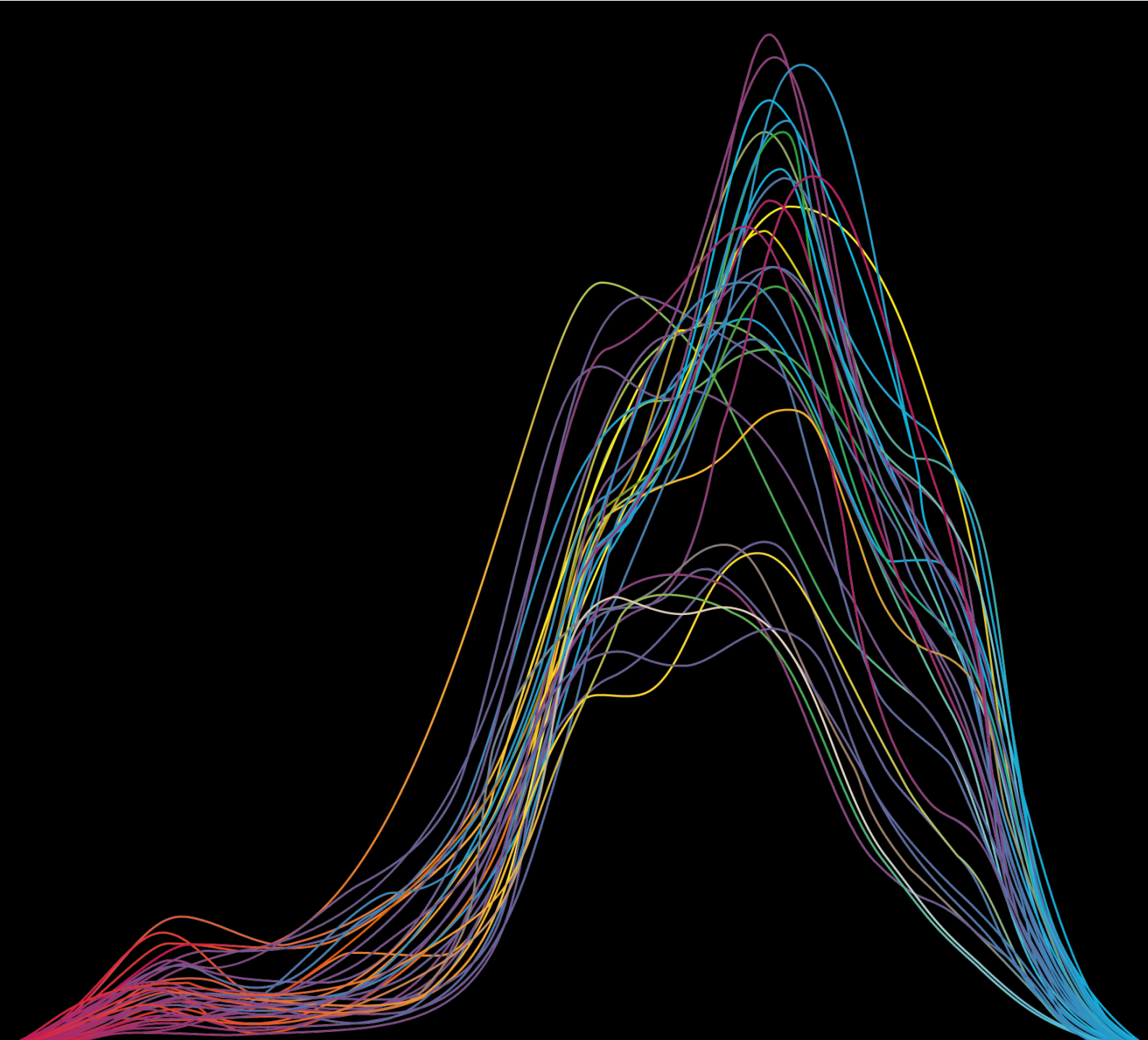


ESSENTIAL SKILLS TRACKER

2023

Will Seymour, Robert Craig



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Comment from the report partners



Tom Ravenscroft, CEO, Skills Builder Partnership

The last year has seen headlines about leaps in Artificial Intelligence, with tools like GPT-3 and Dall-E impressing and terrifying in equal measure. What the last year did not see were any headlines about leaps in UK productivity, growth or educational outcomes.

As we watch rapid technological innovation play out, we see real wages that are stagnant in the UK, gains in social mobility that are insufficient and employers still consistently reporting a skills gap. High demand amongst employers and educators for essential skills has been reported by organisations like the CBI, CIPD and Sutton Trust for decades.

In 2017, I wrote *The Missing Piece*, setting out how those interpersonal, communication, self-management and creative skills were being overlooked in education. Five years on, and 87% of secondary schools and colleges have a touch point with the Skills Builder Partnership, giving their students the opportunity to systematically build those skills. The change is starting to happen.

But the growing body of research now makes it clear: essential skills are fundamental across individuals' lives. This latest report, authored by Robert Craig and Will Seymour, sheds light on how much potential is yet to be realised – but that essential skills can be transformational.



Bina Mehta, Chair, KPMG UK

Driving greater social equality is the defining societal and economic challenge of our time, and essential skills such as communication, problem-solving and teamwork are key to levelling the playing field and unlocking opportunities. By empowering individuals, we can create better outcomes for our society as a whole.

Costing our economy £22bn last year alone, and adding nearly £5,000 to one's earning potential, the social and business imperative for tackling low essential skills is clear.

As an employer of over 17,000 people, our success depends on having diverse talent, each person bringing with them different ideas and experiences that help us continue to drive innovation and solve our clients' greatest challenges.

For too long essential skills have been linked to socio-economic background or seen as 'polish' but this report demonstrates these skills can be learnt and developed like any other.

The KPMG Foundation was delighted to provide seed funding to scale the Skills Builder framework in 2017, and since then we've embedded this thinking into our own KPMG UK community education strategy, helping thousands of students learn vital skills. Last year alone, our community programmes reached 65,000 disadvantaged young people. We're enormously proud to be a part of this ongoing legacy.

**Peter Cheese, CEO, CIPD**

The issues of skills and skills gaps is top of the strategic agenda for organisations and increasingly seen as a constraint on growth and in productivity. At the same time, the pace of change in technical and job skills is accelerating. Businesses will have to invest more in job skills training for the future to be competitive and able to adapt, and government encouragement and support is vital.

But for too long we have lacked clarity on what the core or essential skills are and their importance as the basis for almost every job. The Skills Builder framework and tools give us this clarity. This important research starkly emphasises just how essential those skills are, their value to individuals in getting into work and progressing, their value to organisations, and therefore their value to our economies at large.

Business and education both need to encourage the development of these essential skills, and use this common definition as a shared language. Businesses can't expect education to produce all the job skills, but they should expect more of these essential skills which are also widely recognised as life skills. Business in turn then needs to support the further development of these skills, which are vital in leveraging the more job specific skills and in enabling productive and effective organisations. Now is the time to act.

**Alice Barnard, CEO, Edge Foundation**

This report builds brilliantly on the body of evidence that we have been sharing through our Skills Shortage Bulletins for the last five years. It has never been clearer that building technical and essential skills is crucial for individual success and for the wider economy.

Educators know that essential skills give their students the edge in the labour market and help protect them against the changes we are seeing to sectors and occupations. Having a consistent language around them, labelling them clearly, focusing on them intentionally and helping people to articulate and demonstrate them are all crucial.

Too often passionate teachers are focusing on these skills because they want the best for their students but in spite of, rather than because of, the wider system.

We need an education system that explicitly values these skills, that encourages a truly broad and balanced curriculum, that supports engaging pedagogy that connects to the real world and that measures and showcases young people's wider talents, not just their recall of written information.

Summary

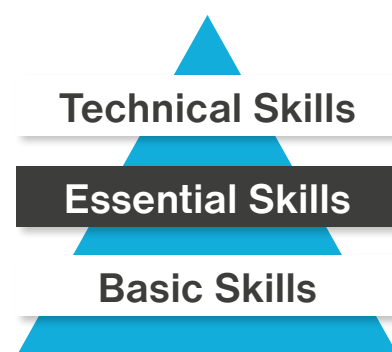
This nationally representative research finds that failing to take a holistic, or “portfolio” approach to skills, both in research and in practice, means missing the significant role that essential skills play in our economy, businesses, education and our broader lives.

Essential skills are those highly transferable skills like problem solving, teamwork and leadership that you need for almost any job. These eight skills are codified and broken down into measurable, teachable components in the Skills Builder Universal Framework. This paper uses “essential skill score” as a measure of an individual’s eight essential skills using this framework. You can read more about these in “What are essential skills?” below.

At an individual level, people with higher levels of essential skills experience improved social mobility, employment, earnings, job satisfaction and life satisfaction. Critically, these skills work as a platform for developing other skills, including the basic skills literacy and numeracy as well as technical skills.

Scaling to an economic level (holding constant the availability of wage premia), the cost of low essential skills to the UK in 2022 was £22.2bn – comparable to the cost of low numeracy. Overlooking essential skills means overlooking a significant potential driver of UK productivity.¹

Where we are able to meaningfully analyse skills together, we find compelling indications that individuals are able to leverage their basic skills, qualifications, or experience only when they also have an adequate level of essential skills.



Productivity

Essential Skills are a missing piece in the UK’s productivity puzzle

This paper looks to contribute a ‘missing piece’ to the UK productivity puzzle. Opportunities in education and work to build essential skills are a strong predictor of individuals’ levels of essential skills and in turn a series of employment and life outcomes. As well as reproducing findings on the cost of low numeracy skills, we analysed the cost of low essential skills. We modelled low skills by scaling from individual wage premia to a population level two ways:

1. Simulating the skills boost of providing skills building opportunities to those that did not have them. 51% of workers have missed such opportunities, with an average cost of £680 each. Projected across the broader population, the cost of not providing skills building opportunities equates to £22.2bn (range £7.5bn – £40.6bn) a year.
2. Statistical improvement, moving everyone with an essential skill score below the first quartile up to that first quartile “skills floor”. 18% of workers fall into this category, with an average cost of £1,370 each. Projected across the broader population, the cost of the very lowest levels of essential skills is £15.2bn (range £4.9bn - £27.1bn) a year.

1. This is based on the assumption that universally higher levels of essential skills would not diminish the returns to those skills. For further discussion, see the Appendix on methodology.

Employment

Essential skills boost income

This research validates previous findings of a wage premium for people with higher levels of essential skills.²

Moving from the lower quartile essential skill score to the upper quartile essential skill score is associated with a wage premium of between 9.4% and 12.0%. For the average full-time worker in the UK, this equates to an extra £3,600 to £4,600 each year.



To further validate this finding, we used an alternative methodology. We compared individuals' earnings to the median for their occupation according to ONS data and found a wage premium associated with the same increase in essential skill score of 8.2%.

Essential skills are valued by UK workers

92% believe that essential skills are important for success within their career. That is on par with literacy skills and more than sector specific knowledge (84%), digital skills (84%), numeracy skills (82%) or technical skills (65%).

Those with higher essential skill scores are much more likely to agree that all of these different skills are important for success within their career, with essential skills still taking precedence. But those only who believe another skill is most important do not tend to see the significance of other skills. This points to essential skills acting as a platform that enables or encourages other skills. Employers keen for their staff to value developing a well-rounded skill set may want to start with essential skills in order to drive engagement with other learning.

Over half (56%) of working age adults in the UK would consider getting a new job for improved skills building opportunities. But it is the most skilled that are most motivated to move: the higher someone's levels of essential skills, the higher the agreement with this statement.

Essential skills predict job satisfaction as strongly as income

Controlling for individuals' job type and age, we find that essential skill score is just as powerful a predictor of job satisfaction as income. Comparisons between those with the same occupation show that essential skill score is often a much better predictor of job satisfaction than income.

As individuals earn more – often used as a proxy for high performance – their essential skill score becomes an even stronger predictor of their job satisfaction.

For employers concerned about retention or engagement, it is likely that building your employees' essential skills has a significantly higher return on investment than increasing their salaries.

2. <https://www.skillsbuilder.org/file/essential-skills-tracker-2022>

People with higher levels of essential skills report higher life satisfaction

When controlling for work status, age, gender, income, education level, and health we find that a 1 standard deviation increase in essential skill score is associated with a 0.17 to 0.22 standard deviation increase in positive response to life satisfaction measures. To put that into perspective, a 2.2 step increase in essential skill score is associated with a half step increase in life satisfaction on a scale of 0 to 10.

Employers can have a significant impact on lifelong learning

The UK has an ageing population and workforce. In this context, it is concerning that individuals' essential skills appear to start to decline once they hit their forties.

However, there are strong indications that opportunities to build essential skills in work completely neutralise this effect. For these individuals, essential skills continue to grow rather than declining with age.

Employability

Essential skills predict unemployment

Moving from the lower to upper quartile of essential skill score is associated with a 25% reduction in the odds of being unemployed.

In other words, 5.2% of individuals with a lower quartile skill score (8.2) are likely to find themselves unemployed, compared to 3.9% of those with an upper quartile skill score (11.2).

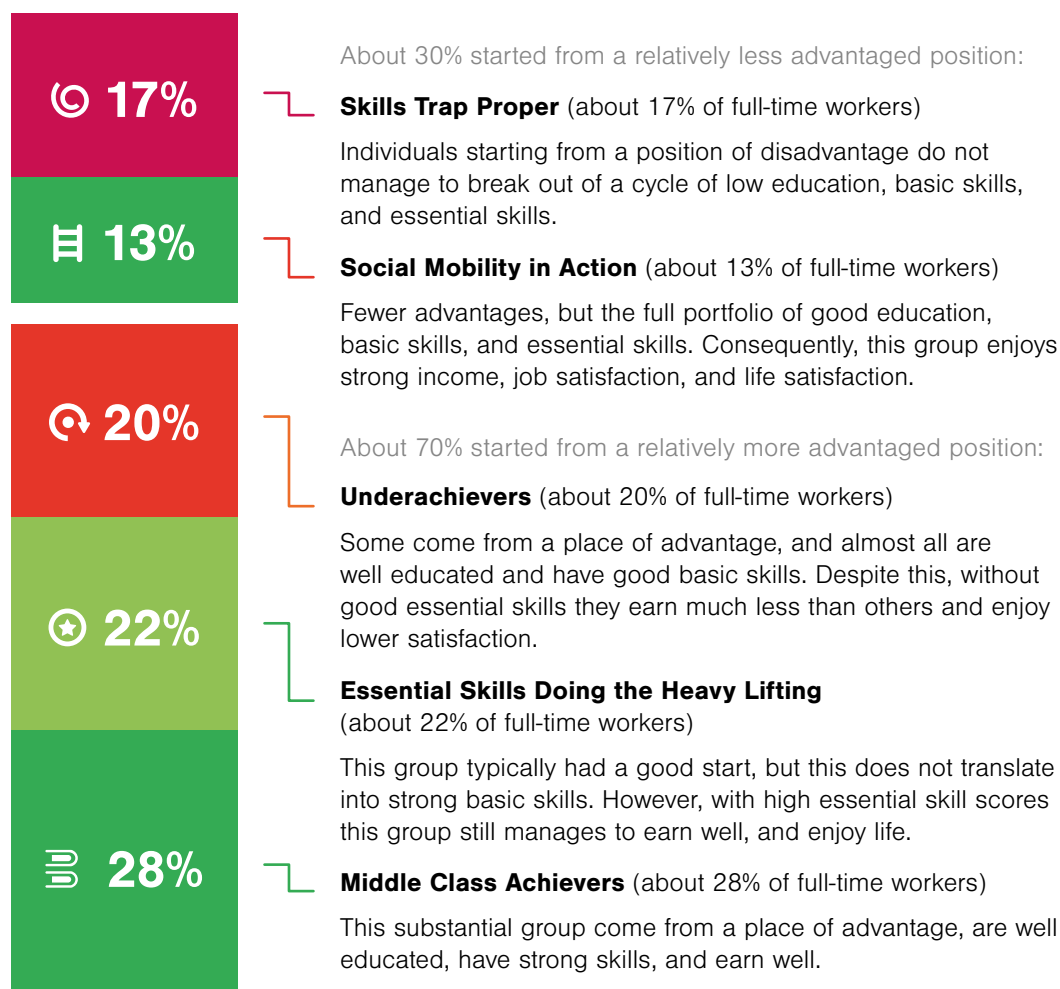
Social mobility

Essential skills are a platform for a skills portfolio that can change lives

In previous research, we found evidence not just of a 'skills gap', but also of a 'skills trap' – disadvantage and a lack of opportunities to build essential skills lead to a lack of value placed upon them, limited future opportunities, lower skill score, lower income, and lower life satisfaction.³ In this paper we are able to expand our understanding of the skills trap by including basic skills. The analysis presented here supports the view that education, basic skills, essential skills, and experience all contribute to success. We find evidence that higher essential skill scores are associated with realising the benefits of other skills, and with social mobility.

3. <https://www.skillsbuilder.org/file/essential-skills-tracker-2022>

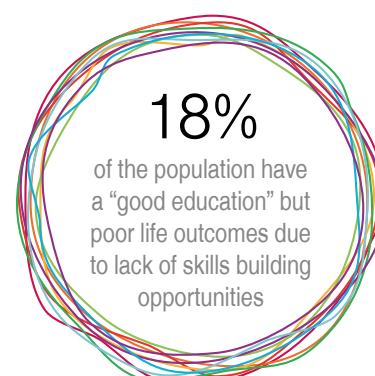
We find that full-time workers in the UK broadly fit into five groups:



Education: realising the learning margin

Cluster analysis reveals the impact of an ostensibly “good education” that builds literacy and numeracy but omits essential skills. Around 18% of the working population has above average education level, literacy, and numeracy, and yet a very low essential skill score. This group has the worst job satisfaction, life satisfaction, and sense of their life being worthwhile. They also earn much less than their peers.

Parents in the UK seem to intuit these findings: 61% view a school’s provision of skills building opportunities as an important factor when choosing a school for their child.



Policy implications

For employers

Employees with higher levels of essential skills have higher job satisfaction, higher life satisfaction and may be more productive. Those individuals also value having a whole portfolio of skills and see how they can contribute to their careers. Skills levels of employees are in turn linked to opportunities to build essential skills.

Employers looking to seize these opportunities should embed a structured and cohesive approach to essential skills across their business. This means not just providing training, but designing roles and performance management in a way that encourages the application and lifelong learning of essential skills.

Given that many employers are already implicitly rewarding higher levels of essential skills through higher pay, there is potential to unlock mobility through transparency and clarity about the value of these skills in the workplace.

This transparency should extend to recruitment, where clearly identifying essential skills could lead to better identifying their existence and high performers who may not have the education background or CVs traditionally sought after.

For policy makers

It is time to stop cherry picking favourite skills and to have a consistent, cohesive approach to building them all so that individuals have the portfolio of skills they need to succeed.

That means starting from a taxonomy of basic skills (numeracy, literacy and digital skills), essential skills and technical skills. To overlook any part of this is to miss a key part of the puzzle, whether trying to solve for social mobility or economic productivity.

Next, we need a systemic, joined up approach to lifelong learning. We already know that low levels of numeracy and literacy are a problem across age groups. We now know that low levels of essential skills in adults is a challenge of similar proportions.

So we need to start young, providing high quality opportunities to build essential skills in education, with a standardised approach that uses a shared language that extends into employment.

We then need to keep going, building that same approach and language into employability programmes and supporting provision of reskilling and upskilling.

For educators

So many educators' commitment to teaching stems from a desire for their students to flourish. For those who value their students achieving improved earnings, life satisfaction and social mobility, then taking a holistic approach to building their skills in education should be a primary goal.

The first step is taking a consistent approach to building essential skills in education, with the same sort of rigour they expect to see in other subjects, one that aligns with the language of social impact interventions and employers.

Secondly, deliver high-quality opportunities to build essential skills. The research shows that just like science or maths, these aren't just acquired by natural osmosis. Focus tightly on specific learning outcomes, by targeting specific steps of each essential skill.

For social impact organisations

Organisations that deliver life changing and impactful interventions are often targeting social mobility or improved outcomes for the individuals that they work with. This paper further validates building those individuals' essential skills as a route to achieving these outcomes.

Designing interventions so that they align with the work of educators as well as the skills that employers are looking for should help continue to drive awareness of the value of essential skills and the impact they can have in individuals' lives.

Providing targeted and high-quality opportunities that explicitly build essential skills, measuring progress in a standardised way, should continue to be a focus for interventions that are targeting improved life outcomes through a skills-related mechanism.

0. Introduction

Introduction

Background

This is the second paper in the Essential Skills Tracker annual research series, assessing the state of the United Kingdom's essential skills through a nationally representative sample of the working age population, administered by YouGov. As well as descriptive statistics of skill levels, the Tracker uses modelling to understand the relationship between skills and other characteristics and variables in order to provide insights for businesses, policy-makers and practitioners.

This paper builds on research showing the 'returns to skills' internationally. The literature has evolved through several strains of underlying theory on human capital. Earlier work such as Mincer (see also Schultz⁴ and Becker⁵) measured human capital as the amount of schooling individuals had completed.⁶ Later work, particularly by Hanushek, recognised that differences in human capital and therefore labour market skills are caused by a number of factors including cognitive and non-cognitive skills.⁷⁻⁸ As noted by Deming in 2017, "A growing body of work in economics documents the labor market return to "noncognitive" skills, including social skills and leadership skills."⁹ Several papers established returns to non-cognitive skills in the US;¹⁰ in the words of Kautz "Greater levels of skill foster social inclusion and promote economic and social mobility. They generate economic productivity and create social well-being."¹¹

This body of literature does include some investigations into the relationships between returns to skills and social advantage, though as noted by Borghans et al, "Despite informal arguments that people skills are important for understanding individual outcomes and are becoming more important, economists have done little to analyze their economic consequences."¹²

4. Schultz, T. W. (1961). *Investment in Human Capital*. The American Economic Review, 51(1), 1–17.
5. Becker, G. S. (1962). Investment in Human Capital: A Theoretical Analysis. *Journal of Political Economy*, 70(5), 9–49.
6. Mincer, J., 1970. The distribution of labor incomes: a survey with special reference to the human capital approach. *Journal of economic literature*, 8(1), pp.1-26.
7. Hanushek, Eric. (2008). *The Role of Cognitive Skills in Economic Development*. Journal of Economic Literature, 46 (3): 607-68.
8. Hanushek (2015): *Returns to skills around the world: Evidence from PIAAC*. European Economic Review. 73.
9. Deming, D. (2017). *The Growing Importance of Social Skills in the Labor Market*. The Quarterly Journal of Economics, Volume 132, Issue 4, November 2017, Pages 1593–1640.
10. Heckman, James & Kautz, Tim. (2012). *Hard Evidence on Soft Skills*. Labour economics. 19. 451-464. 10.1016/j.labeco.2012.05.014.
11. Kautz, Tim & Heckman James (2014). *Fostering And Measuring Skills: Improving Cognitive And Non-Cognitive Skills To Promote Lifetime Success*. OECD Education Working Papers, No. 110, OECD Publishing
12. Borghans, L, Ter Weel, B, Weinberg, B. (2014). *People Skills And The Labor- Market Outcomes Of Underrepresented Groups*. ILR Review, 67(2), 287–334.

It is of note that although this literature commonly uses the terms “cognitive” and “noncognitive” (also “non-cognitive”), there is no entirely consistent operational definition. Cognitive skills usually consist of numeracy and literacy but also sometimes science and problem-solving, while non-cognitive skills include “a variety of interpersonal dimensions including communications ability, team work skills, acceptance of social norms, and the like”.¹³

Of particular importance at an international level is Hanushek’s finding of a return to skills based on analysis of PIAAC data, the OECD Survey of Adult Skills, which measures literacy, numeracy and problem solving in a technology-rich environment. While one of the key findings of that research was that “a one-standard-deviation increase in numeracy skills is associated with an 18 percent wage increase”, Hanushek found that problem solving had a more pronounced return to skills in the UK than in other countries.¹⁴

Pro Bono Economics also utilised the PIAAC data to build on the understanding of returns to skills by calculating a cost to the UK of low levels of adult numeracy, which they found to be around £20.2 billion per year in 2014.^{15 16} A similar approach was taken for literacy, calculating a wage premium of £1,500 per year for moving from very low to basic literacy levels.¹⁷

Our research

By further breaking down the measurement of skills alongside other variables that may impact labour market outcomes, this research looks to provide both a holistic and nuanced understanding of the relationship between outcomes and skills in a UK context. We make the case for taking a “portfolio” approach to skills in research and – perhaps more importantly – in practice.

We find that using the Universal Framework for essential skills – which is widely adopted in practice in a variety of settings both in the UK and internationally – alongside literacy and numeracy as measures of skills is preferable, with a bias towards real world applicability, accessibility and relevance. In other words, we aim to ground the research in practical application and policy contexts. This makes the findings directly relevant for practitioners and policy makers who are able to see the returns to essential skills in terms of the country’s most widely adopted approach to building those skills.

The relationship between skills and outcomes is not straightforward. Our working conceptual model is that essential skills have a two-way relationship with other skills and education more broadly, as well as with employment. Those with higher levels of essential skills may be able to learn basic skills more effectively, while learning those skills and spending more time in education can help individuals build higher levels of essential skills. Roles that require higher levels of skills may also provide more opportunities to build them.

13. Hanushek (2008).

14. Hanushek (2015).

15. Pro Bono Economics (2014): Cost of outcomes associated with low levels of adult numeracy in the UK

16. A follow up paper by Pro Bono Economics in 2021 revised this cost to £25bn in 2020 prices.

17. Pro Bono Economics (2021): Paying the price: The cost of very poor adult literacy

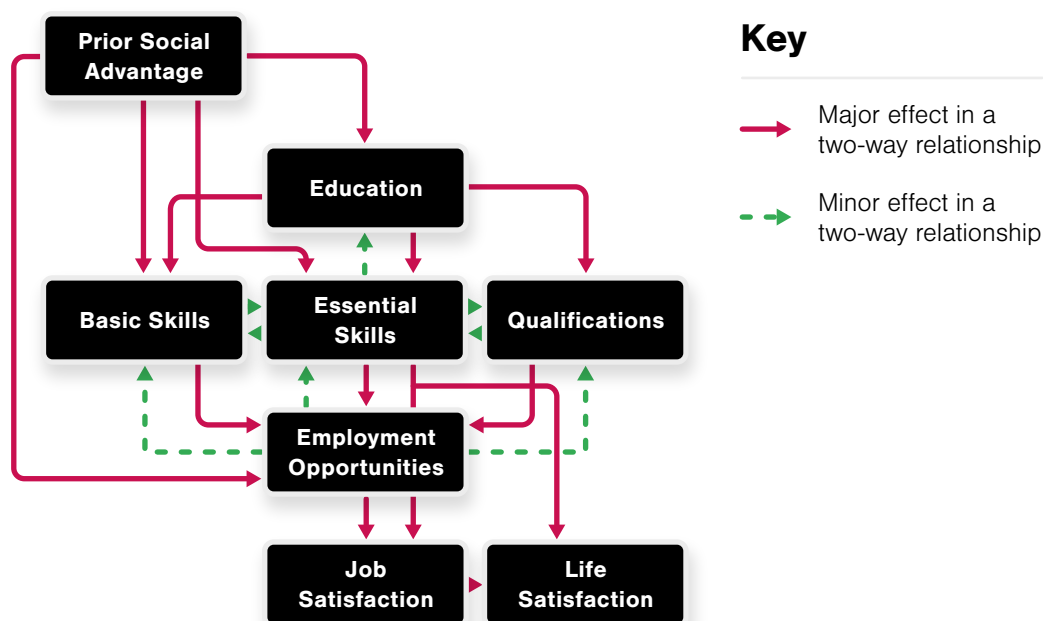


Figure 0.1: Directed Acyclic Graph showing the relationship between key variables explored in this paper, for those in work¹⁸

By partnering with YouGov for data collection, we are able to get a sample of nationally representative data. YouGov's survey panel consists of over one million British adults and survey responses are weighted by age, gender, social class, region and level of education, with weighting targets derived from several sources of data (including ONS population estimates and the census).¹⁹ This means we are able to explore UK-wide effects. In particular, given the role of the UK's pressing 'productivity puzzle' in the looming recession, we present findings that can inform how policy-makers and practitioners' address the issue.

The Skills Builder Partnership is made up of hundreds of organisations working towards improved social mobility through skills development. We therefore present findings on social mobility alongside a wide range of socio-economic factors of importance to policy makers and delivery organisations in the sector including age, gender, geography and social advantage.

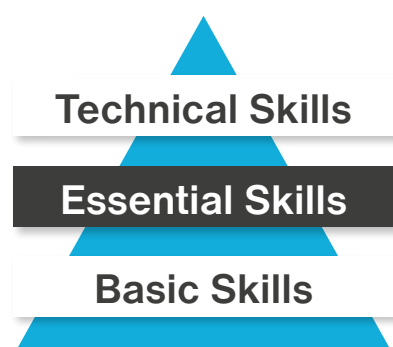
The Essential Skills Tracker 2022 revealed for the first time the "skills trap" that many fall into, of few opportunities to build essential skills in education leading to low value placed on those skills and lower skill levels, later securing lower skilled, lower paid jobs that in turn provide fewer opportunities to build essential skills and ultimately lower life satisfaction. The research also found a significant wage premium for higher levels of essential skills and reported positive attitudinal findings about them in the UK workforce.

As we repeat certain parameters of the research each year, we expand our dataset to refine and increase the significance of our findings. In the long-term, this will also allow us to understand the changing state of essential skill levels in the UK, along with the impact of changes in policy and practice in building skills on outcomes such as productivity.

18. In our modelling, we include in 'prior social advantage' specific measures that are likely to be relevant to the dependent variable in question – eg, gender, ethnicity, type of school, parents' education, and parents' jobs.

19. <https://yougov.co.uk/about/panel-methodology/>

What are essential skills?



Essential skills are those highly transferable skills that everyone needs to do almost any job, which make specific knowledge and technical skills fully productive.²⁰

²¹ These are therefore distinct from basic skills (literacy, numeracy and digital skills) and technical skills (specific to a particular sector or role, sometimes drawing off a particular body of knowledge). In the research literature, they are often referred to as “transversal” or “higher order cognitive” skills.

The eight Essential Skills



1. LISTENING

receiving, retaining and processing of information or ideas



2. SPEAKING

oral communication of information and ideas



3. PROBLEM SOLVING

the ability to find a solution to a situation or challenge



4. CREATIVITY

use of imagination and generation of new ideas



5. STAYING POSITIVE

ability to use tactics and strategies to overcome setbacks and achieve goals



6. AIMING HIGH

ability to set clear, tangible goals and devise a robust route to achieving them



7. LEADERSHIP

supporting, encouraging and developing others to achieve a shared goal



8. TEAMWORK

working cooperatively with others towards achieving a shared goal

The annual Essential Skills Tracker is the first of its kind to use the Skills Builder Universal Framework for Essential Skills. The importance of these skills seems to be talked about endlessly in employer surveys, reviews of educational priorities, and more speculative forward-looking reports.²² But the absence of shared language and measurable outcomes has to date limited tangible and consistent research into who benefits from these skills and the impact of having them. The Skills Builder Universal Framework addresses this gap.

20. UK Commission for Employment and Skills (UKCES) (2009). *The Employability Challenge*.

21. Skills Builder Partnership (2022): *Towards a Universal Framework for Essential Skills*

22. CBI (2018). *Educating for the Modern World: CBI / Pearson Education and Skills Annual Report 2018*. CBI; Institute of Student Employers (ISE) (2018). *ISE 2018 Development Survey: Trends, benchmarks and insights*.

The Framework was developed by the Essential Skills Taskforce, chaired by Sir John Holman, which included the CIPD, CBI and Gatsby Foundation as well as leading businesses, educators and academics with two-way validation against a full-range of frameworks to ensure it is both relevant and comprehensive. It breaks down the eight essential skills into 16 measurable, teachable, learnable components, from Step 0 to Step 15. Individuals indicate their ability against a likert scale for each step, which produces a “essential skill score” from -1 to 15 for each of the eight essential skills.

Like any survey of this kind, there is potential for response bias in response to the self-assessment. Previous research, however, suggests that this might be in the direction of understanding the impact of essential skills on outcomes. Interviews conducted by psychologists to assess “non-cognitive” skills have been found to be an even stronger predictor of labour market outcomes than survey-based measures.²³

In this report we look both at the essential skill score for each of the eight skills (e.g. Problem Solving) but also use an average of all eight skills for each individual to give an average essential skill score. This average essential skill score enables us to undertake analysis and make effective comparisons across the population. Unless otherwise specified, when we talk about “essential skill score” in this paper, we are referring to an average essential skill score across the sample population, which in turn is an average of scores for each of the eight skills. With the term “basic skills” we are referring to literacy and numeracy skills, which are widely accepted as precursors to accessing many other skills.

This research finds that 3.5 million working age adults have used the Framework to build their own skills or those of others, while operationally we know that 87% of secondary schools in the UK have a touchpoint with the Framework through the Skills Builder Partnership. By using it to measure skills in this research, we can produce actionable insights for business, educators, social impact organisations and policy makers.

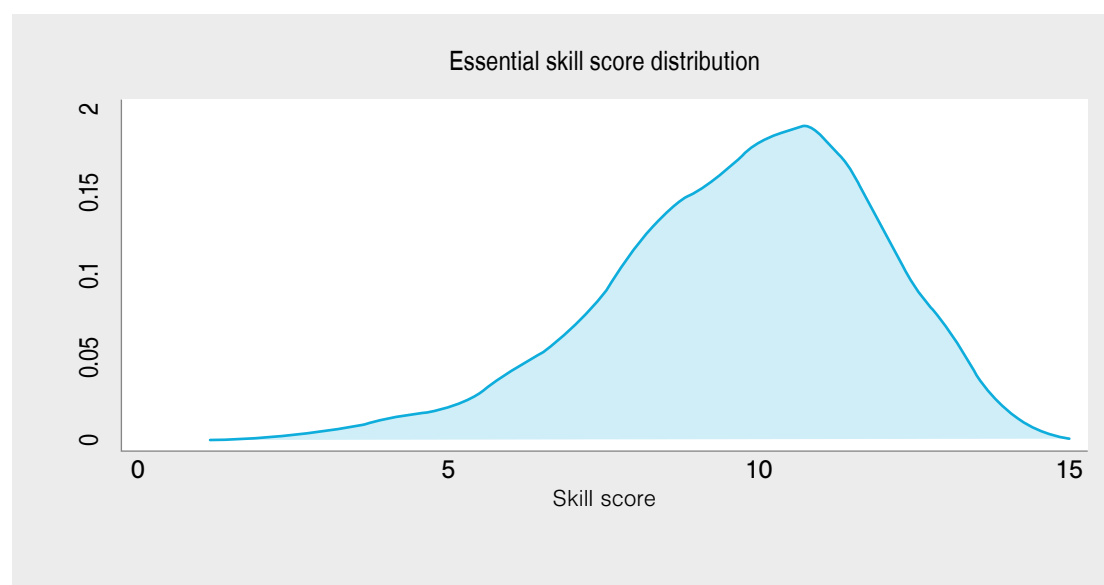


Fig 0.2: Distribution of average skill scores for UK adults aged 18-65

23. Lindqvist, E, Vestman, R (2009). *The labor market returns to cognitive and noncognitive ability: Evidence from the Swedish enlistment*. American Economic Journal: Applied Economics, 3 (1): 101-28.

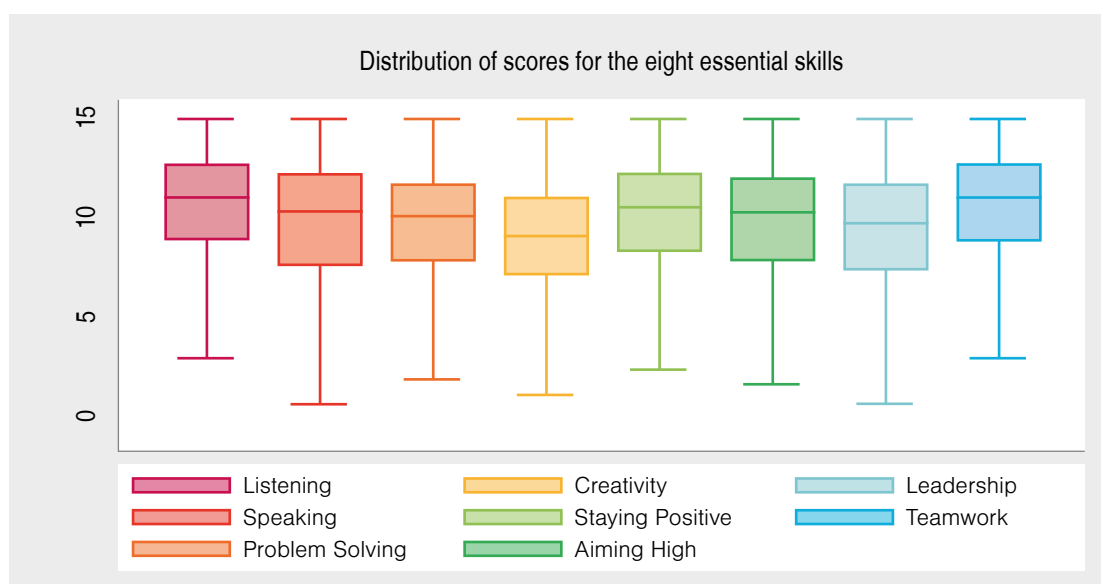


Fig 0.3: Distribution of skill scores for UK adults aged 18-65

How mean skill score breaks down

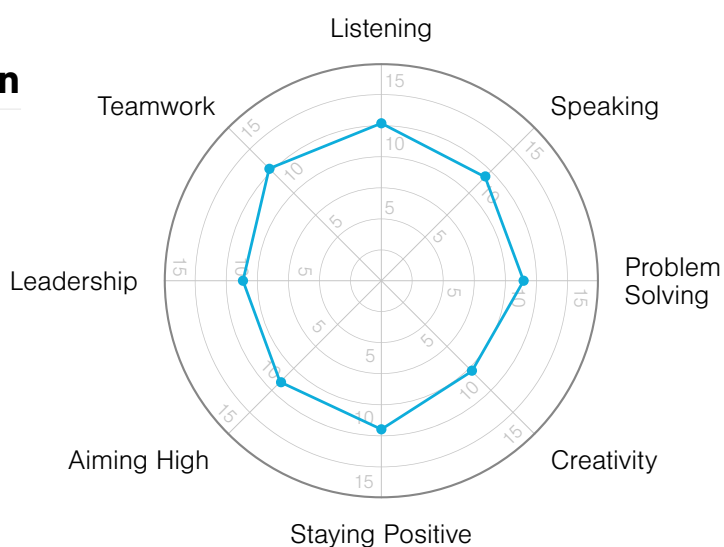
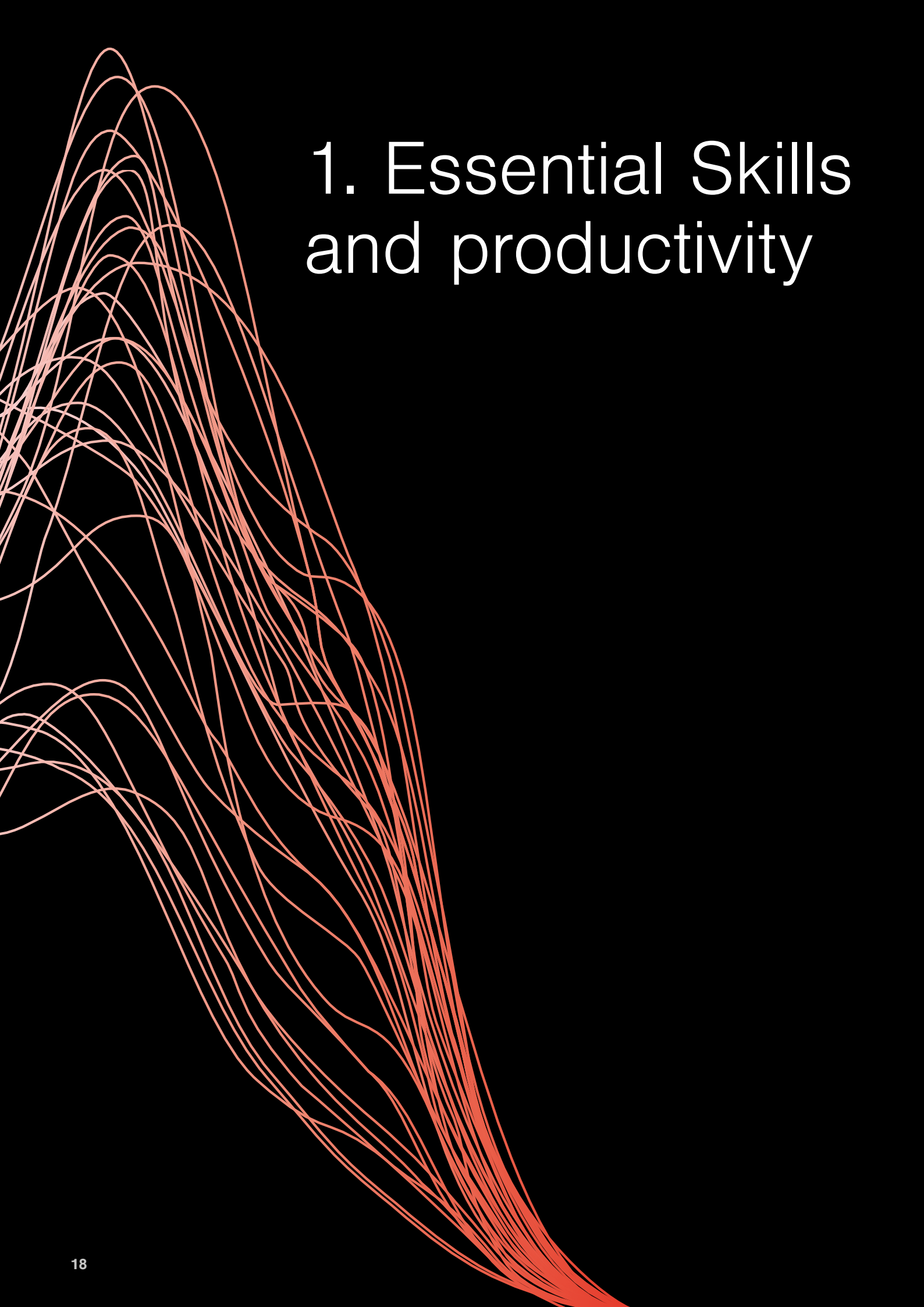


Fig 0.4: Illustrative chart showing skill scores for an individual with an average skill score of 9.4 across all skills



1. Essential Skills and productivity

Essential Skills and productivity

Introduction

Academics, policy makers and politicians continue to wonder at the UK's "productivity puzzle".²⁴ There are many theories as to why productivity in the UK has been stagnant since the 2008/2009 financial crisis and many have suggested partial solutions from industrial strategies to education.²⁵ Adding to the complexity of the picture, there are significant variances in productivity across regions.²⁶ With the UK facing a looming recession, we cannot afford to ignore promising solutions that will have an impact for the economy, businesses and individuals.

One route to understanding the productivity puzzle has been through human capital (also shown to be involved in regional productivity disparities),²⁷ usually conceived of as a function of skill levels. The relationship between the returns to skills and productivity could be linear, or could be more complex – for example, it might be that increased skill levels are necessary for economic growth but are not sufficient on their own to lead to improved productivity.²⁸

Irrespective of whether the relationship is linear or not, improving skill levels is an important component of improving productivity. The questions then follow of which skills need to be built, and how?

There is already research showing a return to skills for literacy and numeracy. Improving these skills is a widely adopted goal of governments and third sector organisations. For example, the UK government has a target of 90% of children leaving primary school with the expected standards in reading, writing and maths. Equally, organisations like the National Literacy Trust and National Numeracy advocate for and take direct action to improve the country's literacy and numeracy levels. The economic (and social mobility) case for doing so is clear.

This paper is the first to look at skills more broadly in the UK by using a widely adopted framework for building essential skills in practice and showing the relationship between essential skills, basic skills and productivity. The implication is that the UK needs a clear roadmap to generating returns to essential skills that in turn can drive productivity.

At an implementation level, focused field-work has already found that providing opportunities to build essential skills in the workplace can drive productivity: 89% of employees who benefited from learning & development that had embedded the Universal Framework believed that the experience improved their performance in role with 75% feeling more engaged in their work. Their managers reported a similar phenomenon.²⁹

24. <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/articles/whatistheproductivitypuzzle/2015-07-07>

25. PWC (2019): *The Productivity Puzzle revisited: why has UK productivity lagged behind other advanced economies?*

26. Gardiner, B., Fingleton, B., & Martin, R. (2020). *Regional Disparities In Labour Productivity And The Role Of Capital Stock*. National Institute Economic Review, 253, R29-R43.

27. Gardiner (2020)

28. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1078063/How_can_skills_and_the_skills_system_promote_productivity_growth.pdf

29. Skills Builder Partnership (2022): *Trailblazers*

30. NIESR (2022). *Productivity in the UK: Evidence Review*

31. See Appendix 1 for further details of how individual wage premia were scaled to the population.

However, for employers to unlock productivity, it may be necessary to consider how essential skills are woven throughout management practices and job design – providing isolated training is unlikely to be sufficient.³⁰

The cost of low numeracy and literacy in the UK

Our portfolio approach to understanding the cost of low skills in the UK builds on previous work and methods. We are particularly grateful to Pro Bono Economics for both leading the way in measuring the costs of numeracy and literacy in the UK, as well as clearly publishing their approach.

You can find a full description of our methods and validation in Appendix 1.

Numeracy

Research by Pro Bono Economics found that low numeracy in 2014 was costing the UK between £6.7bn and £32.6bn a year, with a central estimate of £20.2bn. We have been able to reproduce these findings with this nationally representative dataset, using a methodology that is analytically very similar. Using the same definitions as Pro Bono Economics, our data suggest that 28% of UK workers have low numeracy, which costs those individuals on average £1,952. Projected across the broader population, this equates to a cost to the UK of £28.9bn a year (with 95% confidence intervals at £3.9bn and £55.7bn). We expect to see these wider confidence intervals due to the instruments we have used to measure numeracy.



Previous research consistently finds that the wage premium associated with numeracy is between 4% and 11% when background characteristics are controlled for.³² Pro Bono Economics assumes a wage premium of 9% based on analysis of the British Cohort Study.³³ Regression analysis of our data finds a wage premium of 4.2% (with 95% confidence intervals of 0.6% and 7.8%) for a 1 standard deviation increase in numeracy when controlling for education level.

Controlling for essential skill score and literacy does not decrease the wage premium associated with numeracy. These models provide further evidence that a combination of basic, essential, and technical skills is optimally required in order to succeed.

Literacy

Pro Bono Economics extrapolated the cost of low literacy amongst UK workers to the country as a whole to estimate a total differential in income of £6b per year in 2020 prices. We are able to validate this finding, with some caveats. The variables available to us preclude the meaningful estimation of any reduction in unemployment – in excluding these cases, however, our work more closely mirrors Pro Bono Economics' methodology. We find that 12% of UK workers have low literacy, costing those individuals on average £1,276. Projecting across the broader population, we find a total differential in gross income of £5bn per year in 2022 prices, and estimate the cost to the UK as a whole of low literacy to be £7.7bn (with 95% confidence intervals of £3.9bn and £12.5bn).³⁵

32. Hanusek (2014) found a wage increase of 18% associated with a one-standard-deviation increase in numeracy skills. In this dataset we found a 5-12% wage increase for a one-standard-deviation increase in numeracy skills, depending on the controls used.

33. Vignoles A., de Coulon A. and Marcenaro-Gutierrez O. (2008). *The value of basic skills in the British labour market*, National Research and Development Centre for Adult Literacy and Numeracy. Oxford Economic Papers, 63(1), 27–48.

34. <https://www.probonoeconomics.com/News/poor-literacy-skills-cost-workers-18-months-in-lost-earning>

35. For more information, see Appendix 1

The cost of low essential skills

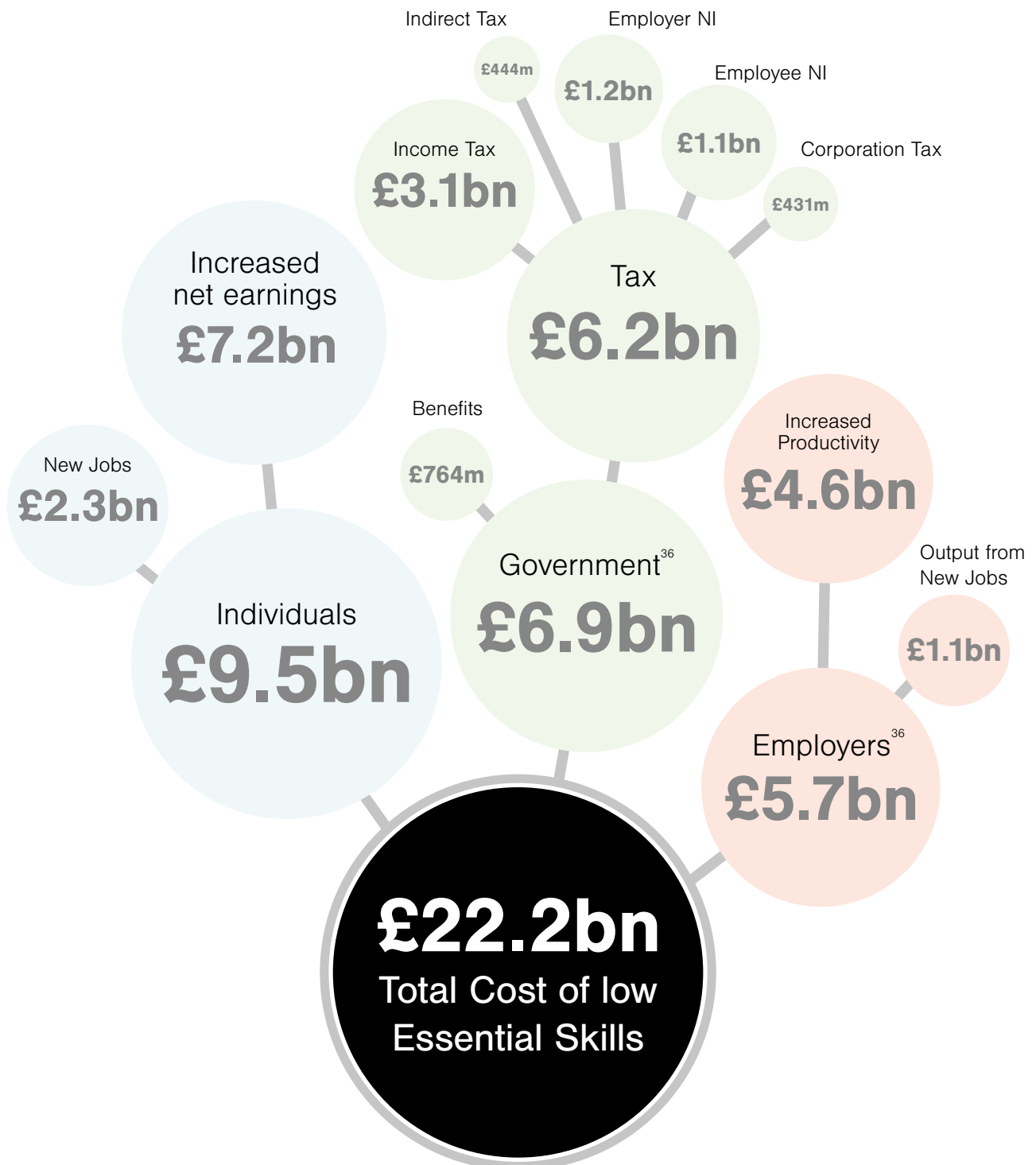


Figure 1.1: A breakdown of the cost of low essential skills in the UK economy according to the central estimate in Scenario 1, scaling up individual costs to a population level

36. An improvement in essential skills at a national level would require some reallocation of focus or resource, which could have associated costs to government and employers. These are outside the scope of this analysis.

Defining low essential skills

While literacy and numeracy benefit from government standards on target levels, which provide a useful heuristic for conducting research, defining “low” levels of essential skills is more nuanced.

To produce findings that are not overly reliant on a single method of calculating a movement from low essential skills to a higher standard, we used two definitions in our work:

1. **Scenario 1:** What if everyone had the opportunity to build essential skills? Previous research has shown that opportunities to build essential skills,³⁷ both in education and employment, are a strong predictor of skill level – we find that 11% of the variation in essential skill level in the UK is accounted for by our measures of opportunity. The practical action to deliver improved essential skills is clear: provide more high-quality opportunities to build them. This approach therefore models the scenario of the skills boost that would be associated with everyone having had skills building opportunities. In other words, providing skills building opportunities to those that did not have them.
2. **Scenario 2:** Statistical improvement at a population-level. We apply an absolute essential skill floor. For each individual with an essential skill score below the floor, we boost their essential skill score to the floor, while keeping all their other characteristics that influence income unchanged, such as education level. We choose to use the first quartile essential skill score as the floor, as we have consistently used this measure as a point of comparison in our analysis.

Modelling Low Skills

Our economy-level modelling is based on the assumption that improved outcomes associated with higher levels of essential skills would scale up to the whole population. We follow the literature on returns to skills by calculating the wage premium of these skills and then scale this finding to the population without adjusting for a hypothetical impact that increased skill supply may have on wage premia.

To keep our estimates simple and limit our assumptions, we therefore statically model the cost of low essential skills over a single year, in pound sterling at 2022 value. We would welcome further research that looks to find broader dynamic relationships in the UK economy.

Scenario 1: What if everyone had the opportunity to build essential skills?

Analysis in the Essential Skills Tracker 2022, and linear regression for this year’s edition, tell us that opportunities to build essential skills, both in school and in work, are strong and significant ($p < 0.001$) predictors of essential skill score throughout life.³⁸ We also observe that this relationship is non-linear. Even when controlling for education level, work status, and other measures of social advantage, we find that those who have had opportunities to develop their essential skills at school are likely to see their essential skill scores diverge from those who have not had these opportunities.

37. Respondents reported the different types of opportunities they had to build essential skills, for example through structured learning or formal coaching or mentoring.

38. Sample size: 1,893; we used interaction terms between both the number of opportunities in school/work and age, both of which were significant at the 0.001 level, and controlled for age. R²: 0.12.

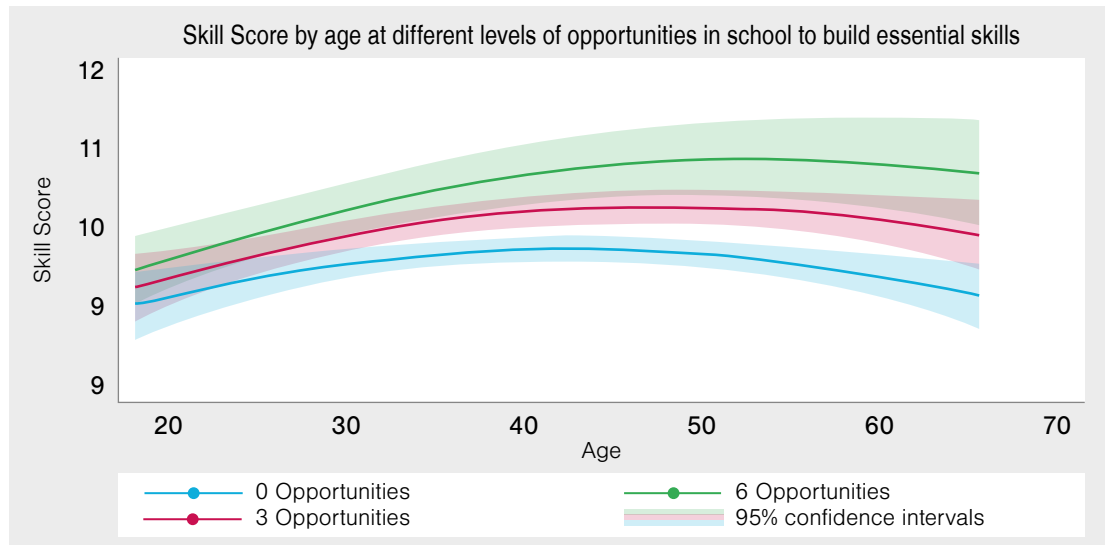


Figure 1.2: skill score by age for different levels of skills building opportunities in education

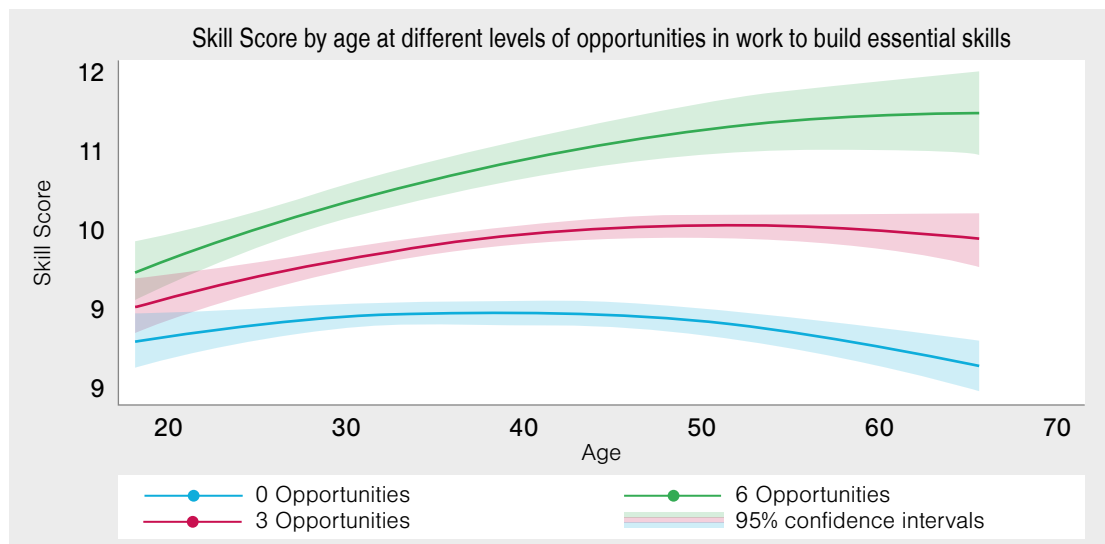


Figure 1.3: skill score by age for different levels of skills building opportunities in work

This allows us to define a hypothetical intervention: for those who have received 0 opportunities in both school and work, we will boost their essential skill score as if they had received 1 in each. Using our sample, and the sample weights to ensure that our extrapolations are nationally representative, we estimate that 42% of workers in the UK would benefit from this boost, to the tune of 0.6 steps in essential skill score on average.

Scenario 2 : Statistical improvement at a population-level.

15% of UK workers in the sample have an essential skill score below the Q1 essential skill score for the UK population as a whole. On average, those who benefit from the skills floor do so by 1.3 steps.

Comparing the two approaches, in Scenario 1, a larger percentage of the population benefits from a smaller essential skill score boost, whereas in Scenario 2 a smaller percentage of the population receives a more significant boost.

Scenario	Measure	Low estimate	Centre estimate per person ³⁹	Centre estimate	Upper estimate
Low Essential Skills - 1	Individual	£3.2bn	£268	£9.5bn	£17.2bn
	Government	£2.3bn	£197	£7.0bn	£13.0bn
	Employer	£2.0bn	£161	£5.7bn	£10.5bn
	TOTAL	£7.5bn	£625	£22.2bn	£40.6bn
Low Essential Skills - 2	Individual	£2.2bn	£189	£6.7bn	£11.8bn
	Government	£1.4bn	£132	£4.7bn	£8.4bn
	Employer	£1.3bn	£107	£3.8bn	£6.9bn
	TOTAL	£4.9bn	£428	£15.2bn	£27.1bn
Low numeracy	Individual	£1.7bn	£346	£12.3bn	£23.3bn
	Government	£1.4bn	£268	£9.5bn	£18.4bn
	Employer	£0.9bn	£203	£7.2bn	£14.0bn
	TOTAL	£3.9bn	£814	£28.9bn	£55.7bn
Low literacy	Individual	£1.7bn	£100	£3.4bn	£5.3bn
	Government	£1.2bn	£71	£2.4bn	£4.0bn
	Employer	£0.9bn	£59	£2.0bn	£3.3bn
	TOTAL	£3.9bn	£229	£7.8bn	£12.5bn

Figure 1.4: a breakdown of costs to the UK economy of low skills by estimation simulation. We calculate the average cost to an individual, including those affected and unaffected by low skills. If the average cost on an individual basis is scaled up to the broader population, this equates to the following aggregate costs.

The essential skills wage premium

A meaningful annual wage premium for essential skills has been found in previous research. This paper further validates analysis in both Better Prepared and the Essential Skills Tracker 2022, which found a wage premium of between £3,900 and £5,900.

By adding and refining controls for experience, basic skills, and social advantage to this analysis, we have been able to update this range.⁴⁰ Given the two-way relationship between essential skills and some controls (for example, higher levels of essential skills could assist attaining higher levels of education), we produce two estimates. Firstly, a more conservative estimate, which controls for experience, numeracy, literacy, education level, work sector, parental education, gender, and health. Secondly, an upper bound estimate controlling for only for numeracy, literacy, and education level.

An increase in essential skill score of one standard deviation is associated with a wage premium of between 6.9% and 8.8%.⁴¹ This is very similar to the wage premium associated with the same increase in numeracy: 6.1% to 7.6%. Looking at this another way, moving from the lower quartile essential skill score of 8.2 to the upper quartile essential skill score of 11.2 is associated with a wage premium of 9.4% to 12.0%. For the average full-time worker in the UK, this equates to an extra £3,600 to £4,600 each year.⁴²

39. We calculated an average individual affect by modelling increased income/employment for those in our sample affected by the hypothetical skills boost, taking into account taxation, pension, etc. at different income levels. We used our sample weights to make this figure as nationally representative as possible. We projected this onto the population as a whole by multiplying the average individual affect by the number employed/unemployed in the UK respectively. See Appendix 1 for more details.

40. We recognise that controlling for experience only goes some way to fully accounting for the effect of earnings trajectories, as summarised by Hanushek (2013), “earnings gradient for cognitive skills is lower in early career spans and higher later.”

41. Also in a UK context, Fleche (2017) found a wage premium of 3% solely for a one standard deviation increase in teachers’ “value added” on pupils’ non-cognitive skills.

42. See Appendix 2 for more details

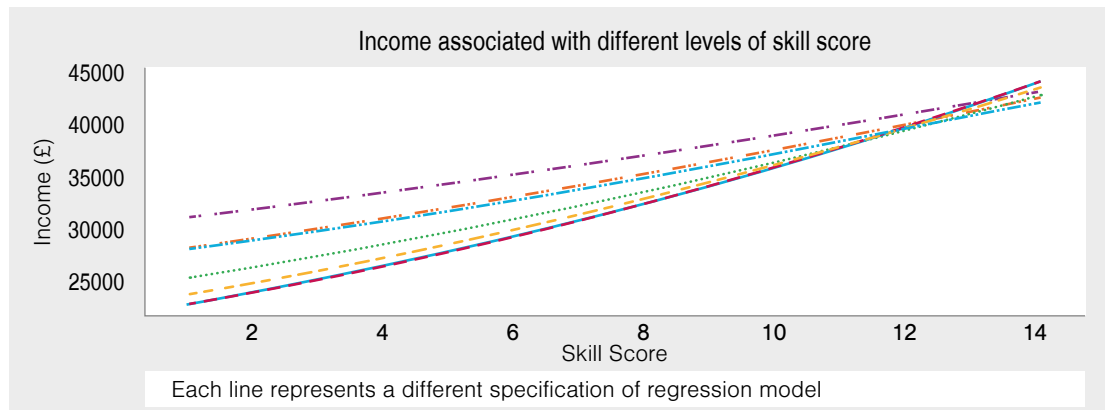


Fig 1.5: income associated with different levels of skill score, according to different specifications of linear regression model

To further validate the essential skills wage premium, we have been able to triangulate the findings using ONS data. Respondents provided their current job titles, which were each programmatically matched to a 4-digit ONS SOC 2020 (“Standard Occupational Classification”) code using the University of Warwick’s Cascot tool.⁴³ Each individual’s earnings were then compared to the median wage for their occupation, according to 2022 statistics from the ONS.⁴⁴ From here we can calculate a wage premium for each individual – how much more or less they earn than others with the same 4-digit SOC code.

Using this method and controlling for experience, gender, and region, we find that individuals with a median essential skill score earn very close to the median wage. The wage premium associated with a one standard deviation increase in essential skill score (or 2.2 steps) is 6.0% – very close to found using incomes reported by respondents.⁴⁵ As expected, this estimate is at the lower bound of the previous estimate range, since in controlling for job title we neutralise (and possibly even penalise) the effect of promotions that may to some extent have been the result of better essential skills. The value of this control is that we can interpret this estimate of the wage premium as a measure of improvements to performance intra-occupation.

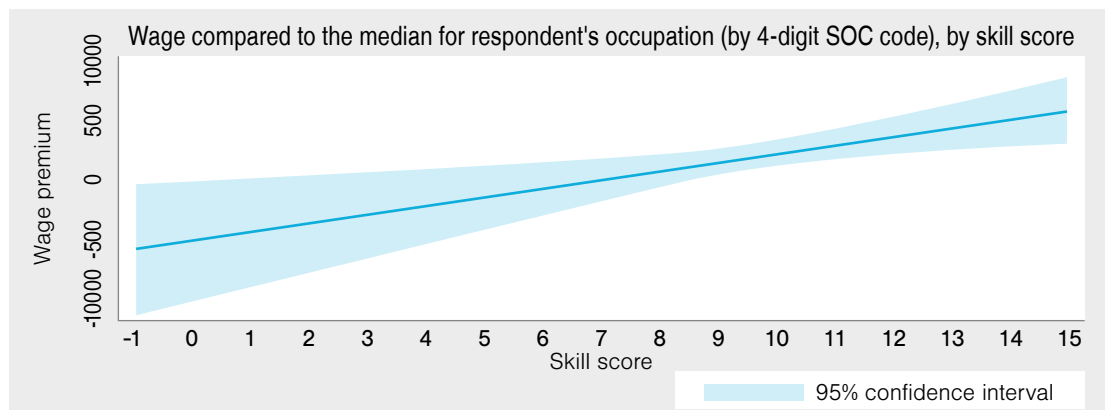


Figure 1.6: wage premium (£s) by essential skill score

43. Automatic matching based on short text snippets can come with high degrees of uncertainty. In order to reduce bias and noise, we reran the ensuing analysis looking a) only at SOC codes matched with at a very high level of confidence and b) with a subsample of SOC codes validated manually. In both cases, we found results that validated the wider approach.

44. <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datasets/allemployeesashtable1>

45. For more information, see Appendix 2

Why essential skills influence pay

Having established the meaningful wage premium to essential skills and the corresponding productivity cost of low skills, we might now ask: what is it about having higher levels of essential skills that mean people get paid more? In other words, what are the mechanisms between being better at, say, problem solving, and earning more money?

There is limited research to date on these mechanisms, but some studies have hypothesised that developing essential skills supports the effective execution of more complex professional tasks.⁴⁶ Other hypotheses include interpersonal skills enabling better management of teams and stronger relationships that lead to promotions.

To help understand the mechanisms at play, we asked respondents who agreed that their essential skills influence their pay to select from a list of reasons why:

We then used logistic regression to explore the relationships between scores in individual skills and likelihood to agree with each of the statements above.⁴⁷ For each skill, we can identify the statement with which agreement is most strongly predicted by a high score. For instance, an individual with a high listening score is 2.12 times more likely to agree that essential skills enable them to build strong relationships, compared to an individual with a low listening score.

They help me achieve my objectives in work (e.g. hitting targets, delivering a strategy etc.)	61% agreed
They enable me to build strong relationships (with colleagues, customers, suppliers etc.)	56% agreed
They enable me to identify further opportunities at work (e.g. coming up with better ways of doing things, creating a new product)	50% agreed
They help me to stay motivated	32% agreed
They help me to come up with novel solutions to problems	41% agreed

We find agreement with the following reasons are most closely predicted by a high score in each of the skills:

- ▶ **Listening:** build strong relationships
- ▶ **Speaking:** build strong relationships
- ▶ **Problem Solving:** come up with novel solutions to problems
- ▶ **Creativity:** come up with novel solutions to problems
- ▶ **Staying Positive:** staying motivated
- ▶ **Aiming High:** staying motivated
- ▶ **Leadership:** build strong relationships
- ▶ **Teamwork:** build strong relationships

46. Galván, José Luis Álvarez et al. (2014). *Assessing the Role of 21st Century Skills on Internship Outcomes in a Steel Multinational Enterprise*. 24.209.1-24.209.20. 10.18260/1-2--20100.

47. We ran 40 univariate logistic regression models – all 8 skills against all 5 questions. In all cases, sample size was 943, and p-value was ≤ 0.001 .

People with higher essential skill scores recognise the effect that this has on their value at work. They not only understand how their skills influence their current pay; they also believe that they should be paid more.⁴⁸ Those who report the highest essential skill scores value essential skills as a driver of pay more highly than technical skills and qualifications – and almost as highly as experience.

To what extent do you agree or disagree that your current level of pay is influenced by the following factors?	Agreement amongst individuals with skill score above Q3 level (11.2)
Essential skills	77%
Technical skills	54%
Experience	80%
Qualifications	53%

What is evident is that the mechanisms by which essential skills influence pay are likely to be complex, with a number of different relationships and mediating variables. Indicative of this is the finding that those with higher levels of Teamwork have a statistically significantly lower likelihood of taking fake sick days (respondents reporting taking a day off as sick when they were not in fact unwell).⁴⁹ From our data, we calculate that sick days cost employers £3.5bn⁵⁰ a year. There are several, non-mutually exclusive hypotheses for this phenomenon, for example stronger relationships with co-workers could increase empathy for the impact that taking a sick day has on the team, or more effective teams with less conflict make work more appealing or enjoyable.

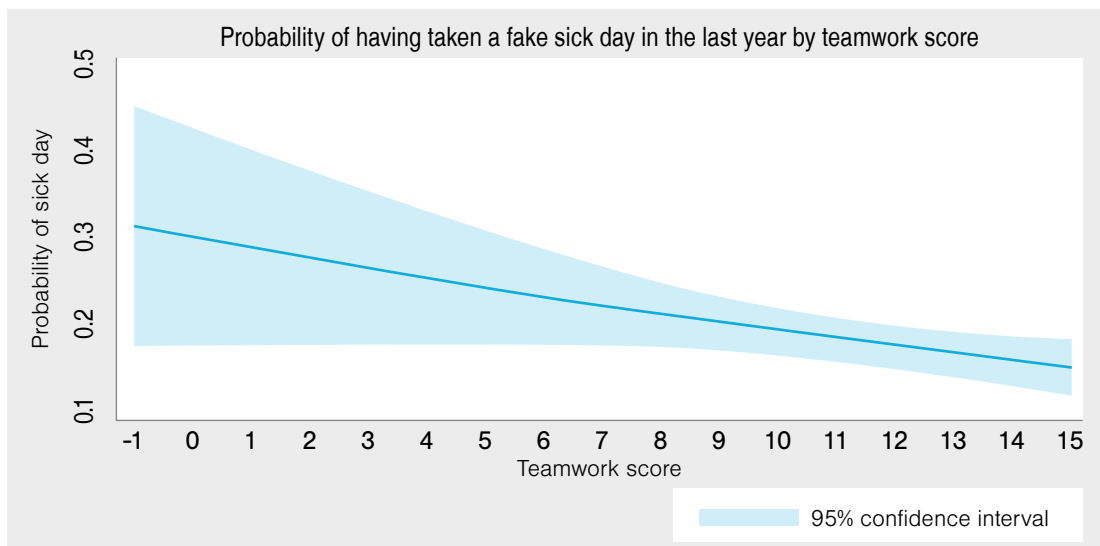


Figure 1.7: probability of “fake” sick days by essential skill score for teamwork

48. Logistic regression found that an individual with a high (ie Q3) skill score is 71% likely to agree that they should be paid more, compared to 61% for an individual with a low (ie Q1) skill score. Sample size: 1,793; p-value: 0.000.

49. A 17% probability compared to a 20% probability. Logistic regression. Sample size: 1,215; p-value: 0.026

50. We calculated the cost of each sick day for workers in our sample based on how many days they work and how much they earn. We then extrapolated this to the UK workforce as a whole. 95% confidence intervals: £2.7bn - £4.3bn.

Given the strong evidence of an essential skills wage premium alongside these beliefs around how this manifests, we would welcome more research by other methods that explores the specific mechanisms by which having higher levels of essential skills can lead to higher performance, and pay.

Changing the course in employment

We have seen the potential for higher levels of essential skills to realise large gains for individuals, the government and employers.

The large majority of workers in the UK recognise the potential impact of essential skills: 92% believe that essential skills are important for success within their career. That is on par with literacy skills and more than sector specific knowledge (84%), digital skills (84%), numeracy skills (82%) or technical skills (65%).



Linear regression confirms that those with higher essential skill scores are much more likely to agree that all of these different skills are important for success within their career, but especially essential skills (controlling for income and other skills). The inverse is not the case for other skills. Those with high numeracy are overwhelmingly more likely to agree that numeracy is important; those with high education levels are overwhelmingly more likely to agree that literacy and digital skills are important; and those with high incomes are overwhelmingly more likely to agree that technical skills are important – but not that other skills are important.⁵¹ This points to essential skills acting as a platform that enables or encourages other skills.

Employers keen for their staff to value developing a well-rounded skill set may want to start with essential skills in order to drive engagement with other learning. Explicitly building in a consistent approach to building these skills - for example the Universal Framework - could codify and add structure to the beliefs of many of their employees in a way that is transparent and supports development.



Figure 1.8: job satisfaction by essential skill score⁵²

51. We ran multivariate linear regression against 7 factors that respondents rated on a scale of 1 to 5 for importance within their career. Sample size: 848. Essential skills significant for the factors discussed at the 0.001 level, and others at the 0.05 to 0.001 levels for the specified factors.
52. We asked respondents how satisfied they are with their current job (Very satisfied, Fairly satisfied, Neither satisfied or dissatisfied, Fairly dissatisfied, Very dissatisfied). 2 on the y-axis is the most satisfied, 0 is neutral, and -2 is the most dissatisfied. We find that the relationship between skill score and job satisfaction remains statistically significant at the 0.001 level, and 50% as strong as that found in univariate regression, even when controlling for age, income, gender, ethnicity, and life satisfaction.

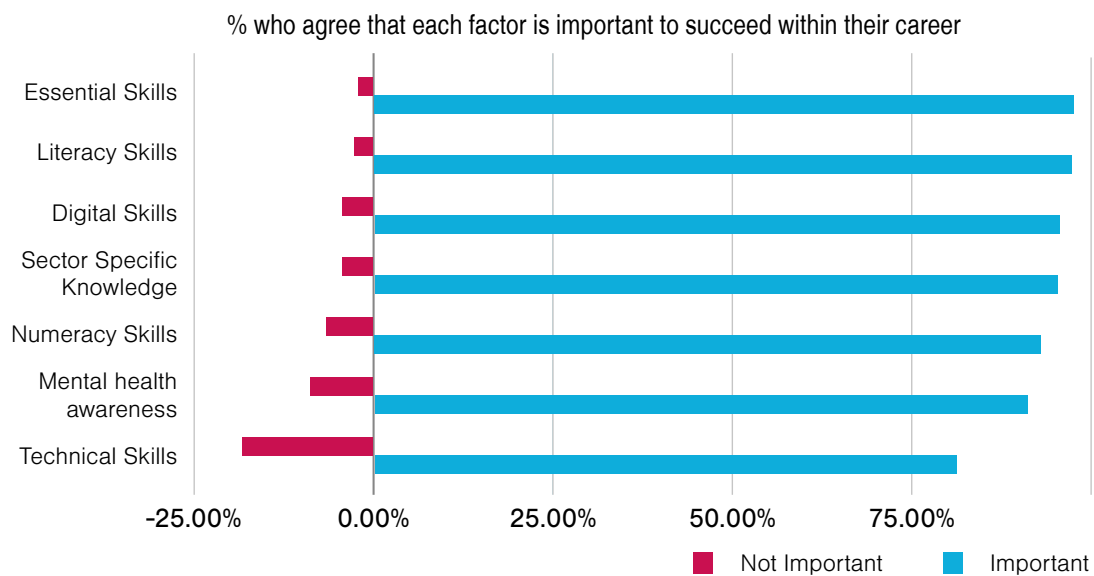


Figure 1.9: value placed in skill type by UK workers⁵³

One particular challenge facing employers is how to retain their highest performing team members in a tight labour market. There is a strong positive relationship between essential skill score and the extent to which individuals would look for a new job if it had better professional development opportunities for essential skills (significant at the 0.001 level).⁵⁴ In the UK over half (56%) of working age adults would consider getting a new job for improved skills building opportunities.

Employers should note in particular that as individuals earn more - often a proxy for high performance - their essential skill score becomes an even stronger predictor of their job satisfaction. The implication for employers is clear: if you want to improve the engagement and retention of your highest performing employees, provide them with opportunities to build essential skills.

In the context of employee engagement and retention, these findings show that there are large potential returns to investment for employers investing in skills building opportunities. This echoes findings in focused field-work that 89% of employees who benefited from learning & development that had embedded the Universal Framework believed that the experience improved their performance in role, with 75% feeling more engaged in their work.⁵⁵

Those with higher essential skill scores are much more likely to manage others

Fostering high performing teams and management is persistently raised as a top priority for business.⁵⁶ Many report that successfully managing teams has become even harder with the advent of hybrid working. A plausible hypothesis is that people with higher levels of skills like teamwork and leadership are better equipped to manage teams. Lindqvist and Vestman found that, “Noncognitive ability is an important determinant of productivity irrespective of occupation or ability level, though it seems to be of particular importance for workers in a managerial position.”⁵⁷

53. Excluding “neither important nor unimportant”, which ranged from 6% to 21%

54. Linear regression. Sample size: 997; p-value: 0.000; R²: 0.02.

55. Skills Builder Partnership (2022): *Trailblazers*

56. <https://www.mckinsey.com/capabilities/people-and-organizational-performance/our-insights/high-performing-teams-a-timeless-leadership-topic>

57. Lindqvist, E, Vestman, R (2009). *The labor market returns to cognitive and noncognitive ability: Evidence from the Swedish enlistment*. American Economic Journal: Applied Economics, 3 (1): 101-28.

The data shows that in the UK, workers with higher levels of essential skills are much more likely to manage more people. This relationship holds even when controlling for experience and income. The implication is that younger people in a variety of sectors (managing large teams is unlikely to have the same effect on wages in the public as private sectors for example) may be more trusted to manage teams when they have higher essential skill levels and may have more opportunities to develop those skills. Those who directly or indirectly manage 100 or more people have an essential skill score that is on average 2 steps higher than those who do not manage anyone.⁵⁸

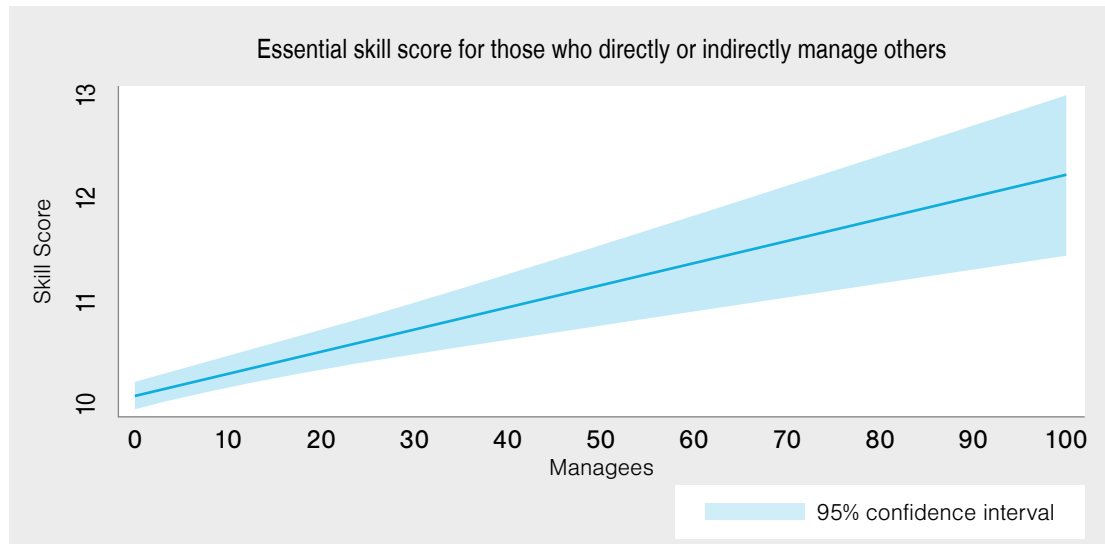


Figure 1.10: essential skill score for those who directly or indirectly manage others

As might be expected from our hypothesis, this trend is even stronger for Teamwork in isolation. Those who manage 100 or more people score almost 3 steps higher in Teamwork than other workers with similar levels of experience and incomes.⁵⁹ Large employers looking to boost management potential, from corporates to the NHS, should consider building teamwork as a cost-effective investment.

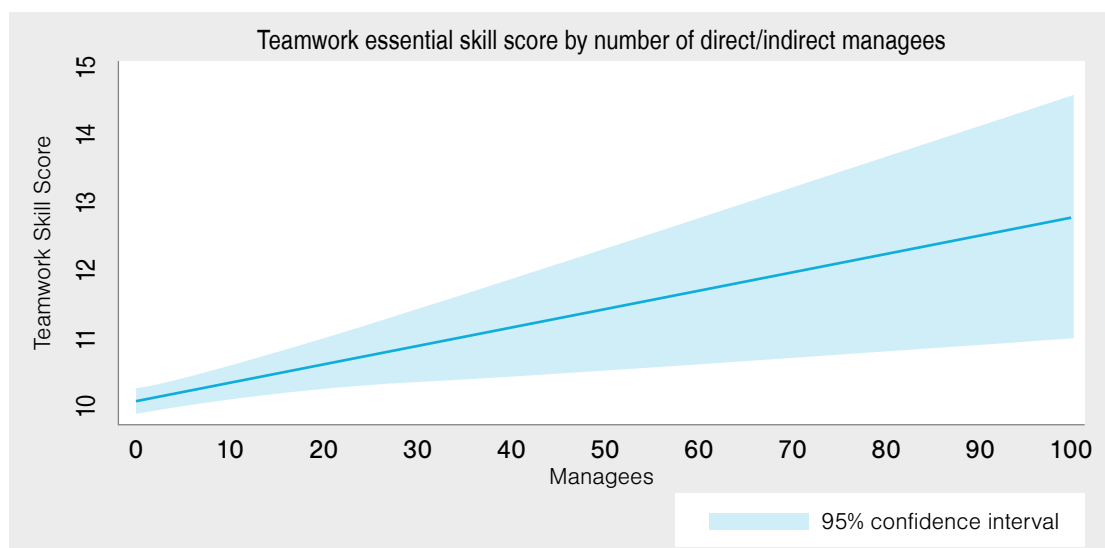


Figure 1.11: teamwork essential skill score by number of direct/indirect manages

58. Linear regression, controlling for experience and income. Sample size: 809; p-value: 0.000; R2: 0.04

59. Linear regression, controlling for experience and income. Sample size: 1,089; p-value: 0.004; R2: 0.06

Job satisfaction

Essential skill score is very strongly associated with job satisfaction. Multivariate regression shows that a one standard deviation increase in essential skill score (or 2.2 steps) is associated with the same increase in job satisfaction as an increase in pay of two standard deviations (or £55,000).⁶⁰

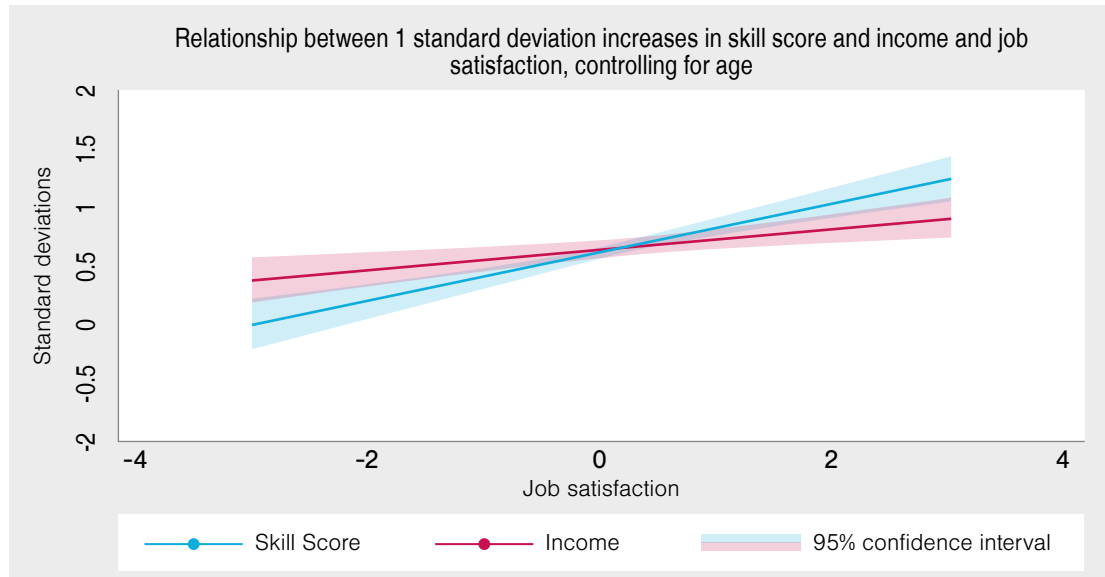


Figure 1.12: job satisfaction by essential skill score and income



Figure 1.13: skill score and job satisfaction at different income levels⁶¹

60. Sample size: 1,142; P-values: skill score: 0.000, income 0.002; age and its square added as control terms, at 0.002 and 0.000 significance levels respectively.

61. Linear regression with a skill score - income interaction term. Sample size: 1,142; p-value: 0.000; R²: 0.02.

Using the same programmatic matching of job titles to SOC codes we used for exploring wage premia allowed a comparison of job satisfaction amongst workers with the same SOC code. Controlling for SOC code and age, we find that essential skill score is just as powerful a predictor of job satisfaction as income.⁶² It is no surprise to find that those with higher skill scores are much more likely to believe that they should be paid more – logistic regression finds a 61% likelihood of agreeing that one should be paid more for those at the Q1 skill score (8.2) vs a 73% likelihood for those at the Q3 skill score (11.2).⁶³

It is hard to overstate the significance of this finding - in a historically tight labour market - for employers concerned about retention, engagement or the alliterative fad of 2022: “quiet quitting”. It echoes industry research that income is often not employees’ number one concern.⁶⁴ Given the considerable direct cash cost of raising incomes, it is likely that building your employees’ essential skills has a significantly higher return on investment.

Life Satisfaction

The UK government is currently analysing consultation responses to inform a new 10-year Mental Health and Wellbeing Plan.⁶⁵ From a health perspective, NICE’s guidelines state that amongst other things, employees should be managed by people who support their health and wellbeing.⁶⁶ The topic has meaningful traction amongst employers: the CIPD reported that in 2022 half of organisations (51%) take a strategic approach to employee wellbeing, and that they are “far more likely to report a number of positive achievements from their activity.”⁶⁷

A clinical-style analysis of wellbeing was outside the scope of this research. However, we used ONS measures of personal wellbeing to explore high-level life satisfaction and its relationship with other variables.

There is a strong, statistically significant relationship between essential skill score and positive response to the question “how satisfied, if at all, are you with your life nowadays?” (from 0 - “Not at all” to 10 - “Completely”), significant at the 0.001 level.⁶⁸

When controlling for work status, age, gender, income, education level, and health we find that a one standard deviation increase in essential skill score is associated with a 0.17 standard deviation increase in positive response to life satisfaction.



62. Sample size: 355. We included responses from the most common 50 SOC codes, all of which have at least 8 responses, and only if the SOC matching confidence is greater than or equal to 50. SOC code is included as a factor variable, in order to compare people to those with the same occupation. We find very similar coefficients for standard deviation increases in skill score and income, both significant at the 0.05 level.

63. Sample size: 1,793, significant at the 0.000 level.

64. Hays (2023). *Salary & Recruiting Trends 2023*

65. <https://www.gov.uk/government/consultations/mental-health-and-wellbeing-plan-discussion-paper-and-call-for-evidence>

66. <https://www.nice.org.uk/guidance/qs147/chapter/Quality-statements>

67. CIPD (2022). *Health and Wellbeing at Work 2022*.

68. For more information, see Appendix 2

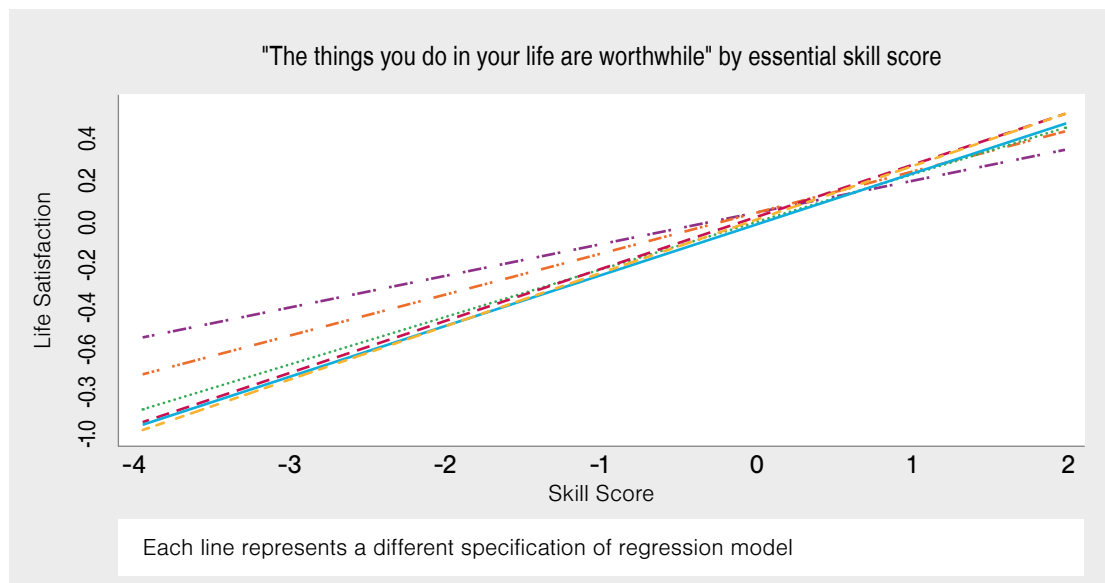


Figure 1.13: "things you do in your life are worthwhile" by essential skill score using different specifications of regression model

There is also a strong, statistically significant relationship between essential skill score and positive response to the question "to what extent do you feel that the things you do in your life are worthwhile?", significant at the 0.001 level.⁶⁹

When controlling for work status, age, gender, income, education level, and health we find that a 1 standard deviation increase in essential skill score is associated with a 0.22 standard deviation increase in positive response.

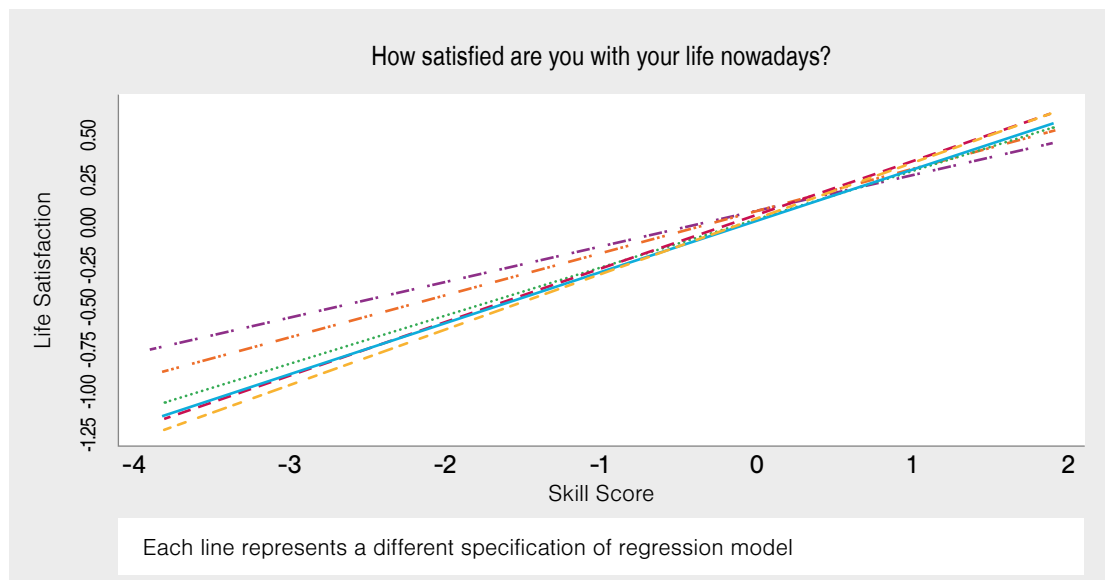


Figure 1.14: "how satisfied are you with your life nowadays?" by essential skill score using different specifications of regression model

69. For more information, see Appendix 2

Build skills, build them now

We have an ageing population and by extension an ageing workforce. As put by the Government Office for Science: “The productivity and economic success of the UK will be increasingly tied to that of older workers.”

Yet the very skills that present an important upside for productivity are the ones that appear to decay with age: older workers tend to have lower levels of essential skills.⁷⁰ Our central hypothesis is that this is an ‘age’ effect rather than a ‘cohort’ effect. In other words, we see the most plausible explanation for our observation being that skill decay happens over someone’s lifetime, rather than differences resulting from events that affect a particular cohort of people at a particular time. With an ageing workforce, if the hypothesis stands then we face the risk of declining levels of the very skills that are so closely related to positive outcomes.

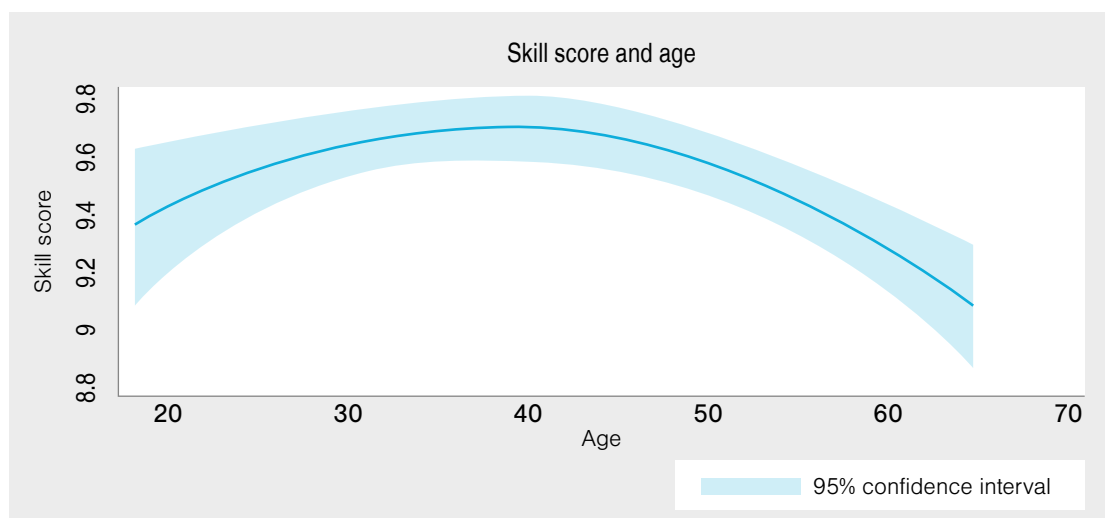


Figure 1.15: essential skill decay with age

Research by CIPD in 2022 “clearly shows older workers participating less in training.”⁷¹ This may be one reason for the apparent skills decay. Fortunately, the data indicates that employers can reverse this apparent downwards trend by giving their employees opportunities to build essential skills at work. This evidence adds further weight to the drive for improved structural opportunities for lifelong learning.

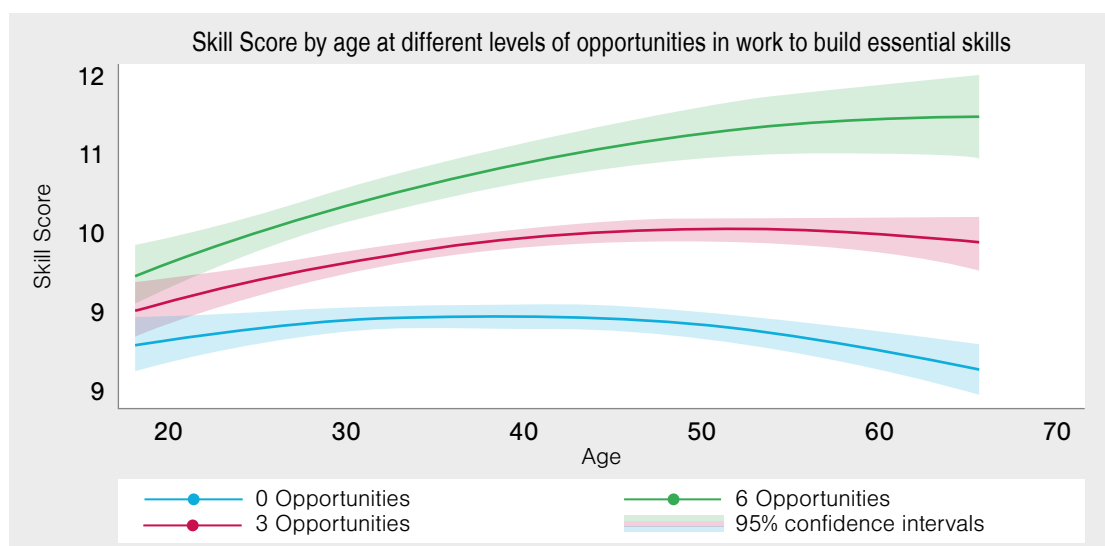


Figure 1.17: essential skill score by age and skills building opportunities in work⁷¹

This potential for skills building opportunities to chart a positive trajectory is further validated by proprietary data from Skills Builder Benchmark. This large dataset includes 10,140 self-assessments against the Universal Framework in a similar manner to this survey methodology. Those individuals using the platform are roughly analogous with survey respondents who report having skills building opportunities in the nationally representative sample and the trajectory of essential skill score with age paints a similarly positive picture.⁷³

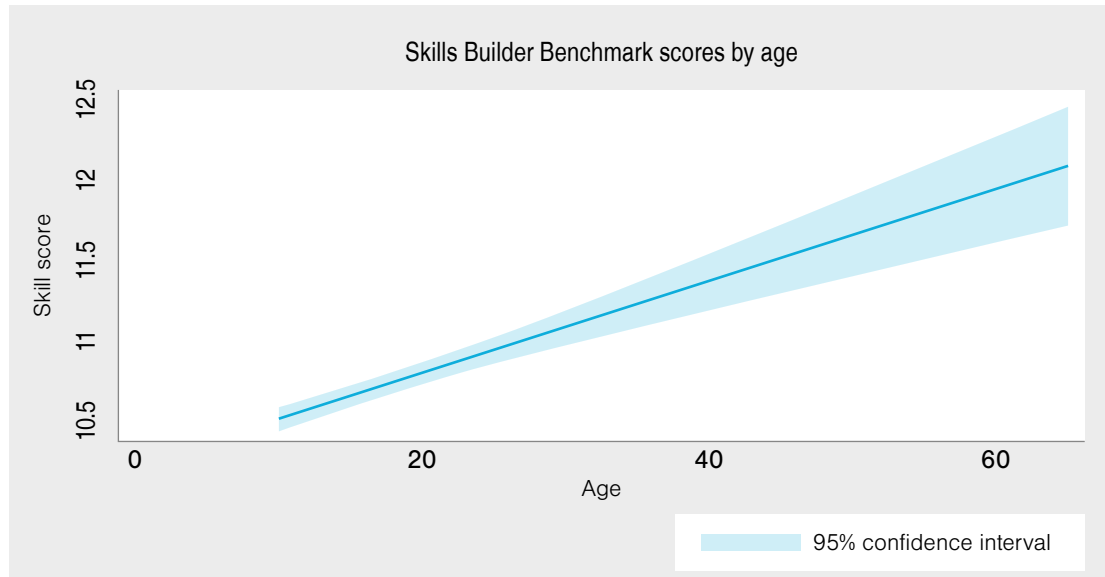


Figure 1.18: essential skill score by age amongst a sample with access to opportunities to build skills in either school or work

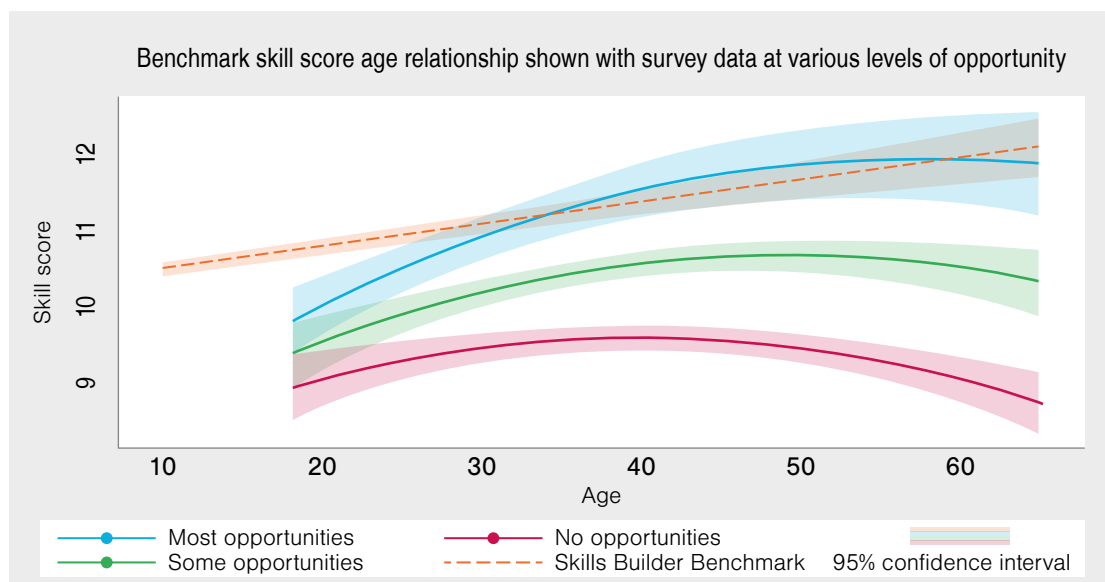


Figure 1.19: essential skill score by age and opportunities to build essential skills with data from Skills Builder Benchmark confirming that with opportunities skill score does not decline with age

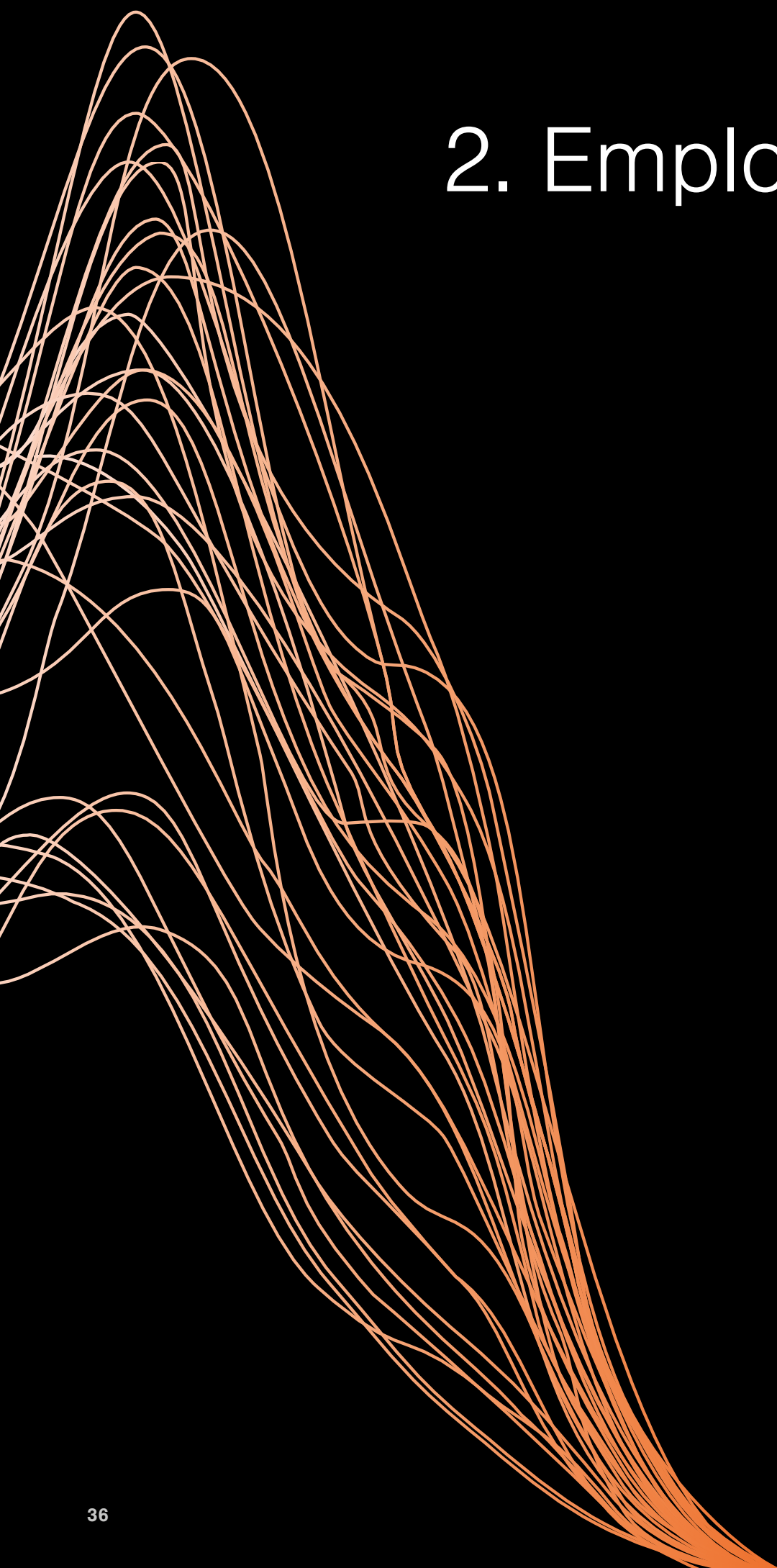
70. Linear regression with age and its square term, with p-values of 0.002 and 0.000 respectively. Sample size: 3,399. R2: 0.02

71. CIPD (2022): *Understanding Older Workers*.

72. Sample size: 1,893; we used interaction terms between both the number of opportunities in school/work and age, both of which were significant at the 0.001 level, and controlled for age. R2: 0.12.

73. Linear regression. Sample size: 10,140; p-value: 0.000; R2: 0.004

2. Employability

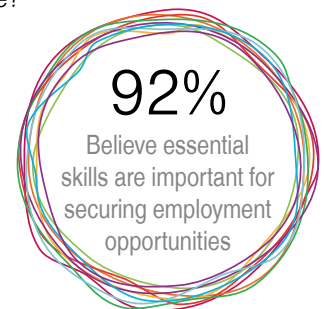


Employability

We have seen that once in-work, higher levels of essential skills are linked to productivity and career-success. But what about their role securing employment in the first place?

The data shows that in the UK, 92% of working age adults believe that essential skills are important for securing employment opportunities.

Higher levels of essential skills influence the type of jobs you can get. Different jobs have both immediate differences in pay as well as different trajectories: there are those that provide more opportunities to build essential skills and increase wages, and those that provide fewer.



Unemployment

The data shows that individuals with higher levels of essential skills are less likely to be unemployed, or out of work and education:

- **Moving from the lower to upper quartile of essential skill score is associated with a reduction in the likelihood of being unemployed, from 5.2% to 3.9%.⁷⁴ We also find a reduction in the likelihood of being out of employment or education from 11.4% to 7.6%.⁷⁵**
- **We find that those with a lower skill score are more likely to be out of work or education when controlling for education, numeracy, literacy, parental education, and health.**

Government research shows that individuals from a working class background are more likely to be unemployed.⁷⁶ At the same time, according to the Health Foundation, “Unemployed people are five times more likely to report poor health than employees: 10.2% compared to 1.9%.” We explore these themes in the following chapter on social mobility.

We would welcome more targeted research in this area. Given the tight labour market and the nature of our sample, our sample of unemployed people is too small to report statistically significant findings when exploring its complex relationships with multiple different variables.

74. Logistic regression with a sample size of 3,399 (p-value: 0.000).

75. Logistic regression with a sample size of 3,399 (p-value: 0.000).

76. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1084566/State_of_the_Nation_2022_A_fresh_approach_to_social_mobility.pdf

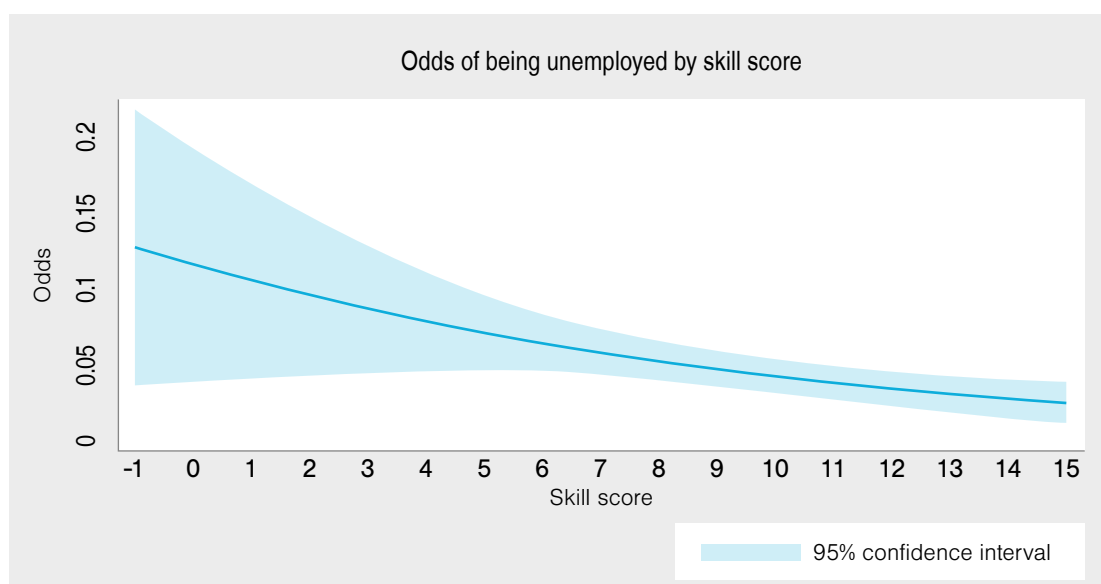


Figure 2.1: the raw relationship between skill score and unemployment

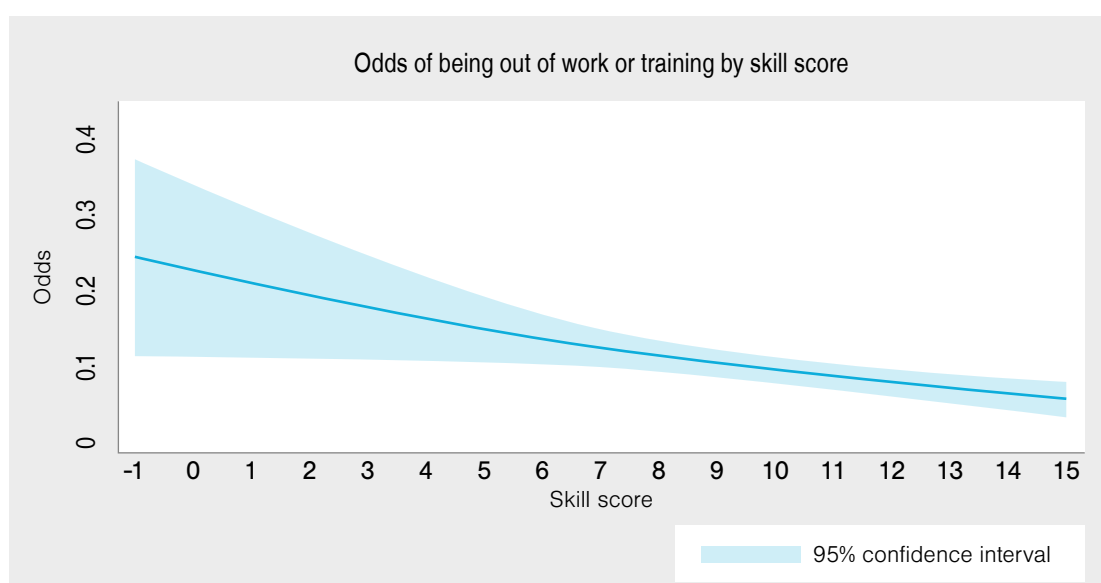


Figure 2.2: likelihood of being out of employment or education and essential skill score controlling for age, education, numeracy, literacy, parental education, and health

When controlling for age, education, numeracy, literacy, parental education, and health, we find that a higher skill score is associated with a lower likelihood of being out of employment or education – however, due to our sample sizes and the number of confounding factors, more research is needed to explore this relationship.⁷⁷

77. With our sample sizes, we cannot establish this relationship with statistical significance using our most cleaned skill score variable. Logistic regression using uncleaned skill scores gives a sample size of 1,771 and a p-value for skill score of 0.002.

Recruitment

Recruitment practices impact all job seekers, from those currently unemployed to those looking for improved career progress. Research has shown that recruitment processes can be very susceptible to bias, to the detriment of particular groups of people.^{78 79} Recruitment processes that accurately assess skills could benefit the less advantaged, rather than recruitment based on experience or other variables that favour those from more advantaged backgrounds.

Particularly in a hot job market, recruitment is also one of employers' top concerns. Research by CIPD found that in 2022, three-quarters of employers still had hard-to-fill vacancies, with problem solving, aiming high and communication skills amongst those in most need.⁸⁰ Employers looking to attract more applicants may note that 64% of working age adults would be more likely to apply to a role if it clearly and transparently explained the essential skills required in the job description. This finding is in line with other recent surveys – for example, Docebo found that learning and development is a “vital factor” in job-seekers' choice of employer.⁸¹ Linear regression analysis finds that essential skill score, numeracy, and literacy are strong, statistically significant predictors of agreement with this statement of attraction to roles more transparent about essential skills.^{82 83} However, this relationship isn't in the same direction for each variable.

Controlling for age, income, education level, and numeracy, those with higher essential skill scores are much more likely to agree with this statement. However, we see the opposite trend for basic skills – we find that those with higher numeracy or literacy are much less likely to agree that essential skills are important. A similar trend looks likely for education level (though not to a reportable degree of statistical significance). It could therefore be argued that many are not yet alert to the synergistic effects pointed to in this analysis, and already understood by those with high levels of essential skills.



Employers looking to create more inclusive recruitment practices could explicitly and transparently indicate the essential skills that they are recruiting for, which may help level the playing field for those individuals not yet alert to the significance of these skills in recruitment (and indeed career success).

78. Zwysen, W., Di Stasio, V., & Heath, A. (2021). *Ethnic Penalties and Hiring Discrimination: Comparing Results from Observational Studies with Field Experiments in the UK*. *Sociology*, 55(2), 263–282. <https://doi.org/10.1177/0038038520966947>

79. Jackson, M. (2009). *Disadvantaged through discrimination?* The role of employers in social stratification. *The British Journal of Sociology*, 60: 669-692.

80. CIPD (2022). *Employer views on skills policy in the UK*

81. https://www.peoplemanagement.co.uk/article/1808719/majority-employees-say-l-d-vital-factor-choosing-employer-survey-finds?bulletin=pm-daily&utm_source=mc&utm_medium=email&utm_content=PM_Daily_201202022.https%3A%2F%2Fwww.peoplemanagement.co.uk%2Farticle%2F1808719%2Fmajority-employees-say-l-d-vital-factor-choosing-employer-survey-finds%3Fbulletin%3Dpm-daily&utm_campaign=7295441&utm_term=5702124

82. “I would be more likely to apply to a role if it clearly and transparently explained the different steps of demonstrating essential skills like problem solving and teamwork in the job description.”

83. Multivariate linear regression. Sample size: 1,103, controlling for age, education, and income; P-values: skill score: 0.000, numeracy: 0.000, literacy: 0.001. R2: 0.07.

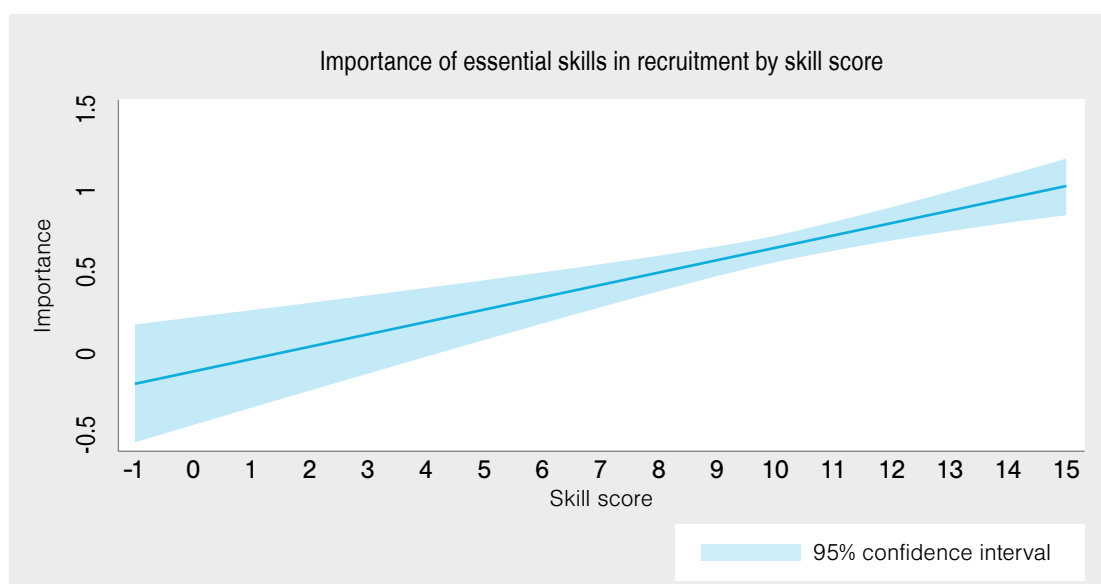
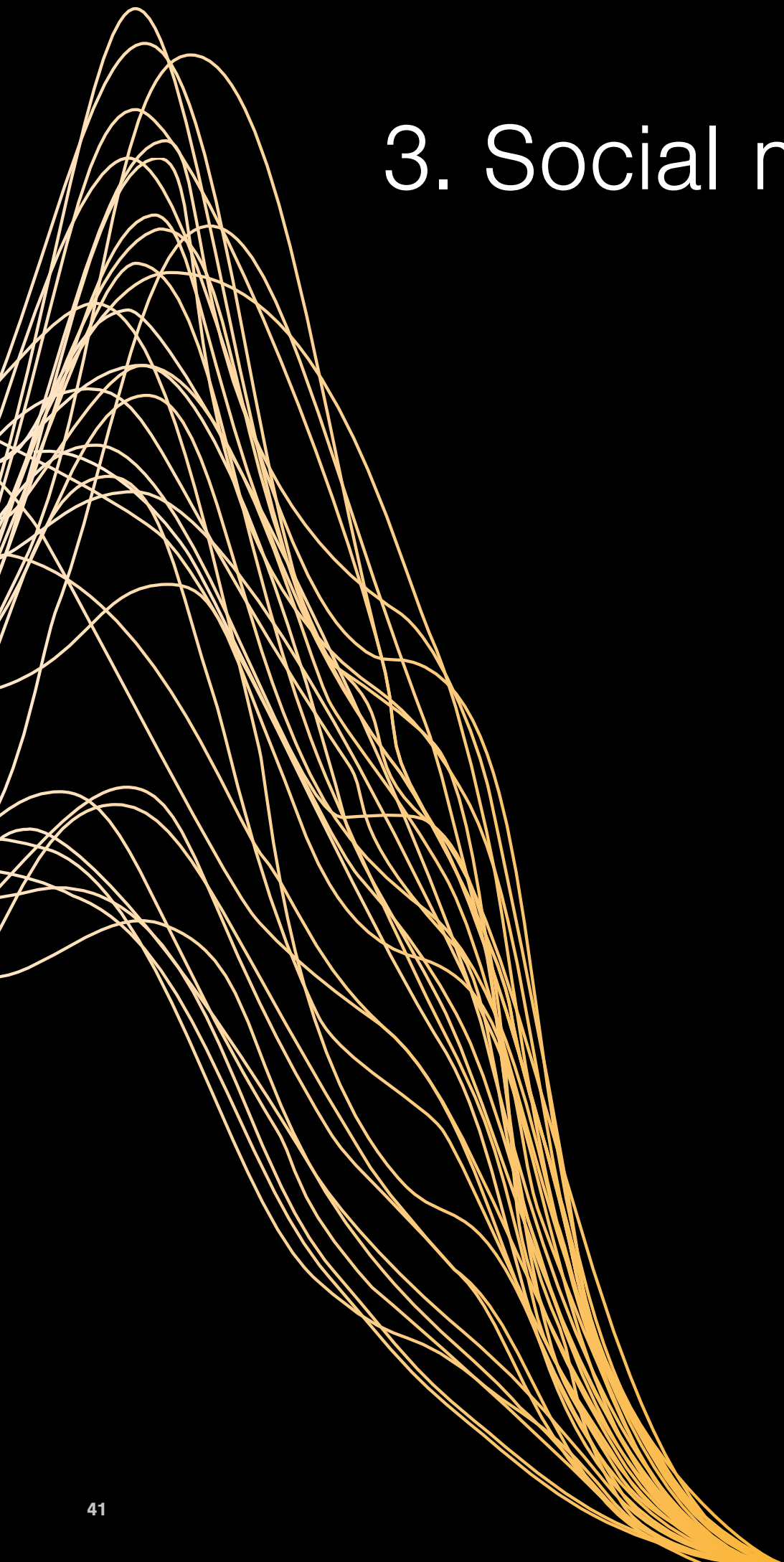


Figure 2.2: Agreement with the statement “I would consider getting a new job if the new role had better professional development opportunities for essential skills”, by skill score

We see a similar pattern when it comes to opportunities to develop essential skills professionally. Individuals with higher levels of basic skills, but otherwise similar levels of essential skills, are likely to discount the value of essential skills in choosing a job – multivariate regression analysis finds that a 1 standard deviation increase in skill score is associated with a 0.18 increase in agreement with the statement “I would consider getting a new job if the new role had better professional development opportunities for essential skills” on a scale of -2 to 2, compared to a -0.11 and -0.07 decrease for increases in numeracy and literacy respectively.⁸⁴ Conversely, individuals with higher levels of essential skills, but otherwise similar levels of literacy and numeracy, are likely to value essential skills more. Increasing basic skills without also increasing essential skills appears to produce a blind spot – more evidence of the importance of growing the whole portfolio of skills

84. Sample size: 1,103; P-values: skill score 0.000, numeracy: 0.001, literacy: 0.002 level; R2: 0.08

3. Social mobility



Social mobility

In 2021 young adults from a professional class background were still 60% more likely to be in a professional job than their counterparts from working class backgrounds.⁸⁵

The Social Mobility Commission recommends looking at social mobility as a continuum as well as taking a more nuanced view where possible, going beyond the movement from one occupational class to another. Previous work by the commission found a positive relationship between essential skills and social mobility.⁸⁶ This research investigates a number of social mobility measures alongside skills, from social grade and parental education to education and income.

We find indications in our data that essential skills are more strongly associated with improved life outcomes for those with lesser prior social advantage. Controlling for education, numeracy, literacy, education, gender, and health we find that the relationship between skill score and income is stronger and more statistically significant (at the 0.001 level) for those without a parent who attended university than for those with a parent who attended university (with a p-value of only 0.184). More investigation is needed to definitively establish this difference.

By itself, parental education is a very strong predictor of income. However, when controlling for essential skill score, numeracy, and higher education, parental education ceases to be a statistically significant variable. This suggests that social advantage manifests better life outcomes through skill and educational acquisition.

Our work further contributes to findings in the literature, which suggest that essential skills are a key factor in achieving positive life outcomes. We undertook cluster analysis in order to complement the analysis already undertaken with a more holistic exploration of how prior social advantage, education, basic skills, and life outcomes tend to manifest in conjunction with one another.

Cluster analysis automatically classifies respondents into groups characterised by shared traits. We used a combination of hierarchical and nonhierarchical clustering in order to “discover” these groups independently of prior assumptions. In the context of analysis already undertaken, the clusters identified by this approach support the argument that essential skills are strongly associated with social mobility.⁸⁷

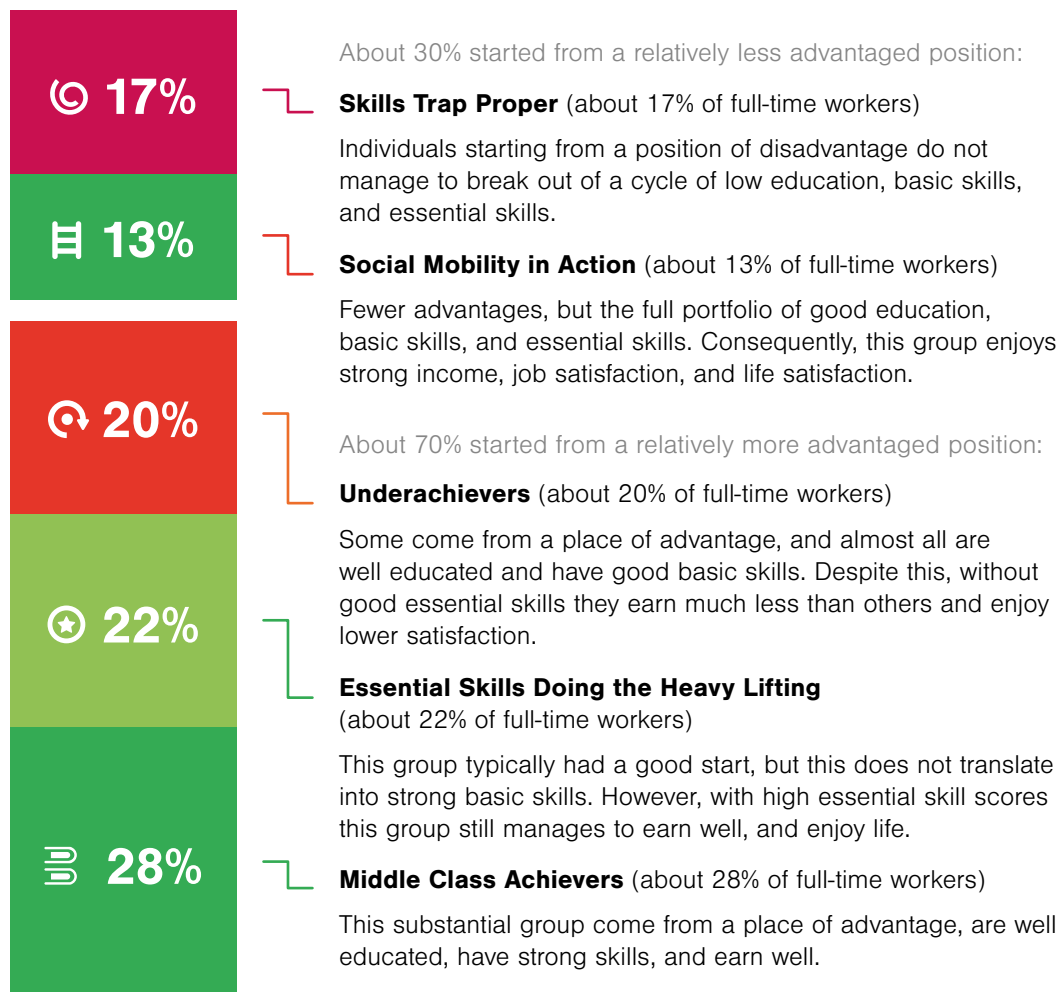
This exercise reveals five distinct groups, two of which had less advantaged backgrounds, and three of which had more advantaged backgrounds.⁸⁸

85. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1084566/State_of_the_Nation_2022_A_fresh_approach_to_social_mobility.pdf

86. Donnelly et al (2019). *An Unequal Playing Field*. University of Bath.

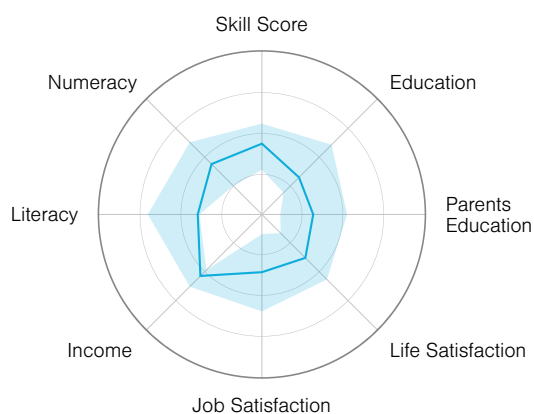
87. See the Appendix for more information on our methodology.

88. For more information, see Appendix 2

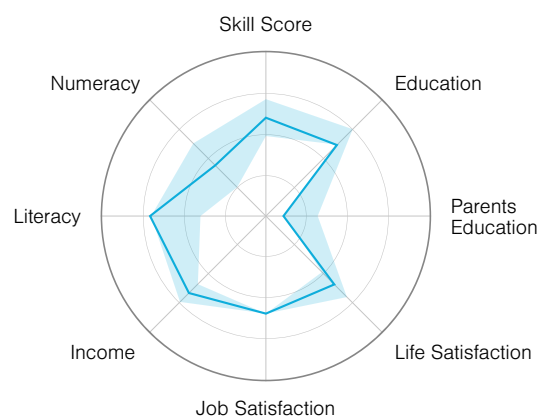


This evidence leads to the conclusion that individuals will not reap the benefits of their education without strong basic and essential skills, regardless of social advantage. For the most disadvantaged in our society, essential skills in a portfolio with basic skills are associated with social mobility and escaping the Skills Trap.

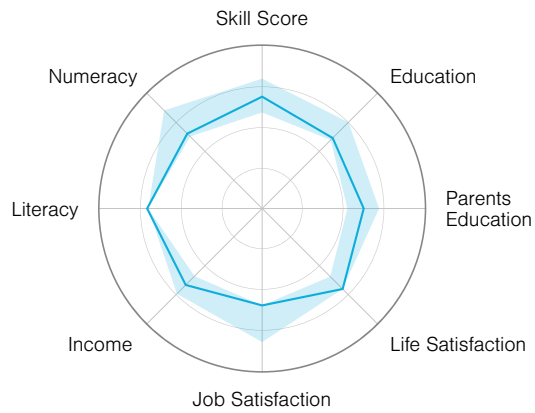
Skills Trap



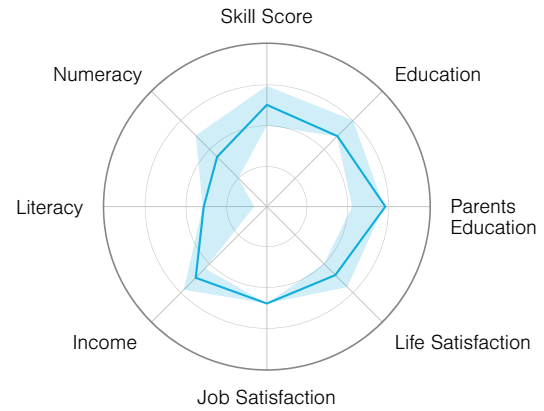
Social Mobility in Action



Middle Class Achievers



Essential Skills Doing the Heavy Lifting



Underachievers

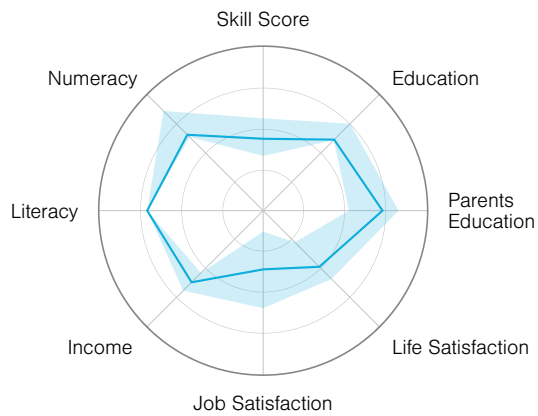
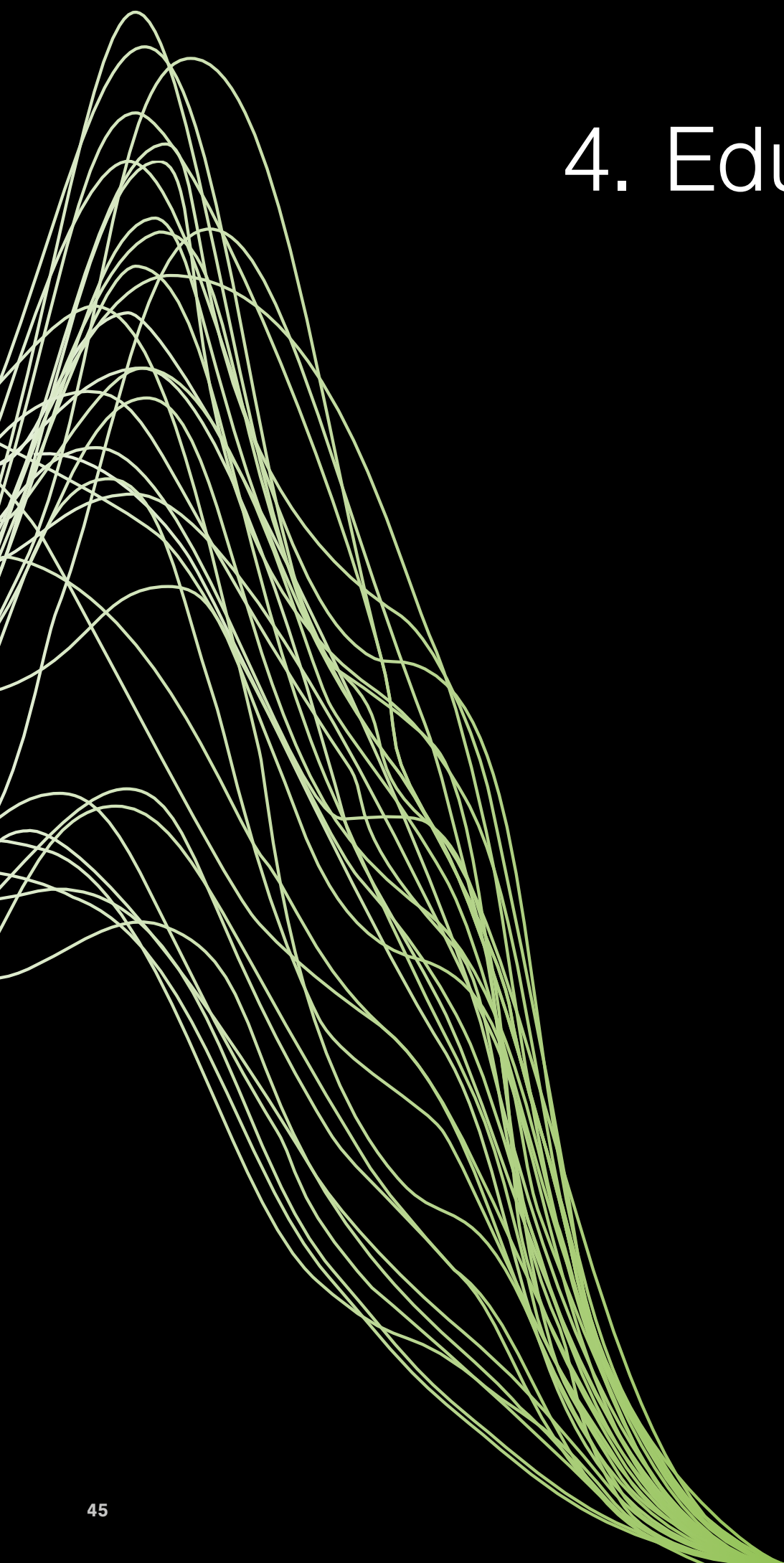


Figure 3.4: characteristics for 5 clusters identified by prior advantage, education, skills, and outcomes for full-time workers, with median and interquartile range shown. Each variable is standardised to comparable scales for comparison.

4. Education



Education

Historically there has been no standardised way of building essential skills in schools, colleges and higher education. One might therefore expect to see significant variance in the opportunities that individuals receive in education: they are likely to be very heavily influenced by individual school policies or even just the practices of individual teachers. Indeed, research has found that “Teachers’ effects on both test scores and non-cognitive skills predict substantial effects on the probability of higher education attendance, future earnings and employment.”⁸⁹

This paper finds evidence that essential skills are likely to act as a platform for other skills, which on their own are weaker predictors of positive attitudes to other skills, and less strongly associated with positive life outcomes. The nature of our data does not allow us to establish direct causal links (though by using modelling techniques based on Directed Acyclic Graphs, causality can be inferred in certain situations).⁹⁰ Analysis of longitudinal studies has however found a causal relationship: “improvements in teachers’ value-added on non-cognitive skills not only raise long-run outcomes but also subsequent math test scores.”⁹¹

It is in this context that we see a wide difference in the opportunities in education, with 40% of respondents receiving no opportunities to build essential skills at school. It is perhaps no surprise given the high value placed on essential skills and their impact on life outcomes that 61% of parents in the UK view a school’s provision of skills building opportunities as an important factor when choosing a school for their child (rising to 73% amongst parents with a high skill score).⁹²

Our cluster analysis supports the view that essential skills are an important part of the skills mix:⁹³

- **Lower education level is associated with much better life outcomes when respondents report high essential skills (around 15% of full-time workers with a lower education level benefit from higher essential skills, compared to 11% who do not).**
- **High education level, numeracy, and literacy – when not complemented with high essential skill levels – are associated with poorer life outcomes (around 18% of full-time workers find themselves in this category).**

89. Fleche (2017): *Teacher Quality, Test Scores and Non-Cognitive Skills: Evidence from Primary School Teachers in the UK*. CEP Discussion Papers (CEPDP1472).

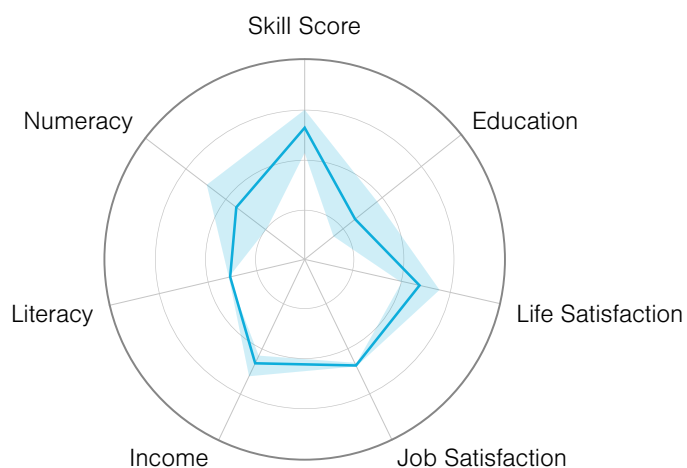
90. Knight, C.R., Winship, C. (2013). *The Causal Implications of Mechanistic Thinking: Identification Using Directed Acyclic Graphs* (DAGs). In: Morgan, S. (eds) *Handbook of Causal Analysis for Social Research*. Handbooks of Sociology and Social Research. Springer, Dordrecht. https://doi.org/10.1007/978-94-007-6094-3_14

91. Fleche (2017).

92. 1e, above the Q3 level (11.2)

93. For more information, see Appendix 2

Low education with essential skills



High education without essential skills

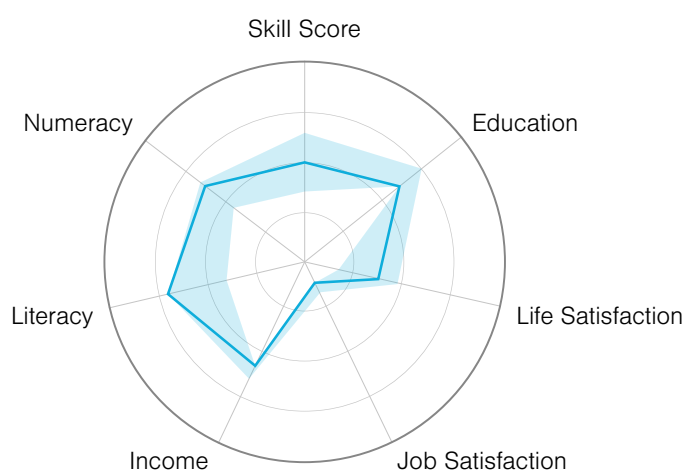
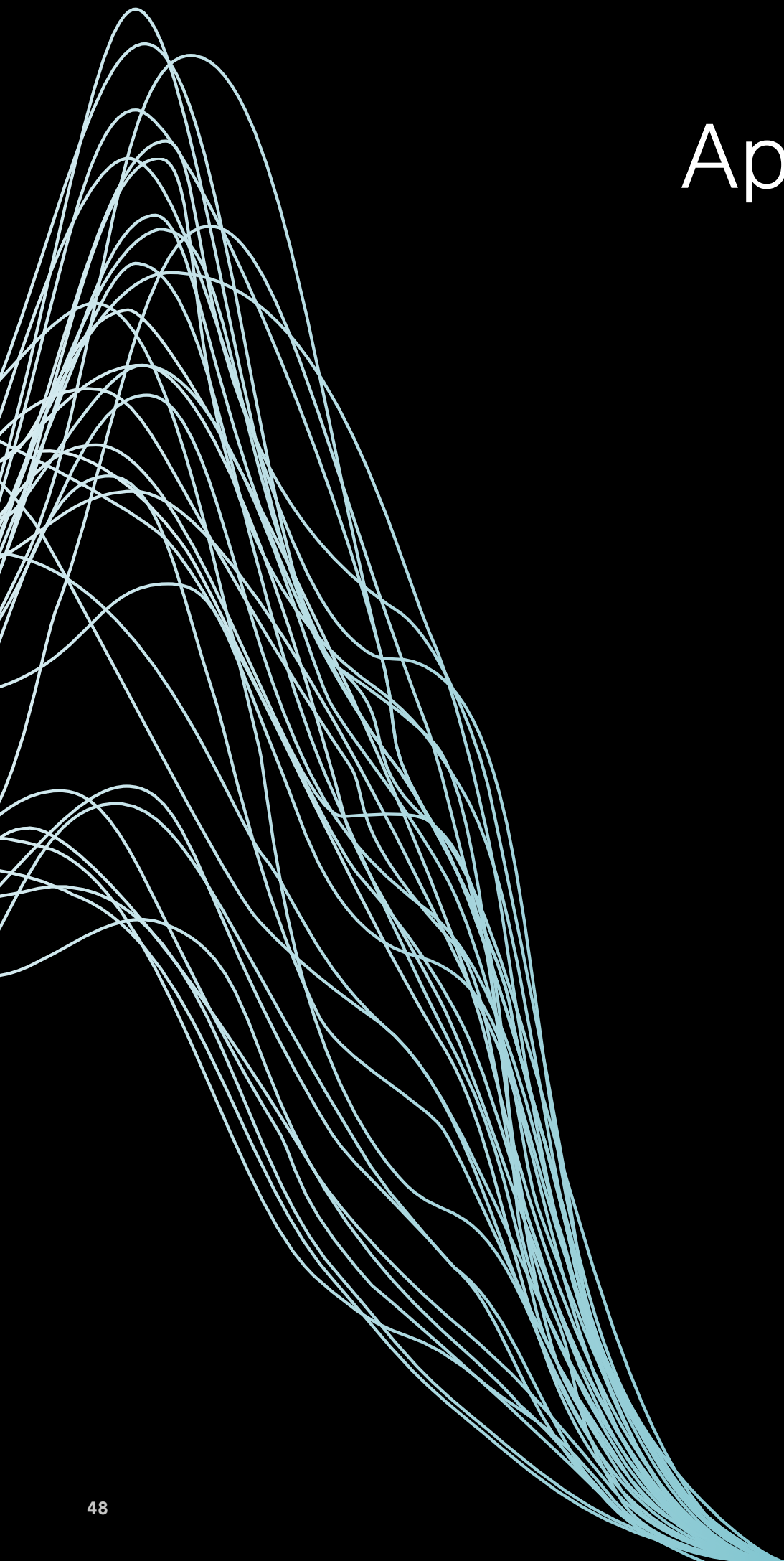


Figure 4.1: characteristics for 2 of 6 clusters identified by education, skills, and outcomes for full-time workers, with median and interquartile range shown. Each variable is standardised to comparable scales for comparison.

Appendix



APPENDIX 1: METHODOLOGY

Data

We targeted a nationally representative sample of UK adults aged 18-65. Fieldwork was conducted by YouGov in November 2022. We received responses from 2,259 respondents. YouGov provides sample weights for each response, calculated using age, gender, social class, education level, and region. We use these sample weights in our analysis in order to make our conclusions as nationally representative as possible.

We acknowledge the sample bias associated with an online survey methodology. In particular, digitally-aware individuals are likely to be over-represented. In addition, a certain level of literacy is required to meaningfully complete the survey.

The Essential Skills Tracker 23 survey design was based on established measures, used in the research literature and by other organisations. For example:

- Essential skills are measured using the Skills Builder Universal Framework, for which there are previous research papers using this methodology as well as large proprietary datasets against which we can validate responses.
- Numeracy is measured using questions recommended by National Numeracy, which they have validated in their own research and delivery.
- Literacy is measured using a 5-question instrument from the PIAAC survey run internationally by the OECD and which underpins research such as that by Hanushek at Stanford.⁹⁴
- Social mobility is primarily measured using both the questions used in the PIAAC survey and those set out by the Social Mobility Commission,⁹⁵ as well as YouGov’s proprietary social grade data.

Environment

Our data is aggregated, cleaned, and processed in a single integrated environment. This allows us to non-destructively calculate a set of custom variables on top of the raw data, ensuring consistency across all of our investigations. This environment also allows us to run unit tests on data load, ensuring accurate and complete intermediate variables. Because we call Stata functions from Jupyter notebooks, we can leverage the advantages of both packages – for instance, we are able to efficiently run and document dozens of iterations of a model.

Data Cleaning

The essential skill scores generated from our survey data follow expected patterns (from our 2021 results and the 10,140 surveys completed within our user-facing digital product). In addition, we have undertaken data cleaning to reduce response bias and improve response quality by identifying responses that fall outside our established reasonable response parameters, which mainly comprises respondents who have not taken due consideration in their responses. We have done this primarily by excluding, in various degrees of stringency, responses with low standard deviations across the answers to the steps of a skill – ie, those who have selected all, or mostly, the same level for every step.

94. Hanushek, E. A., G. Schwerdt, S. Wiederhold and L. Woessmann (2015). *Returns to skills around the world: Evidence from PIAAC*. European Economic Review, Vol. 73, pp. 103–130

95. <https://socialmobilityworks.org/toolkit/measurement/>

We regularly reference the first quartile, median, and third quartile scores, as well as standard deviation. These are calculated on the skill scores of our sample cleaned using our preferred metric (ie the high standard deviation mask explained below), incorporating our sample weights. For consistency and comparability we use the same definitions of these measures throughout our analysis.

We prefer to use the most cleaned metric. Excluding responses, however, involves a non-trivial reduction in sample size. In order to ensure that this exclusion affects our results in limited and predictable ways, we proceed in our analysis with 3 “levels” of mean essential skill score. This ensures the highest level of prudence in reporting findings based on our preferred, yet most exclusionary, metric.

Sample sizes at various levels of data cleaning on skill score:

- 1. Raw
 - a. 2021 + 2022: 4,790
 - b. 2022: 2,259

- 2. Light Mask (we drop only the offending skill(s) and recalculate the mean using the remaining skill(s))
 - a. 2021 + 2022: 4,654
 - b. 2022: 2,452

- 3. Preferred: Heavy Mask (we drop the mean essential skill score entirely for any respondent with an offending score in any step)
 - a. 2021 + 2022: 3,399
 - b. 2022: 1,793

Joining Datasets

Where using common variables, we have been able to use data from both 2021 and 2022 in our analysis. This has the obvious advantage of nearly doubling the sample size. Care has been taken to identify differences between datasets and control for these where appropriate – we include a dummy variable in our modelling in order to control for changes over time as well as coincidental factors such as sample selection.

Incremental Modelling

Our approach to investigating a hypothesis is to start simple, and incrementally introduce variables. At the basis of this approach is using Directed Acyclic Graphs (DAGs), which are seen by many as best practice in this space and which the literature finds are “likely to reduce the degree of bias for the effect estimate in the chosen statistical model” and which “allows an analyst to warrant causal claims” where the DAG is accepted as capturing the most significant relationships for the analysis in question.^{96 97}

96. Shrier, I., Platt, R.W. Reducing bias through directed acyclic graphs. BMC Med Res Methodol 8, 70 (2008). <https://doi.org/10.1186/1471-2288-8-70>

97. Knight, C.R., Winship, C. (2013). The Causal Implications of Mechanistic Thinking: Identification Using Directed Acyclic Graphs (DAGs). In: Morgan, S. (eds) Handbook of Causal Analysis for Social Research. Handbooks of Sociology and Social Research. Springer, Dordrecht. https://doi.org/10.1007/978-94-007-6094-3_14

Model Specification

We follow common practice by standardising the data before estimation. Where there is a clear rationale, we investigate the possibility of non-linear relationships by including polynomial terms, and the possibility of interaction effects by including interaction terms. For instance, we suspect that age has a non-linear relationship to certain variables, and that an interaction term between age and education level might prove more performant than each by itself. These terms are included in the final analysis only when their inclusion is justified by statistical significance below 0.05, and better model performance – otherwise we prefer the simpler case.

Model Diagnostics

We rule out certain common types of misspecification in our models by using a suite of standard tests (eg Ramsey RESET test for linear regression, Link test for logistic regression). If appropriate for the type of model employed, we also assess the residuals according to postestimation best practice.⁹⁸ We plot the residuals against fitted values, and against normal distributions, to look for possible material misspecifications in our model.

We test the sensitivity of our models to outliers by plotting normalised residuals against leverage. Where appropriate, we rerun the model with the top quantile (usually 5%) of outliers (according to their Cook's distance leverage) excluded.

Assumptions

We test the sensitivity of our model to assumptions made upstream in the analysis by repeating the above process in each case. For example, we run all of our models using 3 different grades of essential skill score data cleaning to ensure that the behaviour of the model is broadly consistent across all four analytical choices.

Calculating the cost of low skills

Numeracy

Pro Bono Economics defines low adult numeracy as Entry Level 3 and below, which is the standard expected of children in primary schools. Our numeracy measurement instrument is based on, and validated by, National Numeracy. According to National Numeracy, a score of 3 out of 5 on our set of instruments roughly equates to the level expected of primary school children. According to this definition, 28% of workers in our sample have low numeracy.

Linear regression analysis of our data finds a wage premium of 4.2% (with 95% confidence intervals of 0.6% and 7.8%) for a 1 standard deviation increase in numeracy when controlling for education level, and 8.3% when education level is not controlled for (with 95% confidence intervals of 4.6% and 11.9%). We use the lower wage premium in our modelling in order to better isolate the effect of numeracy, recognising this may be an underestimate given bidirectional links between numeracy and education level.

We find that controlling for essential skills score and literacy does not decrease the wage premium associated with numeracy. We believe that this supports the claim made elsewhere in this report that basic, essential, and technical skills all collectively contribute to success.

Pro Bono Economics estimated the cost of low numeracy to the UK in a year by extrapolating the effects of low numeracy identified for individuals in microeconomic studies to the UK as a

98. <https://www.stata.com/manuals13/rregresspostestimationdiagnosticplots.pdf>

whole, taking into account greater earnings, tax and pensions, and government spending.⁹⁹ We model the returns to individuals from skills indicated by our data, but follow a similar rationale, and similar assumptions, for scaling up to all UK workers, government, and employers.

In our analysis, we find similar attribution of costs to individuals, employers, and government as is Pro Bono Economics' work. The costs associated with employers are slightly higher as a proportion in our analysis – this is largely because we have included returns to corporations as a result of reduced unemployment.

Literacy

Our data give us two options for measuring the effects of low literacy. We attempted to assess our respondents with a 5-question instrument used by the PIAAC survey. With most techniques for assessing literacy unsuitable for a panel survey, we also asked our respondents about their reading and writing habits using an instrument based on the PIAAC survey, knowing that this would in many ways reflect income rather than measure a driver of it (on average, we would expect more highly paid workers to read and write more in the course of their jobs).

While the first instrument gives us a useful, and statistically significant, control in many of our models, we are not able to use it to estimate a wage premium with meaningful statistical significance – largely because the median respondent scored full marks on this exercise. Sample bias for our collection method also likely plays some role in these responses, given the format of YouGov's survey panels requiring a certain level of literacy to be accessed.

The frequency with which our respondents read and write various materials is a strong and statistically significant predictor of income but, on the other hand, its use is likely to result in overestimation of the wage premium associated with literacy – our data suggest a wage premium associated with literacy of 13.3% (with 95% confidence intervals of 9.3% and 17.3%). However, the comparison with the literature suggests that with some considered assumptions our models are able to usefully validate previous findings.

- Pro Bono Economics' analysis of OECD data shows that 13% of those working in England have very low literacy rates. Unlike in numeracy, we are unable to anchor scores in our reading and writing activities instruments to recognised literacy levels. Instead we use the first quartile level on our index of reading and writing activities as a low literacy threshold, which includes 7.4% of UK workers.
- We find that workers with the highest literacy index scores earn 46% more than those with the lowest, controlling for other factors. This is significantly lower than the OECD's finding of 94%. Pro Bono Economics calculates that the average worker in the UK with very poor literacy skills is earning approximately 7.1% less than they would if they had a basic level of literacy skills.¹⁰⁰ In our data, moving from the lowest index score to the Q1 score is associated with a wage premium of around 9%. We cautiously proceed with the analysis on the basis that our data and assumptions allows us to estimate the effects of low literacy on workers' wages to at least an illustrative degree of confidence.

Costs of low Essential Skills

There are strong relationships between levels of essential skills and both earnings and unemployment (at the 0.001 level). We use conservative versions of these models, and conservative assumptions.

99. <https://www.probonoeconomics.com/national-numeracy-calculating-the-cost-of-low-adult-numeracy>

100. Pro Bono Economics (2014): Cost of outcomes associated with low levels of adult numeracy in the UK

Scalability of findings

We apply a cross-sectional analysis across our sample to calculate the extent to which an individual with higher levels of essential skills will typically be paid more relative to an individual with lower skills. This enables us to infer the extent to which low levels of essential skills cost a typical individual. We then scale this up to the broader population.

As in Pro Bono Economics' work, our analysis is based on the critical assumption that effects for individuals could scale up to the UK as a whole – ie, that a significant increase in the levels of essential skills would not affect the premium placed on such skills. The implications of this assumption depend on the extent to which the estimated costs to the UK are interpreted as fully reversible, and over what timeframe. This is one reason for the prudence shown in choosing conservative assumptions.

The literature referenced in this paper supports this approach, given the returns to skills observed at an economic level. In these models output is a function of human capital including skills along with other variables, meaning that as skill levels improve, output grows and all individuals can in theory earn more. However, this approach does not model the relationship between wage premia and scarcity of skills. This means that there may be a dynamic whereby improving the skill levels of those with the lowest levels reduces the scarcity of skills at that level, thereby either reducing the wage premium or moving it higher up the skill curve. Creation of higher skilled and higher paid roles would be unlikely to be immediate or realised in the short-term, with the rebalancing of the economy implied by the literature on returns to skills likely to take some time.

We also subject our assumptions to sensitivity analysis. Following previous research on returns to skills, we control for numeracy, literacy, and education level. We use these controls in order to be more confident of isolating the likely annual cost of only low essential skills in the UK, noting that two-way relationships between essential skills and education level or other skills suggests resulting estimates are likely too low. Doing so, however, ignores potential positive effects of essential skills on education, and basic skills.

Scenario A: hypothetical historic intervention

- Our work in The Essential Skills Tracker 2022, and our work for this year's edition, tell us that opportunities to build essential skills, both in school and in work, are strong and significant ($p < 0.001$) predictors of skill score throughout life. We also observe that this relationship is non-linear. Even when controlling for education level, work status, and other measures of social advantage, we find that those who have had opportunities to develop their essential skills at school are likely to see their skill scores diverge from those who have not had these opportunities.
- This allows us to define a hypothetical intervention: for those who have received 0 opportunities in both school and work, we will boost their skill score as if they had received 1 in each. Using our sample, and the sample weights to ensure that our extrapolations are nationally representative, we estimate that 42% of workers in the UK would benefit from this boost, to the tune of 0.61 steps in skill score on average.

Scenario B: simple skill floor

- Our sample suggests that 15% of UK workers have a skill score below the Q1 skill score for the UK population as a whole (8.375). On average, those who benefit from the skills floor do so by 1.31 steps.

We note that in Scenario A, a larger percentage of the population benefits from a smaller skill score boost, whereas in Scenario B a smaller percentage of the population receives a more significant boost.

Costs to Individuals

For both scenarios, our analysis proceeds from two main effects of an increase in essential skills: for workers, a potential wage premium; and for the unemployed, a potential return to the workforce. We model the effect of increased essential skill scores at an individual level in order to calculate tax accurately. Then we use sample weightings to extrapolate to the UK workforce of 34 million.¹⁰¹

In each scenario, we model the likely wage premium or change in employment status that results from an increase in skill levels amongst those with low skills. The 95% confidence intervals produced by these models allow us to produce a lower and upper bound estimate of the effect.

The benefits to individuals are calculated by taking into account pension contributions by the employee and employer, income tax, national insurance, and indirect tax (VAT). Testing assumptions, for example the proportion of employees paying into their pension via relief at source rather than salary sacrifice, reveals that the resultant figures are not sensitive to reasonable extremes in these assumptions.

There are many other relationships between essential skills and positive effects for individuals, which likely have monetary costs. For example, individuals might also benefit from improved life satisfaction and job satisfaction. These effects would likely have non-trivial cost benefits associated with them, such as improved productivity or lower healthcare demand. Both in order to remain conservative in our estimations, and to focus on the immediate and very significant costs to individuals, these effects have not been included.

Costs to Employers

Previous research has used the ratio of compensation (wages) to gross operating surplus (profit) found in national GDP figures measured by income to approximate the gain in productivity signified by increased wages.¹⁰² In 2013 this ratio was measured at 0.37. We calculate a slightly higher ratio of 0.44 due to profit increasing as a share of GDP (24%) while the share made up by compensation has remained stable at 54%.¹⁰³

We make the assumption that 7% of this increased profit will be returned as corporation tax based on the ratio of gross operating surplus of corporations to GDP measured by income, according to 2022 ONS figures.¹⁰⁴

101. <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/summaryoflabourmarketstatistics>

102. In Pro Bono Economics' analysis, it is assumed that an increase in wages results in a 37% increase in profit, based on wages comprising 54% of GDP measured by income, and profit comprising 20% ($20/54 = 0.37$).

103. <https://www.ons.gov.uk/economy/grossdomesticproductgdp/datasets/secondestimateofgdp>

104. <https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/cgbz/pn2#othertimeseries>

Adoption of the Universal Framework for essential skills, improved recruiting practices and more coherent opportunities to build essential skills (including through job design) would require organisational investment. Many employers have adopted the framework with minimal or no cash costs. Some opportunities to build essential skills delivered through direct training could have a direct cash cost to employers, as would procuring other types of external support. Quantifying these costs is outside the scope of this paper.

Costs to Government

The government would benefit in tandem with individuals and employers. Increased tax (both direct and indirect) paid by individuals is received by the government, as is increased corporation tax paid by more profitable employers.

The government would also benefit directly and immediately from a reduction in unemployment, primarily through a reduced claimant count and corresponding state welfare bills.

In Pro Bono Economics' analysis, it is assumed that each individual moving from Jobseeker's Allowance to employment results in a saving to the government of £9,800 per year, based on estimates taken from DWP's Policy Simulation Model and other DWP analysis.¹⁰⁵ The claimant count in the UK currently stands at 1.5 million,¹⁰⁶ with £10.75 billion to be paid in unemployment benefits in 2022/23,¹⁰⁷ implying a cost per claimant of around £7,200. We consider it prudent to use the lower estimate in our analysis.

We do not attempt to calculate the significant wider benefits to government and society of increasing employment, such as increased health, social participation, and consumer spending. We have also not considered the systemic consequences of reduced unemployment, such as potential inflationary effects of an even tighter labour market. Costs to government of improving the nation's essential skills would in our view be primarily non-cash.¹⁰⁸ A lot of the changes required are about *how* things are done, building off existing provision, not necessarily *what* is done in addition. For example, including the framework in education standards or qualifications can have a wide ranging effect without significant incremental cash spend, though it may lead to reprioritisation of cash spend by schools. Quantifying the costs – cash or otherwise – is outside the scope of this paper.

105. https://publications.parliament.uk/pa/cm201213/cmhansrd/cm130206/text/130206w0006.htm#column_352W

106. <https://www.ons.gov.uk/employmentandlabourmarket/peoplenotinwork/outofworkbenefits/timeseries/bcjd/unem>

107. <https://www.gov.uk/government/publications/benefit-expenditure-and-caseload-tables-2022>

108. See Assessing benchmarks of good practice in school career guidance (2014) by PWC and the Gatsby Foundation for discussion of applying the Standard Cost Model to benchmarks in education.

APPENDIX 2: REGRESSION MODEL PARAMETERS

In this section, we present the specifications of the major models used in our analysis.

Wage premium

VARIABLES	Model 0	Model 1	Model 2	Model 4	Model 5
mean_skill_score_std_masked_h	0.111***	0.102***	0.0878***	0.0673***	0.0690***
numeracy		0.110***	0.0859***	0.0834***	0.0540***
literacy		0.0118	-0.00256	-0.00844	0.000446
education_level			0.0786***	0.0868***	0.0948***
years_in_work				0.118***	0.121***
public_sector					-0.0939***
third_sector					-0.0908*
female					-0.222***
parental_uni					0.0557
health					0.00145
Constant	10.47***	10.45***	10.03***	10.02***	10.11***
Observations	899	899	866	789	780

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

SOC code wage premium

The model is rerun excluding SOC code matches below a certain threshold (0 being the lowest level of confidence, and 100 the highest). We see stable model performance above 50. Above 75, small sample sizes have a detrimental effect on p-values.

VARIABLES	0%	25%	50%	75%	90%
mean_skill_score_std_masked_h	0.0245	0.0265	0.0603**	0.0707**	0.0527
numeracy	0.0508*	0.0518*	0.0593*	0.0569	0.0893
literacy	0.122	0.128	0.247*	0.181*	0.254
years_in_work	0.00572*	0.00555*	0.00663*	0.00192	0.000639
female	-0.148**	-0.153**	0.0375	0.0277	0.104
parental_uni	-0.117	-0.106	-0.0648	-0.141	-0.177
Constant	-0.861	-0.884*	-1.535*	-1.108**	-1.543*
Observations	873	869	572	379	220
R-squared	0.025	0.026	0.058	0.043	0.059

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Life Satisfaction

	(1)	(2)
VARIABLES	“Things you do in your life are worthwhile”	“How satisfied are you with your life”
mean_skill_score_std_masked_h	0.168***	0.220***
part_time (8-29hrs)	0.190*	0.348***
part_time (<8hrs)	0.155	0.283
student	0.432*	0.509**
retired	0.469***	0.290**
unemployed	-0.328	-0.309
not_working	-0.00845	-0.0588
female	0.147**	0.140**
age	0.0444	0.0698*
income_centre	0.161***	0.136***
education_level	-0.0428	-0.0259
health	-0.258***	-0.168***
health_impact	0.0869**	0.119***
Constant	-0.146**	-0.161***
Observations	797	799
R-squared	0.235	0.214

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Unemployment

Raw logistic regression between skill score and unemployment:

	(1)
VARIABLES	Model
mean_skill_score_std_masked_h	-0.106***
Constant	-2.030***
Observations	3,399

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Raw logistic regression between skill score and being out of work or education;

	(1)
VARIABLES	Model
mean_skill_score_std_masked_h	-0.157***
Constant	-0.760***
Observations	3,399

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Due to sample sizes, we were unable to meaningfully explore this relationship with additional control variables. However, we did find a statistically significant relationship between raw skill score (ie before data cleaning) and being out of work or education with additional controls. This relationship is of a similar magnitude to that found above.

	(1)
VARIABLES	Model
mean_skill_score	-0.109***
education_level	-0.108**
numeracy	-0.0535
literacy	0.157
max_parental_ed	-0.0189
health	0.893***
Constant	-3.197***
Observations	1,771

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Cluster Analysis – Social Mobility

We first used Ward's linkage hierarchical clustering to identify the appropriate number of clusters in our dataset. We used both the Calinski/Harabasz and Duda/Hart stopping rules to establish that 5 clusters was appropriate. We then ran kmedians clustering using the Ward's linkage centroids as starting points. While we found some variation following the kmedians clustering, the substantive qualities of our clusters motivated the same analysis.

The same methodology suggests valid clustering with 8 clusters. Analysis of these clusters supports the same conclusions with greater granularity, but we present the 5 cluster model for clarity.

We acknowledge that clustering analysis supports an exploratory analysis of the data, and therefore interpret the results in the context of relationships already established through other methods.

Clustering – Education

We follow the same methodology when exploring the relationship between education, skills, and life outcomes (this time without parental education). This time 6 clusters present themselves. Again, we do see some differences between the hierarchical and kmedians clustering, but both analyses motivate the same conclusions.

APPENDIX 3: SKILLS BUILDER UNIVERSAL FRAMEWORK

Skill: Listening

The receiving, retaining and processing of information or ideas



Step	Statement
0	I listen to others without interrupting
1	I listen to others and can remember short instructions
2	I listen to others and can ask questions if I don't understand
3	I listen to others and can tell someone else what it was about
4	I listen to others and can tell why they are communicating with me
5	I listen to others and record important information as I do
6	I show I am listening by how I use eye contact and body language
7	I show I am listening by using open questions to deepen my understanding
8	I show I am listening by summarising or rephrasing what I have heard
9	I am aware of how a speaker is influencing me through their tone
10	I am aware of how a speaker is influencing me through their language
11	I listen critically and compare different perspectives
12	I listen critically and think about where differences in perspectives come from
13	I listen critically and identify potential bias in different perspectives
14	I listen critically and use questioning to evaluate different perspectives
15	I listen critically and look beyond the way speakers speak or act to objectively evaluate different perspectives


Skill: Speaking

The oral transmission of information or ideas

Step	Statement
0	I speak clearly to someone I know
1	I speak clearly to small groups of people I know
2	I speak clearly to individuals and small groups I do not know
3	I speak effectively by making points in a logical order
4	I speak effectively by thinking about what my listeners already know
5	I speak effectively by using appropriate language
6	I speak effectively by using appropriate tone, expression and gesture
7	I speak engagingly by using facts and examples to support my points
8	I speak engagingly by using visual aids to support my points
9	I speak engagingly by using tone, expression and gesture to engage listeners
10	I speak adaptively by changing my language, tone and expression depending on the response of listeners
11	I speak adaptively by planning for different possible responses of listeners
12	I speak adaptively by changing my content depending on the response of listeners
13	I speak influentially by changing the structure of my points to best persuade the listeners
14	I speak influentially by changing the examples and facts I use to best persuade the listeners
15	I speak influentially by articulating a compelling vision that persuades the listeners


Skill: Problem Solving

The ability to find a solution to a situation or challenge

Step	Statement
0	I complete tasks by following instructions
1	I complete tasks by finding someone to help if I need them
2	I complete tasks by explaining problems to someone for advice if I need
3	I complete tasks by finding information I need myself
4	I explore problems by creating different possible solutions
5	I explore problems by thinking about the pros and cons of possible solutions
6	I explore complex problems by identifying when there are no simple technical solutions
7	I explore complex problems by building my understanding through research
8	I explore complex problems by analysing the causes and effects
9	I create solutions for complex problems by generating a range of options
10	I create solutions for complex problems by evaluating the positive and negative effects of a range of options
11	I analyse complex problems by using logical reasoning
12	I analyse complex problems by creating and testing hypotheses
13	I implement strategic plans to solve complex problems
14	I implement strategic plans to solve complex problems and assess their success
15	I implement strategic plans to solve complex problems and draw out learning to refine those plans over time


Skill: Creativity

The use of imagination and the generation of new ideas

Step	Statement
0	I imagine different situations
1	I imagine different situations and can say what I imagine
2	I imagine different situations and can bring them to life in different ways
3	I generate ideas when I've been given a clear brief
4	I generate ideas to improve something
5	I generate ideas by combining different concepts
6	I use creativity in the context of work
7	I use creativity in the context of my wider life
8	I develop ideas by using mind mapping
9	I develop ideas by asking myself questions
10	I develop ideas by considering different perspectives
11	I innovate effectively when working in a group
12	I innovate effectively by seeking out varied experiences and stimuli
13	I support others to innovate by sharing a range of tools
14	I support others to innovate by evaluating the right creative tools for different situations
15	I support others to innovate by coaching them to be more creative

Skill: Staying Positive

The ability to use tactics and strategies to overcome setbacks and achieve goals



Step	Statement
0	I can tell when I feel positive or negative
1	I can tell when others feel positive or negative
2	I keep trying when something goes wrong
3	I keep trying and stay calm when something goes wrong
4	I keep trying when something goes wrong, and think about what happened
5	I keep trying when something goes wrong and help cheer others up
6	I keep trying when something goes wrong and encourage others to keep trying too
7	I look for opportunities in difficult situations
8	I look for opportunities in difficult situations, and share these with others
9	I look for opportunities in difficult situations, and adapt plans to use these opportunities
10	I look for opportunities in difficult situations, and create new plans to use these opportunities
11	I identify risks and gains in opportunities
12	I identify risks and gains in opportunities, and make plans to manage them
13	I support others to stay positive, by managing my own responses
14	I support others to stay positive, by helping others to see opportunities
15	I support others to stay positive, by helping others to see opportunities and creating plans to achieve them

Skill: Aiming High

The ability to set clear, tangible goals and devise a robust route to achieving them



Step	Statement
0	I know when I am finding something too difficult
1	I know what doing well looks like for me
2	I work with care and attention to detail
3	I work with pride when I am being successful
4	I work with a positive approach to new challenges
5	I set goals for myself
6	I set goals informed by an understanding of what is needed
7	I set goals, ordering and prioritise tasks to achieve them
8	I set goals and secure the right resources to achieve them
9	I set goals and plan to involve others in the best way
10	I create plans that are informed by my skill set and that of others
11	I create plans that include clear targets to make progress tangible
12	I create plans that are informed by external views, including constructive criticism
13	I develop long-term strategies taking into account strengths, weaknesses, opportunities and threats
14	I develop long-term strategies that use regular milestones to keep everything on track
15	I develop long-term strategies that include feedback loops to support flexibility and adaptability


Skill: Leadership

Supporting, encouraging and developing others to achieve a shared goal

Step	Statement
0	I know how I am feeling about something
1	I know how to explain my feelings about something to my team
2	I know how to recognise others' feelings about something
3	I manage dividing up tasks between others in a fair way
4	I manage time and share resources to support completing tasks
5	I manage group discussions to reach shared decisions
6	I manage disagreements to reach shared solutions
7	I recognise my own strengths and weaknesses as a leader
8	I recognise the strengths and weaknesses of others in my team
9	I recognise the strengths and weaknesses of others in my team, and use this to allocate roles accordingly
10	I support others through mentorship
11	I support others through coaching
12	I support others through motivating them
13	I reflect on my own leadership style and its effect on others
14	I reflect on my own leadership style, and build on my strengths and mitigate my weaknesses
15	I reflect on my own leadership style, and adapt my approach according to the situation


Skill: Teamwork

Working cooperatively with others towards achieving a shared goal

Step	Statement
0	I work with others in a positive way
1	I work well with others by behaving appropriately
2	I work well with others by being on time and reliable
3	I work well with others by taking responsibility for completing my tasks
4	I work well with others by supporting them if I can do so
5	I work well with others by understanding and respecting diversity of others' cultures, beliefs and backgrounds
6	I contribute to group decision making
7	I contribute to group decision making, whilst recognising the value of others' ideas
8	I contribute to group decision making, encouraging others to contribute
9	I improve the team by not creating unhelpful conflicts
10	I improve the team by resolving unhelpful conflicts
11	I improve the team by building relationships beyond my immediate team
12	I influence the team by reflecting on progress and suggesting improvements
13	I influence the team by evaluating successes and failures and sharing lessons
14	I support the team by evaluating others' strengths and weaknesses, and supporting them accordingly
15	I support the team by bringing in external expertise and relationships

With special thanks to:

CIPD

