centre, including a three-hour in-basket exercise (an exercise in which participants have to work themselves through a simulated inbox under time pressure) with 21 different decision items. They found that management students with higher levels of positive affect did perform better in terms of interpersonal tasks (within-group discussions) and overall decision-making. Zelenski et al. (2008) confirm this result in a study of 75 directors employed in the private sector and the Canadian federal government: managers with higher levels of positive affect rated their productivity higher than their peers.

Overall, the literature at the individual level suggests a positive impact of mood on performance. However, the sign (and to some extent size) of the impact of positive affect on performance seems to be context-specific. It depends, in particular, on the tasks being completed and the working environment. Applying meta-analytical methods, and hence averaging across many studies, Lyubomirsky et al. (2005) conclude that this impact is, on average, positive.

3. Employee Well-being and Firm Performance

Having looked at the relationship between well-being and productivity at the individual level, we now zoom out, and look at this relationship at the firm level. We first present results from novel empirical analyses in collaboration with the Gallup Organization, analysing its extensive client database to study the relationship between employee well-being and various firm performance outcomes. We then supplement this analysis with other, supporting evidence from the literature.

In general, we expect the direct effects of "happier workers working better" identified previously to translate into positive impacts at the aggregate firm level. But beyond immediate, direct effects of mood on motivation and productivity, we also expect there to be more slowly moving and indirect effects. We thus look additionally at employee recruitment and turnover – the extent to which more satisfied workplaces are more likely to attract and retain talented workers – and at customer loyalty and satisfaction, which are particularly relevant in service industries where employees are in direct contact with customers.

3.1 Meta-Analysis of the Gallup Employee Well-being Database

Over the years, Gallup has accumulated 339 independent research studies – conducted as proprietary research for clients – that include data on employee well-being as well as firm performance. In total, these studies include (partly repeated) observations on the well-being of 1,882,131 employees and performance of 82,248 business units, originating from 230 independent organisations across 49 industries in 73 countries. We calculated, for each of the

82,248 business units, the correlation between employee well-being and various firm performance outcomes.[15] This gives us a unique, rich (yet diverse) source of data to study the relationship between employee well-being and firm performance in the field.

The 339 research studies are largely context-specific, varying not only with respect to organisation and industry but also with respect to geographical location and observation period. We therefore employ meta-analytic methods that enable us to integrate the findings accumulated across the different studies and produce generalisable insights, by controlling for differences between studies resulting from sample size, measurement error, or other artefacts, to eliminate biases (Schmidt and Hunter, 2015).[16]

Our approach involved three steps: first, we aggregated employee well-being and the respective (context-specific) performance outcome at the business-unit level for each of the 339 research studies. Second, we calculated the business-unit-level correlation between employee well-being and performance outcomes for each study. Finally, we applied our meta-analytical toolkit to obtain a single, adjusted (i.e. non-context-specific) average correlation between employee well-being and the respective performance outcome.[17]

Employee Well-being Measures. Gallup has been including well-being measures routinely in all of its studies since 1997 (Harter and Schmidt, 2008; Harter and Agrawal, 2011).[18] Our primary measure is *satisfaction with the organisation as a place to work*, which is obtained from a single-item five-point Likert scale question asking respondents: "How satisfied are you with your organisation as a place to work?" Answer possibilities range from one ("extremely dissatisfied") to five ("extremely satisfied"). For simplicity, we refer to this measure as *employee satisfaction*.[19]

Besides employee satisfaction, the Gallup survey instrument – referred to as Q[12] – also included a measure of *employee engagement*: it asks employees about twelve (hence the name) different dimensions of engagement, reflected in formative workplace conditions (such as whether there is the opportunity for employees to do what they do best, whether there is someone encouraging their development, or whether their opinions count) which are related to a wide range of business outcomes across organisations.[20] Engagement is a psychological construct that goes well beyond satisfaction: employees who are engaged with their job are positively absorbed by what they do and committed to advancing their organisation's interests; they identify themselves with their organisation's mission and values, and represent it even outside formal working hours.

Performance Outcomes. We studied four outcomes, arguably the most important key performance indicators from a business perspective:[21]

- *Customer Loyalty.* Measures of customer loyalty varied across the 339 research studies. Most studies included fairly standard customer loyalty metrics such as the likelihood to recommend or repurchase a product or service, the "net promoter score", or simply the number of repeated transactions.[22] Other studies also included measures of customer satisfaction, service excellence, or customer evaluation of the quality of claims.
- *Employee Productivity.* Measures of employee productivity included mostly financial measures such as revenue or sales per person, growth in revenue or sales over time, quantity per time period, enrolments in programs, labour hours, costs to the budget, cross-sells, or performance ratings.
- *Profitability.* Measures of profitability included the percentage profit of revenue or sales, or the difference between current profit and budgeted profit or profit in the previous time period.[23]
- *Staff Turnover.* Staff turnover was defined as the percentage of (voluntary) turnover per business unit.

Methods. Our meta-analytical methods (see Schmidt and Hunter (2015) for more details) corrected for heterogeneity within each category of performance outcome. After calculating the correlation between employee well-being and the respective performance outcome at the level of each business unit, correlations were aggregated and adjusted for differences in sample size, measurement error, and other statistical artefacts or idiosyncrasies between the 339 original research studies, to obtain true score correlations.

Results. Figure 1 shows true score correlations between employee satisfaction and firm performance as means, taken across all industries and regions. All correlations are in the hypothesised direction. Previous research has shown high generalisability of correlations across studies (Harter et al., 2015).

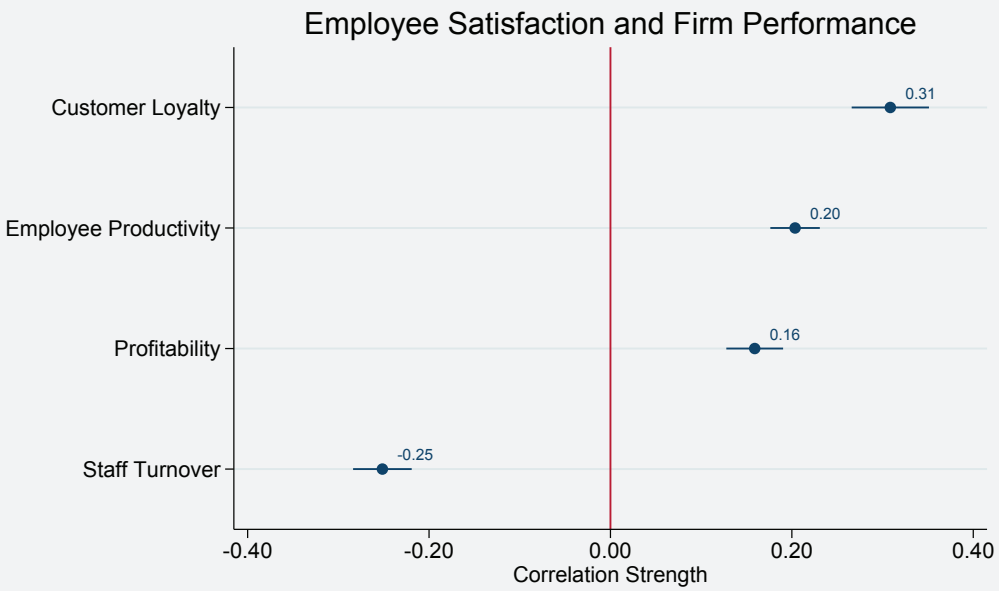
As can be seen, employee satisfaction has a substantial positive correlation with customer loyalty and a substantial negative correlation with staff turnover. The correlation between employee satisfaction and productivity is positive (0.2). Importantly, higher customer loyalty and employee productivity, as well as lower staff turnover, are also reflected in higher profitability, as evidenced by a positive correlation between employee satisfaction and profitability (0.16).

Does the importance of employee well-being for firm performance differ by industry? Figure 2a sheds light on this question.

Conducting our meta-analysis separately by industry (distinguishing finance, retail, services, and manufacturing sectors), we find that there is a gradient in the importance of employee satisfaction for the different performance outcomes by industry.[24] For most outcomes – customer loyalty, business-unit productivity, and staff turnover – employee satisfaction is most important in finance, followed by retail, and then closely, by services.[25] However, these industry differences in correlations have highly overlapping 95% confidence intervals on nearly all outcomes. The correlation between employee satisfaction and productivity appears to be somewhat stronger in the finance industry than in other industries. Perhaps surprisingly, for services and retail, employee satisfaction has a positive but lower relationship with profitability. Even so, the 95% confidence intervals fall almost entirely in the positive range and overlap with the finance industry interval. For manufacturing, we find that employee satisfaction has the lowest correlation with productivity but the strongest with profitability amongst all industry sectors.

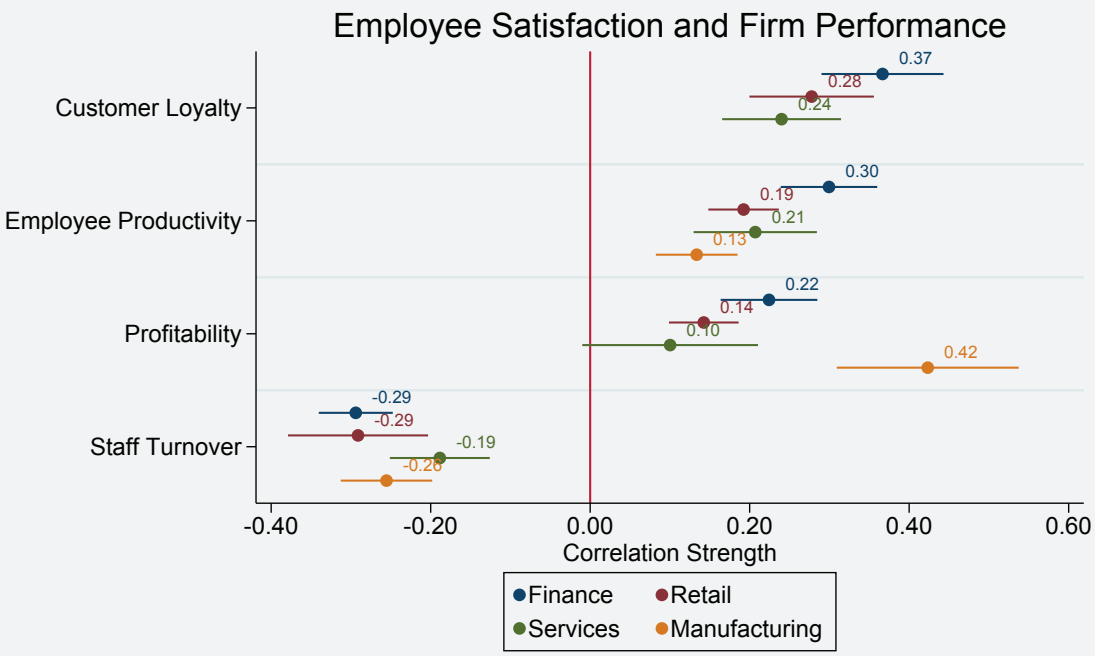
Further research will likely be focused on identifying why such differences exist across industries. One reason for the particularly

Figure 1. Correlation Between Employee Satisfaction and Firm Performance



Notes: The figure plots adjusted average correlation coefficients between employee satisfaction and different performance outcomes originating from a meta-analysis of 339 independent research studies that include observations on the well-being of 1,882,131 employees and performance of 82,248 business units. See Section 3 for a description of the procedure. See Table 1 for the corresponding table and Table A4 in the Appendix for a breakdown of studies.

Figure 2a. Correlation Between Employee Satisfaction and Firm Performance, by Industry



Notes: The figure plots adjusted average correlation coefficients between employee satisfaction and different performance outcomes, by industry, originating from a meta-analysis of 339 independent research studies that include observations on the well-being of 1,882,131 employees and performance of 82,248 business units. See Section 3 for a description of the procedure. See Table 2a for the corresponding table and Table A4 in the Appendix for a breakdown of studies.

strong link between well-being and productivity in the finance industry might have something to do with working conditions in that sector. Although employees in finance have, on average, a higher pay than those in retail, services, and manufacturing, income is not the only – or perhaps even the most important – determinant of employee well-being. In fact, workplace characteristics such as little stress at work or work-life balance have been shown to be equally, if not more, important for employee well-being than pay (Krekel et al., 2018). Such characteristics, however, may be relatively less dominant in the finance industry than in other industries, suggesting that there is potentially more room in the financial sector for employee well-being to unlock positive productivity outcomes. Manufacturing organisations are often highly focused on process efficiency and safety as primary metrics within plants. Process efficiency and safety relate directly to the bottom line as they relate to costs. Job attitudes are likely to relate to discretionary effort that then impacts quality, efficiency, and safety within manufacturing plants and teams, possibly explaining the higher correlation between employee satisfaction and profitability.

We also ran our meta-analysis separately by region, to look at regional differences in the importance of employee well-being for firm performance. Because of the large number of studies conducted in the US, in our analysis, we can only distinguish the US from non-US regions. Figure 2b shows the findings of our separate meta-analysis by region.

As can be seen, we find some evidence that employee satisfaction tends to be more important for performance outcomes in non-US regions, with the exception of staff turnover, for which it

Figure 2b. Correlation Between Employee Satisfaction and Firm Performance, by Region

Notes: The figure plots adjusted average correlation coefficients between employee satisfaction and different performance outcomes, by region, originating from a meta-analysis of 339 independent research studies that include observations on the well-being of 1,882,131 employees and performance of 82,248 business units. See Section 3 for a description of the procedure. See Table 2b for the corresponding table and Table A4 in the Appendix for a breakdown of studies.

is the opposite. 95% confidence intervals for US and non-US regions are, however, highly overlapping, indicating that differences in correlations are likely due to study artefacts rather than true regional differences.

Finally, we replicated our meta-analysis for employee engagement instead of employee satisfaction, examining the relationship between employee engagement and firm performance, on average as well as separately by industry and by region.[26] We find that, when comparing adjusted average correlations for employee satisfaction with those for employee engagement, there are few differences in strength or relative rank, neither for findings at mean value nor for findings separately by industry or by region. The importance of employee engagement for performance outcomes are more homogeneously distributed across industry sectors. These consistent findings across two measures of job attitudes add support to the theory and findings reported in Harrison et al. (2006) and Mackay et al. (2017) of a higher-order job attitude-engagement factor.

In sum, aggregating data from 339 independent research studies that include observations on the well-being of 1,882,131 employees and performance of 82,248 business units, from 230 independent organisations across 49 industries in 73 countries, we find that employee well-being is consistently positively correlated with firm performance.

Well-being has a substantial positive correlation with customer loyalty and a substantial, negative correlation with staff turnover. That is, in addition to the individual-level evidence – based largely on *Emotion Theory* – focusing on affective states and showing immediate effects of mood on productivity, there also seems to be strong evidence – more in line with *Human Relations Theory* – that employee satisfaction plays a

significant role in retaining and motivating the workforce.

Employee well-being in the Gallup data is positively correlated with employee productivity, and ultimately, profitability. The relative strength of the correlation with profitability is somewhat weaker, but this is expected given that profit is a downstream outcome in the hypothesised causal chain from job attitudes to operational outcomes to financial outcomes. Utility analysis of the practical value of the correlation between employee engagement and profitability suggests a 21% difference in profit between top and bottom quartile business units on employee engagement (Harter et al., 2015). The practical value of the size of correlations depicted in this meta-analysis has been calculated in previous studies as non-trivial (Harter et al., 2002, 2015). Although there is – depending on how employee well-being is measured – evidence of some differences by industry, the overall importance of employee well-being for key firm performance outcomes seems largely universal.

3.2 Literature on the Causal Effect of Employee Well-being on Firm Performance

From this correlational meta-analysis, we are unable to make any strong causal claim about the relationship between employee well-being and firm performance.[27] To make such claims, we need longitudinal data – repeated observations of employee well-being and firm performance over time – and some sort of randomised experimental intervention or policy change as a source of *exogenous* variation (which affects employee well-being without directly affecting firm performance), to reduce concerns about omitted variables that may be simultaneously driving employee well-being and firm performance.

Evidence from Within Firms over Time

One initial piece of longitudinal evidence comes from Harter et al. (2010) who studied the relationship between employee engagement and financial performance by exploiting temporal variation in the Gallup client database. The authors found that employee engagement and profitability are reciprocally related (i.e. they influence each other over time).[28] However, employee engagement at time *t* is a stronger predictor of profitability at time *t+1* than *vice versa*, whereby (short-term) outcomes such as customer loyalty and staff turnover are important mediators of this relationship.[29] Although establishing this temporal-causal (also referred to as *Granger-causal*) relationship between employee engagement and financial performance does not solve issues of omitted or "third" variables, it is yet another piece of evidence for a causal effect of employee well-being on firm performance.

Bloom et al. (2015) conducted an experiment on flexible work practices at a NASDAQ-listed Chinese travel agency with more than 16,000 employees, in which call centre agents (who volunteered to participate in the experiment) were randomly assigned to either working from home (the treatment group) or working in the office (the business-as-usual control group) for a period of nine months. The authors found that, at the end of the experiment, call centre agents who were working from home experienced fewer negative and more positive emotions, less exhaustion, and reported a higher overall life satisfaction compared to call centre agents who were working in the office.

Importantly, working from home also led to a 13% increase in performance, of which 9% was due to working more minutes per shift (attributed to fewer breaks and sick days) and 4% due to taking more calls per minute (attributed to a quieter working environment); staff turn-over halved.[30] After the success of the experiment (the company estimated to save about USD 2,000 annually per call centre agent working from home), the scheme was rolled out for the entire workforce (including giving workers who participated in the experiment the opportunity to change their working location again). This change almost doubled performance gains, to 22%, stressing the importance of selection and learning of workers about their own working preferences and styles.

Two other studies on flexible work practices stand out. Moen et al. (2011) examined the causal effect of switching from standard to more flexible, results-oriented working time at Best Buy, a large US retailer. By exploiting the staggered implementation of the scheme in its corporate headquarters, the authors found that staff turnover amongst employees who were exposed to the scheme dropped by 45.5% eight

months after implementation. More flexible work practices also moderated turnover effects of negative home-to-work spillovers (i.e. when responsibilities at home reduce the effort employees can devote to their jobs).

In a related study, however, Moen et al. (2016) showed that a similar organisational intervention – aimed at promoting greater employee control over working time at an IT company – reduced burnout, perceived stress, and psychological distress, while raising job satisfaction (with benefits larger for women) twelve months after the intervention. Taken together, both studies suggest that organisational interventions aimed at raising employee well-being, for example, through raising employees' autonomy over their working time, bear positively upon performance outcomes at the aggregate firm level – a win-win situation for both employees and employers.

A final example comes from the National Health Service (NHS) in the UK. Powell et al. (2014) used a large-scale longitudinal dataset generated from NHS staff surveys in 2009, 2010, and 2010. The authors found that better staff experience is associated with better outcomes for both employees and patients, and in particular, that higher well-being – measured, amongst others, in terms of job satisfaction – and better job design are linked to lower levels of absenteeism and higher levels of patient satisfaction.[31]

Evidence from Between Firms

We now move from studies looking at single companies and organisational interventions to studies examining several companies pooled together. Böckerman and Ilmakunnas (2012) examined the relationship between employee well-being and firm performance in Finnish manufacturing plants over the period 1996 to 2001. The authors linked individual-level data on job satisfaction from the European Community Household Panel with establishment-level data on employer characteristics and performance. The authors found that job satisfaction has a significant, positive effect on value-added per hours worked: a one standard deviation increase in job satisfaction at the plant level increases valued-added per hours worked by 6.6%.[32] In other words, increasing job satisfaction by one point, say, from four to five (out of six), would increase value-added per hours worked by almost 20% – a large effect.

A similar study was conducted by Bryson et al. (2017) in Britain. Using employer-employee data from the Workplace Employment Relations Survey – a nationally representative dataset on more than 2,000 workplaces covering all sectors of the economy except agriculture and mining – for the years 2004 and 2011, the authors found a strong link between well-being and performance.[33] They document a clear, statistically significant, positive relationship between average job satisfaction and performance outcomes at the establishment level (but *not* for job-related affect), in both cross-section (using the year 2011 only) and two-period panel with establishment fixed effects (using both the years 2004 and 2011).[34] Well-being had an impact on financial performance, labour productivity, quality of product or service, and an aggregated performance measure combining all other performance outcomes, even when controlling for establishment, industry, and regional characteristics as well as when looking longitudinally at firms over time. Although it is difficult to assess the exact size of these effects (performance measures are subjective scores reported by managers), the fact that job satisfaction affects *all* performance outcomes (with the exception of labour productivity in the two-period panel) across workplaces is strong evidence for a positive impact of employee well-being on firm performance.

Finally, the findings above match those of Green (2010), who found that job satisfaction is a better predictor for quits than job-related affect (see also Lévy-Garboua et al. (2007) on the predictive power of job satisfaction for quits).

Evidence from Stock Market Performance

Do firms with higher levels of employee well-being perform better on the stock market? To answer this question, Edmans (2011) studied the relationship between employee satisfaction and long-run stock returns using a value-weighted portfolio of the "100 Best Companies to Work for in America".[35] The ratings are based on survey responses from a randomly chosen 250 employees per company (asking about areas such as job satisfaction and attitudes towards management) and publicly available information (demographic make-up, pay and benefits programmes, and culture). The data show that, during the period 1984 to 2009, the "100 Best Companies to Work for in America" had an annual four-factor alpha

– a measure of excess stock market return – of 3.5%. Furthermore, they earned 2.1% higher stock returns than the industry average and had more positive earnings surprises and announcement returns.[36]

The relationship between employee well-being and stock market returns can also be replicated for the "Gallup Great Workplace Award" winners. In a recent study, the organisation compared the earnings per share of seventeen award winners, covering six industries and ranging in size between 800 and 250,000 employees, with their industry equivalents during the period 2011 to 2015 (Gallup, 2017). The data show that winners grew about 4.3 times faster during that period than their equivalents.[37]

Goetzel et al. (2016) study the stockmarket performance of companies winning the "C. Everett Koop National Health Award" – an award conferred annually to firms investing in cost-effective health and well-being programmes for their workers – relative to the average performance in the Standard and Poor's (S&P) 500 Index. The authors arrived at a similar conclusion: over a period of fourteen years (2000 to 2014), winners experienced a 325% growth in stock values, whereas their equivalents experienced growth of only 105%.

These findings are consistent with our results above, and more generally with *Human Relations Theory*, which argues that higher employee well-being causes better firm performance through better recruitment, higher employee motivation, and lower staff turnover. The importance of human resource management, however, may differ around the world, depending on the complementarity of labour market institutions. Indeed, in a recent paper, Edmans et al. (2017) extended the "100 Best Companies to Work For" analysis beyond the US, covering fourteen countries with different institutional settings. The authors found that higher job satisfaction was associated with superior long-run returns, current valuation ratios, future profitability, and earnings surprises only in flexible labour markets such as the US or the UK. Results for more rigid labour markets as in the Scandinavian countries or in Germany, however, were not statistically significant.[38] This suggests that in contexts where firms face lower barriers to hiring and firing and where worker welfare is not outsourced to "cushioning" labour market institutions, corporate social responsibility may yield higher returns.

4. Outlook

At the outset of this paper, we posed a relatively simple question: is there a compelling business case for promoting worker well-being? Overall, the balance of the evidence – both the old and the new that we have presented here – is very much in favour that there are measurable, objective benefits to well-being in terms of employee productivity and firm performance.

We began by looking at the relationship between well-being and productivity at the individual level and showed – by discussing findings from both field and lab – how higher levels of well-being are associated with more creativity and better task performance. Whether it is an effort task in a university lab or the real-life setting of a call centre, well-being is positively correlated with productivity. The evidence base is steadily mounting that this correlation is in fact a causal relationship (running from well-being to productivity).

We then panned away from the individual-level and looked at this relationship at the aggregate firm level. Conducting a meta-analysis of the extensive client database of the Gallup Organization, we showed that higher levels of employee well-being also manifest themselves in improved key firm performance outcomes, including customer loyalty, profitability, and staff turnover (although to a different degree depending on industry sector, an interesting area of future research).

Finally, we complemented our own analysis with empirical evidence at the firm-level from the wider, causal-design literature. We looked, in particular, at interventions targeting flexible work practices and studies linking employer and employee data. Again, a clear positive relationship can be seen between employee well-being and various measures of performance. Firms with higher levels of employee well-being also tend to do better in terms of stock market performance and growth.

There are a number of limitations and exciting avenues for future research. First and foremost,

we did not (and could not) present here a full account of the benefits of well-being at work: besides direct benefits in terms of employee productivity (and ultimately, firm performance), there are, of course, many other benefits to well-being at work such as better health and longevity (De Neve et al., 2013; Graham, 2017), which do not only indirectly contribute to employee productivity but also have wider, society-wide benefits beyond the world of work. Benefits presented here should thus be interpreted as a lower bound.

Second, although we studied the returns to employee well-being in terms of employee productivity and firm performance, we did not study which workplace well-being investments (i.e. investing, say, into more flexible work practices *versus* investing into higher pay) are most cost-effective from a business or policy perspective. This is partly because there are not many interventions in the first place (notable exceptions that directly target employee well-being include Proudfoot et al. (2009) and Jones et al. (2018), for example) and partly because interventions that do exist hardly report costs. It is thus difficult, given the current evidence base, to benchmark different interventions against each other in terms of cost-effectiveness. Across the board, more interventions are needed, and they need to be more transparent. Policy can play a vital role in encouraging experimentation, by providing monetary or non-monetary incentives for firms to conduct interventions and for sharing their impact evaluation results as a public good.

The evidence we have presented here is suggestive of a strong, positive relationship between employee well-being, employee productivity, and firm performance. Raising the well-being of society is a central goal for policy-makers, and it is a goal that is not in opposition to the interests of the business community. There is an important role for business leaders to play in being a strong positive force for raising the well-being of society.

Table 1. Correlation Between Employee Satisfaction and Firm Performance

	Customer Satisfaction	Employee Productivity	Profitability	Staff Turnover
Employee Satisfaction	0.31	0.20	0.16	-0.25
95% Confidence	[0.27, 0.35]	[0.18, 0.23]	[0.13, 0.19]	[-0.28, -0.22]
Number of Studies	68	109	66	88
Number of Business Units	14,092	35,050	26,078	35,587

Notes: The table shows adjusted average correlation coefficients between employee satisfaction and different performance outcomes originating from a meta-analysis of 339 independent research studies that include observations on the well-being of 1,882,131 employees and performance of 82,248 business units. See Section 3 for a description of the procedure. See Table A4 in the Appendix for a breakdown of studies.

Source: Gallup Client Database, Years 1994 to 2015; Confidence Intervals 95% in Brackets.

Table 2a. Correlation Between Employee Satisfaction and Firm Performance, by Industry

	Customer Satisfaction	Employee Productivity	Profitability	Staff Turnover
Finance				
Employee Satisfaction	0.37	0.30	0.22	-0.29
95% Confidence	[0.29, 0.44]	[0.24, 0.36]	[0.16, 0.28]	[-0.34, -0.25]
Number of Studies	15	19	14	17
Number of Business Units	7,509	7,920	6,224	9,193
Retail				
Employee Satisfaction	0.28	0.19	0.14	-0.29
95% Confidence	[0.20, 0.36]	[0.15, 0.24]	[0.10, 0.19]	[-0.38, -0.20]
Number of Studies	11	28	27	15
Number of Business Units	2,459	18,353	18,200	4,708
Services				
Employee Satisfaction	0.24	0.21	0.10	-0.19
95% Confidence	[0.17, 0.31]	[0.13, 0.28]	[-0.01, 0.21]	[-0.25, -0.13]
Number of Studies	33	32	11	38
Number of Business Units	3,314	2,928	774	10,241
Manufacturing				
Employee Satisfaction	—	0.13	0.42	-0.26
95% Confidence	—	[0.08, 0.18]	[0.31, 0.54]	[-0.31, -0.20]
Number of Studies	—	20	9	10
Number of Business Units	—	4,642	268	5,293

Notes: The table shows adjusted average correlation coefficients between employee satisfaction and different performance outcomes, by industry, originating from a meta-analysis of 339 independent research studies that include observations on the well-being of 1,882,131 employees and performance of 82,248 business units. See Section 3 for a description of the procedure. See Table A4 in the Appendix for a breakdown of studies.

Source: Gallup Client Database, Years 1994 to 2015; Confidence Intervals 95% in Brackets.

Table 2b. Correlation Between Employee Satisfaction and Firm Performance, by Region

	Customer Satisfaction	Employee Productivity	Profitability	Staff Turnover
US				
Employee Satisfaction	0.30	0.20	0.17	-0.23
95% Confidence	[0.25, 0.35]	[0.16, 0.24]	[0.13, 0.21]	[-0.28, -0.19]
Number of Studies	45	65	32	56
Number of Business Units	12,010	23,202	17,742	22,622
Non-US				
Employee Satisfaction	0.41	0.25	0.24	-0.16
95% Confidence	[0.27, 0.55]	[0.19, 0.31]	[0.15, 0.33]	[-0.28, -0.04]
Number of Studies	6	18	14	11
Number of Business Units	563	2,238	2,593	1,032

Notes: The table shows adjusted average correlation coefficients between employee satisfaction and different performance outcomes, by region, originating from a meta-analysis of 339 independent research studies that include observations on the well-being of 1,882,131 employees and performance of 82,248 business units. See Section 3 for a description of the procedure. See Table A4 in the Appendix for a breakdown of studies.

Source: Gallup Client Database, Years 1994 to 2015; Confidence Intervals 95% in Brackets.

Endnotes

1 For ease of exposition, these case studies are presented in an online appendix.

2 We focus, in particular, on the *direct* returns to workplace well-being in terms of employee productivity and aggregate firm performance – arguably the most relevant outcomes for business. There are, of course, many other positive returns to workplace well-being such as better health and longevity (De Neve et al., 2013; Graham, 2017) or improved job finding and future (non-pecuniary) job prospects (Akerlof et al., 1988; Krause, 2013; Gielen and van Ours, 2014; see Walsh et al. 2018 for a review), which *indirectly* contribute to more efficient labour markets and a more productive workforce. The returns presented here can thus be seen as lower bounds to investments into workplace well-being.

3 See Judge et al. (2001) for a review of theories on the well-being-productivity nexus and Tenney et al. (2016) for a review of the literature more generally.

4 Conversely, expectancy-based theories of motivation postulate that employee productivity follows from the (expectation of) rewards (which may include higher well-being) generated by eliciting effort (Lawler and Porter, 1967; Schwab and Cummings, 1970). Although there is no consensus about the direction of causality, empirical evidence is mounting that causality runs from employee well-being to productivity rather than the other way around.

5 See Lerner et al. (2015) for a more detailed overview of the effects of emotions on decision-making.

6 There is also a growing body of literature documenting the importance of emotions for risk attitudes and patience (see Meier (2018), for example), through changing the risk or temporal appraisal of situations (Lerner and Keltner, 2000, 2001), which constitutes another, indirect attitudinal channel.

7 Affect measures included peer ratings covering items on happiness, team satisfaction, enjoyment of work, personal frustration, and frustration with the team.

8 In complementary, qualitative analyses, the authors show that positive affect is both a consequence of creative thought events and a by-product of the creative thought process itself.

9 The control conditions watched a documentary film about math as a placebo or did not receive candy. Creativity tasks included the candle game, which requires participants to affix a candle to a corkboard in such a way that wax does not drip on the floor using various tools, and a *Remote Association Test*, which requires participants to think of words related to three other words presented to them.

10 More specifically, a one-point difference in life satisfaction – measured by a standard five-point scale asking respondents "How satisfied are you with your life as a whole?" – at age 22 was associated with a difference in earnings of about USD 4,000 at age 29, relative to the family mean.

11 See also Clark et al. (2018) for a more comprehensive account of the predictive effects of well-being in early life on later-life outcomes.

12 Productivity was measured as the availability of call centre agents to callers, the average duration with which call centre agents handled calls, and the extent to which they resolved calls on their own without escalating them; quality of work was measured as the verbal fluency of call centre agents. A caveat of this study is that the sample size is small (only 29 call centre agents), and that it relied on the self-selection of participants into the study, which could bias results if such self-selection is correlated with productivity outcomes.

13 The question asked respondents "How are you feeling today?", with answer possibilities ranging from one ("frustrated") to five ("unstoppable").

14 Coviello et al. (2017) also show that extrinsic motivation matters for the mood-productivity relationship: for call centre agents whose compensation actually depends on productivity (e.g. who face monetary incentives), the negative effect of positive mood on productivity – measured as the number of calls in total – is moderated if not, in specifications in which item non-response is interpreted as bad mood, even reversed, leading to a positive relationship between better mood and higher productivity. This is in line with recent evidence by Oishi et al. (2007) who show that the association between well-being and various performance outcomes is not linear, for example, people who are at the highest level of well-being perform better when it comes to social relationships, whereas people at slightly lower levels perform better when it comes to income.

15 If there were two studies for the same organisation and these studies were conducted in the same year, the weighted average correlation across the studies is used in our analysis. If the two studies were not conducted in the same year, for example, if data on employee well-being were collected *before* data on performance outcomes, the data that are more recent are used (or the mean in case of repeated data). Finally, if there were multiple studies for the same organisation that varied substantially in terms of sample size, as a rule of thumb, the study with the largest sample size is used.

16 We corrected, amongst others, for sampling error, measurement error in the dependent variables (i.e. performance outcomes), and measurement error and statistical artefacts such as range restriction in the independent variable (i.e. employee well-being).

17 See Harter et al. (2002, 2016) for a detailed description of the meta-analytic methods used.

18 See Table A6 in the Appendix for the different items that are included in the Gallup survey instrument.

19 There is a conceptual difference between *employee satisfaction* and *job satisfaction*, the latter of which is the more frequently used measure in business economics (see Spector (1997) or Cooper and Robertson (2003), for example). Job satisfaction only asks respondents about their job, abstracting from the organisation. We argue, however, that – in our context – employee and job satisfaction are closely related, as the Gallup survey instrument does not ask respondents about their *overall* satisfaction with the organisation but about their satisfaction with the organisation *as a place to work*. Respondents are thus likely to report about their own, personal job experience.

20 Aggregating over the twelve five-point scales yields an overall measure of engagement. We use employee engagement for sensitivity analyses, expecting to find effects of employee engagement on firm performance that are similar if not stronger than those of employee satisfaction.

21 Not every study in the Gallup client database includes every business-unit-level performance outcome: for 94 organisations, there are studies on customer loyalty, for 140 on employee productivity, for 85 on profitability, and for 106 on staff turnover.

22 The net promoter score is a customer-satisfaction benchmark commonly used in market research to provide insight into market growth prospects based on participant satisfaction, with scores ranging from -100 to +100 (Reichheld, 2003).

23 Whenever necessary, we controlled for geographical location (i.e. local market characteristics) when calculating business-unit-level correlations between employee well-being and profitability, in order to make profitability figures more comparable.

24 We focus on the financial, retail, manufacturing, and service sectors because we had fewer than 20 studies for the remaining sectors (materials and construction, personal services, real estate, and transportation and utilities), which we deem insufficient to base inference on. See Table A4 in the Appendix for a breakdown of the studies. Note that, for manufacturing, we have insufficient observations to make correlational inference between employee satisfaction and customer loyalty.

25 Differences between retail and services are (mostly) not statistically significant at conventional levels; differences between finance and services sometimes are.

26 See Figures A1, A2a, and A2b in the Appendix for these results.

27 Note, however, that many of the studies in the meta-analysis, by design, include performance measures that trail employee satisfaction or engagement measures, suggesting some predictive evidence.

28 In a similar longitudinal analysis using the same data source, Agrawal and Harter (2010) study the propagation of employee engagement along the organisational hierarchy over time. The authors find that executive engagement at time *t* affects middle-management engagement at time *t+1* and front-line engagement at time *t+2*, i.e. engagement cascades from leadership to middle management and then to the front line.

29 This finding is somewhat different from Koys (2001), who shows that employee attitudes and behaviour (measured in terms of employee satisfaction and organisational citizenship related to conscientiousness, altruism, sportsmanship, and courtesy) at time *t* are predictive of organisational effectiveness (measured in terms of profitability and customer satisfaction) at time *t+1*, but organisational effectiveness at time *t* is not predictive of employee attitudes and behaviour at time *t+1*. The context of this study, however, is quite specific: the author studies the relationship between employee well-being and firm performance at a regional restaurant chain.

30 As a possible side effect, the authors document that participants in the treatment group were less likely to get promoted conditional on performance. Leslie et al. (2012) show, in both a field study at a Fortune 500 company and a lab experiment, that flexible work practices may result in a career penalty in case that managers attribute their use as being motivated by reasons related to personal lives (as may have been the case for call centre agents who volunteered to participate in the experiment). However, to the extent that mangers attribute the use of flexible work practices to reasons related to efficiency or organisational needs, their use may actually result in a career premium.

31 Powell et al. (2014) study the links between staff experience and intermediate (staff) and final (patient and organisational) outcomes. The measure of job satisfaction used was a multi-item summed scale, including items on support from immediate managers and colleagues, freedom to choose methods of working, amount of responsibility, opportunities to use skills, the extent to which trust is seen as to value the work of staff, and recognition for good work.

32 Böckerman and Ilmakunnas (2012) estimated production function specifications in which job satisfaction – lagged to reduce concerns about reverse causality – is regressed on value added per hours worked at the plant level alongside controls for establishment and employer characteristics. The authors do not find a significant effect of job satisfaction on sales per employee as an alternative measure of productivity. However, this may have been an artefact of the manufacturing sector.

33 Job satisfaction was measured asking employees about nine aspects of their job, including pay, sense of achievement, scope for using initiative, influence over their job, training, opportunity to develop their skills, job security, involvement in decisions, and the work itself, which, when combined, yield an aggregate score of job satisfaction. Job-related affect was constructed similarly, asking employees whether they felt tense, uneasy, worried, gloomy, depressed, or miserable over the past few weeks.

34 Interestingly, Bryson et al. (2017) also test for reverse causality in their two-period panel, by regressing employee well-being in 2011 on firm performance in 2004. They do not find evidence for causality running from firm performance to employee well-being, suggesting – in line with Harter et al. (2010) – that causality runs rather the other way around, from employee well-being to firm performance.

35 The annual ranking is compiled by the Great Places to Work Institute in San Francisco, which rates organisations on four domains, including credibility, respect, fairness, and pride and camaraderie.

36 Edmans (2012) shows that returns even range between 2.3% and 3.8% if the years 2010 and 2011 are also included.

37 The winners experienced a 115% growth in earnings per share during that period, whereas their equivalents experienced growth of only 27%.

38 A sharper theoretical distinction is the difference between liberal and coordinated market economies (Hall and Soskice, 2001): in *coordinated market economics*, where state-facilitated, top-down coordination in employer-employee relations already ensures minimum standards for worker welfare, the marginal cost of spending on additional welfare may be higher than its marginal benefit, or in other words, spending on worker welfare may already be in the range of diminishing returns. In *liberal market economies*, however, corporate social responsibility may have more benefits to workers and firms.

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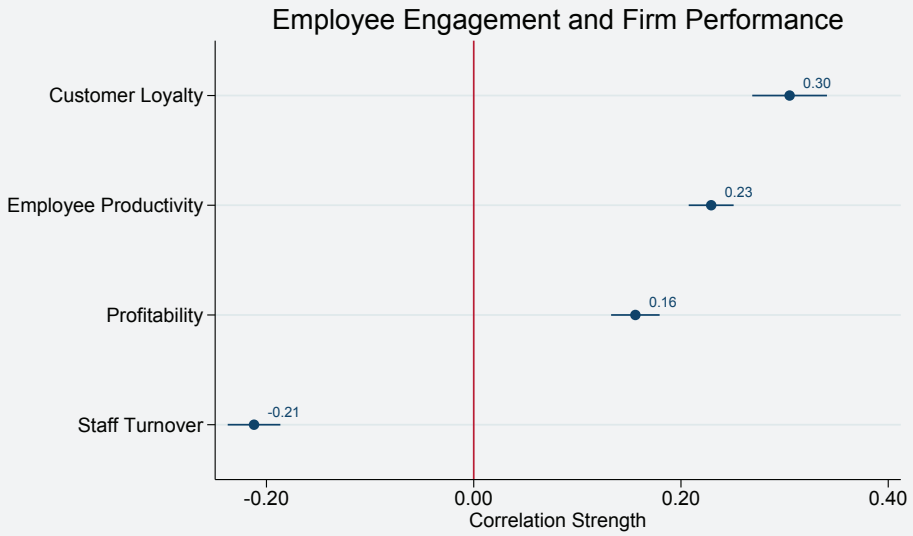
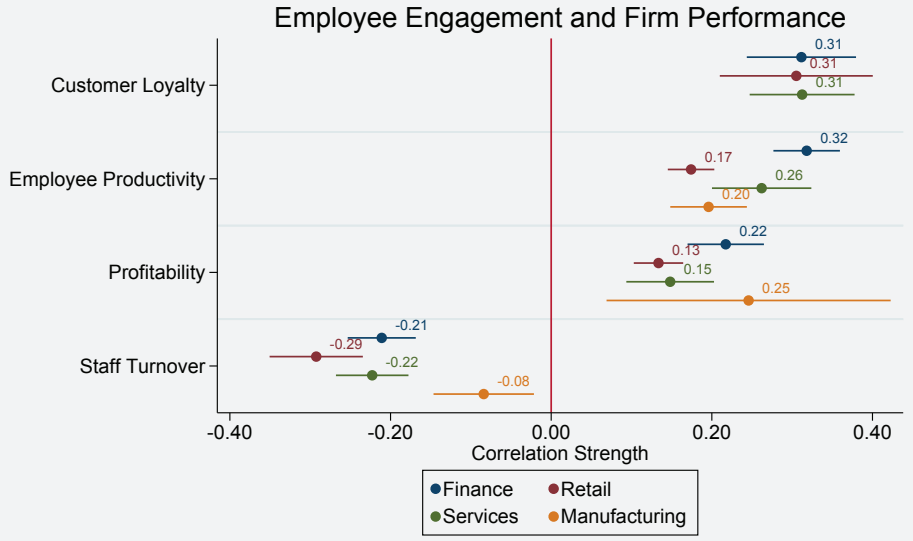
Chapter 5 **Appendix A**

Figure A1. Correlation Between Employee Engagement and Firm Performance



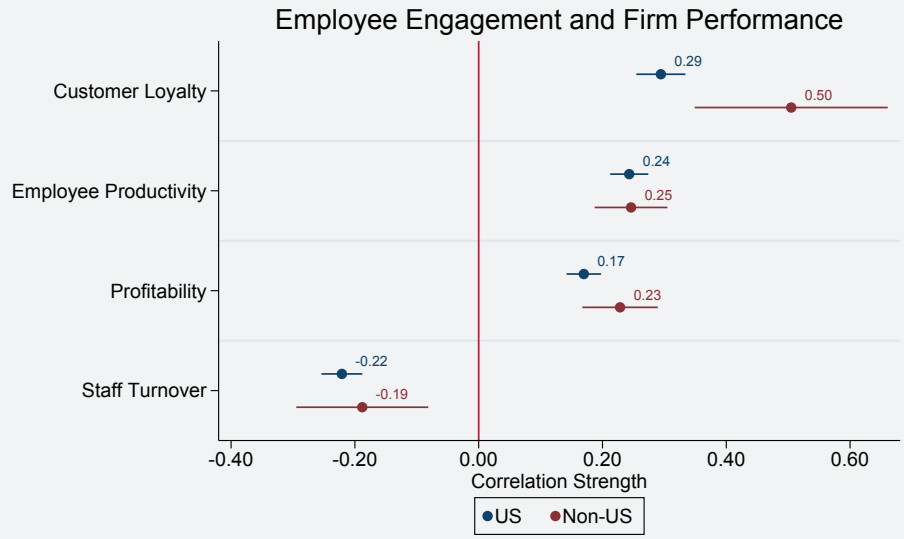
Notes: The figure plots adjusted average correlation coefficients between employee engagement and different performance outcomes originating from a meta-analysis of 339 independent research studies that include observations on the well-being of 1,882,131 employees and performance of 82,248 business units. See Section 3 for a description of the procedure. See Table A1 for the corresponding table and Table A5 for a breakdown of studies.

Figure A2a. Correlation Between Employee Engagement and Firm Performance, by Industry



Notes: The figure plots adjusted average correlation coefficients between employee engagement and different performance outcomes, by industry, originating from a meta-analysis of 339 independent research studies that include observations on the well-being of 1,882,131 employees and performance of 82,248 business units. See Section 3 for a description of the procedure. See Table A2a for the corresponding table and Table A5 for a breakdown of studies.

Figure A2b. Correlation Between Employee Engagement and Firm Performance, by Region



Notes: The figure plots adjusted average correlation coefficients between employee engagement and different performance outcomes, by industry, originating from a meta-analysis of 339 independent research studies that include observations on the well-being of 1,882,131 employees and performance of 82,248 business units. See Section 3 for a description of the procedure. See Table A2b for the corresponding table and Table A5 for a breakdown of studies.

Table A1. Correlation Between Employee Engagement and Firm Performance

	Customer Satisfaction	Employee Productivity	Profitability	Staff Turnover
Employee Engagement	0.30	0.23	0.16	-0.21
95% Confidence	[0.27, 0.34]	[0.21, 0.25]	[0.13, 0.18]	[-0.24, -0.19]
Number of Studies	94	140	85	106
Number of Business Units	20,679	45,328	31,472	43,987

Notes: The table shows adjusted average correlation coefficients between employee engagement and different performance outcomes originating from a meta-analysis of 339 independent research studies that include observations on the well-being of 1,882,131 employees and performance of 82,248 business units. See Section 3 for a description of the procedure. See Table A5 for a breakdown of studies.

Source: Gallup Client Database, Years 1994 to 2015; Confidence Intervals 95% in Brackets.

Table A2a. Correlation Between Employee Engagement and Firm Performance, by Industry

	Customer Satisfaction	Employee Productivity	Profitability	Staff Turnover
Finance				
Employee Engagement	0.31	0.32	0.22	-0.21
95% Confidence	[0.24, 0.38]	[0.28, 0.36]	[0.17, 0.26]	[-0.25, -0.17]
Number of Studies	19	21	16	17
Number of Business Units	11,852	15,140	8,395	11,531
Retail				
Employee Engagement	0.31	0.17	0.13	-0.29
95% Confidence	[0.21, 0.40]	[0.15, 0.20]	[0.10, 0.16]	[-0.35, -0.23]
Number of Studies	16	40	38	20
Number of Business Units	3,687	19,999	19,954	7,912
Services				
Employee Engagement	0.31	0.26	0.15	-0.22
95% Confidence	[0.25, 0.38]	[0.20, 0.32]	[0.09, 0.20]	[-0.27, -0.18]
Number of Studies	45	42	14	48
Number of Business Units	4,224	4,170	1,380	12,787
Manufacturing				
Employee Engagement	-	0.20	0.25	-0.08
95% Confidence	-	[0.15, 0.24]	[0.07, 0.42]	[-0.15, -0.02]
Number of Studies	-	26	10	11
Number of Business Units	-	4,832	393	5,426

Notes: The table shows adjusted average correlation coefficients between employee engagement and different performance outcomes, by industry, originating from a meta-analysis of 339 independent research studies that include observations on the well-being of 1,882,131 employees and performance of 82,248 business units. See Section 3 for a description of the procedure. See Table A5 for a breakdown of studies.

Source: Gallup Client Database, Years 1994 to 2015; Confidence Intervals 95% in Brackets.

Table A2b. Correlation Between Employee Engagement and Firm Performance, by Region

	Customer Satisfaction	Employee Productivity	Profitability	Staff Turnover
US				
Employee Engagement	0.29	0.24	0.17	-0.22
95% Confidence	[0.25, 0.33]	[0.21, 0.27]	[0.14, 0.20]	[-0.25, -0.19]
Number of Studies	57	77	39	67
Number of Business Units	17,177	31,729	21,747	27,844
Non-US				
Employee Engagement	0.50	0.25	0.23	-0.19
95% Confidence	[0.35, 0.66]	[0.19, 0.30]	[0.17, 0.29]	[-0.29, -0.08]
Number of Studies	8	24	18	13
Number of Business Units	976	2,683	3,023	1,736

Notes: The table shows adjusted average correlation coefficients between employee engagement and different performance outcomes, by region, originating from a meta-analysis of 339 independent research studies that include observations on the well-being of 1,882,131 employees and performance of 82,248 business units. See Section 3 for a description of the procedure. See Table A5 for a breakdown of studies.

Source: Gallup Client Database, Years 1994 to 2015; Confidence Intervals 95% in Brackets.

Table A4. Breakdown of Studies on Employee Satisfaction

Panel A – Studies by Industry
Studies on Employee Satisfaction with Indicators of

Industry	Customer Loyalty	Employee Productivity	Profitability	Staff Turnover	Total
Finance	15	19	14	17	65
Manufacturing	0	20	9	10	39
Retail	11	28	27	15	81
Services	33	32	11	38	114
Total	59	99	61	80	299

Panel B – Studies by Region
Studies on Employee Satisfaction with Indicators of

Industry	Customer Loyalty	Employee Productivity	Profitability	Staff Turnover	Total
US	45	65	32	56	198
Non-US	6	18	14	11	49
Total	51	83	46	67	247

Notes: The number of studies by industry and by region, respectively, is smaller than the total number of studies (339) because the total number studies, which is used to calculate average correlations across industries and regions, includes industries and organisations that operate across regions (which are excluded in our heterogeneity analysis).

Source: Gallup Client Database, Years 1994 to 2015.

Table A5. Breakdown of Studies on Employee Engagement

Panel A – Studies by Industry
Studies on Employee Engagement with Indicators of

Industry	Customer Loyalty	Employee Productivity	Profitability	Staff Turnover	Total
Finance	19	21	16	17	73
Manufacturing	0	26	10	11	47
Retail	16	40	38	20	114
Services	45	42	14	48	149
Total	80	129	78	96	383

Panel B – Studies by Region
Studies on Employee Engagement with Indicators of

Industry	Customer Loyalty	Employee Productivity	Profitability	Staff Turnover	Total
US	57	77	39	67	240
Non-US	8	24	18	13	63
Total	65	101	57	80	303

Notes: The number of studies by industry and by region, respectively, is smaller than the total number of studies (339) because the total number studies, which is used to calculate average correlations across industries and regions, includes more includes industries and organisations that operate across regions (which are excluded in our heterogeneity analysis).

Source: Gallup Client Database, Years 1994 to 2015.

Table A6. The Gallup Q[12] Instrument

Employee Satisfaction with Company

"On a 5-point scale, where 5 = extremely satisfied and 1 = extremely dissatisfied, how satisfied are you with your organisation as a place to work?"

Employee Engagement

"On a 5-point scale, where 1 = strongly disagree and 5 = strongly agree, please indicate your level of agreement or disagreement with each of the following items.

1. I know what is expected of me at work.
2. I have the materials and equipment I need to do my work right.
3. At work, I have the opportunity to do what I do best every day.
4. In the last seven days, I have received recognition or praise for doing good work.
5. My supervisor, or someone at work, seems to care about me as a person.
6. There is someone at work who encourages my development.
7. At work, my opinions seem to count.
8. The mission or purpose of my company makes me feel my job is important.
9. My associates or fellow employees are committed to doing quality work.
10. I have a best friend at work.
11. In the last six months, someone at work has talked to me about my progress.
12. This last year, I have had opportunities at work to learn and grow."

Chapter 5 **Appendix B**

Employee Well-being, Productivity, and Firm Performance: Evidence and Case Studies

Case Study 1: Tracking Employee Mood and Training Managers in Real-Time

David Mendlewicz (Butterfly AI)

Butterfly was formed on the premise that 'great managers make great teams' and that people managers require access to employee insight as well as robust support and training to make their teams as delighted, productive, and efficient as possible. To achieve this, Butterfly conducts academically-backed employee pulse surveys that measure overall employee mood and sentiment on key areas of the business. From these surveys, Butterfly provides managers with artificially intelligent training, employee insights on a dynamic dashboard, and trends in employee engagement.

The academically-backed pulse surveys are sent out via e-mail to employees based on a defined cadence specific to each organisation. Most commonly, surveys are sent out either once or twice a month, as time between surveys is important to allow managers to act on the feedback they receive. Butterfly measures overall mood, and what are called engagement drivers: engagement drivers are specific areas within the organisation that managers would like both qualitative and quantitative information on. Most commonly, we see managers measuring *management*, *teamwork*, *work/life balance*, *work environment*, and *roles and responsibilities* as engagement drivers. Every pulse survey asks a varied question on these drivers and employees rate whether they disagree or agree on a point scale. Employees who take the surveys also have the ability to leave comments, so that clients are receiving robust insight on their employee population.

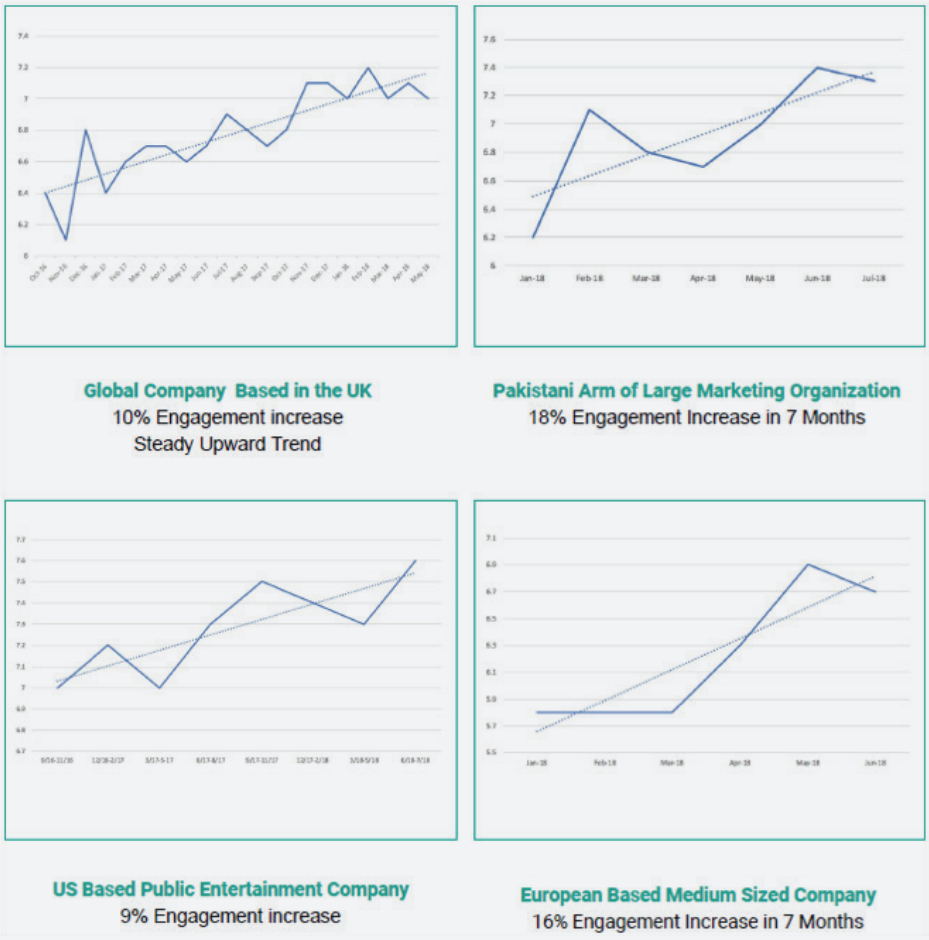
Butterfly sought to measure whether there is a direct correlation between employees having access to provide continuous feedback and their overall engagement and happiness. A few examples of companies with different profiles which – prior to using Butterfly – did not have a culture of continuous feedback were selected as case studies. Each graph in Figure B1 is measuring the overall mood of employees out of five standard mood faces, ranging from zero ("very unhappy") to five ("very happy").

The first graph (upper left) represents a decentralised media and entertainment company headquartered in London. This company experienced substantial growth in headcount over the time period when this study took place. The time frame of the study was from October 2016 to May 2018, and headcount grew from 770 to over 2,000 employees when the study concluded. We see an overall improvement in survey response participation from 22% to 51%. From the time that the survey ran and concluded, the overall mood increased from a score of 6.2 to 7.

The second graph (upper right) represents a centralised Pakistani workforce in the advertising industry. This company experienced a decrease in headcount over the time period when this study took place. The time frame of the study was from January 2018 to July 2018, and the headcount started at 184 employees and dropped to 134 employees by the end. We see again an overall improvement in survey participation: at the outset, 15% of the employee population completed the survey; at the end, the organisation had a consistent participation at around 53%. From the time that the survey ran and concluded, the overall mood increased from a score of 6.2 to 7.3.

The third graph (lower left) represents a centralised media and entertainment company

Figure B1. Positive Engagement Over Time (Butterfly AI, Various Years).



Notes: The four graphs show the evolution of employee mood over time after starting to track employee mood through Butterfly pulse surveys for a selected sample of organisations with different profiles, locations, industries, and sizes which – prior to using Butterfly – had no culture of feedback nor any continuous managerial coaching.

headquartered in California. This company remained consistent in their headcount during the time period when this study ran (157 employees). The time frame of the study was from September 2016 to July 2018. As before, we see an overall improvement in survey participation: at the outset, 64% of the employee population completed the survey; at the end, the organisation had a consistent participation rate at around 75%. From the time that the survey ran and concluded, the overall mood increased from a score of 7 to 7.6.

The fourth and final graph (lower right) represents a decentralised media and entertainment company with offices spread throughout the UK. The headcount grew slightly from 200 employees at the start of the study to 232 at the end. The survey ran for a period of about six months from January 2018 to July 2018. We see, once again, an improvement in survey participation: at the outset, 33% of the employee population completed the survey; at the end, the share was around 52%. The organisation saw the overall mood score increase from 5.8 to 6.7.

Although we can only gather suggestive, correlational evidence from such case studies, the fact that they all show similar findings may

point towards some key insights: the act of presenting employees with access to ongoing feedback channels is likely to positively drive employee engagement in terms of survey participation. We observe this relationship in every case study. We also observe the score representing the overall mood of the employee population increase over the course of the survey period, suggesting that the opportunity to provide feedback may lead to a happier, more engaged workforce.

Case Study 2: LinkedIn: The ROI of Social Recognition

A Partnership Between Globoforce and LinkedIn Shows Correlation Between Social Recognition Experience and Retention of Key Employees

Background

LinkedIn is a platform for professional networking, with over 590 million members in over 200 countries and territories. Since its founding in 2002, LinkedIn has prided itself on having a culture of transformation, integrity, collaboration, humor, and results. Despite rapid growth, LinkedIn has maintained a set of core values: members come first, relationships matter, employees should be open, honest and curious, managers should demand excellence, employees should take intelligent risks, and all employees should act like owners. It was these values that provided stability in the midst of what would soon become a turbulent time for the organization.

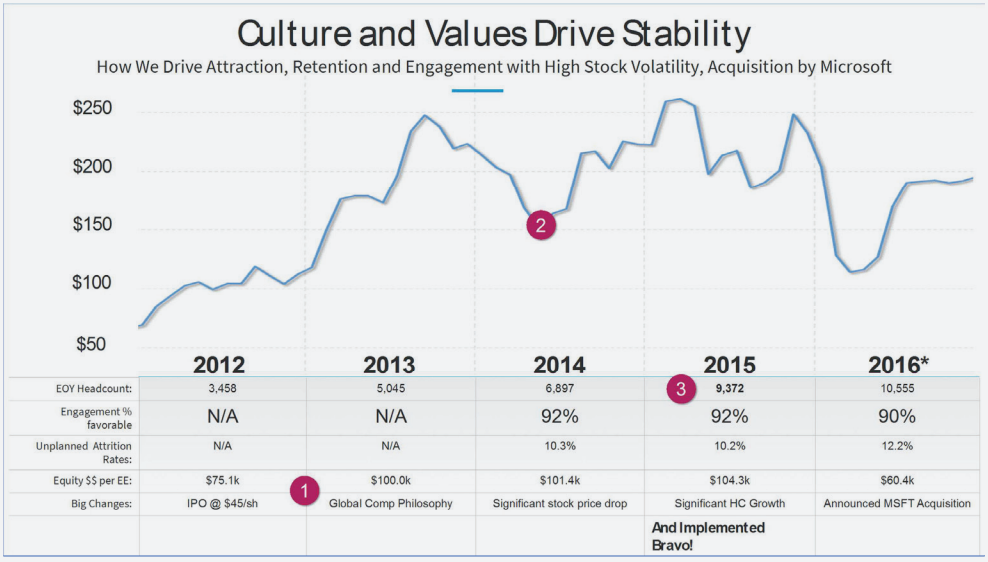
New Challenges

Starting in 2013, LinkedIn faced three core challenges as it scaled to meet the market demand. First, the company changed its compensation strategy from ad-hoc grants to compensation ranges to allow for more rapid growth. However, the following year, LinkedIn experienced stock price volatility, leading to employee retention concerns. In 2016, LinkedIn was acquired by Microsoft, a significant corporate transaction which required major change management. The confluence of these three factors posed a significant challenge to maintaining employee engagement while continuing to attract and retain top talent.

A Renewed Focus on Culture

In response to these new challenges, LinkedIn recognized the need to invest in its underlying culture. Knowing that social support is one of the three strongest predictors of long-term success

Figure B2a. New Challenges



Source: Own illustration

and happiness for employees, LinkedIn designed an intervention to boost employee morale and strengthen internal social connections. In July 2015, LinkedIn partnered with Globoforce, a leading provider of human applications, to launch a global employee recognition program called Bravo! Through the new program, any employee could recognize a colleague who exhibited great performance or efforts at work and demonstrated LinkedIn's core values. Recognized employees were offered a variety of award levels and personalized rewards, including gift cards and merchandise across all countries where employees reside. LinkedIn worked closely with Globoforce to ensure Bravo! has clear ties to LinkedIn's corporate values and is efficient, consistent, and timely.

Utilization Data

In the first 18 months of the Bravo! program, 24% of employees actively recognized another employee. There was a healthy distribution of awards given across all levels of the company, including peer-to-peer awards and manager-to-employee awards. 71% of all awards occurred at Grades 7-9, which represents a majority of individual contributors and early career managers.

Figure B2b. Utilization

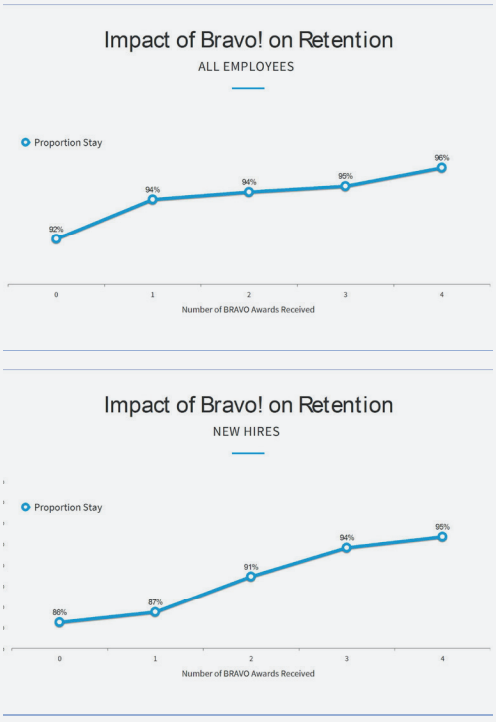
Global Grade	Below	Same	Above	# Awards Given
12	97%	2%	1%	1220
11	95%	3%	2%	2776
10	91%	7%	2%	4849
9	75%	20%	5%	12784
8	45%	35%	20%	12757
7	25%	30%	45%	7266
6	6%	35%	59%	3858
5	3%	17%	80%	581
4	7%	12%	81%	151
3	0%	7%	93%	262

Source: Own illustration

Results

Six months after the launch of the Bravo! program, initial data indicated positive results on employee retention for both new hires and overall employees. These results were confirmed 18 months after launch through in-depth research correlating the number of Bravo! awards and the impact on retention rates. Findings from the research were first presented to a group of senior business leaders at Globoforce's WorkHuman 2017 conference, an annual event dedicated to harnessing the transformative power of people for the next generation of human resources.

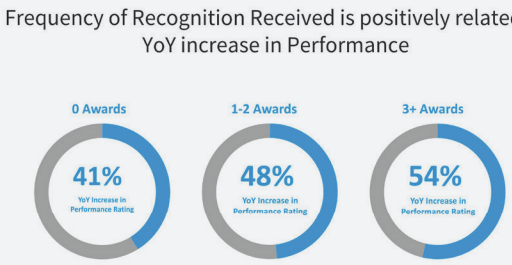
Figure B2c. Correlation Between Awards and Retention



Source: Own illustration

The Bravo! program created a positive impact on year-over-year performance, particularly for high-performing employees who received more frequent recognition.

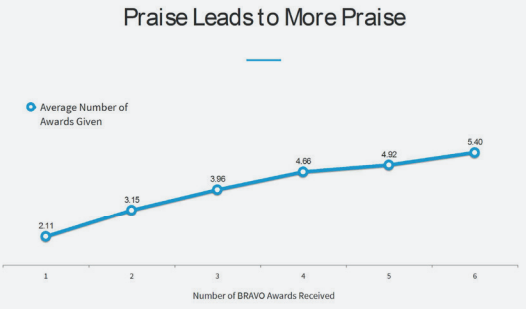
Figure B2d. Correlation Between Awards and Performance



Source: Own illustration

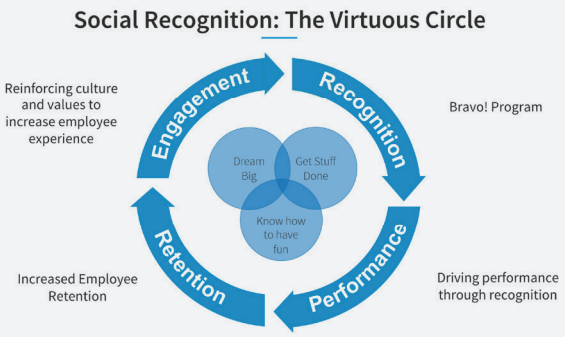
Furthermore, data revealed that the more employees offered praise, the more praise they received in return, creating a virtuous circle of positivity and success.

Figure B2e. Correlation Between Awards Received and Awards Given



Source: Own illustration

Figure B2f. Social Recognition: Mechanisms



Source: Own illustration

Conclusion

Through the Bravo! program and the partnership with Globoforce, LinkedIn discovered just how vital culture was to boosting employee retention and performance. LinkedIn learned that whatever was recognized was repeated and was careful to align its communication strategy at launch to desired behaviors within the company.

Case Study 3: Delivering Happiness in Practice

Jenn Lim (Delivering Happiness)

Canpa (Industry: Construction)

Canpa is a construction materials distribution company based in Turkey, a family business, and had a 31-year presence in the market before its culture transformation. In 2015, it was facing challenges from declining profitability, a 30% employee turnover rate, and low company morale. Unless they could solve their pain points, Canpa would have had to consider downsizing or closing its doors. In the search for solutions, Canpa's Vice President joined *Delivering Happiness* for a Masterclass on company culture and employee engagement. Since implementing a values-and-purpose-based culture into their employee experience, hiring procedures, and brand, Canpa has achieved record historical sales, dramatically reduced their turnover rate to almost zero, and was awarded first place in Turkey's 2018 "Great Place to Work" assessment.

Northwell Health (Industry: Healthcare)

Northwell Health's Office of Patient and Customer Experience sought to roll out its Culture of C.A.R.E [Connectedness, Awareness, Respect, Empathy] to all of Northwell's 61,000 employees and 21 locations. For this project, *Delivering Happiness* (along with Vynamic) co-created and aligned a roll-out strategy, implementation program, and internal frameworks to maintain C.A.R.E through the organisation's culture leaders. Of these initiatives came Northwell's Coach-The-Coach programme, in which their culture leaders were trained and certified to champion and drive C.A.R.E across the organisation. Northwell Health also wove their core values into the set of competencies for which an employee is evaluated by. After their culture transformation, Northwell Health saw significant improvements in their patient satisfaction scores, employee engagement numbers, and the ways culture was lived out every day. Over a period of two years or less, some outcomes were: *(i)* an increase from 45% to 85% in employee engagement rates, *(ii)* 20% of ambulatory locations already reaching the 90th percentile in patient experience, and *(iii)* significant improvements in HCAHPS, a widely-used patient-experience scoring survey.

Zappos (Industry: eCommerce)

In a span of ten years, Zappos grew to $1 billion in gross revenue largely due to their employee-centric corporate culture. Tony Hsieh and his team believed that with the right culture, building a brand known for customer service would be a natural result. To commit to the "right culture", the leadership team defined their core values and made it so that living up to them was part of the job expectation. They also implemented practices from the science of happiness and positive psychology into the employee experience – leading to more workplace happiness. Zappos' culture set itself apart from their competitors through customer loyalty so much that even in 2008 when the e-commerce industry went down for the holiday season, the company still grew in sales and achieved its market of $1 billion in gross revenue. Just a year after, Zappos was acquired by Amazon at a deal valued at over $1.2 billion on the day of closing. For seven years, the company has ranked on Fortune's "100 Best Companies to Work For" list.

Case Study 4: Psychological Technologies in Practice

George MacKerron (Psychological Technologies)

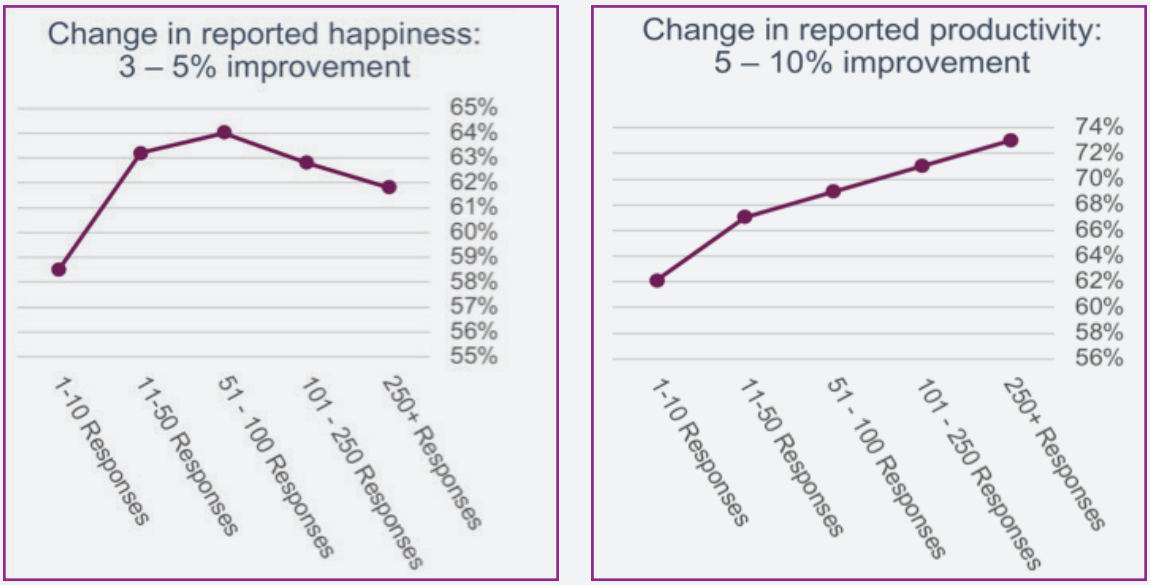
Psychological Technologies (PSYT Ltd) was founded by Nick Begley, former Head of Research for leading mindfulness app *Headspace*, and Dr. George MacKerron, creator of the *Mappiness* research study into hedonic well-being at LSE. Drawing on their expertise, PSYT's award-winning *me@mybest* app aims to help employees and employers to both understand and drive well-being and productivity.

App

The app delivers pulse surveys that include questions on instantaneous happiness, stress, and self-reported productivity, and over time also cover a wide range of potential drivers of these states in terms of the user's behaviour and the organisational environment and culture. Users receive in-app insights based on their answers.

The app also includes a library of tools, including breathing exercises, interactive and audio mindfulness practices, self-assessments, and workplace tips. Employees can dip into these at any time,

Figure B3. Change in Happiness During Use of App



Source: Own illustration

and appropriate tools can also be signposted in reaction to related survey responses. For example, a person who says they slept badly may be signposted to a sleep hygiene checklist or a mindfulness practice focused on better sleep.

In one client organisation, employees reported becoming on average 3 – 5 percentage points happier (which is in line with findings from the original *Mappiness* study), and 5 – 10 percentage points more productive over the period that they used the app, as seen in the line charts above.

Dashboard

Aggregated data from the app are also analysed and fed back to the employer, anonymously, via an interactive dashboard. First, the dashboard provides employers with a descriptive overview of the data, including trends over time and heatmaps across both different slices of the organisation and different aspects of well-being.

Second, the dashboard's analytics engine identifies priority drivers, defined as those that are both high impact — that is, strongly related to happiness and productivity — and below target. Conversely, it identifies strengths, where an item is both high impact and *above* target. Finally, it estimates the potential return on investment (ROI) of improvements in well-being, using linear and logistic regression to connect happiness self-ratings to monetisable outcomes.

The *me@mybest* dashboard shows that employees are happiest on Friday and least happy on Tuesday. This mirrors the original *Mappiness* results. Interestingly, however, Friday also sees employees reporting relatively higher stress and lower productivity.

High-impact predictors of happiness and productivity at client include autonomy ("I have a choice in deciding how I do my work"), psychological safety ("at work, I often try new out things as I have little fear of making mistakes"), confidence in talking to a line manager about a mental health problem, and effectiveness of IT systems. Employees who rate these items favourably are 2.5 - 4 times more likely to rank above the median for happiness and productivity than others, and these differences are significant at the 5% level or better.

Finally, the *me@mybest* dashboard estimates that a 1 percentage point improvement in employee happiness at client could be worth approximately £600 per employee per year as shown.

Case Study 5: An Ecosystem Approach to Staff Well-being in the Education Sector

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There are 84.3 million teachers in the world (see Figure B4a) and yet 80% of teachers are considering leaving the profession. Not only is it challenging for students when teachers leave the profession, but schools lose between $1 billion and $2.2 billion in attrition costs yearly from teachers switching schools or leaving the profession altogether. Although it appears recruitment numbers for this sector has increased, employers (predominantly the government) suffer from retention issues. The data show that over the next five years, almost half of those teachers will either transfer to a new school or give it up completely. The teacher shortage is such a massive global employment issue that UNESCO claims the world must recruit 69 million **new** teachers to reach the 2030 education goals. Although there are myriad complex issues related to the teacher shortage, one of the most cited reasons in the OECD countries is the lack of ability to recruit young people to the profession and burnout of current teachers. In developing countries, teacher status and lack of training is the most highly cited reason for attrition.

Plasticity Labs, a Canadian-based research and consulting company, began working with The Waterloo Region District School Board (WRDSB). Comprised of over 8,000 staff serving 63,000 students across 120 schools, the WRDSB is one of the largest school boards in the province and the first in Canada to take on such a wide-spread, evidence-based, research-driven approach to integrate staff and student well-being into their strategic objectives. Their strategy established a critical importance of **productive working relationships** and **positive interconnectedness** between student and staff well-being. For their efforts, more fully detailed below in the case study, the board was listed in the Forbes 100 Top Canadian Employers in 2017.

Case study

Phase 0:
Baseline measures were gathered. Surveys gathered data on; engagement, sense of community, inspiration, satisfaction, predicted satisfaction, culture, trust, recognition, communication, upward feedback, stress, well-being, hope, efficacy, resilience, optimism, gratitude, performance, citizenship behaviours, and net promoter score (NPS). Data provided key insight as to the areas for improvement most notably **communication**, **recognition**, and **upward feedback** - or key drivers of culture.

Within a school board environment, where staff are decentralized, widely dispersed across hundreds of locations, and fill a wide range of roles and responsibilities, it was determined that benchmarking tools would be developed to identify “At Risk”, “Average”, and “Healthy” scores for each survey response.

After seeing the first round of data, there was a swift response to engage training and programming to address these areas for improvement. Budgets and resources directed at well-being were increased 300%, with a commitment to ongoing data collection at both the department and school level.

Over the four years since working with the WRDSB, interventions varied in size and intensification across 125 schools and eight support departments measured. Groups were identified by schools across three cities; the Education Center (board office), broken out by departments (e.g. HR, Finance, Executive, IT); and parents were also considered a distinct group.

Phase 1:
2014 began with a goal to educate the senior leadership about the benefits of seven social-emotional skills that have been empirically shown to increase happiness and performance; **Hope**, **Efficacy**, **Resilience**, **Optimism**, **Gratitude**, **Empathy**, and **Mindfulness**. The goal was to incorporate these seven traits as the new values framework for well-being across all staff, then expand to students, and eventually outwards, to parents and the broader community.

The interventions began methodically with an aim to create a shared language with the seven traits at the core of all interventions. Education consisted of one-hour talks at annual events,

full-day training and workshops at regional and provincial conferences and speaking with staff during mandatory professional development days. After one year of pure education at the leadership level, phase two was engaged.

Phase 2:
The ecosystem theory was engaged. Teachers, and all staff including custodial, part-time, ECE's, leadership and administrative, plus students and parents were invited to employ the HERO GEM traits in their language at work and at home. The goal was focused on improving workplace culture amongst staff, to subsequently improve conditions for learning for students. These schools, aptly named HERO Generation schools, were provided an exploratory framework for staff and students to utilize. Interventions included, student and staff cocreated mantras read aloud daily, mindful minutes, curated music focused on one of the seven traits, monthly student-led, public assemblies, and priming (gratitude walls, hope trees, HERO-focused art, mantras at all entrances of the school, posters with three intervention examples related to each trait, written in multiple languages located in staff lunch rooms and in all school bathrooms (staff and student). Online employee portals were cocreated with staff, education consultants and Plasticity Labs internal teams for digital collaboration and curriculum guidance. None of the framework was programmatic, it was tool and resource agnostic and showed up differently in each group/school. Most notably, teachers would get three hours every month of Paid Time Off (PTO) for professional development in positive psychology. Lead HERO teaching staff would gather monthly to learn and ideate plans, then return to their individual schools and train other staff. Researchers from Plasticity Labs, Wilfrid Laurier University and WRDSB worked together to measure at three times points throughout the year to identify outcomes.

Simultaneously, interventions were ongoing with corporate staff at the education centre. The research and consulting team worked with departments to understand their daily experiences and personas and target specific programming. Custodial staff, Finance, Marketing, HR, union groups, parent councils, focused on a variety of well-being programs that included; improving physical health, using empathy in communication, building resiliency for front line staff, a well-being portal was created, and programming resources were propped up with an exponential budget increase. March focused on IDOH with a community- wide gratitude installation in the city's core.

Phase three expanded the research to 11 schools and two control schools – these in-sights were cross referenced with the entire school board's data and a full report was developed to capture the outcomes from Phase 0 data gathering, Phase 1 pilot project, and the Phase 2 expansion.

Outcomes
There were several major outcomes that stood out to the research team. One was the "proximity to purpose" as defined by Dr. Whiteside in his white paper that argues the pros and cons of engagement and refers to it as an incomplete measure when it comes to the mission-driven workforce. With the WRDSB, engagement is not a strong predictor of health and happiness because engagement scores are high across almost all schools due to their purpose. The real driver of well-being is the school's culture - particularly recognition, communication, and feedback. This is why interventions such as the HERO Gen that positive influence these areas are so important. On the flipside, the groups at the education centre that are farthest from students (IT, finance, etc.) did not have strong engagement scores, despite having similar culture issues. Because their "proximity to purpose" is significantly lower, it pales in comparison to the engagement of teaching. On average, HERO schools score about 10-14 points higher than non-HERO schools on Recognition, Communication, and Feedback. Employee Net Promoter Score (eNPS) is based on a 0-to-10 rating of how likely an employee is to recommend the organization as a place to work, with 0 not at all likely and 10 extremely likely. Net Promoter Scores for HERO staff were consistently higher than non-HERO staff. Dr. Whiteside suggests that this is because through teaching the importance of traits such as gratitude, empathy, and optimism, staff are cultivating the strengths required to foster and build strong cultures.

It is important to note, in these workplaces, proximity to purpose can also be a leading cause of depletion and burnout. Employees in purpose- driven organizations will often do whatever they can to contribute to their mission – and this can often come in the form of over-

exertion and de-prioritizing their own well-being. The WRDSB and Plasticity Labs are working to identify warning signals and prevention measures going into Phase 3.

Phase 3:
The project is now in 21 schools in WRDSB with a critical focus on building a core team at the board level that works together on well-being. No longer is there a separate group designed to look at student well-being and another team working on staff well-being – they are working congruently. There is a community focus where social media plays a large role in sharing the work going on with the schools to the public. Analyzing the impact on the network effect will be phase four as Plasticity Labs, WRDSB, and Children's Planning Table combine efforts to win the Smart City Canada bid after being short-listed to the top five cities in Canada to be selected.

Figure B4a. Number of Teachers over Time

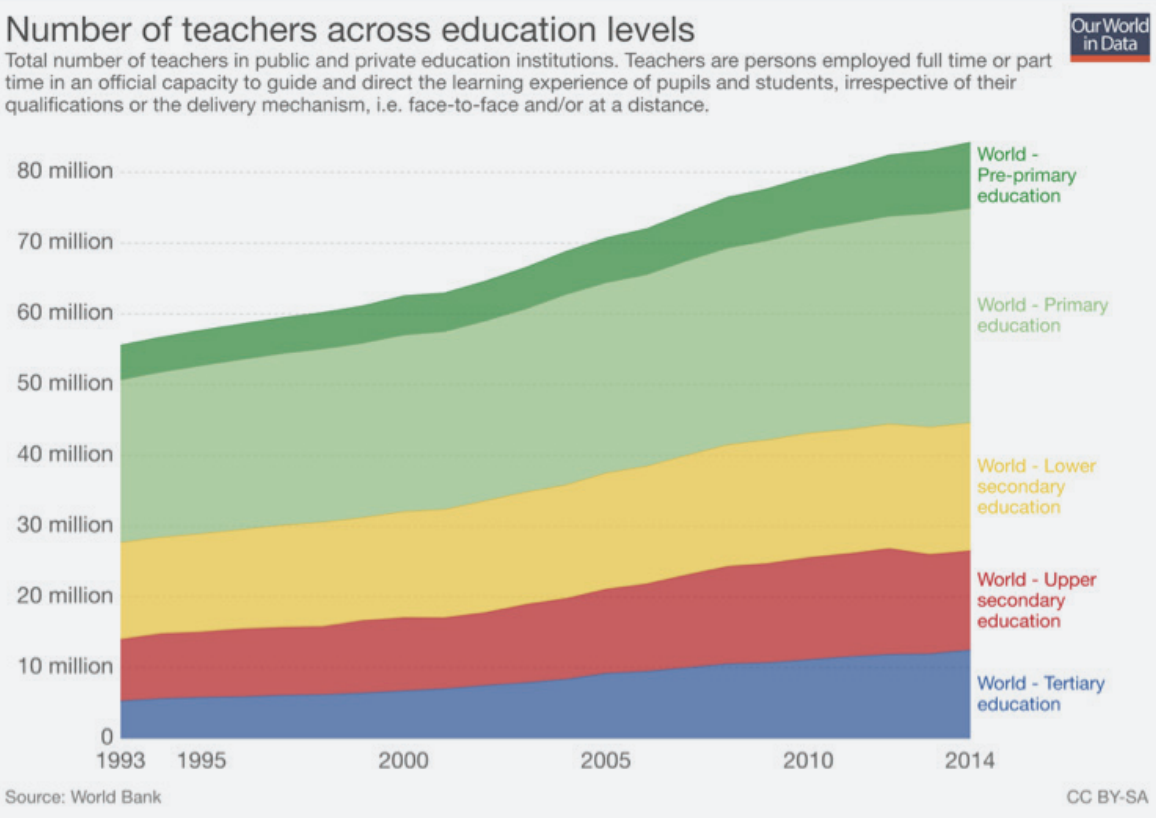
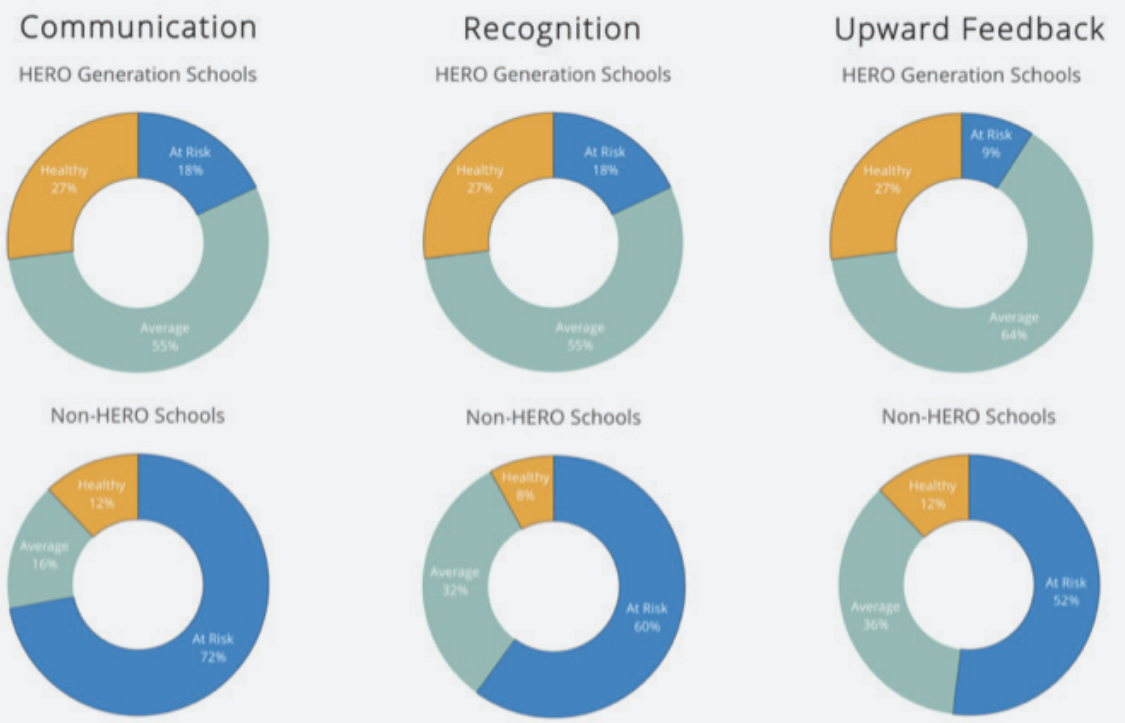


Figure B4b. Selected Outcomes in HERO Generation Schools Compared to Control Schools



Source: Own illustration

Endnotes

i Why Teachers are Lining Up to Leave (The Guardian, 2018) (https://www.theguardian.com/education/2018/apr/10/lesson-battle-why-teachers-lining-up-leave).

ii https://thejournal.com/articles/2014/07/17/the-problem-isnt-teacher-recruiting-its-retention.aspx

iii http://unesdoc.unesco.org/images/0024/002461/246124e.pdf