



**Inequality**

The IFS Deaton Review

# Inequalities in disability

**James Banks  
Heidi Karjalainen  
Tom Waters**

An IFS initiative funded by the Nuffield Foundation

 **IFS** Institute for  
Fiscal Studies

 **Nuffield  
Foundation**

 **ESRC  
CENTRE FOR THE  
MICROECONOMIC  
ANALYSIS OF  
PUBLIC POLICY**

# Inequalities in disability

**James Banks (University of Manchester; IFS), Heidi Karjalainen (IFS) and Tom Waters (University College London; IFS)**

## Introduction

Differences in health outcomes are an important and well-documented dimension of inequality. As discussed in Case and Kraftman (2022), there are marked differences in life expectancy and mortality by regions, gender, education groups, and measures of deprivation. In this commentary, we supplement that analysis by looking at differences and inequalities in the prevalence of disability and the degree to which health limits functional capabilities in the UK. This commentary studies differences in the prevalence of disability between education groups, regions, date of birth cohorts and genders. While there are a number of ways in which disability may affect outcomes, this commentary focuses particularly on employment as an outcome.

Disability is closely related to health conditions, but is not exactly the same. Some disabilities stem from health conditions directly, either from lifelong conditions which affect people since childhood, or from conditions, such as arthritis, that occur as people age. But some health conditions, for example high blood pressure or diabetes (which are two of the most prevalent conditions), can be managed by medication in a way that prevents them from causing functional limitations. Alternatively, older or obese individuals can become (more) disabled over time without any new diagnoses of health conditions. Because of this nuanced distinction between disability and health conditions, it is important to document the patterns of disability over the life course, and its causes and consequences. Disability relates more directly than health to the activities that individuals are able to do and whether they feel included by, and able to participate in, society. Thus inequalities in disability matter independently of inequalities in health.

When defining disability, we can think of it sitting somewhere in the middle of a spectrum going from specific health conditions over to subjective well-being. An analysis of disability, and inequalities in disability, gets closer to an analysis of subjective well-being than does an analysis of inequalities in health because it characterises individuals in part in terms of their subjective feelings about how limited and included they are, given the environments that they live in. These are precisely the kind of dimensions that have been shown to drive individual well-being.

In addition, issues around disability are related to some of the most pressing social and economic policy concerns of contemporary Britain, namely the impending huge burden of social care for the older aged population, the issue of rising labour market inactivity at older working ages particularly since the COVID-19 pandemic, the rapidly rising rate of disability benefit receipt across all age groups, and the staggering rise in mental health conditions for younger cohorts of working-age adults, young adults and children.

Disability is a protected characteristic in UK law under the Equality Act (2010), meaning that disabled individuals have a right not to be treated less favourably, or subjected to an unfair disadvantage, by reason of that characteristic. This right includes protection from discrimination at work, in education, as a consumer, and when accessing public services. Data on protected characteristics are required to be collected by organisations working in these areas, and such data then need to be treated differently than other data that are collected. The Equality Act protects characteristics such as disability precisely because they can be margins of frequent and systematic discrimination. Yet it is striking that there is significantly less large-scale systematic documentation and quantitative evidence on inequalities in disability, than on other protected characteristics such as gender, ethnicity and age. As a case in point to illustrate this, the first analysis of the effect of the COVID-19 pandemic on disabled workers (Jones, 2022) emerged well after the worst phases of the pandemic. In this work, the author points out that evidence on how the pandemic was affecting the disabled population was not prioritised during the pandemic itself, unlike the other three characteristics.

The relative lack of systematic evidence on inequalities in the prevalence of disability may be partly because disability itself is a highly complex issue. While some disabled individuals are easy

to classify – for example, wheelchair users, the visually impaired or deaf communities, or those born with Down's syndrome, cerebral palsy or other lifelong disabling medical conditions – others are less so. Physical and mental disabilities vary significantly, can be difficult to observe, are often a joint product of a person and their environment, and are reported by people's 'subjective' evaluation of the degree of their functional limitations in the tasks they try to carry out. As such, defining disability in a way that covers all such cases can be complex. But analytical complexity should not be a bar to empirical analysis however, quite the opposite in fact.

In addition, it is important to note that, even for individuals where disability can be considered more 'subjective', this does not make it less worthy of analysis or study. People's subjective evaluation of their ability to carry out activities and tasks of everyday life will matter for their own assessments of their material quality of life, but will also directly feed into their behaviour – the choices they and their families make – and hence the outcomes that they experience in the future. As discussed later on in this commentary, those choices, such as young people seeking more help with mental health conditions, can also lead to very real consequences on provision of public services and cannot be dismissed.

In this commentary, we give some summary, high-level evidence on the prevalence of disabilities and inequalities in disability over age, socio-economic status and region. We also focus on the interaction between disability and labour market participation. Our analysis is far from exhaustive but does provide a glimpse into how important, and how large, these inequalities are, how they steadily accumulate from early adulthood onwards, and how these patterns have been changing over time. There is a strong need for more work in the area, in particular work that can bring issues of inequalities in, and by, disabilities of different types more to the fore in the mainstream of empirical analysis of inequality.

We will show that inequalities in the prevalence of disability, defined across educational qualifications, are large. As with health inequalities, they emerge steadily across all ages of the life cycle, although this emergence is patterned somewhat differently for physical versus mental disabilities. These inequalities are highly consequential by the time a generation has reached older working age, being strongly related to both labour market participation and to quality of life. As a result, they will also have important consequences for inequalities in well-being in retirement as well as for future social care needs.

We document the emergence of large inequalities in mental health disabilities at younger ages for recent birth cohorts. This is likely to have consequences for future inequalities in broader disability and for the physical health of those cohorts in the future, particularly given the links between mental health and health behaviours and social participation, each of which are risk factors for future physical health and longevity – as pointed out by Fancourt and Steptoe (2022) in their commentary on the Case and Kraftman (2022) chapter for the IFS Deaton Review.

## Data and methods

Much of the systematic evidence that exists on disability focuses on the links between disability and the labour market for working-age individuals, and hence uses household surveys such as the Family Resources Survey (FRS), the General Household Survey (GHS) and the Labour Force Survey (LFS) (see, e.g., Baumberg, Jones and Wass, 2015; Bryan et al., 2022a; Jones, 2022). Recent work (Bryan et al., 2023) uses the Annual Population Survey (APS), which has a large sample and more detail on the nature of people's disabilities. Other work, especially pieces looking at receipt of disability benefits, uses administrative data (see, e.g., Cribb, Karjalainen and Waters, 2022).

For the majority of the new analysis in this paper we want to exploit the broader coverage of more general surveys, along with the ability to do longitudinal analysis, and hence we use two different longitudinal surveys.

For most of the analysis on disability across the full adult life course, we use the Understanding Society (UK Household Longitudinal Study, UKHLS) data waves 1–11 (2009–19). This is a panel dataset that has been running since 2009 and contains around 25,000 households per year. The

survey contains information on a number of characteristics, including disability and labour market status (University of Essex, Institute for Social and Economic Research, 2022).

For analysis of the 50+ population in England, we use the English Longitudinal Study of Ageing (ELSA), which is a representative panel of the over-50 population in England running since 2002–03, with the latest wave collected in 2018–19. This dataset contains around 8,000 individuals each year. In addition to the kind of data collected in the UKHLS, ELSA also collects considerably more detailed data on the respondents' health and mobility (Breeze et al., 2012).

The key definitions used across this paper are as follows.

- **Disability.** Unless specified otherwise, our main definition of disability is having a long-standing and limiting illness, disability or impairment, as reported by the individual themselves. Long-standing means that it is something that has troubled, or is expected to trouble, the individual for at least 12 months. Limiting is defined as limiting some daily activities (such as moving around, communication or memory). This definition of disability is based on the Equality Act 2010, which defines a disabled person as someone who has a physical or mental impairment that has a 'substantial' and 'long-term' negative effect.<sup>1</sup> As a result, questions on whether an individual has a limiting long-standing illness are common in most survey data and typically have a high degree of comparability across data sources.
- **Poor mental and physical functioning.** While we do not have full information on the types of conditions affecting people with disabilities in the survey data, we can use the SF-12 questionnaire of Understanding Society to assess whether trends in disability differ by mental and physical functioning. SF-12 is a set of questions where the respondent is asked to assess the impact their health has on their everyday life. Thus, instead of focusing on the condition that the individual has, we can use these measures to understand how disability is affecting their lives. Some of the questions aim to capture how much health limits physical activity, and others cover emotional problems. These questions are then combined into mental functioning and physical functioning scores (Ware, Keller and Kosinski, 1995). These scores take values of 0 (low functioning) to 100 (high functioning). We define poor physical and mental health as having a score of 33 or lower, which among our sample means being in the bottom 8% of mental health scores and the bottom 10% of physical health scores.
- **Work disability.** This refers to a specific question about whether an individual feels that, because of their health or disability, they are limited in the type or amount of paid work that they can do. Work disability is strongly related to other disability indicators but not necessarily in a one-to-one relationship, for example, due to people's labour market opportunities, the nature of their employment (and employer) and perhaps also (in the case of post-retirement-age individuals) the degree to which they would want to work.
- **Experience of pain.** We use self-completion questions on pain from Understanding Society and ELSA to assess the experience of pain. ELSA has many questions on pain but in the most straightforward example respondents are simply asked whether they are often troubled by pain. The Understanding Society question asks whether in the last four weeks pain has interfered with normal work (including both work outside the home and housework). We define mild pain as reporting any pain at all (a little bit or more), and moderate or worse pain as reporting that pain interfered with normal work moderately, quite a bit or extremely.
- **Functional limitations: ADL and IADLs.** An alternative and frequently used measure of disability is the number of self-reported difficulties in Activities of Daily Living (ADLs) and in Instrumental Activities of Daily Living (IADLs). Even apart from its relevance and application to the nature of daily life, information on ADLs and IADLs forms the key part of assessments of individuals' disabilities for the purposes of welfare benefit receipt and care needs. For ELSA analysis, we use the following five ADL measures – difficulty in walking across the room, dressing, bathing, eating, getting in and out of bed, and using the toilet – and six IADL measures – using a map, preparing a hot meal, shopping for groceries, making telephone calls, taking medications, and managing money. We create two measures of functional limitations – a binary indicator of whether individuals report difficulty in any dimensions at all, and a simple

<sup>1</sup> See <https://www.gov.uk/definition-of-disability-under-equality-act-2010>.

count of the number of dimensions where difficulties are reported – which we top-code at 6 for those with more than six reported domains of difficulty.

- **Depressive symptoms.** As a simple indicator of depressive symptoms in our ELSA analysis, we use the respondent's score on the commonly used eight-item Centre for Epidemiological Studies Depression Scale (CES-D), where a higher score represents a greater number of symptoms. The CES-D scale items relate to the extent to which, over the past week, the respondent felt depressed, felt everything they did was an effort, felt their sleep was restless, felt they were happy, felt lonely, enjoyed life much of the time, felt sad and felt that they could not get going.
- **Poor quality of life.** All waves of ELSA include the CASP-19 quality of life scale, which is designed to measure quality of life across four dimensions – control, autonomy, self-realisation and pleasure. Since being introduced in a representative population study for the first time in ELSA, CASP-19 (or the shorter form CASP-12) has been implemented in multiple languages in numerous surveys around the world and used in hundreds of studies of psychosocial well-being and quality of life. In many analyses, CASP-19 is coded on a Likert scale with each of the 19 dimensions scoring between 0 and 3; thus, the overall CASP-19 score ranges from 0 to 57, with higher values indicating higher quality of life (see Hyde et al., 2003). For the purposes of our analysis here, the full scale is somewhat problematic because some of the questions directly ask the respondent to assess whether their age, health or financial resources (for example) prevent them being able to enjoy life, and other elements relate to the past or the future. So whilst it might describe subjective well-being effectively, the full CASP-19 scale is not particularly appropriate for looking at the contemporaneous relationship between health, socio-economic status and subjective well-being. Hence, for our analysis we use a simpler measure of poor quality of life that simply takes nine of the more neutrally worded and contemporaneous dimensions from the CASP-19 and looks at the subset of these dimensions to assess where the individual has poor outcomes. Thus, our measure ranges from 0 to 9, with higher numbers indicating poorer quality of life. Specifically, an individual's score is incremented by one point if they respond 'often' or 'sometimes' to the questions: 'how often do you feel what happens to you is out of your control?' and 'how often do you feel left out of things?'. In addition, their score is increased by one point if they respond 'not often' or 'never' to each of the following questions: 'how often can you do the things you want to do?', 'how often can you please yourself in what you do?', 'how often do you feel life is full of opportunities?', 'how often do you feel the future looks good for you?', 'how often do you feel your life has meaning?', 'how often do you feel you look forward to every day?' and 'how often do you feel you enjoy the things you do?'.

In the remainder of this paper, we first describe the institutional setting surrounding the welfare benefits that disabled individuals are entitled to, and use administrative data on the receipt of such benefits to provide some initial statistics on the evolution of the proportion of people with disabilities that qualify them for disability benefits over the last 20 years. We move on to investigating inequalities in the prevalence and incidence of disability over the adult part of the life cycle by level of educational attainment.<sup>2</sup> We then look at issues related to disability and labour market inequalities. We look at regional inequalities for all working-age people, and then go on to provide a more in-depth look at how inequalities in the prevalence of disability, labour market participation and quality of life have interacted for the cohort of individuals going through late working age in the last 20 years.

## Institutional setting

The UK welfare system supports those with disabilities through two different types of benefit:<sup>3</sup>

**Disability benefits.** For children, the main disability benefit is disability living allowance; for working-age adults, personal independence payment; and for pensioners, attendance allowance. Eligibility for these benefits is unrelated to whether the individual is working or able to work, and

<sup>2</sup> Educational attachment can be thought of as a proxy for socio-economic status. Other work has used different measures, such as subjective social status, to define social position (Whillans and Nazroo, 2018).

<sup>3</sup> A recent white paper by the Department for Work and Pensions (DWP), 'Transforming Support: The Health and Disability White Paper', proposes substantial changes to the structure of welfare support for those with disabilities. We focus on the existing system in this paper.

unrelated to their income or assets or those of their family (i.e. the benefits are non-means-tested). Instead, eligibility is based on having a disability which increases living costs (for example, needing help with ADLs such as carrying out day-to-day activities such as getting dressed, or help moving around, or for increased care costs in the case of children's disability benefits). Around £18 billion is expected to be spent in 2023–24 on working-age disability benefits, and a further £9 billion on children and pensioners.<sup>4</sup>

**Incapacity benefits.** These are essentially only for working-age adults. The main incapacity benefits are employment and support allowance and the 'limited capability for work related activity' element of universal credit. Eligibility for these benefits is dependent upon the claimant being unable to work (and therefore they are – with some small exceptions – restricted only to those who are in fact not working). The benefits are also mostly restricted to those who have low family incomes and assets (i.e. they are mostly means-tested). Both means-testing and linking eligibility to inability to work means they are likely to be associated with labour market opportunities: stronger labour market opportunities both reduce the incentive to claim incapacity benefits, and increase the income of any partner, reducing eligibility through the family means-test. Around £18 billion a year is spent on incapacity benefits.<sup>5</sup>

To get a handle on the coverage of these benefits, and how they have changed over time, Figure 1 shows the estimated share of working-age adults (here defined as ages 16–64 for men and 16–59 for women in order to get a consistent time series) in Great Britain that report being disabled, receive a disability benefit, or receive an incapacity benefit (some people claim both benefits and so are represented in both groups). Structural breaks in the survey question wording make it difficult to precisely measure the change in the share of working-age adults that are disabled over time – though as far as one can tell, it appears to be rising over the final decade of this period. We also see a clear and steady rise in the share of adults receiving disability benefits over time, from 2% in the early 1990s to 6% in 2020–21, although the majority of this rise occurred early in the period. The same is not true for incapacity benefit, which has modestly declined since the early 2000s, possibly due to reforms implemented in the 2000s and first half of the 2010s which aimed to move claimants off incapacity benefits (discussed in further detail in Banks, Blundell and Emmerson, 2015).

Some of the rise in disability rates and disability benefit receipt might relate to population ageing. To investigate this issue directly, Figure 2 shows, for each year of age, the share of individuals that are in receipt of a disability benefit. Though Figure 1 focused on working age, for completeness in Figure 2 we show claim rates for all ages. We do this for 2002, 2012 and 2022. In 2013, the government began to replace the existing working-age disability benefit (disability living allowance) with a new one (personal independence payment), so some of the change from 2012 to 2022 could reflect the impact of this reform. We split the data into two panels – age 0–64 and age 65 and over – for visual clarity, as claim rates in the latter group are very high.

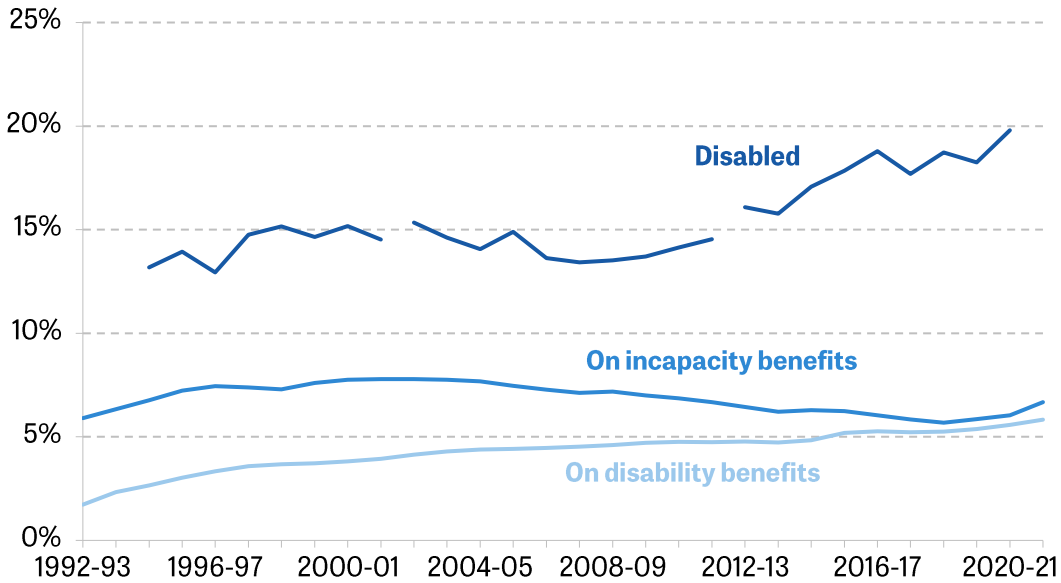
The figure clearly shows that there has been a marked rise in claiming over the last two decades at almost every non-pensioner age. A particularly large increase is seen for children: for example, in 2002, 2%–3% of school-age children received a disability benefit, but by 2022 that had increased to 5%–7%. Office for Budget Responsibility (2019), examining data over the period 2003–18, show that this rise is entirely accounted for by increases in claims for learning difficulties, behavioural disorders and ADHD, primarily among boys. It is worth noting that at least some of the increase may be due to a declining rate of infant mortality.

In some of the main analysis in this commentary, we are going to investigate how disability trends differ by level of education achieved. Insofar as education levels are unaffected by disabilities experienced over the course of one's life, this is an appealing way of investigating inequalities in disability. But of course – as Figure 2 shows – there are early-onset disabilities which might themselves reduce the level of education the individual is able to achieve, and particularly so if the

<sup>4</sup> From DWP, 'Benefit expenditure and caseload tables 2022', <https://www.gov.uk/government/publications/benefit-expenditure-and-caseload-tables-2022>. Figures are in 2022–23 prices.

<sup>5</sup> From DWP, 'Benefit expenditure and caseload tables 2022'. This figure is for 2016–17, in 2022–23 prices. More recent data are affected by the rollout of universal credit, which combines together incapacity benefits with others. This makes it difficult to work out how much is spent to support people because of incapacity for work.

**Figure 1. Estimated disability, disability benefit receipt and incapacity benefit receipt among working-age adults, Great Britain**



Note: 'Incapacity benefits' refers to claimants of severe disablement allowance, incapacity benefit, employment and support allowance, and claimants of universal credit with a health condition restricting work. 'Disability benefits' refers to disability living allowance and personal independence payment. 'Working age' consists of men aged 16–64 and women aged 16–59. Between 2016–17 and 2018–19 the available data on universal credit specify only the number of claimants in receipt of the health-related elements – and therefore exclude those who are in the work capability assessment process or who have been assessed as having a limited capability for work but do not receive the element. The universal credit data in those years also is not split by age or sex. For these years we use a simple imputation, based on data in 2019–20, to estimate the number of working-age individuals who claim universal credit with a health condition restricting work. Gaps in the 'disabled' series are where question wording in the survey changed, causing a structural break.

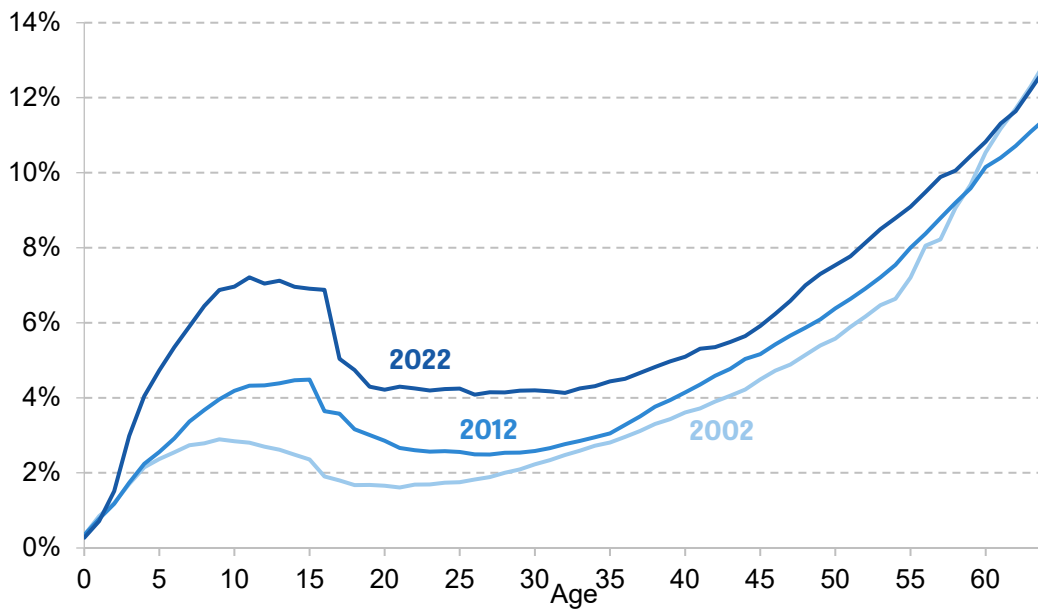
Source: Adapted from figure 1 of Cribb et al. (2022), figure 2 of Banks et al. (2015) and authors' calculations using DWP 'Benefit expenditure and caseload tables 2022' and DWP Stat-Xplore statistics.

education system is less accessible or effective for children with disabilities. The focus in our analysis is on individuals born in 1984 or earlier, a group who were already adults before the recent increase in child disability claims. Nonetheless, it is worth noting that a small number of the individuals from the older cohorts we study will likely have had their education affected by disability, somewhat complicating the interpretation of our analysis. Children with disability may have different educational paths from non-disabled children, both due to differences in school performance, and due to facing different educational expectations (Chatzitheochari and Platt, 2019). More broadly though, these recent data suggest that generations that are younger than those we study in this commentary will be starting off with a higher prevalence of disability, which may well affect their progress through the education system. According to the models and empirical processes set out in the IFS Deaton Review chapters on early childhood development (Cattan et al., 2022), education (Farquharson, McNally and Tahir, 2022) and then health inequalities (Case and Kraftman, 2022; Fancourt and Steptoe, 2022), this is likely to feed through into further inequalities in health across the rest of the life cycle.

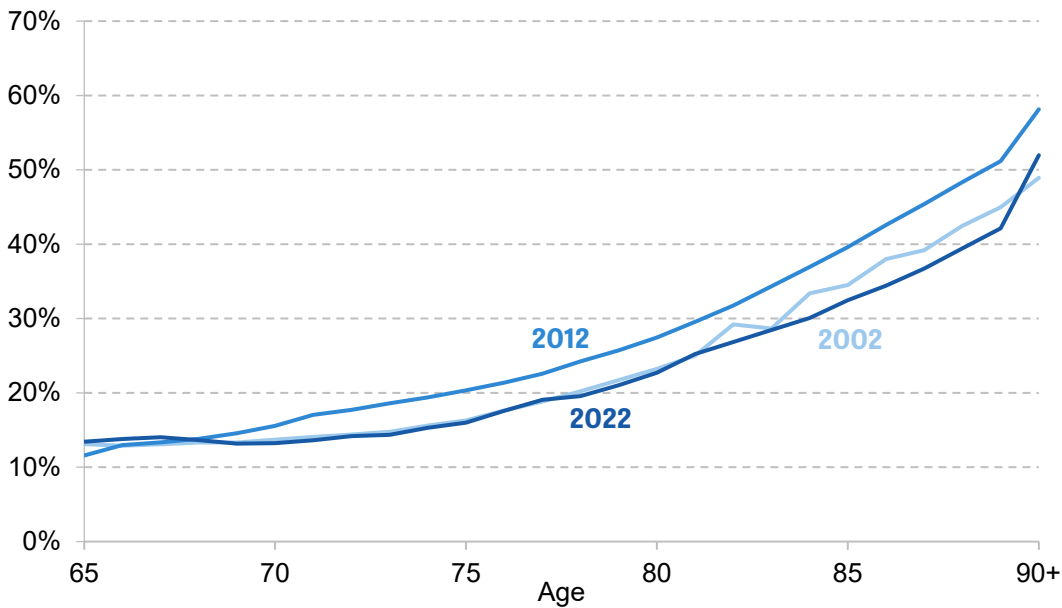
Moving back to Figure 2, we see a sharp growth in claim rates among working-age adults, with larger increases in both absolute and proportional terms among younger adults. While claim rates rose between 2002 and 2012 – when the disability benefit regime was broadly unchanged – growth at almost every working age was faster over the subsequent decade, during which time the personal independence payment reform discussed above was implemented. Precisely how that reform affected claim rates is beyond the scope of this commentary, though it is worth noting that overall claims did start to increase from their previous trajectory right around the time of the reform.

**Figure 2. Share of individuals claiming disability benefits by age, Great Britain**

**(a) Ages 0–64**



**(b) Ages 65+**



Note: The panels show the share of individuals, by single year of age, that receive disability living allowance, personal independence payment or attendance allowance. The sharp decline in claim rates around age 16 reflects the fact that the assessment process changes at that age, and child claimants are sometimes ineligible under the adult assessment criteria.

Source: Authors' calculations using DWP Stat-Xplore data and Office for National Statistics, 'Population estimates for the UK and constituent countries by sex and age: historical time series', <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland>.

While Figure 2 shows a long-running increase in disability benefit receipt for working-age adults, there is evidence that, very recently, growth has sped up further. Prior to the pandemic, around 19,000 people began a new working-age disability benefit claim each month, a level which had been fairly stable for several years. By the start of 2023, that figure had roughly doubled



(discussed in further detail in Joyce, Ray-Chaudhuri and Waters, 2022).<sup>6</sup> If these higher inflows are sustained over a period of time, this implies a significant long-run increase in the number of people on disability benefits.

Though the number of working-age disability benefit claimants has clearly risen over the past couple of decades, from age 60 the pattern is rather different. Figure 2 shows that claim rates for those 60 and over are today almost the same as – or if anything, slightly lower than – they were in 2002. In fact, between 2002 and 2012, there had been an increase in claiming, which has since been undone (it appears that there was a steady rise from 2002 to 2010, then a steady decline since).<sup>7</sup> Partly motivated by this, we largely restrict our focus to those of working age in the analysis that follows.

## Inequalities in disability over the life cycle

### Disability in working age

In this section we examine the prevalence of disability over the life cycle, using the Understanding Society (UKHLS) survey dataset. We split the sample by level of qualifications – those with degrees, those with A levels, O levels, GCSEs or equivalent qualifications, and those with no qualifications – and year of birth cohort, and show prevalence of disability by age.<sup>8</sup> The sample is those born between 1945 and 1984, aged 25–75 over the observation period.

Figure 3 shows the prevalence of disability by age among four different cohorts and three education groups. The figure shows that prevalence of disability is increasing with age across the life cycle from all ages – it is not just from middle age or later life onwards. Among each education group, the rate of disability doubles between ages 30 and 50.

Differences in rate of disability by level of education are also stark. Rates of disability are highest among those without any qualifications and lowest among those with degrees. The gap in the prevalence of disability is largest between those without any qualifications and those who have some, but the differences in prevalence of disability between those with some qualifications and those with degrees are also large – the rate of disability among those with some qualifications seems to be at a similar (or higher) level to the rate of disability among those with degrees who are a decade older. Inequalities in the prevalence of disability are widening steadily from age 30 onwards. The rate at which disability increases with age is faster among the least-educated group in each of the cohorts but, perhaps with exception of the earliest cohort born immediately after the second world war, this pattern is relatively similar across cohorts.

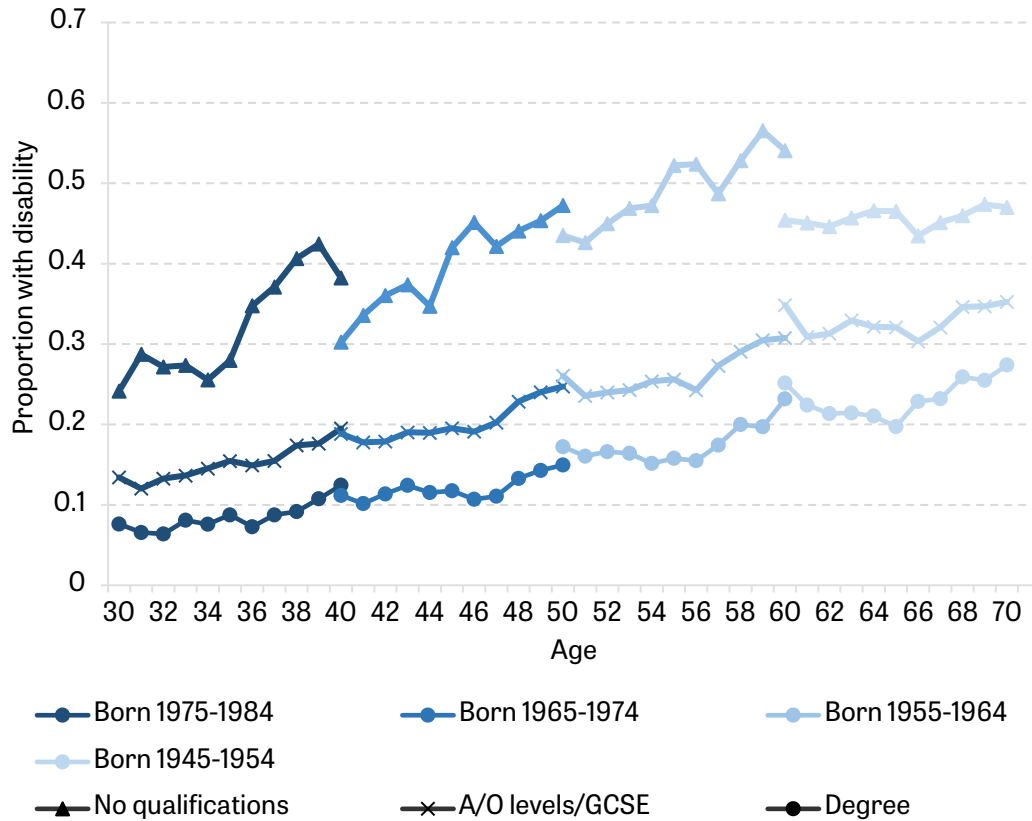
The gaps in prevalence of disability by education group are present for all cohorts from the youngest ages we look at (those aged 25–34 in 2009). The gaps between education groups are large relative to differences by age – the rate of disability among the cohort born between 1975 and 1984 and who have no qualifications, who were on average in their 30s through the

<sup>6</sup> These figures relate to England & Wales, as Scotland has recently begun to replace the main previously UK-wide disability benefit (PIP) with one of its own, complicating trends.

<sup>7</sup> Prior to 1998, DWP medical assessments (for incapacity benefits and disability benefits) were done 'in-house'. In 1998 they were outsourced to a private company that became Atos Healthcare (<https://publications.parliament.uk/pa/cm201213/cmselect/cmpubacc/744/74405.htm#note4>). This contract moved to a different company, MAXIMUS, in 2014 (<https://www.gov.uk/government/news/maximus-appointed-to-carry-out-health-assessments-for-the-department-for-work-and-pensions>), after a number of high profile complaints about Atos. It is possible that these two changes could have affected the number of successful disability benefit claimants and thus had an impact on the trends observed in these figures. However, if so, they would likely have had a bigger impact on the working-age trend, as only a very small share of attendance allowance applicants are required to get a medical assessment ([https://www.citizensadvice.org.uk/Global/Migrated\\_Documents/corporate/45665-cab-what-the-doctor--final-.pdf](https://www.citizensadvice.org.uk/Global/Migrated_Documents/corporate/45665-cab-what-the-doctor--final-.pdf)).

<sup>8</sup> Understanding Society is a longitudinal dataset, but in the first instance we construct a synthetic panel dataset in order to be able to use the full sample. The findings are robust to using a balanced panel, implying that differential mortality or attrition are not driving the patterns we see. In addition, investigations using a four-way education split that differentiates those with A levels from those with only A levels or GCSEs reveals that prevalence of disabilities for those two groups are broadly similar, with the A level group being slightly lower prevalence, as expected, but only by a small amount. As the biggest and most important differences are between those with the highest qualifications, those with no qualifications at all and the rest of the distribution, we just focus on a three-way education classification throughout.

**Figure 3. Long-standing and limiting disability**



Source: UKHLS, 2009–19.

observation period, is higher than the rate of disability among those with degrees who were born in 1945–54 who were, on average, in their 60s over this period.

When looking at differences in rates of disability between education groups across cohorts, it is important to bear in mind that the relative sizes of the educational groups are very different between generations. There are more people with no qualifications and fewer people with degrees in the older generations, and vice versa. This may also explain why there are larger differences in rates of disability between cohorts in the no-qualifications group, than the other two educational groups, as each successive generation without qualifications is on average smaller, and likely to be more disadvantaged, than the previous generation.

### Types of disability over the life cycle

While we do not have full information on the types of conditions affecting people with disabilities in the survey data, we can use the SF-12 questionnaire of Understanding Society (as described in the introduction) to assess whether trends in disability differ by mental and physical functioning.

These measures of mental and physical functioning and the self-reported disability measure are closely, but not perfectly, related. Out of those aged 25–64 with a poor physical functioning score, 87% report having a long-standing limiting impairment or disability, and out of those with a poor mental functioning score, 48% have a long-standing impairment or disability. The poor functional health measures seem to capture more severe levels of disability – out of those aged 25–64 reporting a disability, 42% have a low score from mental or physical health (or both).

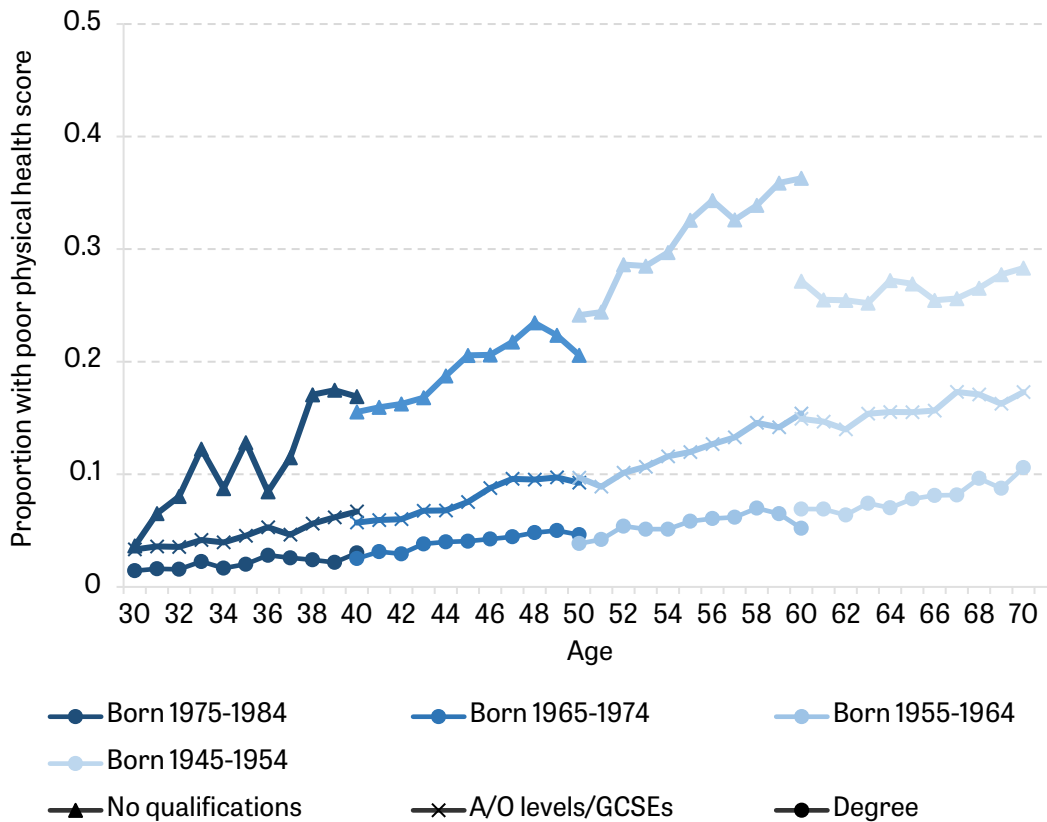
Figures 4 and 5 illustrate patterns in poor mental and physical functioning over the life cycle, again splitting the sample by year of birth and level of educational qualifications. Focusing first on the poor physical health functioning score, Figure 4 shows that the prevalence of poor physical health at age 30 is relatively similar (and low) for all education groups. But its path after that differs strikingly by education, with much faster increases for lower-educated groups, resulting in large gaps by older ages. The increase in poor physical health seems to follow a similar pattern

between cohorts – there are no large differences in prevalence of poor physical health between cohorts at similar ages, apart from the two oldest cohorts with no qualifications where the younger cohort at 60 experienced higher rates of poor physical health than the oldest cohort at a similar age.

In Figure 5, which focuses on poor mental health and functioning, the prevalence is still higher among those with less or no qualifications. However, the patterns now look very different. First, while with disability and poor physical health we saw the prevalence of both steadily increasing with age, the same is not true for poor mental health. Among the oldest cohort, prevalence of poor mental health is low, and relatively stable – or even falling – with age. In fact, the prevalence of poor mental health is higher for each later cohort, and the rate of increase is also faster among younger cohorts. The differences between education groups are now smaller than they were for poor physical health or general disability, especially among the oldest cohort.

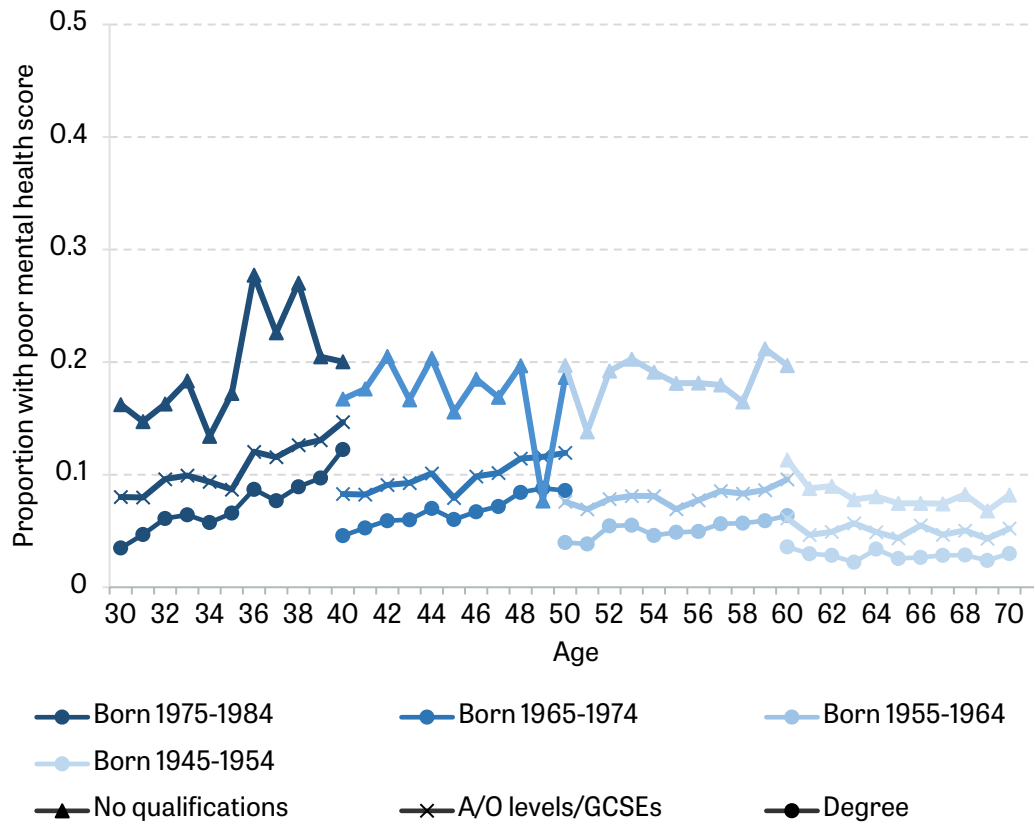
Taken together, these figures illustrate that low levels of education and old age are strongly linked to higher prevalence of physical disability, but with mental health we have seen a generational shift where, regardless of educational group, each successive younger cohort is more likely to have poor mental health functioning. The patterns in mental health are sufficiently different to those that we observe in physical health that the cohort, education and age patterns are flipped – those in the worst-educated group in the oldest cohorts, who are observed in their 60s during this period, have better mental health scores on average than those in the youngest cohorts with degrees who are observed in their late 30s.

**Figure 4. Poor physical health score**



Source: UKHLS, 2009-19.

**Figure 5. Poor mental health score**



Source: UKHLS, 2009-19.

The figures in this section show large differences in rates of disability between educational groups. In some instances, and particularly between ages 30 and 60, these educational differences in disability play a larger role than age in accounting for inequalities in the prevalence of disability. The gaps between educational groups already exist in early adulthood, which suggests that, through effects on other outcomes such as employment and labour market outcomes, inequalities in the prevalence of disability since early adulthood are likely to end up widening existing inequalities in lifetime earnings and financial resources.

### The rise in mental health issues

One question which often arises when discussing the striking rise in the prevalence of self-reported poor mental health, and mental health inequalities, is the extent to which this is a 'real' increase in mental health issues, or whether this pattern is driven by a reporting effect where people are more willing to report having a mental health condition in surveys in more recent years, due perhaps to more awareness and less stigma around mental health conditions.

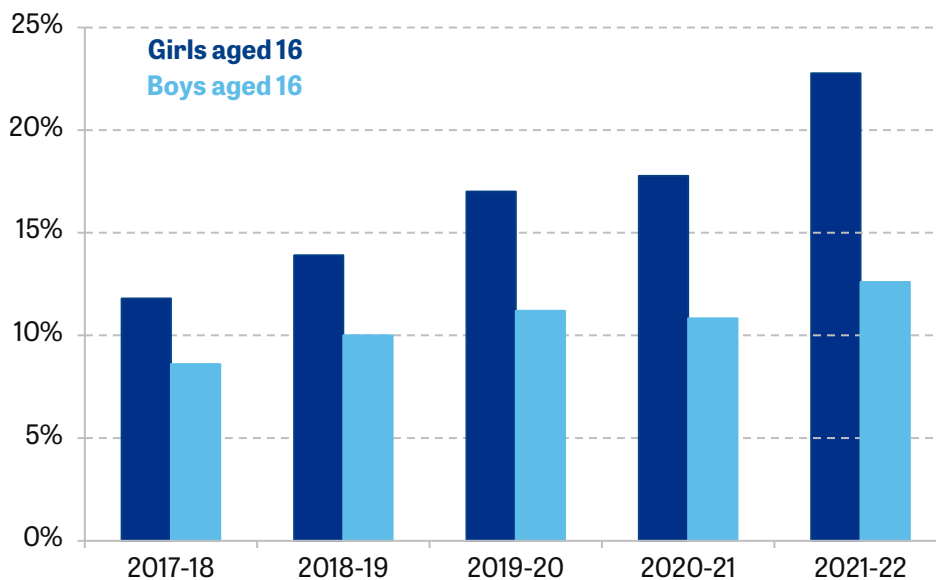
The question of whether the increase in mental health conditions is 'true', or due to changes in reporting, is a difficult question to answer in a satisfactory way. As the SF-12 questions in Understanding Society ask about the individual's emotional problems and how they affect their life, rather than a specific diagnosis, it could be argued that those questions more objectively capture the effect of mental health issues on the individual's daily life, indicating a true effect. Nevertheless, individuals may still be more able to recognise, or willing to acknowledge, such issues than they were in the past. To what extent can we corroborate this evidence on the rise in mental health issues?

Administrative data also point to similar trends of increasing rates of poor mental health, especially among younger generations. The vast majority of the rise in the disability benefit caseload among working-age people that we have seen in Great Britain is driven by more people getting disability benefits due to mental health conditions (Cribb, Karjalainen and Waters, 2022). Once again, however, this could partly be due to greater awareness of, or reduction in stigma

around, mental health conditions leading to more people applying for these benefits than in the past, even if the underlying level of mental health has not worsened.

Perhaps more strikingly, there has also been an increase in the number of people accessing mental health services in recent years. While the pandemic may explain some of this trend, the increases in the proportion of the population accessing these services was clear even pre-pandemic. The NHS Mental Health Bulletin<sup>9</sup> reports that in 2014–15, 3.4% of the overall population in England had had contact with NHS-funded secondary mental health, learning disabilities and autism services in that year, and this figure had grown to 5.1% in 2019–20, and 5.8% in 2021–22. This increase has been even more pronounced among younger age groups, and even more so among girls. As Figure 6 shows, the proportion of girls aged 16 who are in contact with these services increased from 11.8% in 2017–18 (the earliest year of the data for children), to 17.0% in 2019–20 and 22.8% in 2021–22. This means that among girls aged 16, more than one in five were in contact with NHS mental health services in 2021–22, which is a near doubling of the rate just four years earlier.

**Figure 6. Proportion of 16-year-olds in England in contact with NHS-funded secondary mental health, learning disabilities and autism services**



Source: NHS Mental Health Bulletin, 2021–22 Annual report, <https://digital.nhs.uk/data-and-information/publications/statistical/mental-health-bulletin/2021-22-annual-report> (table 3 of England Outpatients Reference Tables).

Other data sources show a similar increase in mental health issues particularly among children. An NHS survey of children and young people's mental health in England (based on the widely used Strengths and Difficulties Questionnaire behavioural screening questionnaire) also found that rates of probable mental disorder in children aged 7–16 rose from one in nine in 2017, to one in six in 2020 (NHS, 2022). Some signs of a similar trend can be seen in suicide rates – between 2012 and 2019, suicide rates among women and girls aged 10–24 roughly doubled.<sup>10</sup>

It is of course possible that the reduction in stigma around mental health conditions also means that people with the same level of mental health problems are now more likely to access these services than they were in the past. Indeed, the number of people who are admitted as inpatients following contact with NHS mental health services (most likely those with the most severe mental health issues) has been falling steadily over time (according to the NHS Mental Health Bulletin), suggesting that the increase in numbers in contact with the NHS for mental health care is driven

<sup>9</sup> See <https://digital.nhs.uk/data-and-information/publications/statistical/mental-health-bulletin/2021-22-annual-report>, table 3.

<sup>10</sup> See <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/suicidesintheunitedkingdom/2021registrations>.

by milder conditions. However, without more thorough research it is difficult to assess to what extent some of the fall in the number of inpatients is due to changes in treatment methods or capacity constraints.

The extent to which changes in reported mental health issues, use of mental health services and receipt of disability benefits for mental health conditions are due to changes in people's reporting rather than an increase in the rate of poor mental health remains an interesting question for further study. But one might argue that, regardless of the extent to which the reported increase in mental health issues is actually due to underlying changes in mental health, there is also a legitimate concern about the pressures on public services, which the administrative data confirm to be very real. These pressures are driven by changes in people's behaviour in contacting mental health services and applying for disability benefits regardless of the underlying cause. A key source of data to investigate the important issue of whether we also see these trends in clinical diagnoses of conditions is the Adult Psychiatric Morbidity Survey (APMS), which is collected periodically in the UK. The next wave, which will update the most recent evidence from 2014, will take place in 2023 (Baker and Kirk-Wade, 2023). Given the importance of mental health issues, and the rapid rises in prevalence and inequalities in mental health and functioning in recent years, there is a strong argument these data should be collected more frequently than every 10 years.

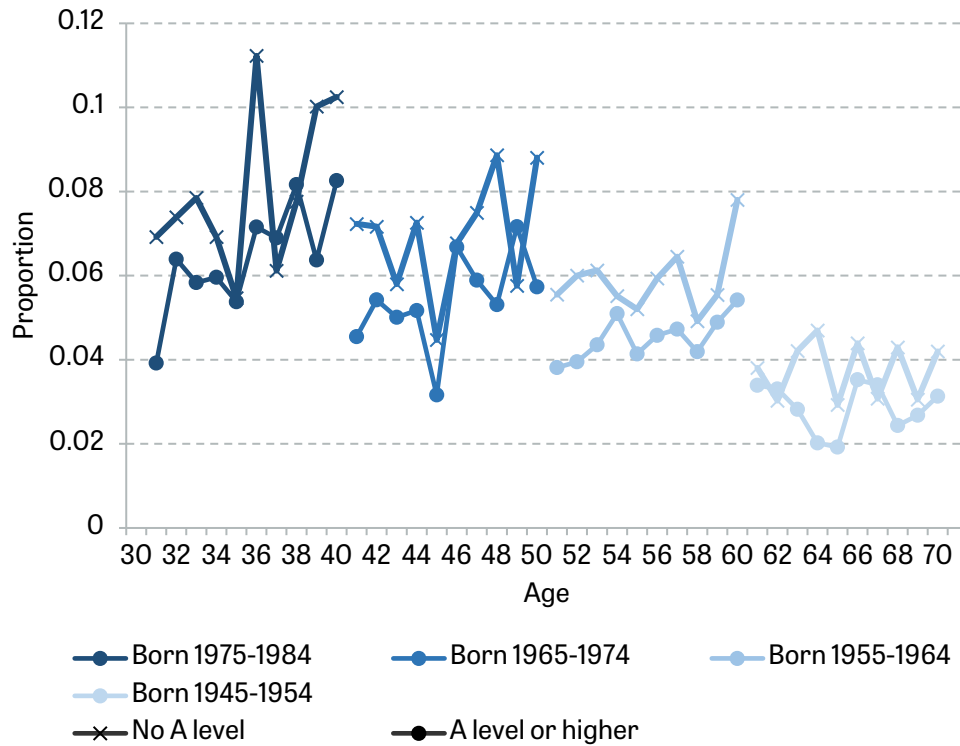
### **Incidence and persistence of poor mental health**

High and increasing rates of poor mental health, especially among younger generations, have potentially very important implications for rates of disability, disability benefit receipt and care needs for those generations in the future. As described in the previous section, the IFS Deaton Review chapters on early childhood development (Cattan et al., 2022), education (Farquharson et al., 2022) and health inequalities (Case and Kraftman, 2022) illustrate how inequalities in health early on in life feed through to further inequalities in health in later life. It is also not just health in childhood that matters for later-life outcomes – there is also evidence that mental ill health of young adults, as well as positive psychological characteristics in mid-life, can be important predictors of later health (see the commentary for the IFS Deaton Review by Fancourt and Steptoe, 2022). Mid-life conditions can also matter for cognition later in life – Cooper et al. (2015), in their meta-analysis, find that diabetes as well as neuropsychiatric problems such as depression earlier in life increase the risk of new incidence of dementia. Exalto et al. (2014) find that vascular risk factors in mid-life are highly predictive of dementia decades later. And both later-life health and cognition will of course be closely linked with disability and care needs in later life.

In order to better understand the evolution of increased prevalence of mental health issues, we look at the changes in the incidence and persistence of poor mental health over the life cycle, by cohort and education group (see Figures 7 and 8). We define incidence as the proportion of people who move into poor mental health out of those who were not in poor mental health in the previous period. We define persistence as the proportion of people who stay in poor mental health, out of those who were in poor mental health in the previous period. We now combine all those with any qualifications (i.e. people with A levels and degrees) as sample sizes are smaller due to the conditioning on poor or good mental health in the previous period. The measures are now noisier (due to smaller sample and also the fact that these measures are the ratio of two fractions), but we can see a few interesting patterns emerge.

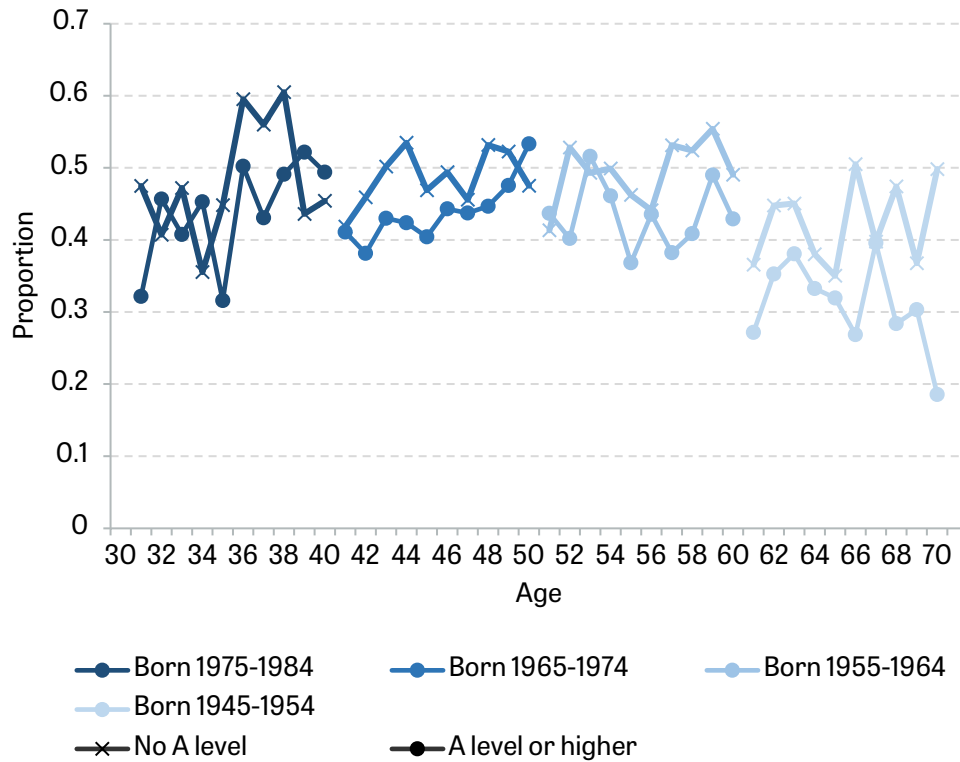
Both incidence and persistence of poor mental health seem to be higher among younger cohorts, and both are also increasing with age, especially across the younger cohorts. These patterns suggest that both the increase in the incidence – onset of new mental health issues – and persistence – the extent to which those with poor mental health stay in poor mental health over time – play a factor in explaining the rise in the prevalence of mental health conditions among these cohorts. We also see increases in incidence and persistence of mental health conditions among both education groups, although, as with previous findings, both rates are slightly higher among the lower-education group.

**Figure 7. Incidence of poor mental health**



Source: UKHLS, 2009-19.

**Figure 8. Persistence of poor mental health**



Source: UKHLS, 2009-19.

### Experience of pain

Another aspect of health and disability which has been relatively under-studied in the UK context is the prevalence of pain. The experience of pain is another dimension for assessing how health affects people's daily lives. It may also be easier to argue that compared with mental health issues, the experience of pain is a more objective measure of how health affects daily functioning, where reporting changes are less likely to play a role in driving patterns over time.

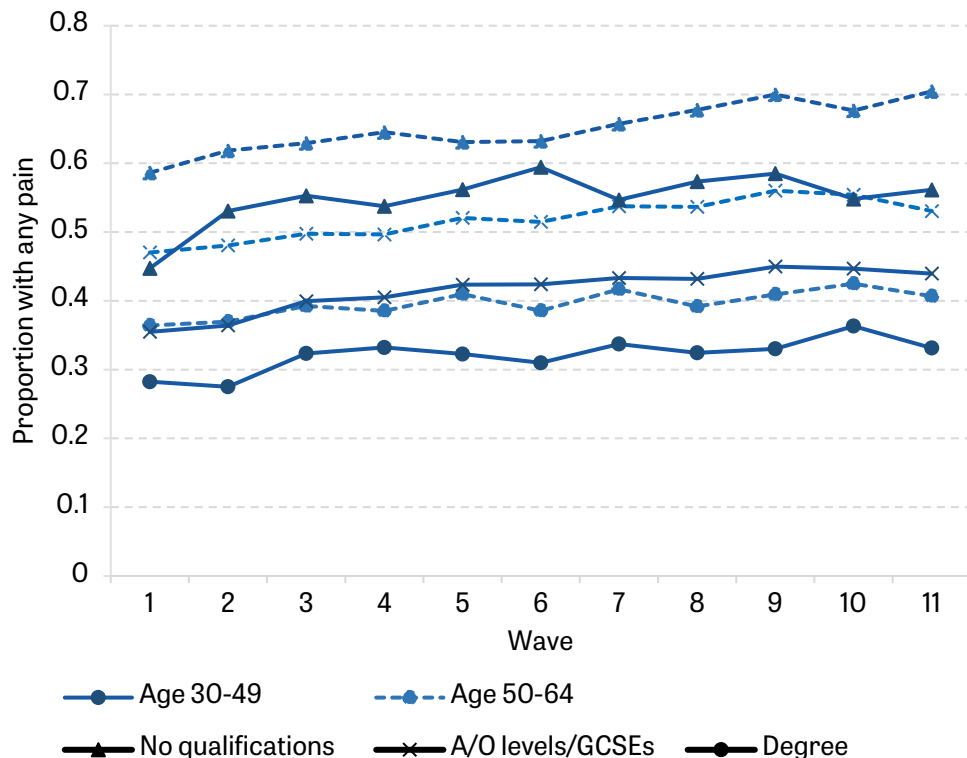
Evidence from the United States shows that younger cohorts in their mid-life report experiencing more pain than older cohorts did either at the same age, or even at older ages. This has been used to argue that in the US the elderly of the future will be sicker than today's elderly (Case, Deaton and Stone, 2020).

We assess the extent to which we can see similar patterns in the UK, by using self-completion questions on pain from Understanding Society, as described in the introduction. We split the working-age sample into two age groups (those aged 30–49 and those aged 50–64) and three education groups, and follow each group over time from wave 1 to wave 11 (2009–19).

Figure 9 shows prevalence of any pain among these age and education groups, and Figure 10 shows prevalence of moderate or worse pain. As with the rates of long-standing limiting illness and poor physical health, we can see that prevalence of both any pain and moderate or worse pain is higher among older people. But once again, differences between educational groups are even starker, and particularly so for moderate or severe pain – those aged 30–49 with no qualifications have higher rates of moderate or severe pain than those aged 50–64 with O levels/GCSEs or A levels, and those aged 30–49 with O levels/GCSEs or A levels have higher rates of such pain than those aged 50–64 with degrees.

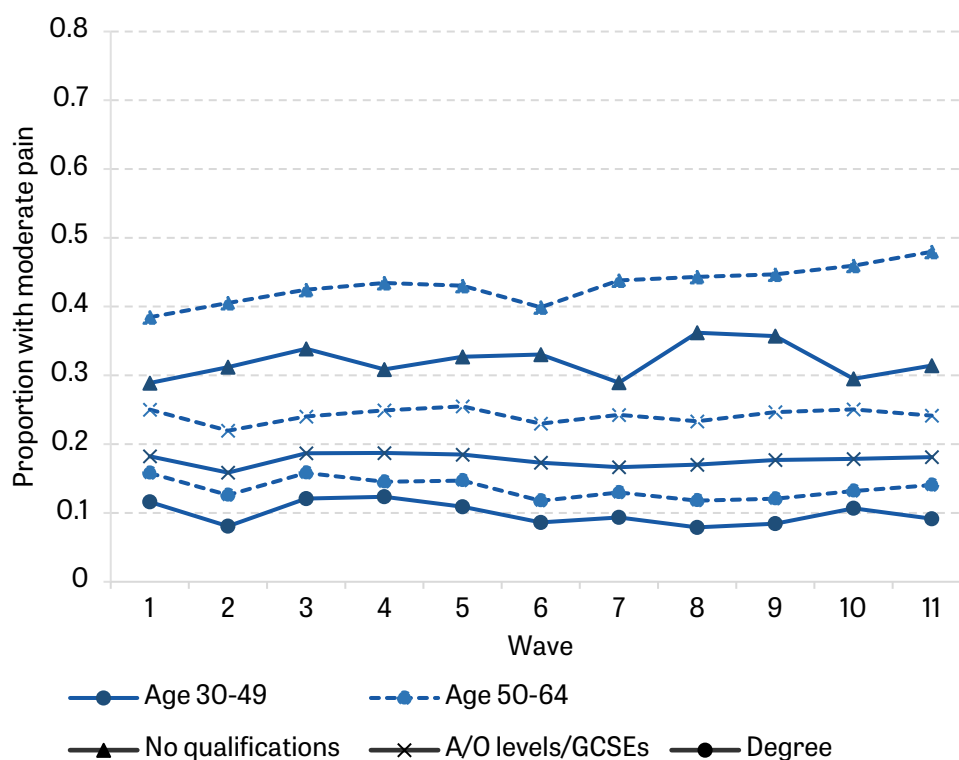
Prevalence of reporting pain seems to be increasing over time, especially 'any' pain, and more rapidly so among the lowest-educated groups. This increase also seems to be mostly driven by increases in reporting of milder pain, as the increase in reports of moderate or worse pain is only clear for the older age group without qualifications. In addition, there is increasing inequality in moderate and severe pain over the sample period, with prevalence rising or constant for the those with no or some qualifications and, if anything, falling slightly for those with degrees.

**Figure 9. Prevalence of any pain**



Source: UKHLS, 2009–19.



**Figure 10. Prevalence of moderate or worse pain**

Source: UKHLS, 2009–19.

## A further look at disability at older ages

The previous section looked at disability over the life cycle among all working-age individuals and showed differences within cohorts already apparent by age 30 and then widening steadily from age 30 onwards. In this section, we document trends in disability amongst a single older cohort using ELSA data, showing how life-course differences have culminated in patterns of inequality in the prevalence of disability in late working life for the birth cohort born between 1943 and 1952. Focusing on a cohort of older working-age individuals is important for two reasons. First, the rate of disability among this group will relate to their ability to participate in the labour market, and the rise in economic inactivity among this age group is a topic that has gathered a great deal of interest especially since the pandemic (see, e.g., Boileau and Cribb, 2022). Second, understanding patterns and inequalities in disability among this age group will allow us to get an early view of upcoming inequalities in care needs at older ages.

Across this section, we document initial levels and inequalities in disability and how they evolve among the cohort of individuals who were interviewed at ages 50–59 in wave 1 of ELSA in 2002. We can track this cohort for the next 17 years over nine waves of data, by which time they are aged 67–76. Given that we follow older people over a long time period, differential mortality and attrition may affect the patterns we find, as those in lower socio-economic groups are more likely to die, or to cease responding to the survey for other reasons, by the end of the sample period. Because of this, when analysing the ‘shape’ of trajectories, we consider a balanced panel of only those who survive until the final interview wave, and continue to participate in ELSA throughout. This tells us the kind of trajectory in disability that those still in the sample at the end of the period have experienced. It will, however, underestimate the initial differences in disability within the cohort, as those with higher rates of disabilities are less likely to be in the balanced sample. So for analysing the nature and extent of inequalities in the overall population aged 50–59 at the start of the period, we also want to use an unbalanced panel of all individuals.

Our balanced sample is those that are observed at baseline, and in at least seven of the subsequent eight waves. Our unbalanced sample is those observed at baseline and then at least one more time

over the next 17 years. Differential mortality is evident from the educational composition of the two samples. In the unbalanced sample ( $N = 4,161$ ), 28.5% have no qualifications and 15.8% have a degree, whereas in the balanced sample ( $N = 2,022$ ), the proportions are 21.6% and 20.1%, respectively, as mortality among those with degrees is much lower than among those with no qualifications. In what follows, we present our results for both samples, using the unbalanced sample (left panel of figures) to discuss the initial gaps that this cohort has arrived in their 50s with, and the balanced sample (right panel of figures) to discuss the shape of their subsequent trajectories.

Like the other household surveys we use, ELSA has questions that can be used to define disability as having a long-standing and limiting illness. However, compared with other surveys, ELSA has a wider set of questions that, for those in their 50s, can capture different aspects of disability in more detail. In this section, we consider measures of functional limitations (ADLs and IADLs), experience of pain, depressive symptoms and quality of life. A detailed definition for each of these measures can be found in the data and methods section.

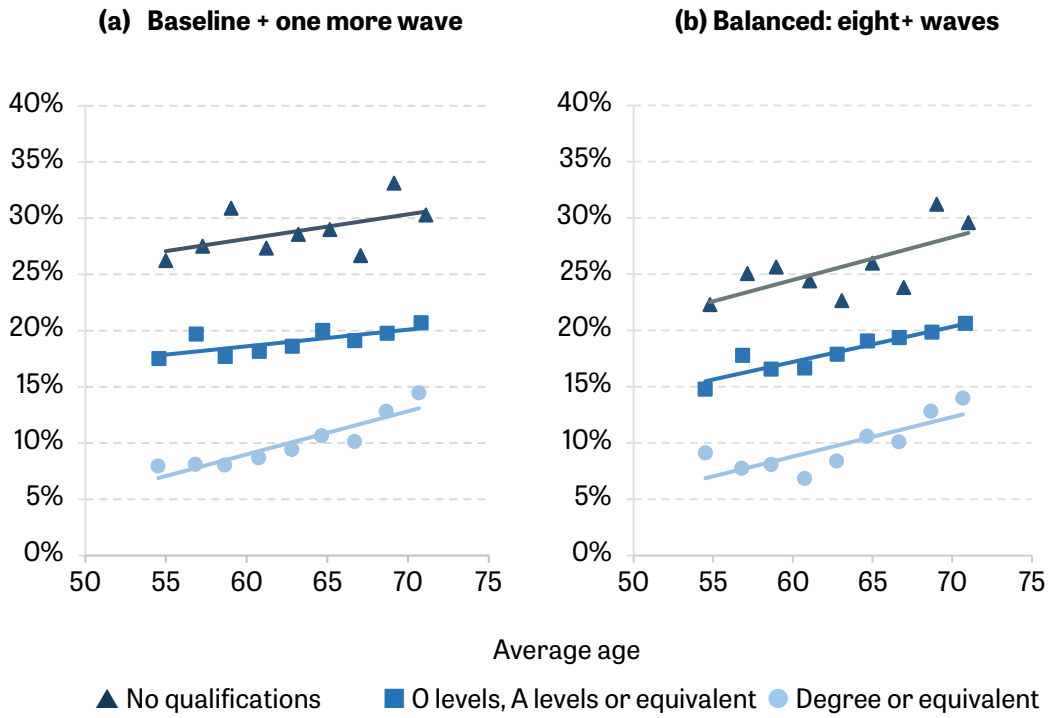
In Figures 11 and 12, we show how the prevalence and number of functional limitations that individuals experience, as well as their trajectories over time, differ between education groups. A particular benefit of ELSA when looking at trends in functional limitations is that the questions around ADLs and IADLs are asked of respondents of all ages, whereas most other surveys only start asking these questions of people aged 65 and over. Figure 11 shows the proportion of people with any ADL or IADL limitations by educational qualifications. In addition to looking at the prevalence of having at least one limitation, we also look at the average number of limitations among each of these groups, which is shown in Figure 12.

We first focus on the panels on the left-hand side of these figures to examine the initial gaps in functional limitations among those aged 55. The figures show that there are very large gaps in initial levels of functional limitations between educational groups. For example, 26% of the group with no educational qualifications have at least one functional limitation in their 50s, compared to 8% among those with degrees in their 50s. The least educated also have four times more limitations than the most educated at the beginning of the trajectory (average number of 0.8 among those without qualifications compared to 0.2 among those with degrees).

Comparing panels (a) and (b) in Figure 11, we can see how the initial levels of functionality differ between the unbalanced and balanced panels. As expected, the gaps in initial levels of functional limitations are smaller among the balanced panel than among the unbalanced panel. This is because within the education group, those who survive to the end of the balanced panel are, on average, healthier than the full unbalanced sample at the start of the period. The effect of differential mortality is more pronounced for those with lower levels of education, as average mortality among this group is higher than among the high-educated groups.

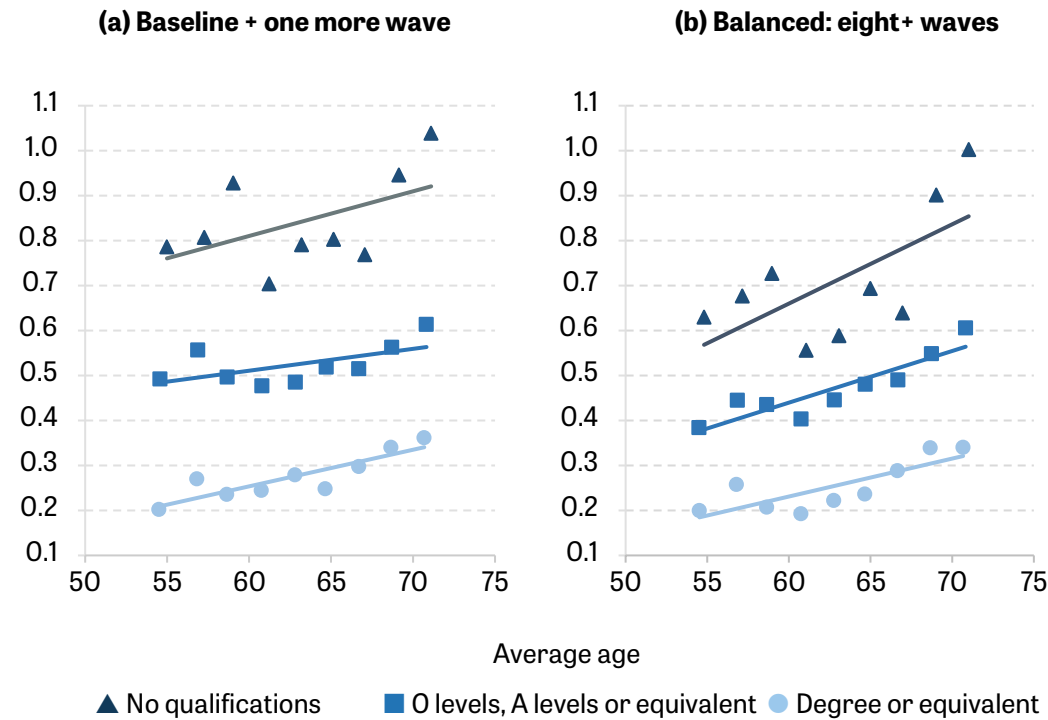
In Figure 11(b) and Figure 12(b), we can compare how disparities in functional limitations by educational groups relate to disparities by age. The rate of increase in prevalence and number of functional limitations by age is similar across educational groups. But due to the initial differences in the level of limitations, individuals with degrees do not even reach the functional limitation level of those in the middle education group even 15 years later. Similarly, it takes more than 15 years for individuals with some qualifications to reach the functional level of those with no qualifications. As a result, one could say that this cohort goes through later working life with a disability gap of over 30 years from the top to the bottom of the education distribution.

**Figure 11. Proportion with any ADL and IADL limitations by educational qualifications, cohort born 1943–52, ELSA data 2002–18**



Source: ELSA, waves 1–9 (2002–18).

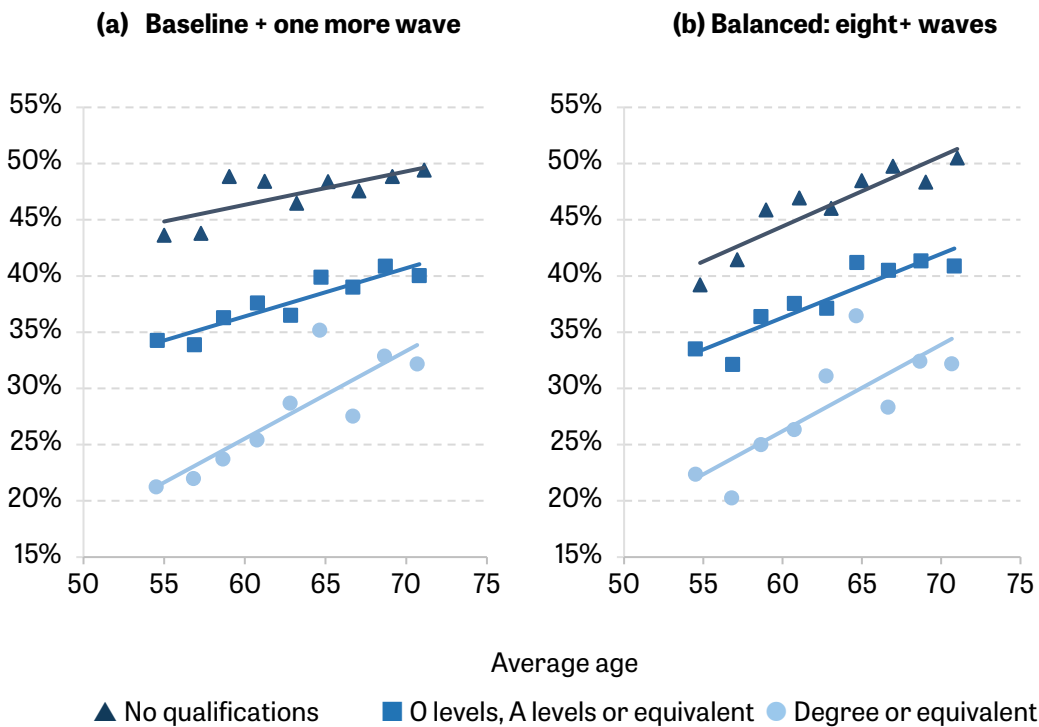
**Figure 12. Number of ADL and IADL limitations by educational qualifications, cohort born 1943–52, ELSA data 2002–18**



Source: ELSA, waves 1–9 (2002–18).

The findings depicted in Figure 13, which shows the prevalence of being often troubled by pain, indicate that comparable trends emerge with regard to experience of pain – prevalence of pain increases by age, and there are large differences in initial levels of pain between education groups. As we saw with functional limitations, the initial disparities in the unbalanced sample (left panel) are significantly larger than those in the balanced panel (right panel) due to differential mortality and attrition. In the unbalanced panel, among those with no educational qualifications, the prevalence of pain among 55-year-olds is around 45%, which is more than double the rate of pain among those 55-year-olds with degrees. And even by the end of the period, the prevalence of pain among those with degrees at age 70 is about a third – which is below the prevalence of pain among those with no qualifications at age 55. By age 70, more than half of those in the no qualifications group are often troubled by pain.

**Figure 13. Prevalence of pain by educational qualifications, cohort born 1943–52, ELSA data 2002–18**

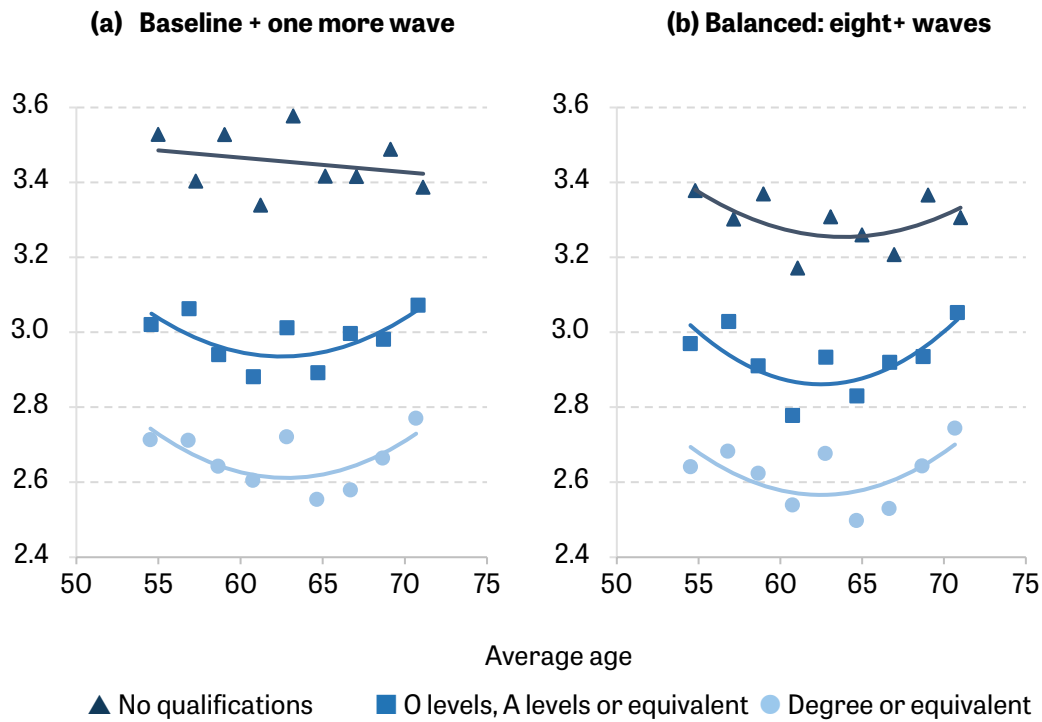


Source: ELSA, waves 1–9 (2002–18).

Figure 14 shows these patterns for the number of depressive symptoms. For this measure, the trajectories look different from our other measures of disability. Focusing on the trajectories in Figure 14(b), we can see that the worst outcomes are typically observed for those in their mid-50s. Outcomes then tend to improve as individuals age, before eventually deteriorating once again. Given this pattern, a quadratic fit is appropriate to model these trends. Similar U-shaped patterns in depressive symptoms by age have been well documented in other studies of depression and mental health over the life course (Blanchflower and Graham, 2022).

While these trajectories have a different shape from the previous measures of disability, the overarching patterns and conclusions are similar to our previous findings. We see very large differences in rates of depression by educational attainment, and these differences are far larger than disparities by age.

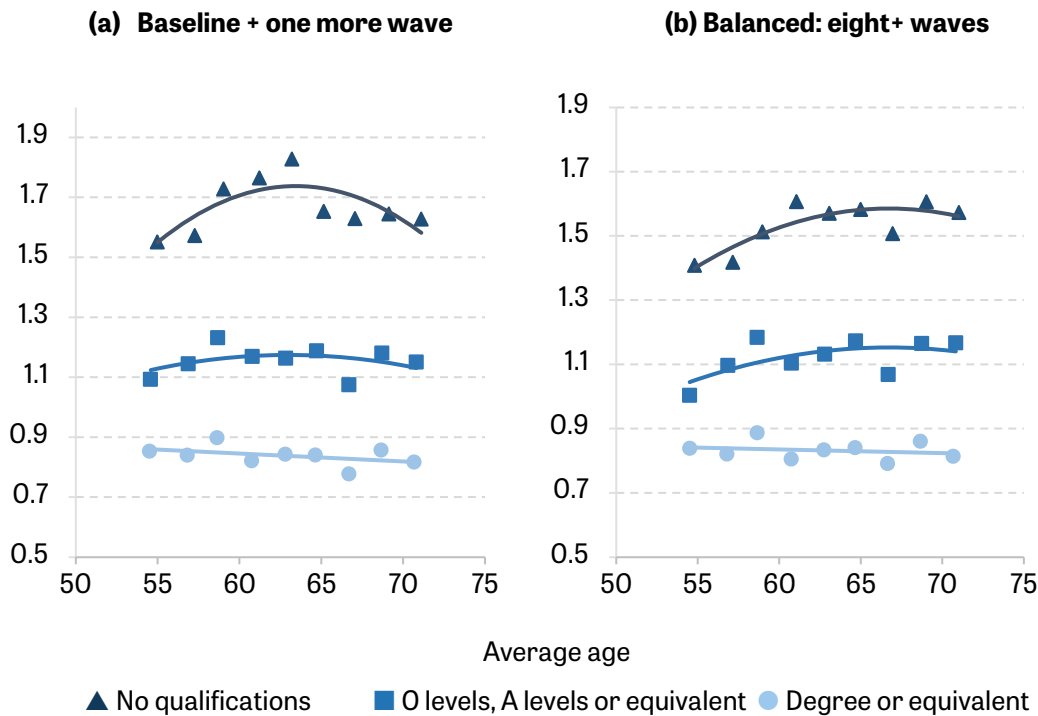
**Figure 14. Number of depressive symptoms by educational qualifications, cohort born 1943–52, ELSA data 2002–18**



Source: ELSA, waves 1–9 (2002–18).

In addition to the measures of functional limitations, pain and depression, ELSA also includes numerous psychosocial measures that allow us to explore how inequalities in measures of disability correspond to disparities in quality of life. Figure 15 illustrates these trends in poor quality of life, using the definition that we outlined in the introduction. The figure shows that disparities in quality of life between educational groups are large and present from the start of the period. In terms of trajectories, those with high education appear to be experiencing, if anything, a slight improvement in quality of life as they age, while those with middle education levels experience a slight decline, and those with low education levels experience a more pronounced decrease. Notably, our measure of poor quality of life is twice as high for those with the least education compared with the most educated at all ages. It seems unlikely that those with the highest levels of education will ever experience the same average level of poor quality of life as the other groups, regardless of their age.

**Figure 15. Poor control/autonomy score by educational qualifications, cohort born 1943–52, ELSA data 2002–18**



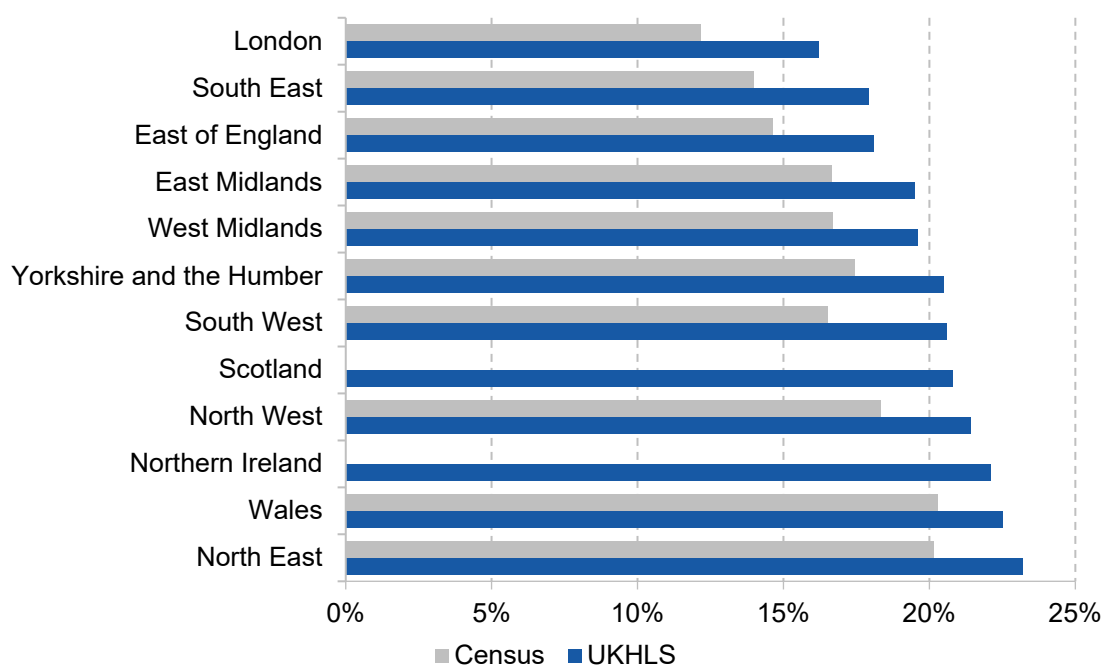
Source: ELSA, waves 1–9 (2002–18).

## Disability and the labour market

We now turn to examine inequalities in disability and labour market outcomes, and how the two interact. Much has been written about the disability employment gap for the working-age population on aggregate – see, for example, Roberts et al. (2020), Jones (2022) and Bryan et al. (2023) – and we do not intend to re-tread that ground here, although we do summarise the main findings below. Instead, we examine two things. First, how do disability and disability benefit rates vary across the country, and how does that relate to the strength of the local labour market?<sup>11</sup> Our second contribution is to study how education and region shape labour market outcomes for disabled individuals at later stages of working life when the possibility of retirement looms. As in the previous section, we draw on ELSA data to allow us to go beyond broad definitions of disability and examine the role of, and control for, different dimensions of disability including ADLs/IADLs and pain.

We begin by showing the share of the working-age population (25–64) that report a disability in each region and nation of the UK, both in the UKHLS data we use elsewhere in this paper (taking the average between 2009 and 2019) and, as a cross-check, in the 2021 Census for England and Wales (equivalent Census data are not available for Northern Ireland or Scotland). UKHLS reports a modestly higher disability rate (around 3 percentage points). This difference may be due to the ways in which the Census and UKHLS ask the questions: the Census asks whether the respondent has any condition that reduces their ability to carry out ‘day-to-day activities’, whereas UKHLS goes through 12 separate activities (e.g. mobility, lifting objects) and asks whether the respondent has a condition that causes them substantial difficulties in carrying out any of those activities.

<sup>11</sup> Here, for our measure of geography, we use the standard 12 region definition as is often used in work on geographical inequality. Future work could use more finely grained geographical measures to more precisely document the interaction between disability, the local labour market and education.

**Figure 16. Disability rates by region: UKHLS and Census**

Note: Sample restricted to those who are aged 25–64. Census statistics are for 2021; UKHLS statistics are the average across UKHLS waves 1–11. At the time of writing, the published Scottish and Northern Irish censuses did not contain comparable statistics.

Source: Nomis, Census 2021; and UKHLS, waves 1–11.

Despite the modest average difference, the regional patterns are similar between UKHLS and the Census. Disability is strongly regionally patterned, with London having a disability rate of 16% (in UKHLS), compared to 23% in the North East.

Table 1 explores this regional relationship further, and in a way that allows us to control for potential compositional differences in the regional populations in order to understand, for example, to what extent the lower rate of disability in London can be explained by the population being younger on average in London compared with the rest of the country. Column 1 shows the raw (unconditional) fraction of the working-age population who are disabled, expressed relative to the disability rate in Yorkshire and the Humber (which has the median unconditional disability rate) – in other words, reproducing the same statistics as seen in Figure 16. Columns 3 and 5 show the equivalent figures for the fraction of the population with poor physical or mental health, respectively, which generally show similar regional rankings.

Each of columns 2, 4 and 6 then examines how much of these differences in disability and poor mental and physical functioning are explainable by demographic differences (age, sex and education<sup>12</sup>). Broadly, we find that they explain some, but by no means all or even most, of the differences across region. The ranking of regions changes little, and the magnitude of differences reduces only modestly (for example, the standard deviation of regional disability rates falls by a third).

<sup>12</sup> Specifically, we control for: sex; age and its square; and age and its square interacted with a three-way education variable.

**Table 1. Regional differences in disability and health**

	Disability		Poor physical health		Poor mental health	
	Unconditional (1)	Conditional (2)	Unconditional (3)	Conditional (4)	Unconditional (5)	Conditional (6)
Reference: Yorkshire and the Humber unconditional mean	20.5%		8.7%		9.8%	
North East	0.027**	0.025**	0.010	0.008	0.002	0.004
Wales	0.020**	0.013	0.011	0.007	0.007	0.006
Northern Ireland	0.016	0.005	0.020***	0.012*	-0.011*	-0.017***
North West	0.009	0.012	0.009	0.011*	0.000	0.002
Scotland	0.003	-0.000	0.002	-0.001	-0.006	-0.004
South West	0.001	0.003	-0.007	-0.005	-0.013**	-0.008
West Midlands	-0.009	-0.011	-0.006	-0.007	-0.003	-0.004
East Midlands	-0.010	-0.011	-0.008	-0.008	-0.016***	-0.015***
East of England	-0.024***	-0.021**	-0.020***	-0.017***	-0.020***	-0.018***
South East	-0.026***	-0.015*	-0.024***	-0.017***	-0.019***	-0.013**
London	-0.043***	-0.015*	-0.023***	-0.007	-0.014**	-0.007
<i>N</i>	256,105	256,105	256,105	256,105	256,105	256,105

Note: Sample restricted to those who are aged 25–64. \*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

Source: UKHLS, waves 1–11.



How do these differences in disability, and physical or mental health and functioning relate to other outcomes? In Table 2, we carry out a similar regional breakdown analysis for the numbers on disability benefits and the numbers in work. We also look at the numbers of disabled individuals receiving disability benefits and the numbers in paid work.

Column 1 of Table 2 shows the fraction of the population that receive health-related benefits (either incapacity or disability benefits). There are two important points here. First, while the ranking of nations and regions is broadly similar to that for disability rates overall, Northern Ireland stands out – its rate of disability is third of the 12 nations and regions, but its rate of health-related benefit receipt is by far the highest (14%, 3 percentage points above the second highest). Second, the differences between nations and regions in health-related benefit receipt are, in proportional terms, larger than for disability (even excluding Northern Ireland). Column 2 shows differences in health-related benefit rates once we control for the same demographics as above – as well as mental and physical health.

Surprisingly, even controlling for health makes fairly little difference to the rankings of regions, though it has somewhat more of an effect on the magnitudes of differences (with the standard deviation falling by 43%). This same point is emphasised in columns 3 and 4, which examine the likelihood of claiming health-related benefits among only those that report a disability. We see substantial differences across regions and again Northern Ireland is an outlier, with disabled people there much more likely to claim than disabled people elsewhere.

The final four columns of the table examine labour market outcomes. Columns 5 and 6 show how overall employment rates (i.e. regardless of disability) vary across the regions and nations, and how much of those differences are explained by demographics. As is well known, northern regions (including Yorkshire and the Humber, the reference region) have lower employment rates, and Northern Ireland the lowest. Columns 7 and 8 show how employment rates vary among those with a disability. There is a strong correlation between the overall employment rate and the disability employment rate (with the former explaining 86% of the variation in the latter). Importantly, the regional differences in employment for disabled people are larger than for the population as a whole – on average, for every 1 percentage point higher the divergence in regional employment rates, the disability employment rate diverges by 2 percentage points.

Together, these results help us piece together a picture about regional inequalities in disability and work. Some regions, such as Yorkshire and the Humber and the North East, have weaker labour markets, which implies especially weak labour markets for those with disabilities. And, because entitlement to health-related benefits and the incentive to claim them is related to labour market outcomes, it is in those regions with weak labour markets that health-related benefit receipt is especially high (i.e. the correlation between columns 1 and 7, or columns 2 and 8, is strong). This is consistent with individual-level evidence showing that local labour market conditions affect likelihood of claiming incapacity benefits even conditional on health (Roberts and Taylor, 2021). This explains why even though health outcomes (Table 1) are regionally patterned, health-related benefit claims are considerably more so: the labour market magnifies the inequalities.

**Table 2. Regional differences in disability benefit receipt and employment**

	On health-related benefits		Disabled: on health-related benefits		In work		Disabled: in work	
	Unconditional	Conditional incl. health	Unconditional	Conditional incl. health	Unconditional	Conditional	Unconditional	Conditional incl. health
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Reference: Yorkshire and the Humber unconditional mean	9.4%		36.4%		74.1%		46.5%	
North East	0.015	0.008	0.024	0.030	-0.018	-0.018	-0.014	-0.010
Wales	0.017**	0.007	0.025	0.011	-0.006	0.002	0.003	0.022
Northern Ireland	0.046***	0.034***	0.134***	0.094***	-0.023*	-0.006	-0.083***	-0.039**
North West	0.005	0.003	0.025	0.014	0.009	0.004	-0.021	-0.003
Scotland	0.004	0.009*	0.036	0.036*	0.014	0.014	-0.004	0.005
South West	-0.006	0.005	-0.023	0.013	0.038***	0.032***	0.050**	0.017
West Midlands	-0.014*	-0.014***	-0.048**	-0.036*	0.019*	0.023**	0.038	0.040**
East Midlands	-0.010	-0.004	-0.038	-0.016	0.036***	0.035***	0.066***	0.046**
East of England	-0.026***	-0.009*	-0.066***	-0.018	0.042***	0.034***	0.071***	0.028
South East	-0.028***	-0.005	-0.070***	-0.012	0.053***	0.035***	0.108***	0.052***
London	-0.027***	-0.006	-0.034	0.001	0.034***	-0.004	0.067***	0.022
N	256,105	256,105	49,072	49,072	256,105	256,105	49,072	49,072

Note: Sample restricted to those who are aged 25–64. \*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

Sources: UKHLS, waves 1–11.

The interactions between disability and the labour market for working-age individuals are documented in a substantive literature on the 'disability employment gap', which looks at the different probabilities of being in paid work for disabled individuals with different characteristics in comparison with the non-disabled population. The unconditional disability employment gap is substantial, of the order of 30 percentage points, depending on the exact nature of the data, sample, and measures that are being used (Bryan et al., 2023; Jones, 2022). The gap is bigger for those with mental health disabilities than those with physical health disabilities and, as would be expected, bigger for those with more severe impairment than those with less severe impairments (Bryan et al., 2022a, b). Nevertheless, a gap of 9 percentage points still exists for those with mild physical impairments and a gap of 18 percentage points for those with mild mental health impairments (Bryan et al., 2023). Disabled people may have a lower employment rate for a number of reasons, including health limiting their ability to work, lower financial incentives to work (due to the availability of incapacity benefits), or discrimination by employers.

As would be expected from the descriptive statistics in Table 2, gaps differ by region, with by far the largest gap in Northern Ireland. Gaps are also greater for lower-education groups. There was a slight narrowing of the gaps over the period 2014–19, which would be consistent with the increase in rates of mental health disabilities (in particular) being driven by increases in prevalence of those with milder impairments, as discussed earlier, but this reduction in the gap has only occurred for those with A levels or higher education (Bryan et al., 2023).

These results are all using pre-pandemic data. As pointed out in Jones (2022), evidence on the effects of COVID-19 on the labour market outcomes for disabled workers was late in arriving compared with other characteristics. However, once the analysis did emerge, it showed that during the pandemic itself, disabled workers were more likely to go out to work rather than work at home, and more likely to work in occupations exposed to COVID-19 than non-disabled workers – despite having a higher clinical vulnerability to COVID-19 (Bryan, Bryce and Roberts, 2021). Disability employment gaps were relatively unaffected by the pandemic. Disabled workers were more likely to be temporarily away from work than non-disabled workers (e.g. furloughed; Jones, 2022) and those who contract long COVID – for which disability is a risk factor – have a roughly one-in-ten chance of being away from work while suffering with the condition (Waters and Wernham, 2022). Given the role of work in human capital accumulation and subsequent labour market outcomes, these factors raise the possibility that the pandemic will have long-run impacts on disability-related employment inequalities, including across regions.

Finally, Longhi (2017) and Office for National Statistics (2022) also provide data on the disability pay gap – differences in median pay for disabled versus non-disabled employees, with the latest Office for National Statistics data using Annual Population Survey data over the period 2014–21. The disability pay gap widened from 11.7% to 14.1% over the period 2014–19 (when the disability employment gap was narrowing slightly). Since then, the pay gap has narrowed very slightly to 13.8% in 2021. Pay gaps are consistently wider for disabled men than for disabled women, are wider for those with more severe impairments, and vary significantly by type of disability, with the biggest gap being a raw pay gap of 33.5% for those with autism. Adjusting for personal and job characteristics reduces raw pay gaps, as would be expected, but some gap still remains. In the case of employees with autism, the fully adjusted pay gap is still 9.9% (Office for National Statistics, 2022).

## Disability and labour market inequalities at older working ages

It is clear from our analysis above that by the time people get to their 50s the correlation between education and disability is very strong, and health and disability differences have accumulated across the life cycle such that there are large fractions of the population with disabilities, and particularly so for less-educated groups.

In this section, we look in detail at the late life labour market consequences of this by analysing the population aged 55–70 in the most recent two waves of the ELSA study that were collected prior to the pandemic: 2016/17 and 2018/19. With the higher granularity of the ELSA data, we are able to explore interactions between different dimensions of disability, control for the extent of individuals' functional limitations, depressive symptoms and levels of pain, and also finish with an understanding of how these factors, in combination with whether people are in work, relate to people's quality of life.

Given the key role of late-life labour market participation, one dimension of particular importance that we look at is work disability – whether an individual’s health or disability specifically limits the type or amount of work they can do. In Table 3, we look at the correlation between education and disability for this later working life group, whether defined in terms of limiting long-standing illness (as consistent with our previous analysis), or in terms of work disability. Men aged 55–70 with work disabilities are twice as likely to have no qualifications as those without, and almost half as likely to have degrees. The differentials are only slightly smaller for women. For both men and women, the correlations between educational qualifications and work disability are even stronger than the correlations between education and limiting long-standing illness.

**Table 3. Educational composition of disabled and non-disabled groups at older working ages**

Education	All	Limiting long-standing illness		Work disability	
		Not disabled	Disabled	Not disabled	Disabled
<b>All aged 55–70</b>					
None	14.4	12.0	20.2	11.6	23.3
Some	62.1	62.2	61.9	62.1	62.2
Degree	23.5	25.8	17.9	26.3	14.4
	100.0	100.0	100.0	100.0	100.0
<b>Male aged 55–70</b>					
None	12.2	9.5	19.1	9.3	21.2
Some	60.7	60.7	60.8	59.9	63.4
Degree	27.1	29.9	20.0	30.8	15.4
	100.0	100.0	100.0	100.0	100.0
<b>Female aged 55–70</b>					
None	16.1	14.0	21.0	13.3	25.0
Some	63.2	63.4	62.7	63.9	61.3
Degree	20.7	22.6	16.4	22.9	13.7
	100.0	100.0	100.0	100.0	100.0

Table 4 looks at how these differences in education and disability correlate with employment outcomes, analysing disability employment gaps by education for this late working life sample. Comparing panels (a) and (b), it is clear that these gaps in employment rates between disabled and non-disabled individuals are bigger, not unexpectedly, when we define disability as being work disabled. Less than 20% of those aged 55–70 with work disabilities are in paid work, compared with almost half of those without work disabilities, implying a disability employment gap for older working-age adults of nearly 30 percentage points. The gap is smaller – roughly 20 percentage points – when disability is defined by limiting long-standing illness, but is still substantial. Note also that the gaps become smaller with age as even those without disabilities at older ages are more likely to be retired.

Looking specifically at the 55–59 age group, perhaps the last of the ages towards the end of working life that are largely unaffected by early retirement, the overall disability employment gap is almost 30 percentage points if disability is defined by limiting long-standing illness, and almost 40 percentage points when defined by work disability. Just over 40% of those reporting work disabilities in this age group are working, compared with over 80% of those not reporting work disabilities. Focusing on those with no qualifications within this age group reveals even starker differences for those with low education. Over three-quarters of those aged 55–59 with no qualifications who do not report any work disabilities are working, compared with just over one-quarter of those reporting some work disability.

**Table 4. Employment rates by age and level of educational qualifications, at older working ages in England, ELSA waves 8 and 9; 2016–19**

Education	Aged 55–59		Aged 60–64		Aged 65–70		All aged 55–70	
	Not disabled	Disabled	Not disabled	Disabled	Not disabled	Disabled	Not disabled	Disabled
(a) Disability measure: limiting long-standing illness or physical disability								
None	72.4	34.6	55.8	18.9	20.4	6.9	38.5	14.4
Some	82.1	53.2	62.0	40.0	24.9	15.4	49.1	29.8
Degree	84.5	66.1	54.7	38.8	29.2	22.1	49.4	34.0
<b>All</b>	<b>81.9</b>	<b>52.7</b>	<b>59.4</b>	<b>35.1</b>	<b>25.3</b>	<b>14.9</b>	<b>47.9</b>	<b>27.4</b>
(b) Disability measure: work disability								
None	77.0	26.9	56.4	13.5	21.1	5.2	39.8	10.7
Some	83.0	44.7	64.1	27.4	25.7	11.0	50.1	22.0
Degree	84.8	51.4	55.5	28.6	30.5	10.9	49.9	22.7
<b>All</b>	<b>83.0</b>	<b>42.3</b>	<b>60.9</b>	<b>24.2</b>	<b>26.3</b>	<b>9.6</b>	<b>48.9</b>	<b>19.5</b>

The relationship between general disability and work disability is not straightforward, and we have seen that work disability is more correlated with people being in paid employment than more general measures of disability. Given the importance of work at older ages, a focus on people whose ability to work is limited by their health or disability seems natural. We continue to analyse both measures of disability here, however, due to the potential for what is known as justification bias – the idea that individuals may report that their disability limits their ability to work precisely as a justification for the fact that they are not working (see Bound, 1991, for example).

Whilst this potential bias may matter for some analytical purposes, it does not make work disability uninteresting. Much like with mental health issues we discussed above, the nature of self-reporting patterns about subjective disability status may be an issue to study but the self-report itself – the subjective assessment of status – and inequalities in these self-reports are still relevant. Whether someone arrives at older working ages feeling like their health limits their ability to work is an important outcome in its own right. Previous evidence has suggested that work disability does display reporting differences across individuals and is influenced by institutional and labour market environments (Kapteyn, Smith and van Soest, 2007). It is also affected by the amount of pain that individuals are in (Banks et al., 2009). But an individual's subjective evaluation of their ability to work might plausibly affect their job search and their decision to apply for benefits, as well as their quality of life and sense of purpose.

Thinking of the regional labour market differences we documented above, it is also quite likely that, to the extent that people are differentially able to find work in their local labour market, there will be a regional patterning in these work disability inequalities at older ages too. Hence, in the next part of our analysis, we consider to what extent reported disability is associated with whether someone reports themselves to be limited in their ability to work, and whether or not these associations vary by education and region, even when we control for the level of physical and mental health and functioning as well as the amount of pain that individuals are in. Given that the data we have available just cover England, and also have somewhat small numbers of observations within each region, we just partition the country into two groups: the North, which is defined as the three regions with the worst local labour markets – the North East, the North West and Yorkshire and the Humber, as evidenced from column 5 in Table 3 – and the South.

Tables 5 and 6 present multivariate regression models for the probability that someone says they are work disabled. A set of interacted dummy variables capture the key variation we are interested in, presented in the top part of the tables, and all analyses are first run with a simple

set of control variables (typically for age, sex and year) and then an additional specification with detailed controls for the intensity of an individual's disability – the number of ADL/IADLs they have, and whether they are in pain or have depressive symptoms.

Table 5 shows those with disabilities (i.e. limiting long-standing illnesses) are of course much more likely to report work disability than those without. For example, looking at the left-hand set of estimates, a man aged 55–70 in the South with a limiting long-standing illness would have a 62.3 percentage points higher rate of work disability than the reference group, which is a man aged 55–70 in the South without a limiting long-standing illness. But this difference in work disability between those with and without limiting long-standing illnesses is greater in the North, and greater for men than for women.

**Table 5. Likelihood of reporting work disability, ELSA waves 8 and 9, 2016–19**

	Sex	Region	Coefficient	s.e.	Coefficient	s.e.
LLSI disability:						
No	Male	South	Reference category			
		North	-0.005	0.011	-0.006	0.010
	Female	South	-0.012	0.008	-0.021	0.008
		North	-0.020	0.009	-0.030	0.009
Yes	Male	South	0.623	0.020	0.488	0.021
		North	0.709	0.026	0.545	0.027
	Female	South	0.589	0.018	0.425	0.019
		North	0.628	0.025	0.472	0.025
Number of ADL/IADL limitations:						
1					0.105	0.020
2					0.282	0.027
3					0.276	0.029
4					0.314	0.033
5					0.354	0.029
6+					0.385	0.019
Often in pain					0.058	0.009
4+ depressive symptoms					0.038	0.008
Constant			0.159	0.053	0.087	0.055
$R^2$			0.480		0.534	
$N$			7,820		7,820	

Note: Linear probability model. Other controls included: age dummies interacted with education dummies; wave 9 dummy. Standard errors clustered at individual level.

Source: ELSA waves 8 and 9, 2016–19.

When we control for the severity of people's conditions, in the final two columns on the right-hand side of the tables, the differences between regions and between genders are reduced but are still present. There is also a clear and independent role for the intensity of functional limitations as well as pain and depression as well as general disability in leading to work disability.

Table 6 presents a similar model but with splits by education group instead of region. Differences across genders are not large, but the differences across education groups are substantial for both genders. Men with degrees are 51.2 percentage points more likely to report a work disability if they have a limiting long-standing illness than if they don't, whereas men with no qualifications are 79.3 percentage points more likely. The corresponding numbers for women are 49.6 and 73.5. Once again, these differences are attenuated when we control for the intensity and severity of people's health conditions (implying that a limiting long-standing illness is likely to be more 'severe' for those with no qualifications than for those with degrees), but the differences between education groups are still large and the relativities stay the same – both men and women with no qualifications are around one and half times as likely as those with degrees to report that their disability limits their ability to work even when controlling for the severity of their disability.

In an additional specification (see Table A1 in the Appendix), we interacted these education effects with region to show how the educational gradient in the degree to which disability led to work disability varied by region. There are no differences between the South and the North for those with no qualifications – in both broad regions, three-quarters of those with disabilities report a work disability. Whilst the work disability rates for more-educated disabled individuals are lower than for those without qualifications in both broad regions, there is more work disability in the North than in the South for disabled individuals with some qualifications or degrees, by around 5–10 percentage points depending on the education group and whether we control for severity of the disability. Thus, the education gradient in work disability for the disabled is somewhat steeper in the South.

Taken together, the results in Tables 5, 6 and A1 are suggestive of a key correlation between work disability and the quality of labour market opportunities – individuals with disabilities are consistently more likely to report that their disability limits their ability to work when they are in worse labour markets.

We now move on to looking at labour market outcomes for older workers with disabilities and for those with work disabilities in particular, providing a more detailed and nuanced counterpart to our broad descriptive disability employment gap statistics presented in Table 4. We use the same multivariate framework as in Tables 5 and 6 to look at employment gaps for the disabled versus non-disabled and how these differ across groups defined by similar interactions of variables. Given our previous discussion of age effects on retirement with the group of older workers, it is crucial that we have full interactions of single-year age dummies and a gender dummy to capture the fact that the likelihood of working in the non-disabled group varies considerably, and systematically, by age and gender for the 55–70 age group.

Table 7 shows that the disability employment gap for older workers is considerable, and is also systematically different by education – there is a clear and statistically significant education gradient in the employment gap. When defined according to whether the individual has any disabilities, the gap for men is larger by two-thirds for those with no qualifications compared with those with GCSEs or A levels, and nearly three times as large for those with no qualifications when compared with those with degrees. For women, the gap is twice as large for those with no qualifications as it is for the rest – there are only small differences in the gap for women according to whether they have GCSEs, A levels or degrees. Thus, the education gradient in the disability employment gap for older workers is steeper for men than for women. The gaps are smaller when we adjust for the severity of the disability but still large and statistically significant. For example, disabled older men with no qualifications are 31 percentage points less likely to be working than similar non-disabled men in the model that only adjusts for age and sex; this falls to 19 percentage points in the model that adjusts for the severity of functional limitations and symptoms.

**Table 6. Likelihood of reporting work disability; ELSA waves 8 and 9; 2016–19**

	Sex	Qualifications	Coefficient	s.e.	Coefficient	s.e.	
LLSI disability:							
No	Male	None	Reference category				
		Some	-0.004	0.018	0.009	0.017	
		Degree	-0.037	0.018	-0.013	0.017	
	Female	None	0.014	0.022	0.008	0.021	
		Some	-0.024	0.017	-0.020	0.017	
		Degree	-0.030	0.019	-0.016	0.018	
	Yes	Male	None	0.793	0.031	0.618	0.032
			Some	0.660	0.026	0.529	0.026
			Degree	0.475	0.042	0.395	0.039
Female		None	0.735	0.030	0.542	0.030	
		Some	0.592	0.024	0.456	0.024	
		Degree	0.466	0.040	0.335	0.036	
Number of ADL/IADL limitations:							
1				0.105	0.019		
2				0.277	0.028		
3				0.268	0.029		
4				0.311	0.032		
5				0.348	0.029		
6+				0.378	0.020		
Often in pain				0.057	0.009		
4+ depressive symptoms				0.037	0.007		
Constant			0.073	0.025	0.018	0.023	
$R^2$			0.484		0.536		
$N$			7,820		7,820		

Note: Linear probability model. Other controls included: age dummies; wave 9 dummy. Standard errors clustered at individual level.

Source: ELSA waves 8 and 9, 2016–19.



**Table 7. Disability employment gaps: likelihood of being in work, ELSA waves 8 and 9, 2016–19**

Disabled	Education	Disability measure: LLSI				Disability measure: work disability			
		b	s.e.	b	s.e.	b	s.e.	b	s.e.
		(1)		(2)		(3)		(4)	
<b>Male</b>									
No	None	Reference category							
	Some	0.029	0.04	0.021	0.04	0.042	0.04	0.035	0.04
	Degree	0.026	0.04	0.015	0.04	0.029	0.04	0.022	0.04
Yes	None	-0.309	0.05	-0.188	0.05	-0.342	0.05	-0.264	0.05
	Some	-0.155	0.04	-0.074	0.04	-0.242	0.04	-0.191	0.04
	Degree	-0.084	0.05	-0.035	0.05	-0.208	0.05	-0.164	0.05
Constant		0.834	0.05	0.868	0.05	0.847	0.05	0.862	0.05
<b>Female</b>									
No	None	Reference category							
	Some	0.057	0.03	0.053	0.03	0.049	0.03	0.046	0.03
	Degree	0.036	0.03	0.029	0.03	0.027	0.03	0.024	0.03
Yes	None	-0.213	0.03	-0.109	0.04	-0.281	0.03	-0.219	0.03
	Some	-0.098	0.03	-0.026	0.03	-0.202	0.03	-0.150	0.03
	Degree	-0.072	0.04	-0.001	0.04	-0.203	0.04	-0.143	0.04
Constant		0.751	0.04	0.768	0.04	0.770	0.04	0.774	0.04

Note: Linear probability model. Other controls included: columns 1 and 3, age dummies interacted with sex dummies, wave 9 dummy; columns 2 and 4, as columns 1 and 3 with addition of number of ADLs, IADLs, pain and depressive symptoms. Standard errors clustered at individual level.

Source: ELSA waves 8 and 9, 2016–19.

When we look at the difference in employment rates between those who say they have a disability that limits the type or amount of work they can do, the gaps are larger, as would be expected. The work disability variable is more highly correlated with whether or not people are working than is the general disability variable. But, in this case, the gaps are also not attenuated so much when we control for the severity of the functional limitations and disabilities. Intuitively, the fact that the individual assesses their disability as limiting their ability to work is probably already reflecting the severity or nature of the disabilities they have. Similarly, the education gradient in disability employment gaps, whilst still present and statistically significant, is less steep when defined by work disability instead of general disability.

As with our analysis of work disability above, we have also looked at this using a decomposition by education and broad region (results presented in Table A2 in the Appendix). The employment gap for those with no qualifications is not significantly different between the North and the South, whether defined by general disability or by work disability. Employment outcomes for disabled individuals with more education are worse in the North than the South though, with the result that the education gradient in the disability employment gap is steeper in the South.

In the final table of our analysis, we bring these employment and disability data together with the quality of life indicators we have in ELSA to look at how work disability and work interact with disability and other individual characteristics in 'explaining' poor quality of life. Given the nature of our (entirely descriptive) models, all we are capturing here are correlations – we attach no causal inferences to the differences we observe. Nevertheless, the number of different types of dimensions that we are able to observe and account for in our multivariate models makes these correlations of some interest. And more generally, the issue of how work and disability combine to potentially influence an individual's quality of life towards the end of their working life is one that warrants further research, and this analysis provides a starting point for that.

In Table 8, we present two models with an individual's quality of life as their outcome. In the first model (columns 1 and 2), the measure of quality of life is a binary indicator taking the value 1 if the individual reported any of the poor quality of life outcomes in our measure (as described in the introduction). Thus, the coefficients can be read as the probability that an individual falls into the poor quality of life group. In the second set of models (columns 3 and 4), we use the full quality of life score, which can range from 0 to 9 according to the number of dimensions of poor quality of life the individual reports. As with all our models in the tables above, we include full interactions of single year of age dummies and sex in all models, to control for other factors that might vary systematically for either sex between ages 55 and 70.

Turning to the control variables first, and noting that negative coefficients in the table are 'good' outcomes since our dependent variable is capturing poor quality of life, there is a clear education gradient in quality of life for both genders at this age. Men with degrees are 24 percentage points less likely to be in the poor quality of life category than the reference group with no qualifications (where almost two-thirds are in the low quality of life category as indicated by the constant in the regression). The education gradient is less steep for women, as women with no qualifications are less likely to be in the poor quality of life group (by 12 percentage points) than their male counterparts.

When we add the number of functional limitations, depressive symptoms and pain to the model, we can see clear correlations between each of these indicators of the intensity of people disability and their quality of life. As an example, an individual aged 55–70 with two ADL/IADL limitations and depressive symptoms would have a poor quality of life score that is more than twice as bad as a similar individual without those two health indicators – from model 4, the coefficient on 2 ADLs is 0.792 and the coefficient on depressive symptoms is 0.676, in comparison to a constant term of 1.32, which captures the quality of life score in the reference group. Controlling for these factors does not, however, attenuate the education gradient in quality of life for either men or women.

The coefficients capturing the correlations between quality of life, work disability, and whether someone is working indicate large and statistically significant correlations. For those who do not report a work disability, there are only small quality of life differences according to whether the individual is working or not. Those who are working are 5 percentage points more likely to be in the poor quality of life group, but the quality of life scores are not significantly different between those who work and those who don't. However, for disabled older workers, it is a different story. Those who report a work disability but who are still working are 20 percentage points more likely to be in the poor quality of life group, and those with work disabilities who are not working are 30 percentage points more likely. These differences remain large and statistically significant – 10 percentage points and 17 percentage points, respectively – even when we are controlling for the severity of all the disabilities that the individual has.

**Table 8. Models for poor quality of life, ELSA waves 8 and 9, 2016–19**

		<i>I</i> (poor quality of life score > 0)				Poor quality of life score (0–9)			
		(1)		(2)		(3)		(4)	
		b	s.e.	b	s.e.	b	s.e.	b	s.e.
Work disabled									
No	Not in work	Reference category							
	In work	0.051	0.02	0.055	0.01	-0.043	0.05	-0.025	0.05
Yes	Not in work	0.329	0.02	0.171	0.02	1.480	0.08	0.604	0.08
	In work	0.194	0.03	0.104	0.03	0.575	0.13	0.129	0.12
Qualifications									
None	Male	Reference category							
Some	Male	-0.139	0.03	-0.120	0.03	-0.294	0.12	-0.192	0.11
Degree	Male	-0.241	0.03	-0.203	0.03	-0.635	0.12	-0.457	0.12
None	Female	-0.120	0.06	-0.127	0.06	-0.812	0.29	-0.815	0.27
Some	Female	-0.250	0.06	-0.236	0.06	-1.185	0.28	-1.080	0.26
Degree	Female	-0.289	0.06	-0.261	0.06	-1.388	0.28	-1.231	0.27
Number of ADLs/IADLs									
1				0.125	0.02			0.466	0.10
2				0.100	0.03			0.792	0.16
3				0.195	0.03			1.134	0.22
4				0.168	0.03			1.084	0.24
5				0.184	0.04			1.355	0.28
6+				0.213	0.02			2.093	0.21
Often in pain				0.042	0.01			0.179	0.05
4+ depressive symptoms				0.184	0.01			0.676	0.04
Constant		0.646	0.05	0.510	0.05	1.890	0.26	1.321	0.25

Note: The 'b' columns report coefficients from a linear probability model. Other controls included: age dummies interacted with sex dummies; wave 9 dummy. Standard errors clustered at individual level.

Source: ELSA waves 8 and 9, 2016–19.

## Conclusion

We have shown that inequalities in the prevalence of disability, and the differences in the way in which they emerge over the life course, are substantial in particular when looking across education groups. There are also significant differences by gender, age or birth cohorts, and regions. We have also argued that, whilst related to health, these inequalities are important to recognise in their own right. The documentation of disability inequalities speaks to the difficulties and vulnerabilities that individuals have in dealing with their environments in a way that is more direct than simply analysing health conditions or life expectancy alone. Measures of disability are also more directly related to indicators of the potential care burden, whether in the formal social care market or informally within families.

As with health inequalities, disability inequalities build up and emerge steadily over the life course rather than sharply in specific parts of the life course. The prevalence and patterning of physical

disabilities with age seems remarkably similar across birth cohorts for those at working ages. In contrast, mental health issues have been rising across cohorts and thus there have been increasing overall disability rates across cohorts. Mental health issues and inequalities in mental health and functioning are becoming increasingly important. Whilst it is important for future research to understand this trend in more detail, and in particular to look carefully at the issue of how much of this increase can be attributed to changing subjective norms, it seems clear that this is an incredibly important trend to acknowledge. Regardless of their cause, people's subjective assessments of their situation and level of disability are likely to drive multiple behaviours – health behaviours, such as smoking, drinking and diet, labour market behaviours, such as sickness absence, job search and connectedness to the labour market more generally, and also social behaviours. The fact that mental health issues emerge early in adulthood also means that individuals have longer to live with their consequences. They are also important because they lead to future inequalities in health and physical disability – the fact that mental health issues and inequalities have been increasing so rapidly in younger cohorts means that, if unchecked, there are likely to be wider inequalities in physical health and disability for these cohorts in the future, later in their lives, than we have documented for their predecessors.

We have argued that functioning and autonomy, and their role in an individual's quality of life, should be studied as an outcome over and above disease and/or mortality. Environments matter for this. This is particularly the case at older ages, from 50 or so onwards, when inequalities in disability have built up and become substantial, and when issues such as an individual's ability to continue to participate in the labour market, at least until the State Pension Age, come into play, as does their need for formal or informal social care.

The link to labour market environments is important because it also provides a channel by which inequalities in disability feedback into future socio-economic inequalities. Not only will disabled individuals face higher health and social care costs, but their lifetime earnings, and ability to finance such costs, are going to be lower as a result of their disabilities. The link to labour market participation will have consequences for well-being in retirement, but also for dependency on welfare benefits prior to the State Pension Age.

We have shown that there are considerable disability inequalities in the population at older working ages and that these are systematically related not just to employment outcomes but also to the opportunities for different educational groups in (regional) labour markets. A decomposition analysis of aggregate working-age disability employment gaps (Bryan et al., 2023) has argued that education alone will not close disability employment gaps, suggesting a need to address the other barriers to employment that are faced by those with physical and mental disabilities. Policymakers and commentators have often been concerned about whether and which jobs contribute to improving or worsening health. But the extent to which jobs and labour markets are accessible and inclusive for those already with poor health and functioning could be just as important. Our analysis of disability, labour market outcomes and quality of life for older workers has shown the key role for the interaction of disability and employment in explaining patterns of quality of life outcomes at older working ages.

The evidence base on inequalities in, and by, disability is relatively thin when compared with other dimensions such as race and gender. But the evidence there is, both here and elsewhere, shows that the magnitudes of those inequalities are large. More work needs to be done to bring a deeper understanding of inequalities in disability and the drivers of these inequalities into the mainstream, and to shed more light on the issue of inequalities in economic, social and quality of life outcomes between the disabled and non-disabled populations.

## Appendix

**Table A1. Likelihood of reporting work disability, ELSA waves 8 and 9, 2016–19**

	Qualifications	Region	Coefficient	s.e.	Coefficient	s.e.
LLSI disability:						
No	None	South	Reference category			
		North	0.022	0.023	0.014	0.022
	Some	South	-0.019	0.014	-0.009	0.014
		North	-0.026	0.015	-0.018	0.015
	Degree	South	-0.039	0.014	-0.019	0.015
		North	-0.047	0.016	-0.027	0.016
Yes	None	South	0.757	0.026	0.567	0.027
		North	0.750	0.032	0.577	0.033
	Some	South	0.599	0.021	0.467	0.022
		North	0.655	0.026	0.520	0.027
	Degree	South	0.434	0.034	0.341	0.031
		North	0.546	0.051	0.403	0.047
Number of ADL/IADL limitations:						
1					0.107	0.019
2					0.276	0.028
3					0.264	0.029
4					0.309	0.032
5					0.343	0.030
6+					0.373	0.020
Often in pain					0.056	0.009
4+ depressive symptoms					0.039	0.007
Constant			0.102	0.028	0.042	0.027
R <sup>2</sup>			0.486		0.537	
N			7,820		7,820	

**Table A2. Likelihood of being in work, ELSA waves 8 and 9, 2016–19**

Disabled	Education	Region	Disability measure: LLSI				Disability measure: work disability			
			(1)		(2)		(3)		(4)	
			b	s.e.	b	s.e.	b	s.e.	b	s.e.
No	None	South	Reference category							
		North	-0.070	0.04	-0.067	0.04	-0.087	0.04	-0.084	0.04
Yes	Some	South	0.023	0.03	0.019	0.03	0.020	0.03	0.018	0.03
		North	0.024	0.03	0.021	0.03	0.010	0.03	0.008	0.03
	Degree	South	0.032	0.03	0.025	0.03	0.018	0.03	0.016	0.03
		North	-0.042	0.04	-0.049	0.04	-0.050	0.04	-0.052	0.04
	None	South	-0.256	0.03	-0.141	0.04	-0.328	0.03	-0.257	0.03
		North	-0.308	0.04	-0.201	0.04	-0.346	0.04	-0.285	0.04
Constant	Some	South	-0.121	0.03	-0.044	0.03	-0.233	0.03	-0.181	0.03
		North	-0.199	0.03	-0.118	0.03	-0.283	0.03	-0.227	0.03
	Degree	South	-0.078	0.04	-0.025	0.04	-0.210	0.04	-0.165	0.04
		North	-0.155	0.05	-0.061	0.05	-0.291	0.05	-0.215	0.05
			0.837	0.04	0.862	0.04	0.867	0.04	0.875	0.04
$R^2$			0.235		0.254		0.261		0.27	

Note: Linear probability model. Other controls included: in columns 1 and 3, age dummies interacted with sex dummies, wave 9 dummy; in columns 2 and 4, as columns 1 and 3 with additional controls for number of ADLs, IADLs, pain and depressive symptoms. Standard errors clustered at individual level.

Source: ELSA waves 8 and 9, 2016–19.

## References

- Baker, C., and Kirk-Wade, E. (2023), 'Mental Health Statistics: Prevalence, Services and Funding in England', House of Commons Library, <https://researchbriefings.files.parliament.uk/documents/SNO6988/SNO6988.pdf>.
- Banks, J., Blundell, R., and Emmerson, C. (2015), 'Disability Benefit Receipt and Reform: Reconciling Trends in the United Kingdom', *Journal of Economic Perspectives*, 29 (2), 173–90, <https://doi.org/10.1257/jep.29.2.173>.
- Banks, J., Kapteyn A., Smith, J. P., and van Soest, A. (2009), 'Work Disability is a Pain in the \*\*\*\*, Especially in England, The Netherlands, and the United States', in D. M. Cutler and D. A. Wise (eds), *Health at Older Ages: The Causes and Consequences of Declining Disability Among the Elderly*, Chicago, IL: University of Chicago Press, 251–94, <https://press.uchicago.edu/ucp/books/book/chicago/H/bo6016337.html>.
- Baumberg, B., Jones, M., and Wass, V. (2015), 'Disability Prevalence and Disability-Related Employment Gaps in the UK 1998–2012: Different Trends in Different Surveys?', *Social Science & Medicine*, 141, 72–81, <https://doi.org/10.1016/j.socscimed.2015.07.012>.
- Blanchflower, D. G. and Graham, C. L. (2022), 'The Mid-Life Dip in Well-Being: A Critique, Social Indicators Research', 161, 287–344, <https://doi.org/10.1007/s11205-021-02773-w>.
- Boileau, B., and Cribb, J. (2022), 'The Rise in Economic Inactivity among People in their 50s and 60s', IFS Briefing Note BN345, <https://ifs.org.uk/publications/rise-economic-inactivity-among-people-their-50s-and-60s>.
- Bound, J. (1991), 'Self-Reported versus Objective Measures of Health in Retirement Models', *Journal of Human Resources*, 26, 106–38.
- Breeze, E., Banks, J., Nazroo, J., and Steptoe, A. (2012), 'Cohort Profile: The English Longitudinal Study of Ageing', *International Journal of Epidemiology*, 42, 1640–48, <https://doi.org/10.1093/ije/dys168>.
- Bryan, M., Bryce, A., and Roberts, J. (2021), 'Employment Related COVID-19 Exposure Risk among Disabled People in the UK', *Social Science & Medicine - Population Health*, 16, 100984.
- Bryan, M., Bryce, A., Rice, N., Roberts, J., and Sechel, C. (2022a), 'Exploring Mental Health Disability Gaps in the Labour Market: The UK Experience during COVID-19', *Labour Economics*, 78, 102253.
- Bryan, M., Rice, N., Roberts, J., and Sechel, C. (2022b), 'Mental Health and Employment: A Bounding Approach Using Panel Data', *Oxford Bulletin of Economics and Statistics*, 84, 1018–51.
- Bryan, M., Bryce, A., Roberts, J., and Sechel, C. (2023), 'The Role of Education in the Disability Employment Gap', Sheffield Economic Research Paper Series SERPS no. 2023010, <https://www.nuffieldfoundation.org/wp-content/uploads/2021/06/The-Role-of-Education-in-The-Disability-Employment-Gap-1.pdf>.
- Case, A., Deaton, A., and Stone, A. A. (2020), 'Decoding the Mystery of American Pain Reveals a Warning for the Future', *Proceedings of the National Academy of Sciences of the United States of America*, 117(40), 24,785–24,789, <https://doi.org/10.1073/pnas.2012350117>.
- Case, A., and Kraftman, L. (2022), 'Health Inequalities', IFS Deaton Review of Inequalities, <https://ifs.org.uk/inequality/health-inequalities>.
- Cattan, S., Fitzsimons, E., Goodman, A., Phimister, A., Ploubidis, G. B., and Wertz, J. (2022), 'Early Childhood Inequalities', IFS Deaton Review of Inequalities, <https://ifs.org.uk/inequality/early-childhood-inequalities-chapter/>.
- Chatzitheochari, S., and Platt, L. (2019), 'Disability Differentials in Educational Attainment in England: Primary and Secondary Effects', *British Journal of Sociology*, 70, 502–25, <https://doi.org/10.1111/1468-4446.12372>.

Cooper, C., Sommerlad, A., Lyketsos, C.G., and Livingston, G. (2015), 'Modifiable Predictors of Dementia in Mild Cognitive Impairment: A Systematic Review and Meta-Analysis', *American Journal of Psychiatry*, 172, 323–34, <https://doi.org/10.1176/appi.ajp.2014.14070878>.

Cribb, J., Karjalainen, H., and Waters, T. (2022), 'Living Standards of Working-Age Disability Benefits Recipients in the UK', IFS Working Paper 22/24, <https://doi.org/10.1920/wp.ifs.2022.2422>.

Exalto, L. G., Quesenberry, C. P., Barnes, D., Kivipelto, M., Biessels, G. J., and Whitmer, R. A. (2014), 'Midlife Risk Score for the Prediction of Dementia Four Decades Later', *Alzheimer's & Dementia*, 10, 562–70, <https://doi.org/10.1016/j.jalz.2013.05.1772>.

Fancourt, D., and Steptoe, A. (2022), 'The Contribution of Adult Experiences, Multimorbidity and Positive Psychological Well-Being to Social Inequalities in Health', IFS Deaton Review of Inequalities, <https://ifs.org.uk/inequality/the-contribution-of-adult-experiences-multimorbidity-and-positive-psychological-well-being-to-social-inequalities-in-health/>.

Farquharson, C., McNally, S., and Tahir, I. (2022), 'Education Inequalities', IFS Deaton Review of Inequalities, <https://ifs.org.uk/inequality/education-inequalities/>.

Hyde M., Wiggins R. D., Higgs P., and Blane D. B. (2003), 'A Measure of Quality of Life in Early Old Age: The Theory, Development and Properties of a Needs Satisfaction Model (CASP-19)', *Aging and Mental Health*, 7, 186–94, <https://doi.org/10.1080/1360786031000101157>.

Jones, M. (2022), 'COVID-19 and the Labour Market Outcomes of Disabled People in the UK', *Social Science & Medicine*, 292, 114637, <https://doi.org/10.1016/j.socscimed.2021.114637>.

Joyce, R., Ray-Chaudhuri, S., and Waters, T. (2022), 'The Number of New Disability Benefit Claimants Has Doubled in a Year', IFS Report No. R233, <https://ifs.org.uk/publications/number-new-disability-benefit-claimants-has-doubled-year>.

Kapteyn, A., Smith, J. P., and van Soest, A. (2007), 'Vignettes and Self-Reports of Work Disability in the United States and the Netherlands', *American Economic Review*, 97 (1), 461–73, <https://doi.org/10.1257/aer.97.1.461>.

Longhi, S. (2017), 'The Disability Pay Gap', Research Report 107, Equality and Human Rights Commission Pay Gaps Research, <https://www.equalityhumanrights.com/sites/default/files/research-report-107-the-disability-pay-gap.pdf>.

NHS (2022), 'Mental Health of Children and Young People in England 2022 – Wave 3 Follow Up to the 2017 Survey', <https://digital.nhs.uk/data-and-information/publications/statistical/mental-health-of-children-and-young-people-in-england/2022-follow-up-to-the-2017-survey>.

Office for Budget Responsibility (2019), 'Welfare Trends Report: January 2019', [https://obr.uk/docs/dlm\\_uploads/Welfare\\_trends\\_report\\_2019.pdf](https://obr.uk/docs/dlm_uploads/Welfare_trends_report_2019.pdf).

Office for National Statistics (2022), 'Disability Pay Gaps in the UK: 2021', <https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/disability/articles/disabilitypaygapsintheuk/2021>.

Roberts, J., Bryan, M. Bryce, A., Rice, N., and Sechel, C. (2020), 'The Impact of COVID-19 on Disabled Peoples' Employment Rates', evidence submitted to the Work and Pensions Committee on the Disability Employment Gap, <https://www.sheffield.ac.uk/media/38194/download?attachment>.

Roberts, J., and Taylor, K. (2021), 'New Evidence on Disability Benefit Claims in Britain: The Role of Health and the Local Labour Market', *Economica*, 89 (353), 131–60, <https://doi.org/10.1111/ecca.12382>.

University of Essex, Institute for Social and Economic Research (2022), Understanding Society: Waves 1–12, 2009–2021 and Harmonised BHPS: Waves 1–18, 1991–2009. [data collection]. 17th Edition. UK Data Service. SN: 6614, <http://doi.org/10.5255/UKDA-SN-6614-18>.

Ware, J. E., Keller, S. D., and Kosinski, M. (1995), 'SF-12: How to Score the SF-12 Physical and Mental Health Summary Scales', Health Institute, New England Medical Center.



Waters, T., and Wernham, T. (2022), 'Long COVID and the Labour Market', IFS Briefing Note BN246, <https://ifs.org.uk/publications/long-covid-and-labour-market>.

Whillans, J., and Nazroo, J. (2018), 'Social Inequality and Visual Impairment in Older People', *Journals of Gerontology: Series B*, 73, 532–42, <https://doi.org/10.1093/geronb/gbv163>.