Exploring the Impact of Disability Onset on Individual and Family Wellbeing in the UK

A thesis submitted in partial fulfilment of the requirements for the degree of PhD

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December 2022

Summary

This thesis explores the impact of disability onset upon the subjective wellbeing of working-aged (16-64) individuals in the UK, and its effects upon their spouses and children. A fixed effects estimation, based on a model by Meyer and Mok (2019), is applied to 9 waves of survey data from *Understanding Society,* recorded between 2009 and 2018. Severity of disability (defined by the number of areas of life an individual has substantial difficulties with) is found to be the largest driver of changes in subjective wellbeing following disability onset. Short-term but severe disabilities are associated with a decline of around half a point on a 7-point life satisfaction scale in the onset year. Having a chronic (long-term) disability alone is not associated with wellbeing declines, but having both a chronic *and* severe disability is associated with declines in life satisfaction of around 0.7 to 1.3 points from the onset year until 7 years after, with no evidence of adaptation back to baseline. Around 35-41% of wellbeing losses following disability onset are explained by changes in employment or income, but co-habiting with a partner at the time of onset is shown to buffer the effects of disability by around half. Disability onset is also found to negatively affect the spouse's subjective wellbeing, although unexpectedly, this is not found to be the case for spouses who already have a disability themselves. Subjective wellbeing of non-disabled people with disabled partners continues to decline up to 7 years following spousal disability onset and is partially explained by changes in household incomes. Children are also found to experience small negative subjective wellbeing effects from parental disability but this is confined to girls aged 13 and over. Girls below this age can actually experience *positive* wellbeing effects from maternal disability.

Acknowledgements

This thesis was written in collaboration with Disability Rights UK and was funded by the Economic and Social Research Council's 2+2 scholarship award. The data analysed in this thesis was sourced from the Institute for Social and Economic Research at the University of Essex.

I would like to give thanks to my supervisors Professor Melanie Jones (primary), Dr Ezgi Kaya (secondary) and Professor Victoria Wass (secondary) for their invaluable support and patience during the research process.

I would like to thank the following people for their help, support and comments along the way: Fazilet Hadi (Disability Rights UK), Louisa Hardwick, Professor Nigel O'Leary, Dr Annie Tubadji (all Swansea University), Dr Monika Oczkowska (CenEA), Professor Andrew Oswald (University of Warwick), Dr Armenak Antinyan, Professor Luigi de Luca, Dr Iain Long, Professor Patrick Minford, Professor Indrajit Ray, (all Cardiff University).

A special thanks to my colleagues: Basmah Aldarsi, Julia Diniz, Alexander Jones, Soozy Nesom and John Peirce, without whom the PhD process would have been a much lonelier experience.

I would also like to thank Sol Alim, Denise Brereton and Lydia Taylor (all Cardiff University) for aiding my navigation through the PhD process.

Finally, thank you to my mother, Carol, for helping me to get this far.

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Glossary of Terms

AFIP: Armed Forces Independence Payment.

BHPS: British Household Panel Survey.

CPI: Consumer Price Index.

DDA: Disability Discrimination Act (1995).

DLA: Disability Living Allowance.

DWP: Department for Work and Pensions.

ESA: Employment and Support Allowance.

FE: Fixed Effects regression.

GDP: Gross Domestic Product.

GSEOP: German Socio-Economic Panel.

GHQ: General Household Questionnaire.

HILDA: Household, Income and Labour Dynamics in Australia.

IIDB: Industrial Injuries Disablement Benefit.

LFS: Labour Force Survey (Office for National Statistics).

LLFS: Local Labour Force Survey

NCDS: National Child Development Study.

NHS: National Health Service.

NUTS: Nomenclature of Territorial Units for Statistics.

OLS/POLS: Ordinary Least Squares/Pooled Ordinary Least Squares regression.

PIP: Personal Independence Payment.

PSID: Panel Study of Income Dynamics.

PWI: Personal Wellbeing Index.

PWI-A: Personal Wellbeing Index (Adults).

PWI-SC: Personal Wellbeing Index (School Children).

RE: Random Effects regression.

SDA: Severe Disablement Allowance.

SF-12: Short-Form 12 survey of general health.

SWB: Subjective Wellbeing.

SLSS: Student's Life Satisfaction Survey.

SSRS: Social Readjustment Rating Scale.

SWLS: Satisfaction With Life Scale.

UC: Universal Credit.

UNICEF: United Nations Children's Fund.

UKHLS-GPS: UK Household Longitudinal Study – General Population Sample.

U. Soc.: Understanding Society.

1 Introduction

It is well established in the economics literature that disability is associated with a variety of life outcomes. These include lower probability of employment (e.g., Charles and Stephens, 2004; Jenkins and Rigg, 2004; Jones *et al.*, 2018; Oguzoglu, 2011), fewer weekly working hours (e.g., Jones, 2007; Meyer and Mok, 2019), lower incomes (e.g., Charles, 2003; Jolly 2013; Singleton, 2012; Stephens, 2001), and lower returns on human capital investments such as education, skills and training (e.g., Charles, 2003). There are around 4.4 million working-aged disabled people in the UK, 53.7% of whom are in some form of employment, compared to 81% of non-disabled people (Department for Work and Pensions, 2021). This disability employment gap is quite large compared to other European countries, many of which have a gap of around 12-15 percentage points (Van der Zwan and De Beer, 2021). This difference persists in the UK despite the passing of various legislation, such as the Disability Discrimination Act (1995), which made discrimination unlawful in relation to employment and in other areas of society.[1]

However, the current academic literature is somewhat limited with regards to how disability onset affects subjective wellbeing or how any wellbeing changes are explained by changes in the more traditional economic variables discussed above. It is also not clear the extent to which subjective wellbeing adapts to disability over the longer term. Some studies from the field of psychology have argued the existence of the 'hedonic treadmill', the hypothesis that wellbeing always returns to a set point given enough passage of time, regardless of what positive or negative life events beset the individual (e.g., Brickman and Campbell, 1971; Brickman, Coates and Janoff-

[1] It should be noted that this gap has reduced by 9 percentage points from 37.3 to 28.3 between Quarter 2, 2013 and Quarter 2, 2021 (Department for Work and Pensions, 2021).

Bulman, 1978). For example, one early study tracked the wellbeing of paraplegic accident victims alongside that of a group of individuals who had recently experienced large lottery wins, and reported that the mean wellbeing for both sets of groups, despite being far apart at the start of the study, gradually converged over time (Brickman *et al.*, 1978). Later studies, however, suggest that adaptation following disability is only a partial process (e.g., Oswald and Powdthavee, 2008; Powdthavee, 2009a), although the length of these studies are fairly short (around 5 years). Furthermore, the existing literature does not always consider the heterogeneous nature of disability or disabled people, nor how different aspects of disability interact with each other. For example, people in certain categories of disability may respond to onset more sensitively or adapt quicker than others. Moreover, prior to this study, the wellbeing effects of disability on the family members of disabled people were somewhat overlooked. To the best of my knowledge, only one economics paper directly investigates the relationship between spousal disability and own subjective wellbeing (Braakmann, 2014), whilst no literature could be found which explores the relationship between children's subjective wellbeing and parental disability, despite numerous studies existing for the opposite relationship between children's disability and parental wellbeing (e.g., Hauser-Cram *et al.,* 2001).

The aim of this thesis is to explore the impact of disability onset upon the subjective wellbeing of working-aged (16-64) individuals and their families in the UK. It includes three empirical chapters, the first of which focuses on the wellbeing of the disabled individual, whilst the second and third focus on how disability onset affects the spouse and children of disabled people, respectively. This study analyses panel data from *Understanding Society,* a longitudinal study of over 40,000 families in the

UK across 9 years (2009-2018). The dataset is rich in content and includes variables which capture aspects of individual wellbeing, health and disability status and various aspects of the respondents' work, home and social lives. It also includes a shorter *Youth Survey,* conducted by adolescent children of the adult respondents. This dataset was also chosen as it contains personal and household identification numbers for each respondent which allow spousal and parent-child dyads to be identified.

Chapter 3, which explores the impact of disability onset upon the individual, aims to take a more nuanced empirical approach compared to previous studies of its kind, taking account of the severity and duration of disability, as well as how much time has passed since onset. The longitudinal nature of the data allows subjective wellbeing to be tracked before, during, and after onset for people in different disability categories. A model by Meyer and Mok (2019) is adapted so that disabled individuals are placed into four time-invariant categories called 'One-Time', 'Temporary', 'Chronic Non-Severe' and 'Chronic Severe'. The main model estimates the subjective wellbeing of people belonging to these groups from 3 years before disability onset until 7 periods after, where wellbeing is reported on a scale of 1 to 7. The preferred estimation method is fixed effects, which allows a comparison of the wellbeing of the same individual during periods of disability and non-disability. From this starting point, further analysis is conducted, including exploring potential channels of wellbeing through the inclusion of additional controls such as income and employment status, and exploring heterogeneity of pre-onset characteristics such as marital status and gender.

Chapter 4 explores how disability onset affects the wellbeing of the spouses of disabled people. This is a much less explored area in the current literature, although there are studies which explore people's labour market response to spousal health and disability shocks (e.g., Berger and Fleisher, 1984; Charles, 1999; Shen, Zheng and Tan, 2019) and the wellbeing effects of caregiving for a family member (e.g., Biegel, Sales and Schultz, 1991; Chappell, 1990; Given and Given, 1991; Horowitz, 1985). To the best of my knowledge, only one paper looks specifically at the wellbeing effects of spousal disability; Braakmann (2014), using German data, finds that only women's life satisfaction is negatively affected by a partner's disability (by as much as 50-73% of their partner's own wellbeing decline), with little evidence of adaptation, despite individuals adapting to their own disability.

The sample size in this chapter is restricted as it includes only those who have a spouse. Therefore, the empirical model used is less nuanced than the one used to estimate the wellbeing response to own wellbeing. However, it still estimates the wellbeing effects of disability upon the spouse at different points in time relative to onset (from 4 years before onset until 7 years after). As with Chapter 3, the model is estimated under fixed effects. This chapter includes a special focus on the wellbeing differences between couples in which both partners are non-disabled, both are disabled, and only one partner is disabled. It later explores potential channels, such as income and caregiving, through which spousal disability may operate to affect own wellbeing.

Chapter 5 explores how disability onset affects the children (aged 10 to 15) of disabled people. To the best of my knowledge, there is no current literature which attempts to measure the impact of disability upon the subjective wellbeing of a disabled person's children. Empirically, it draws upon a limited selection of other longitudinal papers on children's subjective wellbeing, such Powdthavee and Vernoit's (2013) study on the impact of parental employment, as well as those which look at how children are affected by parental divorce, bereavement and poor parental mental health. Therefore, this chapter offers some seminal findings with respect to this previously unexplored relationship. An event study model, such as those used in Chapters 3 and 4, cannot be used in this chapter due to the much smaller sample size. This time, children's wellbeing is estimated based on the interactions between factors such as the child's age, the child's sex and the sex of the disabled parent. Again, the model is estimated using fixed effects, which allows a comparison of the same child's wellbeing between periods of parental disability and non-disability, similar to the approach taken by Powdthavee and Vernoit (2013) in their study on the wellbeing effects on children of parental unemployment. The model is extended to explore heterogeneity and channels of wellbeing, such as the sex of the disabled parent and whether parental income or labour hours' drive any of the results.

The findings in this thesis contribute to the existing academic literature in several ways. First, it provides new empirical evidence regarding the extent to which the subjective wellbeing of working-aged individuals respond to disability onset, whilst making a distinction between different aspects of disability such as severity, duration, and the amount of time since onset. Second, it provides new evidence relevant to the argument over whether wellbeing adaptation occurs in the years following disability onset, considering that the adaptation process may differ for different disability categories. Third, it contributes to the discussion on which potential channels drive wellbeing through disability and explores the heterogeneity of responses to disability onset among different groups in society. The findings from Chapters 4 and 5 fill a large gap in the literature, which overlooks how disability affects members of the disabled person's family. Furthermore, this study provides a contribution in the relatively new area of tracking children's subjective wellbeing over time, providing insights into how children respond to external life events by gender and at different ages.

The findings may also have policy implications which may be of interest to disability charities, not-for-profit organisations, or any other body interested in elevating the wellbeing of families who live with disability. Whilst there may be substantial academic literature from which such organisations can draw upon to indicate how disabled people experience more traditional economic outcomes, it is not clear the extent to which subjective wellbeing of disabled individuals is affected through such mechanisms. If post-onset changes in subjective wellbeing are found to be significantly driven by the disabled person's income, labour hours or time spent caregiving, for example, disability charities or similar organisations may wish to focus upon these particular areas. It is also not entirely clear whether wellbeing is affected more by certain aspects of disability than others, such as severity or duration, or pre-onset characteristics such as marital status. Hence, the findings may hypothetically help inform organisations to most efficiently allocate their resources towards those who are most likely to be affected by disability onset. The remainder of this thesis includes an outline of the institutional and policy context surrounding disability in the UK in Chapter 2; it is important that any definitions of disability used are consistent with UK legislation so that any recommendations drawn from its findings are in line with existing policy. This is followed by the three empirical chapters discussed above (Chapters 3, 4, and 5). Each will include a review of the existing literature, a discussion of the dataset and methodologies to be used, the empirical results and a chapter-specific discussion before finishing with an overall conclusion to the findings.

2 UK Disability Policy and Institutional Context

Universal healthcare and social welfare in the UK, including disability benefit payments, can be said to stem from the *Liberal Welfare Reforms* of 1906-1914. Compulsory health insurance was provided for workers earning less than £160 per year under the National Insurance Act 1911. The Act gave workers the right to sick pay of 9 shillings a week and free medical treatment and paved the way for the establishment of the National Health Service (NHS). In 1918, the War Pensions Act was the first legislation to instigate regular payments to those living with a disability. During the Second World War, the Disabled Persons (Employment) Act 1944 was enacted, which required firms of over 250 employees to hire a quota of disabled workers. However, the act was ultimately unsuccessful as there was no one appointed to monitor such quotas, although it set the precedent for a legal definition of a disability and a register of disabled persons, upon which future public policy would be based.

The creation of the NHS and the welfare state in the UK followed proposals from the Beveridge Report in 1942. Both institutions were established in 1948 following the election of the post-war Attlee government, and created a social safety net for those who did not pay National Insurance contributions, including disabled people. The 1948 National Assistance Act obliged local authorities to provide suitable accommodation to people who, through disability or any other reason, were in need of care where none was otherwise provided. In the same year, the *Industrial Injuries Disablement Benefit* (IIDB) compensated those who had contributed National Insurance payments against workplace injuries and were paid in addition to any labour earnings. Until 1971 however, unless a disability had arisen from war or workplace injury, those who were unable to work due to sickness or injury were not differentiated from other unemployed individuals; they simply received means-tested assistance if household income fell below a given threshold. In this year, *Invalidity Benefit* was introduced to the National Insurance scheme to provide assistance to men under the age of 65 and women under 60 who could not work due to illness or incapacity. It was paid at a higher rate than unemployment benefit and increased onto a long-term scale rate after one year. It comprised of three parts, invalidity pension, invalidity allowance and additional pension. Invalidity pension increased if the claimant had a spouse (subject to the spouse's earnings) and if they had dependent children.

Invalidity Benefit was abolished in 1995 and replaced with *Incapacity Benefit*. It came after the Prime Minister at the time, John Major, complained about the rising caseload of benefit claimants, saying "Frankly, it beggars belief that so many more people have suddenly become invalids, especially at a time when the health of the population has improved". A main feature was that claimants' disabilities would need to be confirmed by a doctor using a procedure called the *All Work Test*. Importantly, claimants would be assessed on their ability to carry out any form of employment, not just their previous profession, thus attempting to reduce the number of claimants. Incapacity Benefit was also taxable. From the year 2000, successful claimants would also have to undergo follow-up appointments called *Personal Capability Assessments* to ascertain whether their condition had improved and thus were used to update Job Centre staff of claimants' most recent assessment of their employability.

Other types of disability benefit have been made available in addition to those described above. In 1970, *Attendance Allowance* was introduced to provide support for those who live independently but might otherwise go into residential care.

Mobility Allowance was introduced in 1979 as a means-tested monthly payment for working-aged disabled people (16-66) who are unable to walk and would benefit from a change of surroundings, financed by the occasional taxi ride for example. IIDB was phased out and replaced by *Severe Disablement Allowance* (SDA) in 1984, although it penalised those with poor National Insurance contributions and did not distinguish between those who had a broken employment record (often men) and those who applied their labour in the household (often women). The amount the claimant was entitled to was affected if they worked for more than 16 hours per week or were paid above a certain threshold.

SDA and Incapacity Benefit were eventually abolished by the Brown government in 2008 and replaced with *Employment and Support Allowance* (ESA). New applicants apply for ESA through a claim form which is assessed by the Department for Work and Pensions (DWP), at least 13 weeks after the initial claim is made. If the evidence shows that the applicant cannot reasonably be expected to work, the face-to-face assessment is declared not necessary. In this case, the applicant is recommended for a Support Group and a higher rate of ESA is granted. Otherwise, the applicant must attend a face-to-face assessment.

This assessment involves asking the applicant factual questions which have a bearing on eligibility such as what medication or therapy they are receiving, their medical history, clinical judgements such as whether the claimant is terminally ill or faces substantial risk if placed in the workplace, and an estimated date of recovery. Whether a claim is successful comes down to a scoring system, made up of a framework of set criteria known as ‘functional’ and ‘non-functional’ descriptors. There are 17 functions against which applicants are assessed, including manual dexterity, mobilising, reaching, picking up objects, making oneself understood, continence, learning and interacting with other people. Each activity comes with descriptors, rated with a 6, 9 or 15 to determine the level of disability severity. For example, the activity of manual dexterity comes with the following descriptors and associated scores:

- The claimant cannot use a computer keyboard or mouse (9 points)
- The claimant cannot use a pen (9 points)
- The claimant cannot pick up a small object (15 points)
- The claimant cannot press a button or turn a page (15 points and a place in the Support Group)

The assessor can only pick one descriptor for each activity. The applicant is reported as capable of completing an action only if they can do so 'reliably, repeatedly, in a timely manner, safely and without significant pain'. Otherwise, they are recorded as being incapable of completing the action. For the most severe disabilities, the assessor recommends the claimant a place in the Support Group with a higher rate of ESA. At the end of the assessment, the applicant is declared as 'Fit for work', 'Unfit for work, but fit for work-related activity' or 'Fit for neither work nor work-related activity'. The latter are placed in the *Support Group*, whilst those in the second category are placed in the *Work-Related Activity Group*, which means that they are expected to be fit for work at some point in the future. In February 2018, there were 2.3 million people in the UK on ESA and incapacity benefits (out of a population of 66.27 million), down 110,000 on the previous year (Department for Work and Pensions, 2018). Of this number, 69% were in the Support Group, 18% were in the Work-Related Activity Group, 10% were in the assessment phase, leaving 3% unknown. In 2017, the DWP announced that those in the Support Group who have a 'severe, lifelong disability' would no longer need to undergo periodic assessment.

Both Attendance Allowance and Mobility Allowance began to be replaced in 1992 by the *Disability Living Allowance* (DLA), but this too began to be phased out in 2013 to be replaced by the *Personal Independence Payment* (PIP), designed to help disabled adults with the extra living costs associated with having a long-term condition. It is non-means-tested, does not require National Insurance contributions to have been paid, is tax-free and is not intended to be a substitute for a primary income, as is the case with ESA. In addition to regular transfer payments, since 1994, those re-entering the labour market because they have fully or partially recovered from disability, it is possible to apply for an *Access to Work* grant. This is designed to cover expenses such as travel costs, a support worker or reader, a communicator for support in interviews and workplace adjustments which are not considered 'standard equipment'. As of April 2020, this grant was capped at £60,700.

In 2012, the Cameron government combined ESA and five other benefits for working-aged people into a single system known as *Universal Credit* (UC). It was designed to simplify the benefits system and to incentivise paid work. A key element of UC was that when an individual, disabled or not, moved from unemployment to employment, they would see their benefits taper off rather than fall off a 'cliff edge' which was described as trapping people in unemployment. This is particularly pertinent to disabled people, who have been shown to move into part-time employment as a way to accommodate disability (Jones, 2007). UC has faced many criticisms, not least from a disability standpoint. The *Work and Pensions Select Committee* described UC's sanction system as "pointlessly cruel" and pushed disabled people into "grinding poverty", potentially reducing their income on average by around £300 per month (Bulman, 2019). These sanctions included withholding up to six months of payments for missed appointments. One charity reported that up to 450,000 disabled people could be negatively affected by UC (Citizens Advice, 2012). Some Members of Parliament called for UC to be suspended for disabled people as it was causing them to be unable to pay for basic living expenses and rely on unpaid care, including from their own children (Butler, 2018). At the time of writing, ESA and PIP are still in existence but both are being phased out by UC. Claimants are eligible for ESA if they are below state pension age and have a disability which affects how much they can work. They receive £74.35 a week (or £58.90 if under the age of 25) for 12 weeks while the claim is being assessed, rising to £113.55 a week (or £74,35 if under 25) following a successful application. These amounts include Support Group and Work-Related Activity components of £38.55 and £29.05 respectively although since April 2017, the latter has since been abolished.

Currently, three levels of disability premium payments can be claimed for on top of ESA payments. The basic disability premium is £34.95 a week for people who are either registered blind or in receipt of any other disability-based payment, such as DLA or PIP. Severe disability premium is £66.95 a week and is available for people who get the basic disability premium, plus also PIP, *Armed Forces Independence Payment* (AFIP), DLA care component or Attendance Allowance. Enhanced disability premium is £17.10 a week and is available for people who get the basic disability premium and either in receipt of PIP, AFIP or DLA care component at the highest rate, or they are in the ESA support group.

PIP is eligible for working-aged people who have a health condition or disability in which they have had difficulties with daily living or getting around (or both) for 3 months and expect these difficulties to continue for at least 9 months. It is comprised of two components. The first is a daily living component of £59.70 for the standard rate or £89.15 for the enhanced rate. The second is the mobility component of £23.60 a week for the standard rate or £62.25 for the enhanced rate. They are awarded on a fixed term basis of either 2 or 5 years but can be subject to review at any time.

More recently, in addition to legislation designed to insure people against the labour market effects of disability, laws have been passed which protect disabled people from discrimination in the workplace and elsewhere. The Disability Discrimination Act (DDA), enacted in 1995, made it unlawful to discriminate against people in relation to employment, provision of goods and services, education and transport in respect to their disabilities. It followed similar legislation to prevent discrimination based on gender and race around two decades previously. Workplaces, places of education and providers of public transport were expected to make 'reasonable adjustments' (e.g., ramps, elevators and accessible toilets) so that their usage would not be limited to non-disabled people. The DDA definition of disability is a person who "has a physical or mental impairment which has a substantial and long-term adverse effect on his ability to carry out normal day-to-day activities." 'Substantial' is defined as more than minor or trivial, for example, taking much longer than it usually would to complete a daily task such as getting dressed. "Long-term" means 12 months or more, for example a breathing condition that develops because of a lung infection (Gov.uk, 2010).

The Act was updated in 2005 to extend the legislation to all public authorities, but the DDA was repealed and replaced in 2010 by the Equality Act, which was implemented to fall in line with the European Union's *Equal Treatment Directives*. Section 15 of the Act gives a definition of discrimination as it pertains to disabled people as follows:

(1) A person (A) discriminates against a disabled person (B) if —

> *(a) A treats B unfavourably because of something arising in consequence of B's disability, and*
>
> *(b) A cannot show that the treatment is a proportionate means of achieving a legitimate aim.*

(2) Subsection (1) does not apply if A shows that A did not know, and could not reasonably have been expected to know, that B had the disability.

The Act was designed to protect people against discrimination, harassment or victimisation in employment, who fall into nine protected characteristics: age, sex, gender reassignment, race, religion or belief, marital status, pregnancy and maternity, sexual orientation and disability. With respect to disability, the 2010 Act defined 'reasonable adjustments' in the workplace to include accommodating disabled people through changes to policies, working practices, physical layouts, or providing extra equipment or support, including at the recruitment stage.

2.1 UK Child Wellbeing Policy

UK government policy designed to enhance the wellbeing of children can be argued to have arisen from the United Nations' *Convention on the Rights of the Child*, which was written in November 1989 and ratified in the UK in December 1991.[2] The UK government made its first report to the Committee in January 1995, raising concerns regarding child poverty and inequality, violence towards children, the use of custody, age of criminal responsibility and lack of opportunities for children to express their

[2] See Appendix [3.1] for a brief discussion on the impact of this convention on UK government policy.

views (Davies, 2000). Further to the work with UNICEF, UK governments have since devised strategies to enhance children's wellbeing, including the *Child Poverty Strategy*, initiated by the Blair government in 1999, with the goal of ending child poverty by 2020.[3] The Department for Work and Pensions has used 'social indicators' in their publication *Opportunity for All* to monitor the Child Poverty Strategy since 1999, an annual report designed to analyse poverty and social exclusion in childhood, work, retirement and in the community. The number of indicators used is wide-ranging and includes data on children in workless households, teenage pregnancy, school attendance and achievement, child obesity and inadequate housing, however the main focus is material wellbeing. The *Child Poverty Act* was enshrined in law in 2010 but was abolished and replaced in 2016 by the *Welfare Reform and Work Act*, thus also abolishing the targets to reduce poverty and the poverty measure based on family income. The Child Poverty Action Group (2022) describes steady progress being made between 1999-2005, which resumed in 2005-2010 with sustained rises projected to continue from 2010 onwards.

The UK governments operate various strategies specifically to improve child wellbeing (see Department of Health, 2000; Scottish Government, 2008; Welsh Government, 2015). A relatively recent example can be seen from a publication of the Welsh Government's *Programme for Children and Young People* (Welsh Government, 2015). This document describes seven core aims for improving children's wellbeing in Wales and are titled 'Early Years'; 'Education and Learning Opportunities'; 'Health, Abuse and Victimisation'; 'Play, Sport, Leisure and Culture';

[3] Four targets were set: - for less than 10% of children to live in relatively low-income families (below 60% of the median); for less than 5% of children to live in material deprivation; for less than 5% of children to live in absolute low income families; fewer children to live in relative poverty for long periods of time (three years or more) (Child Action Poverty Group, 2022).

‘Participation in Decision Making’; ‘A Safe Home and Community’; and ‘Not Disadvantaged by Poverty’. An important part of this legislature is the incorporation of the UN principle that children should be “heard and involved in the decision-making process”, which has been enshrined in policies including the Children Act 1989, the Children (Scotland) Act 1995 and the Children (Northern Ireland) Act 1995. The growing culture for assessing children’s wellbeing by allowing them to participate in the data-collection process has led to the increased use of self-completion surveys, rather than using indicators such as poverty, material wellbeing, school performance, etc. More recently, UK government policy on the wellbeing of children and young adults (aged 16-24) has been guided by the *State of the Nation* report (see Department for Education, 2019, 2020, 2021), which uses data compiled by the Office for National Statistics. In October 2018, Prime Minister Theresa May promised that this report would be published annually. It seeks to build upon work by charities, children’s organisations and academia to “understand the current state of children’s satisfaction with their lives and the range of experiences they face”. The content is extensive and includes data on subjective wellbeing of children and young people from the ages of 5 to 24, where overall wellbeing is split into 7 different domains. This report is discussed in more detail in section 5.2.1 under the heading of ‘Collecting and Analysing Children’s Subjective Wellbeing Data in the UK’.

3 The Impact of Disability Onset Upon Individual Wellbeing

3.1 Introduction

The purpose of this chapter is to measure the impact of disability onset upon individual subjective wellbeing over time. Using 9 waves of survey data from *Understanding Society,* recorded between 2009 and 2018, this chapter estimates 'life satisfaction paths', which trace self-reported levels of life satisfaction (on a scale of 1-7) in the years before, during, and after the onset of disability amongst working-aged people in the UK. These life satisfaction paths are estimated for different groups of people, categorised by the severity and duration of the disability. This chapter then explores whether disability onset affects various groups in society differently, such as different genders, income levels, and marital statuses, and whether any channels of wellbeing can be identified through which disability operates.

It is well established within the academic literature that disability is associated with a range of different economic outcomes relative to non-disabled people. These include lower employment probability (e.g., Charles and Stephens, 2004; Oguzoglu, 2011; Stern, 1989), fewer working hours (e.g., Jones, 2007; Meyer and Mok, 2019), lower incomes (e.g., Charles, 2003; Jolly, 2013; Singleton, 2012; Stephens, 2001), lower consumption (e.g., Meyer and Mok, 2019), and lower returns on human capital investments (e.g., Charles, 2003). These effects can be quite persistent over time (e.g., Jenkins and Rigg, 2004; Jones, Mavromaras, Sloane and Wei, 2018). However, it is less common to find economic studies in which the outcome variable is subjective wellbeing (hereafter SWB). The use of SWB alongside more traditional economic variables, especially in studies of disability, become more commonplace around the turn of the 21st century (e.g., Burchardt, 2000). The literature is also unclear on how more traditional economic variables, such as those listed above, act as a channel through which disability onset influences individual wellbeing. Take the example of someone who reduces their labour hours from full-time to part-time following disability onset. Assuming no change in the wage rate, one may expect this individual to be made worse off as the disability places a constraint upon the maximum weekly hours they can work. This hypothetically reduces their best possible outcome in terms of solving a utility maximisation problem between income and leisure time. Yet, this may not necessarily be the case if, for example, the individual is insured against disability onset or if they are in receipt of transfer payments in the form of disability benefits. Both scenarios would cause an upward shift in their work-leisure time budget constraint, which may even lead to an overall *increase* in utility, driven by additional leisure time. Moreover, the amount of time that has passed since disability onset should be taken into account, as the individual may experience a degree of wellbeing adaptation, even if neither their income nor the extent of their disability improves. It has also been shown that an individual may voluntarily choose to work part-time as a way to accommodate their disability, or as an intermediate step on the way back to full-time employment (Jones, 2007), so working lower labour hours after disability onset may not necessarily be counter to the individual's best interests.

There is a body of literature which looks at the relationship between disability and wellbeing, although much of it is cross-sectional and hence does not estimate any effects of a new disability upon subjective wellbeing (e.g., Diener *et al*, 1999; Martin, Meltzer and Elliot, 1988), or in some cases the data were only collected once disability onset had already occurred (Chase, Cornille and English, 2000; Mehnert *et al.*, 1990; Uppal, 2006). The wellbeing literature has been criticised by Burchardt, (2000, p.662) for not considering that the response to disability may change over time. There are a few examples of longitudinal studies which can be drawn upon however, which give an indication of whether people adapt to disability onset given enough passage of time. There is evidence within the literature that adaptation occurs partially (e.g., Brickman *et al.*, 1978), completely (e.g., Pagán-Rodríguez, 2010), partially but depending on the severity of the disability (e.g., Oswald and Powdthavee, 2008), or not at all if the disability is both of a severe and long-term nature (Jones *et al.*, 2018). There is also a body of literature which covers how well SWB adapts over time to other life events such as ill health (e.g., Gupta *et al.*, 2015), childbirth (e.g., Clark and Georgellis, 2013; Powdthavee, 2009), marriage (e.g., Clark and Georgellis, 2013; Lucas *et al.*, 2003; Lucas and Clark, 2006), divorce (e.g., Gardner and Oswald, 2006; Lucas, 2005) and unemployment (e.g., Clark, Georgellis and Sanfey, 2001). Such event-studies can be drawn on for potential methodologies for measuring the wellbeing response to disability over time.

The main research questions for this chapter are:

1. How does disability affect the subjective wellbeing of working-aged individuals, and how do the results change depending on the characteristics of the disability?
2. How does the wellbeing response to disability change over time, and are there any anticipation or adaptation effects?
3. Do pre-existing characteristics such as income level, gender, or marital status influence the wellbeing responses to disability?

4. Through which channels (if any) do the wellbeing changes operate?

In research question 1, the characteristics of disability referred to are severity, persistence, and time from onset. The empirical model in this chapter attempts to take a more nuanced approach than much of the previous literature by examining the interactions between these characteristics rather than exploring them separately. In question 2, the term 'anticipation effect' refers to a hypothesised decline in SWB in the periods prior to onset, and is phrased in this way to remain consistent with the previous literature. However, it should be considered that any decline in SWB prior to onset is likely to result, at least in part, from a deterioration in health rather than the "anticipation" of becoming disabled in the future. The part of question 2 regarding adaptation is included because much of the current literature uses a shorter timeframe, usually because of limitations in the available data. It is hypothesised here that there may be heterogeneity in the speed of adaptation to disability between people in different disability categories, as well as in the magnitude of the responses. Similarly, it is hypothesised that there is heterogeneity in the response to disability onset among different groups in society, which is the justification for question 3. For example, it is documented in the psychology literature that females tend to respond more severely than males to both positive and negative emotional shocks (e.g., Diener *et al.*, 1999), so this can be tested with respect to disability. Accumulated wealth has been shown to found to provide somewhat of a buffering effect upon disability onset (e.g., Smith *et al.*, 2005), although it is less clear whether higher income levels (i.e., the flow, rather than the stock of money) prior to onset exhibit similar effects. This chapter will also explore heterogeneity with regards to educational background, family structure and age of onset. The literature seems to suggest that being younger at onset leads to better outcomes as individuals are better able to adapt and to make human capital decisions which accommodate their disability, but on the other hand, there may be advantages of later onset as the individual spends more time in a better state of health (e.g., Charles, 2003), so this is also tested. It is also unclear from the literature the extent to which marital status affects the wellbeing response to disability onset. This latter source of heterogeneity provides a segue into the second and third empirical chapters, which explore the effect of disability onset within the family. Finally, question 4 is included to explore the channels through which disability potentially operates to affect wellbeing, separate from the discomfort, pain or inconvenience caused by the disability itself. These may include reduced incomes, financial strain, or material deprivation, and are included to help better direct any policy responses generated from the findings.

The first step in this chapter (section 3.2) is to review the existing literature from both the fields of psychology and economics. Psychology provides useful theories of how wellbeing responds to external influences, including *hedonic adaptation,* which suggests that people return to a fixed level of wellbeing following positive and negative life events, given enough passage of time. Meanwhile, economic theory provides explanations for why disabled people may face poorer economic outcomes which subsequently influence wellbeing, including discrimination and human capital theories. There is also a review of the studies which have empirically estimated the effects of disability onset upon more traditional economic variables (which did not always include wellbeing) and those which use survey data to estimate the effects of various life events upon wellbeing longitudinally.

Section 3.3 describes the data and outlines the definitions of variables. The data comes from *Understanding Society*, an annual survey of over 40,000 households conducted by the University of Essex. There are 9 of waves of panel data available, covering the years 2009 to 2018 and are a representative sample of the UK population. This dataset is chosen for its relatively large sample size, which allows many different disability 'trajectories' to be identified and for each individual's wellbeing to be tracked up to 9 years. It is also a rich source of personal characteristics, which allow for analysis of heterogeneity and channels of disability.

The methodological approaches are outlined in section 3.4. The sample is restricted to working-aged (16-64) individuals to ensure a degree of homogeneity in the data, although sensitivity checks are carried out on other age groups. The data analysis (section 3.5) uses an adaptation of a model by Meyer and Mok (2019), which examines the interactions between disability severity, chronicity (duration) and time since onset to estimate the effects of disability upon economic outcomes including income, consumption and employment probability. In this thesis, these outcome variables are replaced with subjective wellbeing and the model tracks the SWB of people in these groups before, during and after disability onset.

Finally, a set of conclusions is drawn up in section 3.6 and any policy implications which can be drawn are discussed. The main hypothesis for this chapter is that disability onset is expected to exhibit a negative wellbeing effect upon wellbeing, but that the extent of the wellbeing changes (and rate of adaptation) will differ by disability category and by societal group. The main intention of this research is to allow disability charities and other organisations who are interested in promoting the wellbeing of disabled people to know which groups of people should be prioritised when allocating resources. This study will also provide a starting point and a contextual framework to the more seminal research in Chapters 4 and 5, which will look at the effects of disability onset upon family members of disabled people.

3.2 Literature Review

The literature review in this chapter is divided into six sections. The first is an overview of the relevant economic theory. The second and third are concerned with finding the best definitions and measurements of wellbeing and disability, respectively. The fourth considers the contributions from both the fields of psychology and economics in exploring which variables best explain SWB. The fifth considers the longitudinal effects of disability onset upon areas other than SWB, such as income, financial difficulties, leisure time and family relationships, all of which are shown to exhibit effects upon SWB in themselves. Finally, this review considers the papers which examine changes in SWB over time and whether there is evidence for the existence of hedonic adaptation following various positive or negative life events. This section also focuses upon the dynamic effects of disability onset and concentrates on papers from which various empirical methods can be adopted and modified for statistical analysis, especially those which include longitudinal data.

3.2.1 Economic Theory

There are a few schools of thought within economic theory which attempt to explain why disabled and non-disabled people face different life experiences. Commonly, the economics literature points towards various poorer outcomes in the labour market, including reduced labour hours, reduced capacity to work, lower levels of labour market participation, lower wages, over-skilling, higher probability of unemployment and poorer job choice.[4] Such outcomes are typically explained through

[4] See Cai, Mavromaras and Oguzoglu (2014); Currie and Madrian (1999); Jones, Mavromaras, Sloane and Wei (2014); Mavromaras, Oguzoglu, Black and Wilkins (2006); Oguzoglu (2010, 2011, 2016); Wilkins (2004) for reviews.

discrimination or human capital theories. However, lower wages experienced by disabled people have also been explained, in part, by productivity differences (Jones, Latreille and Sloane, 2006) or the individual's own choice to work fewer hours in response to disability (Jones, 2007). The first model of discrimination was introduced by Becker (1957); employers exhibit a taste for discrimination against a particular group, so that they experience disutility from hiring workers belonging to this group.[5] The main implications of this model are wage differentials and preferential hiring, however both practices are illegal in the UK. An assumption of Becker's model is that both types of worker exhibit equal levels of productivity, yet this is not necessarily always the case. Suppose that the average minority worker is less productive than the majority worker and receives a lower wage. It is still possible that productivity could be higher in workplaces with only majority workers, however profitability should still be higher at firms who employ more minority workers.

Another type is statistical discrimination (Arrow, 1973; Phelps, 1972),[6] which operates on the assumption that employers have imperfect information on the minority worker's productivity. Thus, they use statistical information on the whole group they belong to so that productivity can be inferred (correctly or not) upon the individual. If the minority group is found to be less productive initially, perhaps due to historic discrimination, each individual in the group is expected to be less productive. This form of discrimination can lead to a vicious cycle, whereby members of the minority group are discouraged from participating in the labour market, regardless of their own productivity. Phelps (1972) explains that he makes no underlying assumptions regarding the productivity levels of members of minority

[5] For a full depiction of this theory, see Appendix [A1].
[6] See Appendix [A2] for an adaption of Phelps' (1972) theory applied to disability.

groups. Nor does he claim to know whether most discrimination is of the statistical kind however he remarks that even if it is, it is no less damaging to its victims.

Both types of discrimination are related to the human capital argument. Minority workers can be discouraged from investing in education or skills if they feel that their average return in investment will be less than those who are not discriminated against. Human capital refers to a person's knowledge, skills or experience which determine their productivity and wage in the labour market (see for example, Becker 1964; Mincer, 1958, 1974). Higher investment in human capital is associated with higher wage levels. An argument for why human capital matters for disabled people in the labour market is posited by Charles (2003), who states that human capital is multi-faceted and made up of three sub-categories. *Healthy capital* may be thought of as human capital which is only of use if the person is healthy. *General capital* is of use for people in all states of health but may have a higher per-unit payoff when the person is healthy. *Disability capital* is human capital that is only useful when the person is disabled. The dynamic pattern of the earnings losses from disability can be thought of in terms of the changes in the levels of these different facts of human capital. Disabilities such as loss of hearing or sight deplete healthy capital as the individual loses the ability to carry out tasks such as reading. Once onset has occurred, an individual's success in the labour market depends in part on how much general capital they accumulated before onset (education, training, etc.). This type of capital does not diminish in usefulness with a change in disability status. Disability capital is the other determinant of post-onset labour market success, for example the disabled individual may learn Braille, sign-language or how to use assisted technology, all of which are disability capital investments. Charles (2003) argues that there are benefits to thinking about human capital in this way. Human Capital

Theory states that an individual decides to invest at any age based on both the expected future benefits and the costs expended to make the investment. Thus, younger people should invest more in human capital, ceteris paribus. Also, as capital takes time to accumulate but depreciates slowly, it generally rises with age but at a decreasing rate.

Given that human capital grows with age, it is expected that more healthy capital will be destroyed the older disability onset occurs, for example, if an individual can no longer operate machinery using skills acquired over many years. For younger workers, their short-term earnings are expected to be impacted less in percentage terms because they had less healthy capital to begin with. Their post-onset earnings growth should also be greater because they have the most cumulative benefits to gain from investment in forms of human capital which are useful to a disabled person and a longer time to recoup investment costs. It is also easier for younger people to direct their investment in human capital in a way which specifically accommodates their condition. Charles (2003) asked the following question: suppose that the only difference between two 50-year-old men is that one became disabled at the age of 25 and the other at 40. Which of the two would one expect to have the highest earnings? One hypothesis is that the man who became disabled at 25 would have longer to adapt to their disability and make human capital investments accordingly. On the other hand, the man who became disabled at 40 would have spent a larger portion of his life in a healthy state, making it easier for him to acquire skills which would increase his earnings.[7]

[7] The findings in the empirical portion of Charles' (2003) paper strongly supported the former argument over the latter. The other worker characteristics considered in this paper were education level and race. Non-whites were found to experience larger income drops and worse recoveries when they experienced work-limiting disabilities. Higher educated men

Whilst concepts such as utility, expected utility and welfare are well established within the economics literature, the concepts of SWB, life satisfaction and happiness are relatively new, having been studied in much more depth in psychology.[8] Most early economics studies on such matters were largely empirical and drew on psychological, rather than economic theory (see Ferrer-i-Carbonell, 2013, for an overview). For example, Easterlin (1974) explored the relationship between economic growth and happiness, which turned out to be quite weak. Blanchflower and Oswald (2004a) argued that subjective reports of wellbeing have largely been ignored by economists, who claim that subjective data is unreliable, although they do list several notable exceptions.[9] They developed a wellbeing function to relate the concept of utility in economics to subjective wellbeing. It takes the following form:

$$r = h(u(y, z, t)) + e$$

where r is a self-reported level of life satisfaction (usually some integer on a Likert scale), $u(\cdot)$ is thought as being the person's true level of wellbeing or utility, $h(\cdot)$ is a continuous, non-differentiable function relating actual to reported wellbeing, y is real income, z is a set of demographic and personal characteristics, t is the time period and e is an error term. As shown in figure 3.1, the function $h(\cdot)$ rises in steps as u increases. An assumption is that $u(\cdot)$ is a function only observable to the individual and cannot be conveyed unambiguously to the surveyor without some error, e, to account for the inability for humans to accurately communicate their happiness level.

(defined as those with some level of college education) were found to experience smaller annual earnings drops following onset and experienced better recoveries, explained by changes in annual hours.

[8] See Andrews (1991); Argyle (1989); Campbell (1981); Campbell, Converse and Rogers (1976); Diener (1984); Douthitt, MacDonald and Mullins (1992); Fox and Kahneman (1992); Larsen, Diener and Emmons (1984); Shin (1980); Veenhoven (1991, 1993); Warr (1990).

[9] These include Clark (1996); Clark and Oswald (1994b); Frey and Stutzer, (1999, 2000) Ng (1996, 1997).

As Blanchflower and Oswald (2004a) put it, “your ‘two’ may be my ‘three’”. They compare this approach to the experienced utility idea advocated by Kahneman, Wakker and Sarin (1997), where ‘true’ utility is the latent variable and the subjectivity of responses can be thought of as being swept into the error term.[10]

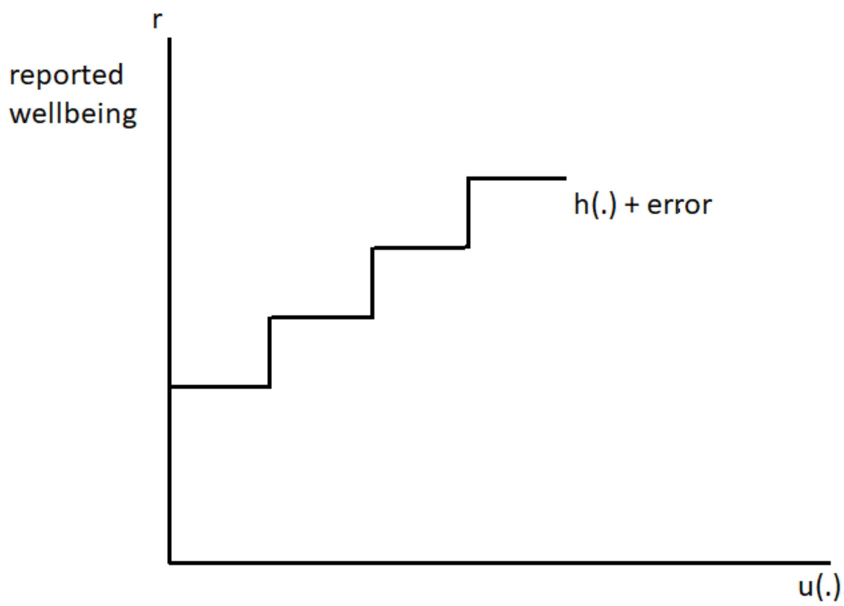

Figure 3.1 The function relating actual and reported wellbeing (from Blanchflower and Oswald, 2004a).

3.2.2 Defining and Measuring Disability

Earlier academic literature tends to define disability less specifically relative to more recent work. For example, some early studies simply noted whether an individual was officially registered disabled or not, although Brickman *et al.* (1978)

[10] Blanchflower and Oswald (2004a) further defend the use of subjective reports of wellbeing by using an analogy of asking respondents to describe their height in a time before standard measures had been invented. Self-reported heights would contain useful ordinal data but would be subject to significant error. The data would be more valuable when averaged across people compared to stand-alone observations.

differentiated between paraplegic and quadriplegic accident victims. More recently, researchers have used a definition of disability based on whether the respondent's condition limits their ability to carry out typical daily activities (Oswald and Powdthavee, 2008; Powdthavee, 2009a), or limits the amount of work they can do[11] (e.g., Burkhauser and Daly, 1998; Jenkins and Rigg, 2004; Pagán-Rodríguez, 2010, 2012), although some studies use both definitions (Burchardt, 2000; Jones, Davies and Drinkwater, 2018). However, the use of the subjective work-limiting definition was argued to be inappropriate by Burkhauser and Shroeder (2007) as it captured those respondents whose work was affected even if they had not officially registered as being disabled or having a reduced capacity to work.

It is also commonplace for researchers to be guided by acts of legislation to inform disability definitions. For example, Burkhauser and Daly (1998), Jenkins and Rigg (2004) and Pagán-Rodríguez (2010, 2012) concentrate only on individuals who experience two periods of non-disability followed by a report of disability which persists for at least two periods, as this was consistent with US disability legislation at the time. In a UK context, Burchardt (2000) used the Disability Discrimination Act (1995) definition, which covers disabilities and health problems which have a "substantial effect" on day-to-day activities. They must also have lasted, or are expected to last, for at least 12 months. More recent studies such as Jones, Davies and Drinkwater (2018) remain consistent with more up-to-date legislature such as the Disability Discrimination Act (2005), in which a disabled person is defined as someone who has a "physical or mental impairment that has a substantial and long-term adverse effect on his or her ability to carry out normal day-to-day activities".

[11] For a useful overview of the advantages of self-reported and objective measures of health and disability, see Bound (1991).

Disability Chronicity and Severity

Some literature makes a distinction between different extents of disability, such as chronicity (how long someone is disabled for) and severity (the extent to which disability affects daily activities). For example, Lucas (2007) and Pagán-Rodríguez, (2012) use three consecutive periods of disability to differentiate long-term disabilities from short-term disabilities, whilst Meyer and Mok (2019) go a step further by categorising persistence of disability under three headings: 'One-Time' if disability is reported in a single (annual) period, 'Temporary' if reported in two consecutive periods and 'Chronic' if reported in three or more consecutive periods. This method is mirrored in similar studies by Jones, Davies and Drinkwater (2018) and Jones, Mavromaras, Sloane and Wei (2018), which are discussed further below.

Charles (2003) proposed that severity should be controlled for in any paper which investigates the effects of disability. He argued that self-reported binary reports of work-limiting disability are not informative enough about the precise condition because they conflate different forms of disability and their effects on the outcome variables. For example, those who became disabled from accidents cannot make human capital decisions in preparation for them, whilst a disability which stems from a degenerative condition may be easier to predict. The literature differentiates between severely and non-severely disabled people in different ways. For example, Jones, Latreille and Sloane (2006) define severely disabled people as those who are work-limited, and those who are disabled but not work-limited as non-severely disabled. By distinguishing between the two severity levels, Jones et al. (2018) explain that the unobserved productivity effect of disability can be separated from discrimination. In Jones, Davies and Drinkwater (2018), disability severity is defined as having multiple (i.e., more than one) disabilities. The authors acknowledge that this is an imperfect way of reporting severity as it relies on the assumption that multiple conditions are more serious than any single disability. However, multiple disabilities have been found to be closely correlated with subjective measures of severity (Berthoud, 2003). Similarly, Jenkins and Rigg (2004), using BHPS data, ask respondents, "how much does your health limit the amount of work you can do?", where answers of 'a lot' or 'somewhat' are included as sub-categories of disability. Also using BHPS data, Oswald and Powdthavee (2008) and Powdthavee (2009a) denote respondents as 'Moderately Disabled' if they report that they are 'disabled but able to do day-to-day activities including housework, climbing stairs, dressing oneself, and walking for at least 10 minutes' or 'Severely Disabled if they report that they are 'disabled and unable to do at least one of the above day-to-day activities'.[12] In both papers, accounting for severity makes a noticeable difference to the results, for example, severely disabled people experience adaptation in their subjective wellbeing to baseline levels by around 30%, compared to 50% for non-severely disabled people. However, the data only allows the authors to observe up until the second year after disability onset (Oswald and Powdthavee 2008), so whether longer term adaptation is present is not known.

In some longitudinal studies, a time-invariant measure is used to describe whether an individual is mostly severely or mostly non-severely disabled over a period of time. Using PSID data, Stephens (2001) constructs a 'severity index' to do this. The total number of reports of disability are summed and then divided by the number of waves the individual appears in the sample. If this index is greater than or equal to 0.5, the individual is categorised as severely disabled, or non-severely disabled if

[12] This approach keeps the definition of disability consistent with the Disability Discrimination Act (see section 3.3.1).

lower than 0.5. Whilst the inclusion of severity weights increases the effects of disability upon the outcome variables, the coefficients on the weights themselves are not statistically significant. A similar approach is taken by Meyer and Mok (2019), also using PSID data. Time-invariant dummy variables, generated using severity ratios, are interacted with a set dummies which represent levels of chronicity (as discussed above) and another set which represent the number of years away from onset. The results show that people who have both a chronic and a severe disability experience considerably poorer economic outcomes (e.g., income, probability of employment, consumption), which would not have been picked up on using chronicity or severity alone. Similar results are found by applying the same methodology to Australian data by Jones, Mavromaras, Sloane and Wei (2018).

Self-reported measures of disability

Self-reported measures of disability are widely used in the literature despite some well-known limitations. These include justification bias and measurement error (Bound, 1991).[13] The former occurs when a respondent exaggerates or falsely reports a disability as a way to justify some aspect of their life where they feel they are underachieving, such as income or employment status, or for the purpose of receiving disability benefits (Benitez-Silva *et al.*, 2004). However, Charles (2003) suggests that this is less of an issue in panel data studies, where fixed effects models can control for unobserved individual heterogeneity. Polidano and Vu (2015) attempt

[13] Specifically, Bound (1991) found that when self-reported measures were used, health played a larger role, and economic factors a smaller role, compared to using objective alternatives. Whilst this may suggest a bias, Bound (1991) argued that objective measures potentially result in larger biases in the opposite direction, e.g., a measure of health based on number of hospital visits does not provide an accurate proxy for capacity to work.

to mitigate against potential justification bias by using functional disability rather than work-limiting disability. They argue that this measure should be less prone to justification bias because it asks respondents to report their specific health conditions, rather than just a 'work-limiting condition', which may be open to interpretation. Charles and Stephens (2004) argue that there is also an attenuation measurement bias error, because the work limitation responses are a noisy mixture of true work capacity, however the disability literature finds that these opposing biases appear to cancel each other out.

Another potential issue is sample selection bias, namely that those who face disability onset are not drawn from a random distribution but can be predicted from individual characteristics such as health and education levels. For example, in Meyer and Mok (2019), it is found that disability onset tends to be preceded by a deterioration in health, rather than a change in employment status. Similarly, Jones *et al.* (2018) find that pre-onset health decline is more pronounced for those in the chronic-severe disability category, compared to chronic non-severe respondents, so this is something which should be considered controlling for.

3.2.3 Defining and Measuring Wellbeing

Subjective wellbeing, or life satisfaction is 'the degree to which one judges the quality of one's life favourably' and the best way to measure life satisfaction, according to psychologists, is by asking how individuals how they feel (Veenhoven and Ehrhardt, 1995).[14] 'Subjective wellbeing' is an umbrella term in the literature, encompassing

[14] Veenhoven and Ehrhardt (1995) test three theories, *comparison theory, folklore theory* and *livability theory*. Only livability theory was found to accurately predict life satisfaction

similar ideas such as happiness and life satisfaction, or even concepts such as utility or welfare, which are more commonly used in economics, traditionally. Life satisfaction has been described as ‘a psychological state that may be broadly associated with psychological well-being’ (Neugarten, Havighurst and Tobin, 1961). The use of SWB in place of more traditional economic variables has grown more commonplace since the turn of the 21st century, with some researchers arguing that economists should look towards developing measures that focus more directly on experienced utility, rather than decision utility estimated by a function of revealed preferences (Dolan and Kahneman, 2008).[15] However, life satisfaction questions have been included in surveys used by psychological studies for some time, with early examples by Likert (1932), Cantril (1965) and Bradburn (1969).

Ferrer-i-Carbonell (2005) noted that three assumptions are required in order to use self-reported levels of SWB within economic analysis: (1) individuals are willing and able to answer satisfaction questions; (2) a relation exists between what is measured and the concept the researcher is interested in; (3) there is an assumption of interpersonal comparability at an ordinal level, for example, a respondent with a reported SWB of 8 is strictly happier than one with a reported SWB of 6. The underlying assumptions are discussed in more detail in Ferrer-i-Carbonell (2002).

In most of the literature, wellbeing is a self-reported variable in which respondents are asked to measure their personal wellbeing on a Likert scale, consisting of up to 11 points. The Brickman *et al.* (1978) study on accident victims and lottery winners used

scores. It is based on the premise that subjective wellbeing depends on objective quality of life and in particular, living conditions, rather than comparisons to one’s peers or society’s expectations.

[15] This is based on an idea by Gilbert and Wilson (2000), that our wants, as captured by our decisions, are based on predictions of what we will subsequently enjoy. However, we can be guilty of “miswanting”, we want things that would not really make us happier or do not want things that would.

a 6-point scale whereby participants were asked to rate how happy they were before the event (or 6 months ago for the control group) and the scale was anchored by "the best and worst things that could happen to you in a lifetime". A possible problem with this method was that it could not be known whether respondents would have given the same answer regarding their pre-event happiness, had they been asked the same question at the time. This is not just a potential case of misremembering; accident victims may upwardly bias their perceptions of how satisfying their lives were before the event (Janoff-Bulman, 1989).

Ten-point (1-10) and eleven-point (0-10) Likert scales are typical in the economics literature (e.g. Boyce and Wood, 2011; Clark, Georgellis and Sanfey, 2001; Clark *et al.*, 2008; Ferrer-i-Carbonell, 2005; Ferrer-i-Carbonell and Frijters, 2004; Helliwell, 2003; Jones *et al.* 2018; Lucas, 2007; Lucas, Clark, Georgellis and Diener, 2003; Pagán-Rodríguez, 2010, 2012; Pollman-Schult, 2014; Schoon, Hansson and Salmela-Aro, 2005; Stutzer, 2004), perhaps because this fits with the proclivity for people to think in terms of decimals or percentages. In some datasets, including BHPS and Understanding Society, seven-point scales (1-7) are also commonplace (e.g., Chase, Cornille and English, 2000; Clark and Georgellis, 2013; Luttmer, 2005; Oswald and Powdthavee, 2008; Powdthavee, 2009a). In these cases, a score of 1 is typically associated with a statement such as 'not at all satisfied' and 7 with a statement such as 'completely satisfied'. The scores of 2, 3, 4, 5 and 6 are thus associated with statements such as 'very unsatisfied', 'slightly unsatisfied', 'neither satisfied or dissatisfied', 'slightly satisfied' and 'very satisfied', or similar expressions, respectively.

In most cases, the original values are retained in the regression models, but there are exceptions; using GSEOP data, Lucas and Clark (2006) and Lucas (2007) use a 0-10 scale, but to account for average trends over time (including mean-level changes that took place around the time of the fall of the Berlin Wall), satisfaction scores are centred within each year and within each of the subsamples added over the years. Hence, a zero score represents the average satisfaction level for a particular year within a subsample. Similarly, some researchers report (and display graphically in the form of 'life satisfaction paths') their regression results in terms of absolute values of SWB (e.g., Bauer *et al.*, 2015; Oswald and Powdthavee, 2008; Pagán-Rodríguez, 2010; Powdthavee, 2009a), whilst others report changes in SWB as deviations from a baseline of zero, which is the equivalent reporting the estimated coefficients on regressors (e.g., Clark *et al.*, 2008; Gupta *et al.*, 2015; Jones *et al.*, 2018; Lucas *et al.*, 2003;).

Issues with self-reported wellbeing measures

SWB can be subject to measurement errors arising from the subjectivity of self-reporting, as well as response bias, memory bias and defensiveness, although subjective data has been shown to be a useful and stable measure (Uppal, 2006), possibly because the stable component of life satisfaction dominates the mood effects (Diener *et al.*, 1999). Oguzoglu (2011), using an approach by Stern (1989), found no evidence for justification bias when characterised along disability severity. Bound (1991), using a model which combines objective and subjective measures of health outcome found that potential biases can be found in either direction; subjective reports of health status can upwardly bias estimates of wellbeing while objective reports such as hospital visits can cause downward bias, so overall, the effects may cancel each other out.

Another potential problem with measuring SWB is that following a major life event, people may change their overall worldview and what used to be a 7 out of 10 for example, before the event, may lie somewhere else on the scale post-event. This issue was addressed by Janoff-Bulman (1989), who explained that people generally live their lives according to various *schemas*. These are axiomatic assumptions about the world which may exist in contrast to known facts. For example, people may be aware that one in four people eventually contract cancer over a lifetime and that car accidents are commonplace. However, they still maintain a general belief of "it can't happen to me". This is argued to come from a sense of safety and security which exists as part of a healthy personality. Moreover, people in general hold three fundamental assumptions about the world based on life experience: the world is benevolent, the world is meaningful, and the self is worthy. When faced with a severe negative life event, these assumptions are "shattered" and new assumptions about the world are formed. Hence, ex-post self-reports of SWB may be biased upwards, based on the individual's newly anchored scale of 0-10, subsequently based on a less benevolent world and hence, positive life events are now taken less for granted. This is part of "Shattered Assumptions Theory" (see Janoff-Bulman, 1992). This theory is not without its criticisms and subsequent tests of the theory found mixed results (e.g., Kaler *et al.*, 2008), or that assumptions are weakened rather than shattered (e.g., Schuler and Boals, 2016). It has also been argued that strong assumptions are associated with the individual having a stronger bond with their caregiver at an early age (Mills, 2010), whilst weak assumptions are associated with a history of previous traumas, experiences of PTSD or depression (Kaler *et al.*, 2008).

Ferrer-i-Carbonell (2013) argues that the use of self-reported happiness questions has led to new, and sometimes unexpected, insights into individual happiness and motivation, particularly when it comes to the relative weak association between income and life satisfaction. In a review of the literature, she states that there is enough evidence to be confident that people are willing and able to provide meaningful subjective answers when asked to evaluate their own lives. She cites decades of work by psychologists, which preceded the interest in the subject by economists, and showed clear correlations between self-reports of life satisfaction and the amount of smiling, changes in facial muscles, physiological responses and appropriate levels of brain activity. There are also studies which show strong correlations between "objective" determinants of happiness such as health levels and subjective measures (e.g., Konow and Earley, 2008).[16]

3.2.4 The Determinants of Subjective Wellbeing

The psychology literature offers many suggestions of which aspects of life determine individual wellbeing. In a well-cited psychology paper, Warner Wilson (1967) conducted a widespread review of the existing academic knowledge on wellbeing at the time, concluding that the happiest type of person was "a young, healthy, well-educated, well-paid, extroverted, optimistic, worry-free, religious, married person

[16] Some papers offer an alternative method to measure wellbeing, known as the GHQ-12 (General Household Questionnaire). This method was developed as a screening device identifying non-psychotic and minor psychiatric disorders. It is coded on a scale of zero to 36 using Likert scoring (0-1-2-3), with lower values corresponding to higher levels of mental wellbeing. It is designed to measure short-term deviations from an individual's regular state of mental wellbeing but not as a diagnostic tool for longer term disorders. The average UK participant in the survey has been shown to score around 6 or 7, with a score of 12 or 13 generally regarded as almost always indicating a psychiatric condition (Easton and Turner, 1991). Whilst the GHQ-12 is widely used in the disciplines of psychology and medicine and is widely viewed as a robust measurement, there are concerns over its validity as it is seen by some as being too multi-dimensional and contains unidentified sources of response bias (see Hankins, 2008). It can also be argued that it is closer to a definition of psychological distress than it is to wellbeing, as this is what it was designed to measure. Due to this uncertainty, it will not be used as a measure of wellbeing in this thesis.

with high self-esteem, job morale, modest aspirations, of either sex, and a wide range of intelligence”. A large body of work has branched off from this paper (see Diener *et al.*, 1999 for a review), from both economics and psychology. Some of Wilson’s (1967) explanatory variables have stood the test of time, while others have been more successfully challenged. Below, each of the main potential determinants of wellbeing that are frequently included in the literature is considered in turn.

Personal characteristics

Several researchers have concluded that personal characteristics such as age, gender or ethnicity explain around 8-20% of the variance in wellbeing (Andrews and Withey, 1976; Campbell, Converse and Rogers, 1976; Diener *et al.*, 1999), compared to external events. Contrary to Wilson’s (1967) findings, many papers struggle to find a relationship between age, or youthfulness, and SWB (Diener *et al.*, 1999). Commonly, a U-shaped relationship is found between the two, where SWB reaches its lowest at middle-age (Blanchflower and Oswald, 2004b; Ferrer-i-Carbonell and Gowdy, 2007; Frijters and Beatton, 2012). Deaton (2010) ran regressions on life satisfaction and age for 132 different countries and found that the results varied greatly between countries, with only evidence of its existence in rich English-speaking countries. Whitbourne (2018) has since regarded the relationship as a ‘myth’ and Hellevik (2017) argued that it only occurred when controlling for family and health variables, although Blanchflower (2021) found the relationship to be universal across 145 countries, reaching a minimum at around 49 or 50, consistent with the findings of Van Landeghem (2012) across European countries.

The psychology literature is somewhat ambiguous regarding whether sex differences account for variance in SWB (Diener *et al.*, 1999). On average, men appear to be about as happy as women (Inglehart, 1990; Louis and Zhao, 2002; Shmotkin, 1990; White, 1992). However, women are reported to react to external events, both positive and negative, with more intense emotions (Fujita, Diener and Sandvik, 1991; Lee, Seccombe and Shahan, 1991; Wood, Rhodes, and Whelan, 1989). Dolan, Peasgood and White (2008) note that women tend to report higher levels of overall SWB (e.g., Alesina, Di Tella and MacCulloch, 2004) but report worse scores on measurements of psychological distress such as the GHQ-12 (Clark and Oswald, 1994), however, gender differences disappear when examining smaller subsets. Hispanics have been shown to report higher levels of SWB than white individuals (Luttmer, 2005) and white people higher levels than African Americans (Thoits and Hewitt, 2001). Another argument is that ethnicity only significantly affects SWB when combined with other socioeconomic or health differences (Chang *et al.*, 2014).

Diener *et al.* (1999) argue that there is no obvious pathway in psychological theory to link personal characteristics such as age, gender or ethnicity to SWB. More important is personality type and how different personality types interact with external events. They describe personality as ‘one of the strongest and most consistent predictors of subjective well-being’. Early psychological literature is said to take a “bottom-up” approach, which does not take into account an individual’s personal disposition, whereas more recent research takes a “top-down” approach, which argues that personal happiness is determined in part by personality (e.g., Diener and Lucas, 1999) and in part by genetics (e.g., Tellegen *et al.,* 1988). This is consistent, in general, with Wilson (1967) that SWB is higher on average for those individuals who are extraverted, optimistic and worry free (e.g., DeNeve and Cooper, 1998), regardless of external events. Similarly, Emmons and King (1988) showed that extroverts tend to react more strongly to positive and negative life events compared to neurotics, whilst lower rates of SWB are reported amongst individuals with a personality which gave them a proclivity to ruminating on past misfortunes (Nolen-Hoeksema, Parker and Larson, 1994). Finally, Diener *et al*. (1999) remarked that the literature does not support the idea that low achievers in life are necessarily unhappy. In fact, having big life goals is more closely associated with lower levels of SWB because ambitious people are more likely to observe a gap between where they currently are in life and where they wish to be.

Relationships and family

The literature finds a generally positive relationship between SWB and being married (e.g., Blanchflower and Oswald, 2004a; Campbell *et al*., 1976; Diener, Gohm, Suh and Oishi, 1998; George, Okun and Landerman, 1985) and a negative relationship for being divorced, separated or widowed (e.g., Blanchflower and Oswald, 2004a). Being in a meaningful long-lasting relationship has been shown to provide more happiness than a series of shorter, less meaningful relationships (Blanchflower and Oswald, 2004b). Similarly, co-habiting is associated with higher levels of SWB, depending on the level of commitment and stability in the relationship (Brown, 2000). Being separated is associated with lower levels of SWB than being widowed or divorced (e.g., Helliwell, 2003), with women more likely to suffer from depression following divorce (Horwitz, White and Howell-White, 1996). However, there is evidence of a selection effect with those exhibiting lower levels of SWB before marriage being more likely to get divorced (e.g., Lucas, 2005).

The evidence on whether having children affects SWB is mixed. Controlling for income and financial satisfaction, Haller and Hadler (2006) find that having children has no significant effect upon happiness but a positive effect on overall life satisfaction. There are reported hedonic benefits of having children (Gilbert, 2006; Powdthavee, 2009b) but other researchers report negative effects upon SWB (Clark, Diener, Georgellis and Lucas, 2008; Glenn and Weaver, 1988; Gove and Geerken, 1977; LeMasters, 1957; McLanahan and Adams, 1987; Powdthavee, 2009c; Rossi, 1968). Dolan *et al.* (2008) conclude that having children can reduce SWB when certain negative external circumstances exist. These include single parenthood and divorce (Frey and Stutzer, 2000; Schoon, Hansson and Salmela-Aro, 2005), a recent house move (Magdol, 2002), poverty (Alesina *et al.*, 2004) or if the child needs special care (Marks, Lambert and Choi, 2002). Applying a fixed effects model to 17 waves of GSOEP data, Pollman-Schult (2014) finds that parenthood has substantial positive effects on life satisfaction which are offset by financial and time costs and these costs vary considerably with household factors such as employment, number and age of children and marital status. Becchetti and Pelloni (2013) conclude that the evidence on the relationship between child-bearing and happiness is a puzzle because on average, having children has a negative effect on life satisfaction. One explanation is that individuals like to depart from selfishness and rationality and gain utility from taking on responsibility. The second explanation is that individuals simply underestimate the cost and time commitments involved in raising a child. They acknowledge strong variability across gender and income levels, however; higher income households may be able to devote more hours to raising children or spend more on childcare. For women, there are greater opportunity costs of raising children in developed countries because of the perceived impact upon their career earnings.

With regards to family relations in general, Becchetti and Pelloni (2013) discuss the concept of 'relational goods' as a method to understand the relationship between happiness and sociability. Relational goods are 'a specific kind of local public good for which investment, production and consumption coincide'. For example, a football game or a movie can be watched alone but when they are enjoyed in company, the acts of laughing or cheering together effectively creates a new type of good. On a smaller scale, they take the form of family relationships and friendships which embody emotional support structures, social approval and solidarity. Hence, relational goods are a way of including other individuals into the utility function with respect to the relative income approach in happiness studies (Ferrer-i-Carbonell, 2005). Regular contact with friends and family has been found to be associated with higher SWB (e.g., Lelkes, 2006; Pichler, 2006) and better mental health (e.g., Kawachi and Berkman, 2001; Werner-Seidler, Afzali, Chapman, Sunderland and Slade, 2017), although Martin and Westerhof (2003) found that only contact with family raises SWB, but not with friends.

Education

There is weak, but statistically significant evidence in the literature that education levels directly affect SWB (e.g., Campbell *et al.*, 1976; Cantril, 1965; Diener *et al.*, 1993; Stutzer, 2004). A positive relationship has been found between each additional level of education and SWB (Blanchflower and Oswald, 2004a), which becomes stronger for individuals with lower incomes (Campbell, 1981; Diener *et al.*, 1993) and those from poorer areas (Veenhoven, 1994). Part of the relationship can be explained by the covariance between education, income and occupation (Campbell, 1981; Witter *et al.*, 1984). However, Clark (2003) finds a link between higher education levels and worse GHQ scores, whilst Clark and Oswald (1994a) find that those who are highly educated suffer greater drops in SWB when faced with an unemployment shock. This may be because this group tends to exhibit higher aspirations and unemployment decreases the likelihood of their goals being met (Diener et al., 1999). Castriota (2006) suggests several reasons why education may be positively related to life satisfaction: education or knowledge is a good in itself, from which utility can be derived and some people may associate shame with falling below a minimum level of education. Moreover, education signals skills to a potential employer where otherwise asymmetric information may exist. Higher education levels are also associated with labour market participation, employability, autonomy and ability to choose more interesting jobs. Dolan *et al.* (2008) argue that education levels may be related to unobservable traits (motivation, attitude, intelligence etc.) and recommend looking towards the studies which control for unobserved heterogeneity. However, they explain that fixed effects models are unlikely to pick up any significant effects of education unless the individual's highest level of education changes within the time span of the panel survey. They also argue that higher education levels are likely to be positively correlated with income and health, so these must be controlled for, as to not overestimate the coefficient on education level. One study which uses fixed effects estimations is FitzRoy and Nolan (2020). Using 18 waves of BHPS and Understanding Society data, they find that higher educated people experience greater life satisfaction, including over the time of the 2008-09 economic crisis, although their average income was always higher. Less educated people experienced rapid income growth up to the point of the crisis but without any change in life satisfaction, whilst higher educated people experienced increasing life satisfaction after the crisis, despite falling real incomes. For this group, the coefficients on income levels are not statistically significant. A possible explanation is that this group experience many non-pecuniary benefits such as more interesting jobs.

Employment and income

There is a broad selection of literature which associates lower levels of SWB with unemployment (e.g., George *et al.*, 1985; Riddick, 1985). Diener *et al.* (1999) explain that, separate from income, employment provides an optimal level of stimulation, identity, meaning and social relationships (Csikszentmihali, 1990; Scitovsky, 1976). An alternative explanation is that employed people experience lower stress levels, higher life satisfaction and lower suicide rates (Oswald, 1997; Platt and Kreitman, 1985). Unemployment has been reported to cause drops in SWB of between 5-15% (Di Tella *et al.*, 2001; Frey and Stutzer, 2000; Helliwell, 2003; Stutzer, 2004). However, Dolan *et al.* (2008) explain that because of the relationship between health and disability, when health is controlled for, estimates of SWB may be underestimated.

Poorer wellbeing as a result of unemployment has also been associated with being middle-aged (Clark and Oswald, 1994; Pichler, 2006; Winkelmann and Winkelmann, 1998), higher educated (Clark and Oswald, 1994), and male (Clark, 2003; Dockery, 2003; Gerlach and Stephen, 1996; Lucas, Clark, Georgellis and Diener, 2004; Thedossiou, 1998). Using a fixed effects model, the GHQ-12 score for unemployed men is found to rise once future income and employment expectations have been controlled for (Wildman and Jones, 2002). Controlling for financial losses caused by unemployment, this study found that poorer levels of SWB are caused by increased concern over future finances. However, SWB has been found to be mitigated by the receipt of transfer benefits (Di Tella *et al*., 2003).

There is evidence in the literature of a positive relationship between SWB and labour hours worked (Dolan *et al*., 2008; Schoon, Hansson and Salmela-Aro, 2005; Wienzierl, 2005). Others however (Luttmer, 2005; Meier and Stutzer, 2006) report an inverse U-shaped relationship, suggesting there is an optimal number of hours worked for every individual. However, lower SWB is recorded for men working part-time hours compared to full-time male workers (Schoon, *et al*., 2005). Wunder and Heineck (2012) find that working time preferences and mismatches between shift times can be more detrimental to the wellbeing of working couples, rather than the number of hours worked. Using a fixed effects model with GSOEP data, they find a positive relationship between hours worked and wellbeing for men but the opposite for women. Women experience higher wellbeing when their male partners work full-time, but men are negligibly affected by their female partners' working hours, except when they are very high. The evidence is unclear on whether different types of work affect SWB, although casual work has been shown to exhibit negative effects on wellbeing in the UK (Bardasi and Francesconi, 2004). Insecure work is strongly associated with poorer mental health outcomes, especially for those living alone, single parents and when local housing is unaffordable (Bentley, Baker and Aitkin, 2019).

With regards to income, studies since Wilson (1967) have shown weak statistical links with SWB. A well-known concept within the literature is the *Easterlin Paradox* (Easterlin, 1974), the finding that whilst higher incomes are associated with higher levels of wellbeing contemporaneously, over the longer term, rising real incomes across the board are not related to increases in wellbeing. Oswald (1997) also found no relationship between happiness and economic growth between the 1970's and 1990's in the US, UK, Belgium or Japan. Reviewing the available literature in this area at the time, Diener *et al.* (1993) concluded that income changes impact SWB the most when they affect the individual's ability to meet basic needs or the resources required to meet their goals. Similar findings are concluded by Ferrer-i-Carbonell (2005). Blanchflower and Oswald (2004a) find that in the US, individuals from higher quartiles of the income distribution report significantly higher levels of SWB than all lower quartiles. Similar results are found by Di Tella and MacCulloch (2006), who use GSOEP data from 1985 to 2000 to regress self-reported levels of happiness (on a scale of 0 to 10) against income. Respondents are divided into 'rich' and 'poor' halves of the sample. An increase in annual income by 1000 Deutschmarks is associated with an increase in wellbeing for the 'poor' of 0.12 points and an increase of 0.008 for the 'rich'. Easterlin (1974) also found that happiness increased with income a lot more at the lower end of the distribution. As such, the relationship between income and wellbeing is typically found to be positive across the literature, but non-linear with diminishing returns (e.g., Clark, Frijters and Shields, 2008). However, Becchetti and Pelloni (2013) find this only holds in the very short-term. Over the longer term, the relationship is weaker because of hedonic adaptation to the new income level. Similarly, Easterlin (1974) found that income changes were correlated with changes in happiness at any given point in time, although gradual income changes from the 1940's to the 1970's overall did not improve happiness. The relationship has also been shown to be weaker when controlling for individual characteristics such as personality (Ferrer-i-Carbonell and Frijters, 2004; Luttmer, 2005). Stevenson and Wolfers (2008) however, finds a lack of evidence for this relationship at all when using multiple measures of SWB.

Other literature has focused upon the effects of relative, rather than absolute incomes. Diener *et al.* (1993) found that changes to an individual's income were more important determinants of SWB than absolute levels, possibly because an income reduction increases the gap between the individual's available resources and what they originally viewed as their set of attainable goals, however, people tend to adapt quickly. Some researchers have found that social comparison also plays a part as SWB is affected by comparing own's own income with that of their peers (Becchetti and Pelloni, 2013; Diener *et al.*, 1999) or even with their own partner's; Gash and Plagnol (2019), using the first seven waves of Understanding Society, find that short-term changes in proportional income (as a fraction of household income) exhibit a positive relationship with men's SWB, but not for women's SWB.

Leisure time and leisure activities

SWB has been positively associated with partaking in hobbies and leisure activities (e.g., George *et al.*, 1985; Riddick, 1985), membership of local community groups or sports clubs (Helliwell, 2003; Helliwell and Putnam, 2004; Pichler, 2006) and volunteering (Greenfield and Marks, 2004; Lawton, Gramatki, Watt and Fujiwara, 2020; Meier and Stutzer, 2006; Thoits and Hewitt, 2001), whilst a positive relationship has been found between arts engagement or cultural attendance in communities and better mental health and wellbeing (Wang, Mak and Fancourt, 2020).[17] Studies have also shown a link between exercise and wellbeing, from both

[17] 'Arts engagement' includes dancing, singing or playing a musical instrument to an audience, rehearsing or performing in a play, taking part in a carnival or street art, painting, drawing, sculpting, photography or film-making, craftwork or going to book clubs among other activities. 'Cultural attendance' includes going to the cinema, an exhibition, a festival, a play, or other performance. Mental distress was measured using the GHQ-12, mental function was measured using the SF-12 (12-item short form health survey), subjective

survey and experimental research (e.g., Fox, 1999). Being active is associated with reductions in anxiety and depression, improved mood, sleep and general self-worth (e.g., Biddle and Ekkekakis, 2005). Even mild exercise, such as gardening, has been associated with higher levels of SWB (Baker, Cahalin, Gerst and Burr, 2005; Ferrer-i-Carbonell and Gowdy, 2007). In the opposite scenario, those who forego leisure time to care for others are found to exhibit lower psychological wellbeing by way of worse GHQ-12 scores (Hirst, 2003; Hirst 2005; Marks, Lambert and Choi; 2002; Van Den Berg and Ferrer-i-Carbonell, 2007), especially for closer family relations (Marks *et al.*, 2002). Similarly, caregiving has been associated with a loss of autonomy and reduced leisure time, which has been linked with lower SWB (e.g., Biegel, Sales and Schultz, 1991; Chappell, 1990; Given and Given, 1991; Horowitz, 1985;).

Macroeconomic variables

There is a body of literature which examines whether SWB is affected by the wider environment, whether socially, politically or economically. In general, there appears to be a negative relationship between SWB and the unemployment rate (Alesina *et al.*, 2004; Di Tella *et al.*, 2001; Di Tella *et al.*, 2003; Wolfers, 2003), which may be explained if the individual fears becoming unemployed themselves. The same four papers also found a slight negative relationship between SWB and inflation, although positive relationships between SWB and economic growth tend to be weak (Easterlin, 1995; Oswald, 1997).

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wellbeing was measured using Understanding Society's self-reported 7-point Likert scale. Better scores were found for all three measures of wellbeing when respondents engaged in either of the two types of activity.

There are very mixed findings on whether income inequality affects individual SWB. For example, Fahey and Smyth (2004) find a negative relationship between income inequality in an economy and SWB whilst Haller and Hadler (2006) find a positive relationship. This is likely due to different income distributions between countries. Dolan *et al.* (2008) argue that former communist countries with flatter income distributions tend to be unhappy, whilst Latin American countries with higher income inequality levels are generally happier. Deaton (2008) ran regressions between life satisfaction and national income per capita on 132 countries and finds a strong relationship; a doubling in GDP per capita is associated with a one-point increase in life satisfaction on a 0 to 10 scale, with stronger correlations found for wealthier countries. Lower life satisfaction is also associated with pollution (Ferrer-i-Carbonell and Gowdy, 2007), living in an unsafe or deprived area (Ferrer-i-Carbonell and Gowdy, 2007; Lelkes, 2006) and living in rural areas (Dockery, 2003; Graham and Felton, 2006; Hayo, 2004; Hudson 2006).

Health

Wilson (1967) strongly associated good health with higher levels of SWB but later research (e.g., George and Landerman, 1984; Larson 1978; Okun, Stock, Haring and Witter, 1984) found that SWB was more closely correlated with subjective self-reported health measures, rather than objective measures such as a doctor's report or number of hospital visits. Dolan *et al.* (2008) summarises that studies consistently show a strong relationship between both physical and psychological health and SWB, but especially so for psychological health. Other papers find that the relationship depends on the nature of the illness. For example, Graham, Higuera and Lora (2011) find that larger drops in SWB are associated with conditions that cause anxiety and pain, compared with those that cause physical problems. This is likely because people tend to adapt better to one-time shocks than to conditions that cause longer term uncertainty.

3.2.5 Measuring the Longitudinal Effects of Disability upon Variables other than Wellbeing

There is a wide body of literature which associates disability with poorer economic outcomes, although much of the work is cross-sectional (e.g., Burkhauser and Daly, 1998; Chase *et al.,* 2000; Ville and Ravaud, 2001). Papers which include a time dimension became more prominent around the turn of the 21st century. Burchardt (2000) was one of the first studies to consider 'disability trajectories' over a period of time, which allow for heterogeneity in disability recovery times. Those with disabilities lasting over 4 years were found to be more prone to poverty and unemployment. Burchardt concluded that policies that failed to distinguish between disability trajectories led to marginalisation of disabled people and were costly to the state. Stephens (2001) was the first to estimate the longitudinal effects of disability upon consumption, acknowledging that it is generally viewed as a better proxy for utility than income in both the psychology and economics literature (e.g., Cutler and Katz, 1992). Using PSID data, Stephens found slight downward movements in both income and consumption in the period prior to onset, suggesting that disability onset is, at least in some cases, anticipated. Consumption continued to fall before making a slight recovery four years post-onset. Overall, consumption tended to 'track' household income, regardless of its composition of wages or transfer payments. A problem with the study is that the results do not give a clean interpretation of disability onset on household well-being; the gap between after-tax household income and post-onset consumption is too large for the food-elasticity estimates used in the model. The continued decline in consumption following disability remains unexplained also. Nevertheless, a key conclusion was that if disability can be predicted, people tend to smooth their consumption in the years prior to onset accordingly. Hence, only focusing on earnings overestimates the impact of disability shocks on household wellbeing.

Heterogeneity in response to disability shocks

Later papers found that income drops associated with disability shocks are experienced heterogeneously across different groups of individuals, including by sex, race, age of onset and education level. Analysing PSID data, Charles (2003) reported that disabled men experience income "jumps" prior to disability onset, substantial "drops" in the year of onset, partial recoveries in the first two years post-onset and a steady decline over the longer term. However, larger losses from disability and smaller recoveries are associated with being older at onset, non-white, more chronically disabled and less educated. It is also found that half of the recovery that men are estimated to make in the first two years following onset can be explained by changes in industry and occupation, which are more likely to be actioned by white men and the relatively higher educated. It is also concluded that individual characteristics have predictive power to determine whether an individual's income would be susceptible to disability onset or not and that disability was not randomly distributed. Furthermore, when disability is not anticipated, such as in the case of accidents, individuals do not make human capital decisions in preparation of them. However, other disabilities, such as those which occur following a degenerative health condition, are better prepared for. Unfortunately, the data in Charles' paper does not allow for a disentangling of the two groups. Sex differences are also found by Jones, Latreille and Sloane (2006), who showed, using cross-sectional LFS data, that the income 'penalty' for work-limiting disability has fallen over time for men, possibly reflecting legislation, but not for women. Polidano and Vu (2013) finds heterogeneity in response to disability onset between the sexes and across different education level. They use a difference-in-differences model to estimate probabilities of employment, part-time employment and low-income work. Individuals are found to be increasingly less likely to find themselves in full-time work every year after disability onset and more likely to be in a low-income household following onset. Higher educated disabled individuals find it easier to regain full-time work after onset. However, those with lower education are linked to receiving higher income support after onset. Disabled women are also more likely to find themselves out of work or in part-time employment compared to men, but education was the most important factor. Using PSID data, Jolly (2013) finds that the greatest negative employment effects of disability onset are experienced by workers who are older at time of onset, African American, or came from blue-collar professions. Singleton (2012) criticises previous studies, such as that of Charles and Stephens (2004), for not differentiating between different categories of disability. Applying an event study model to pooled US data, Singleton finds a positive correlation between disability, a precipitous decline in earnings and increased divorce rates. These relationships are found to be stronger for younger, higher-educated men who faced a work-preventing, rather than work-limiting disability and whose onset was unexpected. However, Jenkins and Rigg (2004) argue, using BHPS data, that a selection effect is present in such studies, as disabled people are already economically disadvantaged prior to onset. Therefore, this should be accounted for when attempting to estimate the employment or income effects of disability onset, and should be disentangled from the effect of the disability itself as well as the length of disability. The authors find that incomes are, in most cases, only found to make partial recoveries to pre-onset levels.

Heterogeneity in disability types

As well as differences in life circumstances and personal characteristics, heterogeneity in the type and duration of disability are also found to play a part in driving the economic effects of disability. Mok, Meyer, Charles and Achen (2008) were among the first to look specifically at the effects of the duration of disability upon several economic outcomes. They re-examine the work of Charles (2003) and Meyer and Mok (2006), which initially claimed that disability onset only results in small short-term losses in terms of hours worked and earnings. Mok *et al.* (2008) however find evidence of much larger losses in both outcome variables for the most chronically disabled, which persists even a decade after onset.

As well as duration of disability, researchers have also examined the effects of disability severity upon economic outcomes. Severity of disability is typically measured by one of a few subjective ways, such as asking the respondent to rate their disability on a scale of 1 to 10 (e.g., Jones, Mavromaras, Sloane and Wei, 2018; Oguzoglu, 2011), or by asking the extent to which their disability affects their ability to carry out day-to-day activities, with responses such as "a lot" and "a little" differentiating between severe and non-severe disabilities, respectively (e.g., Meyer and Mok, 2019)[18]. Other studies have asked respondents how many disabilities they

[18] Alternatively, respondents are asked the extent to which their disability affects their ability to carry out work-related activities if a work-related disability definition is used.

have or how many areas of day-to-day life (e.g., mobility, sight, memory) are affected by their disability with single responses denoting non-severe disabilities and multiple responses denoting severe disabilities (e.g., Jones, Davies and Drinkwater, 2018). Oswald and Powdthavee (2008) and Powdthavee (2009a) denote severely disabled individuals by those who declare that they are disabled *and* are unable to complete at least one task from a given list.

Using a two-equation dynamic panel data model with HILDA data, Oguzoglu (2010, 2011) finds that severe disabilities negatively impact labour market participation more than less severe disabilities, even when controlling for persistence of participation. In a later study, Oguzoglu (2016) reports employment effects vary by both chronicity and severity of the disability, suggesting that a differentiated policy approach should be taken. Similarly, Jolly (2013) finds considerably lower earnings and levels of income mobility for the most severely and chronically disabled using 40 waves of PSID data. Meyer and Mok (2019) use 48 years of PSID data to derive a sophisticated fixed effects model which controls for both severity and persistence. The model applies the framework of Baily (1977) and Chetty (2006) to PSID data to measure how disability causes a fall in consumption and how the US social security system mitigates for this. They also measure changes in other variables such as income, leisure time, food consumption and housing consumption in disabled men. People with both a chronic and a severe disability are found to experience significant reductions in these variables, with little evidence of recovery, even a decade after onset. Those who face more temporary and less severe conditions make partial or full recoveries. The above effects are partially cushioned by factors including welfare benefits, intra-family risk sharing and tax credits and reductions. However, the more severely disabled men in the study are at an increased risk of losing family support by becoming divorced or separated within a decade of onset. The most severely disabled suffer a 77% income drop with a 28% decline on food and housing consumption.

Jones, Davies and Drinkwater (2018) extend the Meyer and Mok framework by including controls for disability exit as well as onset. They use eight waves of UK data from the Local Labour Force Survey (LLFS) to estimate the effect of disability upon labour hours. Disability is categorised into five mutually exclusive disability trajectories to control for individuals that experience different degrees of disability persistence. They show that for most groups, there is an asymmetry in the impact of onset and exit, where employment is significantly reduced at onset and continues to decline. However, when controlling for unobserved heterogeneity, exiting disability only has a limited effect upon employment. Jones, Mavromaras, Sloane and Wei (2018) also adopt this framework and find that individuals who are temporarily disabled (two consecutive periods of self-reported disability) make significant recoveries in terms of probability of employment. Meanwhile, those most severely and chronically disabled (at least three consecutive periods of disability) face much lower levels of employment, even a decade after onset.

3.2.6 Longitudinal Wellbeing Studies and Hedonic Adaptation

Whilst traditional economic theory tends to presume that a shock such as disability onset will have a permanent effect upon an individual's utility, this is not consistent with the psychology literature, which allows for a degree of adaptation over time. Oswald and Powdthavee (2008) describe this disconnect between the two social science disciplines as "scientifically unattractive". Not allowing for adaptation within the data perpetuates the perception that disabled and non-disabled people make up two distinct and fixed groups in society, which has been described as misleading (Burchardt, 2000). Moreover, cross-sectional studies cannot differentiate between differences in outcomes caused by pre-onset and post-onset factors (Jenkins and Rigg, 2004). Only more recent economic papers, discussed below, have begun to consider the adaptation process in relation to disability.

The term 'hedonic adaptation' was first coined by Frederick and Loewenstein (1999) but by this time it had been well established in the psychology literature that negative event shocks do not necessarily have a permanent and stationary effect upon wellbeing. Hedonic adaptation serves two important functions; first as a mechanism to protect the person from potentially dangerous psychological and physiological reactions that occur with prolonged emotional states, which can eventually lead to metabolic diseases. Second, if the affected person's actions over a certain length of time have failed to fully or partially eliminate the threat, it becomes increasingly unlikely that these actions will have much of an effect, if any, in the future. Thus, hedonic adaptation frees up resources to focus upon more attainable goals (Diener *et al.*, 1999).

Brickman and Campbell (1971) conceived the idea of the *hedonic treadmill*, that all individuals return to a personal set point of wellbeing over time following a positive or negative life event. This has found a lot of support in the subsequent psychological literature.[19] In a well-known example, Brickman, Coates and Janoff-Bulman (1978) compare a group of multimillion-dollar lottery winners to a group of individuals who suffered quadriplegia or paraplegia as a result of accidents and measure both groups' self-reported happiness over time. Whilst these events are initially reported as "highly positive" and "highly negative", respectively, towards the end of the study the

[19] See Diener, Lucas and Scollon (2006) for an overview.

lottery winners were much unhappier, and the accident victims much happier, than the researchers expected. The accident victims were found to gain more satisfaction than the lottery winners from smaller pleasures such as watching tv or dining with family. Similar results were found in a different study of Americans with spinal cord injuries; Schultz and Decker (1985) found that life satisfaction was only marginally lower and levels of depression only marginally higher than the non-disabled population, twenty years after onset. Near full adaption was also observed for individuals with amputations, with the remaining gap explained by body-image issues and phantom limb pain (Tyc, 1992).

Diener, Lucas and Scollon (2006) conclude that 35 years after Brickman and Campbell (1971) introduced the concept of the hedonic treadmill, four important revisions have to be made. First, people on average return to a *positive* state of wellbeing, rather than feeling emotionally neutral (e.g., Diener and Diener, 1996). Second, the set points of wellbeing that people return to vary widely across individuals due to inborn personality differences (e.g., Diener and Lucas, 1999). Third, happiness is multi-faceted and composed of separable well-being variables such as pleasant emotions and unpleasant emotions, which means that an individual's set point can change over time depending on life circumstances (e.g., Scollon and Diener, 2005). Fourth, life satisfaction can change across time cross-sectionally due to country-wide effects (e.g., Fujita and Diener, 2005). Fifth, adaptation rates vary widely across individuals, for example, people with a happier disposition tend to react more strongly to positive life events (e.g., Larsen and Ketelaar, 1991).

Further to the revisions above, Diener et al. (1999) conducted a review of the longitudinal wellbeing literature since the work of Brickman *et al.* (1978) and made a few broad conclusions; the human emotional system reacts to recent events more strongly than past events, the effects of which dampen over time (e.g., Headey and Wearing, 1989; Suh, Diener and Fujita, 1996) and that the largest reactions happen within 3 months of the event (Suh *et al.*, 1996); when controlling for age at the time of disability onset, time since injury and environmental changes on the wellbeing of disabled individuals, time since injury is found to be positively correlated with general life satisfaction (Krause and Sternberg, 1997); those who acquire disability earlier in life are happier than those who became disabled in later life because the former group had more time to adapt (Mehnert *et al.*, 1990); and people are, on average, happy and that they return to a positive set point after adaptation, rather than a neutral level (Headey and Wearing, 1989). The subsections below summarise a selection of academic papers which estimate hedonic adaptation of wellbeing following some positive or negative life event. Whilst most of these do not include disability as an exogenous variable, they are still useful as they provide suggestions for estimating such shocks and show how different groups of individuals recover from adversity.

Adaptation to changes in employment status

Using BHPS data, Clark and Oswald (1994a) were possibly the first researchers to find evidence of adaptation to mental distress following the onset of unemployment. The effects in the period of job loss are instantaneous and significant but the level of distress reduces gradually every 6 months. Building upon this, Winkelmann and Winkelmann (1998) estimate wellbeing equations which include duration of unemployment spells in years and the square of the duration, to pick up any non-linearities. The coefficients on these terms are significant, leading the authors to conclude that the wellbeing effects of unemployment outweigh the pecuniary effects. The effects are greater for men and those of prime age (29-49). Past unemployment has also been shown to exhibit a 'scarring' effect on current wellbeing; Clark, Georgellis and Sanfey (2001) estimate SWB using 11 waves of the German Socio-Economic Panel Study (GSOEP) in a fixed effects model with dummy variables for current and past employment and an interaction between the two factors. Life satisfaction is not only found to be lower for the currently unemployed, but also for those with higher levels of past unemployment, implying the presence of a scarring effect, rather than unemployment being something that one adapts to over time. In a later study, Clark *et al.* (2008) use 20 waves of GSOEP data to estimate two fixed effects wellbeing equations that include explanatory dummy variables which represent leads and lags of unemployment onset. Anticipation effects are found, with SWB dipping in the periods prior to unemployment in the first equation. Partial adaptation is found in the second. The methodology is adopted using Russian data (Bauer, Cords, Sellung and Souza-Poza, 2015), but unemployment is shown to exhibit permanent negative effects upon SWB. The authors put this down to country-specific differences in ability to adapt to negative events as well as different interpretations of life satisfaction. The Clark *et al.* (2008) methodology is replicated with British BPHS data by Clark and Georgellis (2013) with very similar results, albeit with an unexplained dip in SWB for males at 3 years after the unemployment event. Similar patterns with lead and lag effects are also found when the GHQ-12 score is the outcome variable.

Adaptation to changes in marital status

Using 15 waves of GSOEP data, Lucas, Clark, Georgellis and Diener (2003), find that marriage only gives people a small boost on average – around one tenth of a point on an 11-point scale in the year of the wedding, before life satisfaction returns to its 'set point' within 8 years. Consistent with Heady and Wearing (1989), wellbeing reverts to a positive, rather than neutral, level. The rate of adaption depends on individual personality types and the adaptation process takes longer for those who experience the largest wellbeing shocks. This is consistent with findings across the psychology literature to various life events (e.g., Diener *et al.*, 1999). Lucas and Clark (2006) find similar results when controlling for whether the couples cohabited before marriage, but with slightly higher life satisfaction levels for cohabiting couples. Clark *et al.* (2008) find SWB to increase in anticipation of marriage but declines after the wedding year, with the lag and lead effects being gradual for men and sharper for women. Similar results are found when 18 waves of British data (BHPS) are applied to the Clark *et al.* (2008) model (Clark and Georgellis, 2013).

Lucas (2005) finds strong downward anticipation effects associated with divorce (drops in SWB) up to six years before the event, which are quickly alleviated in the year of divorce, however adaptation in the post-onset years is not a complete process (around 50%). Clark *et al.* (2008) find similar lead effects up to one period before divorce, before SWB rises sharply above baseline, particularly for men. Again, very similar results are found using British data (Clark and Georgellis, 2013). Using BHPS data, Gardner and Oswald (2006) find that changes in SWB around the time of divorce are similar between men and women when measured using the GHQ-12, which declines in anticipation of divorce but returns to a set point within a few years. However, in absolute terms, women are most affected. SWB is found to decline most when the couple have children and recovers quickest when the individual remarries within a few years of divorce.

Lucas *et al.* (2003) demonstrate long-lasting results of widowhood, with adaptation not quite returning to baseline levels 8 years after the event. Looking at both the effects of marriage and widowhood, they believe that the process could not be described as a hedonic treadmill, which assumes adaptation is inevitable. Instead, there is a lot of variability, with some individuals facing SWB trajectories in the opposite direction and with substantial long-term changes to life satisfaction for some individuals following such events.[20]

Clark *et al.* (2008) find strong anticipation effects of widowhood for both sexes and complete adaptation within around four years. Again, very similar results were found using British data, except this time men adapted to widowhood much quicker, within around one period (Clark and Georgellis, 2013). Clark *et al.* (2008) find that childbirth exhibits strong anticipation effects for women but SWB declines for both sexes in subsequent years with full adaptation within 5 years. Again, the results are mirrored in British data (Clark and Georgellis, 2013), although this paper also associates the period of childbirth with gradual but significant dips in GHQ-12 scores, which recover quickly and fully for females but slowly and partially for males.

[20] One argument is that life satisfaction and psychological disorders such as depression should be treated as separate concepts which are not necessarily closely related. For example, Stroebe, Stroebe, Abakoumkin and Schut (1996) found that regardless of SWB, depression levels were higher and adaption rates slower for bereaved individuals compared to non-bereaved individuals, although these levels did eventually decline.

Adaptation to ill health

Gupta, Mishra, O'Leary and Parhi (2015) use the framework of Clark and Georgellis (2013) with 18 waves of BHPS data to estimate the effects of ill health upon SWB. This method is extended across the wellbeing distribution within a quantile regression setting (see Koenker, 2004). Evidence for adaption varies depending where in the distribution the individual belongs to, with strong adaption for the 75th and 90th percentiles, but significantly less so for the 10th, 25th and 50th percentiles. In another study, Graham, Higuera and Lora (2011) show that people tend to adapt better to one-off shocks than to constant uncertainty. However, health shocks have larger long-lasting effects upon SWB compared to other shocks such as income.

Adaptation to disability

Overall, the literature on whether adaptation to disability occurs is mixed. The study of accident victims and lottery winners by Brickman *et al.* (1978), discussed in section 3.2.6, was the first of its kind in terms of measuring the longitudinal effects of disability on SWB. The main conclusion drawn from the study was that major life events, either good or bad, have smaller effects on wellbeing than one may expect, for two reasons: contrast and habituation effects. In the shorter term, the effects of a strongly positive event, such as a major lottery win, are mitigated by the fact that small or mundane pleasures (e.g., watching TV, buying clothes) no longer bring much happiness when contrasted to the lottery win. Similarly, after a strongly negative event such as becoming paraplegic, small pleasures are amplified due to the anchoring effect of the accident providing a sharp contrast. In either case, the process of habituation causes SWB to return close to its starting point in the long run. This may be because people are more likely to rate their own wellbeing in comparison to how they felt in the recent past, rather than how they felt a long time ago. Unfortunately, the time period for this study was very short and the sample size was small. Nevertheless, other studies have shown that adaptation can take place very quickly; people with spinal cord injuries have been recorded as experiencing strong negative emotions one week after their accident, but two months later, their strongest emotion was happiness (Silver, 1982), whilst Suh, Diener and Fujita (1996) found evidence of negative wellbeing effects after two months.

More recently, studies have challenged the idea that adaptation to disability is a complete process and have also looked at how SWB changes prior to disability onset (anticipation effects). Lucas (2007) finds, using both GSOEP and BHPS data, that onset is associated with moderate to large drops in happiness (0.40 to 1.27 standard deviations) but with little adaption over time. Oswald and Powdthavee (2008) estimate SWB using a fixed effects model with 7 waves of BHPS data. They find that hedonic adaptation lies between 30-50% depending on the severity of the disability.[21] Moreover, for those individuals who become disabled at some point during the study, their initial level of life satisfaction (two periods prior to onset) is, on average, lower than the population mean at 4.8, suggesting that disability does not strike randomly or independently of personal characteristics.[22] Using HILDA data, Jones, Mavromaras, Sloane and Wei (2018) also find heterogeneity in adaptation between disability categories. People with short-term disabilities (1 or 2 years) experience

[21] Moderately Disabled is defined as 'disabled but able to do day-to-day activities including housework, climbing stairs, dressing oneself, and walking for at least 10 minutes.' Severely disabled is defined as 'disabled and unable to do at least one of the above activities.'
[22] To control for this, the authors assume that current life satisfaction is negatively correlated with past disability. They add a four-value dummy variable to the model, ranging from 0 to 1 to represent the ratio of past disability between t-j and t-1 measured as a percentage of the total time spent being disabled. Both fixed effects and random effects models are used but the former provides much stronger evidence for hedonic adaptation.

rapid adaptation, although there is little evidence for recovery amongst those with both a severe and chronic disability, even 10 years post-onset.

In another study, the framework by Clark *et al.* (2008), discussed previously, is adapted by Pagán-Rodríguez (2010) to examine disability onset, using 23 waves of GSOEP data. The study finds evidence of anticipation effects, a sharp decline at onset and strong adaptation effects for most, but limited effects for those who were already in poor health before onset. This U-shaped dip in SWB is also found by Boyce and Wood (2011) using the Clark *et al.* (2008) framework, but only for those with "agreeable" personality types, out of the "Big Five" personality types, with full adaptation after 4 years. SWB for those without agreeable personality types however continued to decline gradually.

Smith, Langa, Kabeto, and Ubel (2005) estimate SWB before and after disability onset for people with high and low amounts of accumulated wealth. They find that people with savings and other assets report better wellbeing in both periods, but importantly, wealthy people who experience disability onset face smaller drops in SWB compared to less wealthy disabled people, and also adapt much quicker. Wealth is argued to provide a 'wellbeing buffer' whilst also improving SWB by enabling the individual to purchase goods and services to accommodate their disability. Freedman *et al.* (2019) also find wealth to be a wellbeing buffer for people who experience disability onset, whilst income is found to be a buffer for people in the middle-income quartiles.

As well as looking at overall SWB, a few studies have explored the dynamic effects of disability onset upon various facets of life satisfaction. Using a fixed effects model with BHPS data, Powdthavee (2009b) finds disability onset to exhibit negative effects on satisfactions with income, social life and use of leisure time but a positive impact on satisfaction with amount of leisure time. All participants find ways to adapt in full, apart from those with severe disabilities. Disutility experienced from the disability itself is found to be more impactful than other consequences such as lost earnings. It is argued that people adapt to income shocks quickly because money is largely in the background whereas individuals are reminded of their disability several times a day as they struggle to complete regular tasks. Income is an increasingly less important factor to explain life satisfaction the longer the individual spends in disability.[23] Health satisfaction is the domain found to be the most affected by disability, dropping four years before onset. Finally, Pagán-Rodríguez (2012) finds that although overall SWB recovers after 5 years post-onset, disability has various longitudinal effects upon different domains of life satisfaction: health, household income, housing, job and leisure. Most of these domains make full recoveries after 3-5 years, however health satisfaction and job satisfaction only make partial recoveries after 7 years.

3.2.7 Summary

A number of broad conclusions can be made from the available literature. There is a lot of evidence that disability exhibits negative effects on SWB and psychological health, although the variance in responses is quite large. Both the duration and severity of disability (and the interaction between these two factors) play important roles in determining how much SWB falls, how long the adaptation process takes, or

[23] The model follows a two-stage process whereby an individual's life satisfaction is a function of the satisfaction they experience in the different domains in their life (health, income, housing, partner, social life, amount of leisure, use of leisure). Each domain is referred to as a DS equation and is a function of past, present and future disability status. They include dummy variables to denote persistence and severity of disability and are estimated separately using fixed effects models.

whether it occurs at all. Disability is usually defined by the existence of a condition which limits the individual's ability to carry out typical day-to-day activities, which may or may not include the ability to work, whereas the severity of disability is typically defined by the extent to which disability prevents these activities. Long-term disabilities appear to exhibit greater negative effects upon SWB than short-term disabilities, regardless of whether disability is continuous or not. Even intermittent disabilities can be harmful to SWB as past periods of disability exhibit scarring effects. On the other hand, there is evidence in the literature of full and partial adaptation to disability onset, even for those with serious spinal cord injuries, so more research needs to be done to investigate which combinations of disability severity, disability duration and pre-existing characteristics lead to different adaptation times.

However, the evidence on whether people adapt to disability is varied. Early psychological literature (e.g., Brickman and Campbell., 1971) was largely supportive of the *Hedonic Treadmill*, the idea that adaptation is a complete process given enough passage of time, and that people always return to a positive, rather than neutral, set point of wellbeing. However more recent literature has argued that this is only a partial process (e.g., Oswald and Powdthavee, 2008; Powdthavee, 2009), or may not happen at all for those with the greatest extents of disability (Jones *et al.*, 2018) so more exploration is required here. There is also evidence that SWB can be affected in the periods prior to some life event if the individual anticipates it. This may occur in the case where the disability arises as the result of a degenerative health condition, so empirical analysis should consider differentiating between disabilities which are anticipated and those which come as more of a shock. The wellbeing response to disability onset has been argued to differ by gender, age of onset, education level, pre-onset levels of health and wealth, so these sources of heterogeneity should also be explored. In particular, the pre-onset effects of income and marital status on the response to disability have not been extensively considered.

The literature lists many potential drivers of SWB other than disability but there is a heavy focus on employment and income. Income alone is not strongly correlated with SWB, although logged income sometimes returns statistically significant (positive) coefficients in regression equations, suggesting diminishing marginal returns to income. What seems more important for wellbeing is that the individual is not unemployed and is able to keep consumption levels to a satisfactory level without experiencing material deprivation. Disability is commonly associated in the literature with lower incomes, working fewer labour hours and lower probability of labour force participation, so these should be considered as potential mechanisms through which disability affects wellbeing. The inclusion of employment status and income in any regression equation should be done with caution due to the potential for these variables to be mechanisms through which disability affects wellbeing. Whilst there are quite well-established methodologies for estimating both the economic impacts of disability onset and for estimating wellbeing, the literature which applies both sets of methodologies within the same set of estimations remains sparce.

3.3 Data and Definitions

3.3.1 The Dataset

The data for this chapter is drawn from Understanding Society, a nationally representative longitudinal household study, conducted by the Institute for Social and Economic Research at the University of Essex. The surveys are delivered by the National Centre for Social Research, which chooses a randomly selected sample of households to represent the UK population. Data is collected about all residents living in a household. Residents and their offspring form the core sample and are followed over their life course at one-year intervals. The design of the survey is similar to its predecessor, the British Household Panel Survey (BHPS), and household panel studies in other countries (e.g., GSOEP, HILDA, PSID). It is designed to be large enough to analyse minority samples such as disabled people or single parents. Wave 1 consists of the General Population (GP) sample, which includes 26,000 UK households and an Ethnic Minority Boost (EMB) sample, which includes 4,000 households with at least one ethnic minority individual. Wave 2 includes the 8,000 households that survived the 18th wave of the BHPS. Wave 6 includes the Immigrant and Ethnic Minority Boost Sample.

This dataset is chosen for a few reasons; the first is its relatively large sample size, which allows respondents to be placed into either a control group consisting of people who never become disabled or a treatment group consisting of suitable disability 'trajectories', or patterns, for analysis, whilst excluding many unsuitable trajectories. How these trajectories are generated is explained in section 3.3.2. A second reason is that it is comprised of 9 waves of data, which allows sufficient time to be able to track an individual's wellbeing before, during and after disability onset whilst being relatively assured that the length of time they spend disabled can be appropriately categorised. A further benefit is that it is a rich source of data regarding personal characteristics, covering areas such as subjective wellbeing, disability, income, employment, education level, family composition, financial status, and residential area. This allows for a suitable selection of controls and facilitates the analysis of potential channels of wellbeing and heterogeneity in the results.

The data is collected from interviews with adult (aged 16+) household members. Until Wave 7, most interviews were conducted face-to-face, with some sensitive questions collected in self-completed questionnaires. Around 500 households refused to participate in face-to-face interviews but were happy to complete the survey by telephone. From Wave 8, an increasing portion of participants completed the survey online. Interviewees were incentivised with a £10 shopping voucher. Each respondent answered the main individual questionnaire, as well as a self-completion questionnaire, the whole process taking around 40 minutes. The response rate for the self-completion questionnaire was around 87% for people from the GP sample and around 70% for those from the EMB sample. The first wave contains 51,994 observations, compared to 35,171 in the last period, an attrition rate of around 35%.

The data begins in wave 1, from a survey conducted between 2009 and 2011, and extends to wave 9, which was conducted between 2017 and 2019. Most, but not all variables are included in each wave, for example, data on spending time with friends and socialising are included only in waves 3, 6 and 9 and data on material deprivation are included only in waves 1, 2, 4, 6 and 8. Attrition rates in selected waves of the BHPS and Understanding Society are shown in Table 3.1. They are relatively low with 70% of the BHPS/Understanding Society sample still participating after 12 years and 40% after 24 years. Attrition rates are greater amongst non-white ethnic minorities compared to white people and are lowest amongst black people. It is highest in London and Wales and lowest in Yorkshire, the East, South East and South West. On average, non-disabled respondents stay in the survey for around 7.45 waves, compared to 8 waves for the average disabled respondent, so there is not a concern that people leave the survey when they become disabled. There is not usually a strong association between attrition rate and health status (Lynn and Borkowska, 2018).

Table 3.1: BHPS/Understanding Society attrition rates by sex, age and ethnicity.

	BHPS Wave 1 1991	BHPS Wave 7 1997	BHPS Wave 13 2003	U. Soc. Wave 2 2010	U. Soc. Wave 7 2015
Sex					
Male	4,833	75.6	66.2	47.3	37.5
Female	5,431	79.1	71.4	52.8	41.2
Age in 1991					
16-19	696	71.7	58.9	42.0	30.8
20-29	1,960	74.1	64.6	45.8	35.3
30-39	1,972	79.0	69.6	49.9	39.1
40-49	1,877	79.2	70.1	53.2	44.8
50-59	1,298	76.7	70.8	57.5	47.0
60-69	1,213	81.0	79.1	57.2	41.0
70+	1,248	78.9	71.6	38.6	30.4
Ethnic Group					
White	9,503	79.0	70.8	51.7	40.6
Black	138	50.8	36.8	20.0	17.0
Other	252	69.6	58.5	44.0	36.1
Total	10,264	78.3	69.9	51.0	40.0

Note: Ethnic group was not included in the proxy questionnaire, so analysis for this variable is restricted to sample members who completed the personal interview at wave 1. Source: Understanding Society Working Paper Series No. 2018-01 (Lynn and Borkowska, 2018).

Proxy interviews

Some respondents are assigned a proxy if they are unable to answer the questions themselves, for example if they are incapacitated by illness. Proxy interviews are abridged versions of the main survey and omit various questions if they are deemed too personal or cannot be answered by a proxy. In total, 36,202 observations (21.4%) of 9,575 individuals from the starting sample are excluded because their response was given by a proxy so it was not possible to record their subjective wellbeing. Many of these individuals will likely be permanently disabled and would not normally be part of the treatment or control group anyway. Feasibly, some respondents may begin the survey as non-disabled and later become unable to answer further waves due to severe disability onset, in which case, the most severely disabled people in the survey may be under-represented. In the full sample of 407,353 observations, there are 5,469 instances where an individual transitions from being a non-proxy to a proxy respondent over the 9 waves, but it cannot to be determined how many of these have transitioned due to disability. A similar number of transitions (5,546) occur in the opposite direction from proxy to non-proxy respondents over the 9 waves. Despite the similar numbers, we cannot conject that one effect necessarily cancels out the other. In the first case, potential members of the treatment group are excluded from the data, which may lead to more conservative estimates on the effects of disability. However, this is not a great concern as disabled people have better attrition rates than non-disabled people, as discussed previously.

Weighting strategy

The data in Understanding Society are subject to a weighting strategy. The aim of this is to mitigate against any potential bias caused by under-coverage, sampling or non-response. The dataset consists of four components. The first is the UK Household Longitudinal Study - General Population Sample (UKHLS-GPS) and is based on an equal-probability sample of addresses across the UK. The second is the

Ethnic Minority Boost Sample, which is restricted to areas with relatively high proportions of ethnic minority persons. The aim is to achieve similar numbers of respondents in each of the five ethnic groups. The third is the General Population Comparison Sample (GPCS), which consists of a random subsample of the UKHLS-GPS, consisting of half of the original sample, who are asked the additional ethnic minority questions to provide a comparison group against the ethnic minorities. Weights in this sample take the same form as in the UKHLS-GPS. The last component is the British Household Panel Survey sample, which consists of the individuals who participated in the BHPS from 1991/92 to 2008/09, and corresponds to around 8,500 households in wave 2 of Understanding Society. It includes boost samples in Scotland and Wales, which were introduced in 1999 and the Northern Ireland sample, introduced in 2000.

Three types of weight are used: design weights, non-response adjustments and post-stratification/calibration adjustments. Design weights are used to account for differences in selection probabilities. These include different sampling fractions for the four countries of the UK and to match estimated ethnic group profiles in different profile sectors. It also accounts for newly born babies, who also become sample members because without weighting, there would be a higher selection probability for children whose parents lived in separate households in the first wave. Non-response adjustments are used to reflect the different propensities of selected individuals and households to participate in the survey at wave 1 and conditionally at subsequent waves. Post-stratification or calibration adjustments may be required if, after applying nonresponse-adjusted design weights, sample distributions are not a good match to known population distributions. This could potentially adjust for residual response error, not corrected by the above measures, sampling error or under-coverage of the sampling frame.

The dataset contains several subsamples of the population which are over- or under-represented; due to the boost samples, there are higher proportions of ethnic minorities and residents of Northern Ireland in the sample compared to the UK population. There are also lower proportions of recent immigrants into the UK compared to the population and higher proportions of those who responded in wave 1 and continued to play a part in the survey. The existing literature suggests that there is no reason to assume that the probability of entering disability should be different depending on ethnicity or immigrant status, although some control variables such as income, education level may be affected. However, the weighting strategy adopted by Understanding Society adjusts for these subsamples.

Understanding Society provides a range of different weights for different purposes, including both cross-sectional and longitudinal weights. Standard practice for panel data is that the researcher chooses longitudinal weights from the most recent wave and applies these to every observation from other waves for every individual. Researchers should also choose the simplest set of weights, which accounts for the data they are using and nothing else. In this case, the appropriate weight selection provides weights for combined UKHLS and BHPS data which accounts for the Ethnic Minority Boost data, but not for proxy interviews. Sensitivity analysis will be conducted to examine the impact of weighting on the estimation results.[24]

[24] Understanding Society were contacted to confirm that the correct weights were being used for this study. They explained that if data is being analysed from the adult questionnaire, including the self-completion questionnaire from waves 6 to 9, researchers should use the weight called "w_indscui_lw" and copy this weight to all observations in waves 1 to 5.

Sample selection criteria

The full sample contains 407,353 observations over the course of the 9 waves, or between 35,171 and 54,559 individuals in each wave (85,852 unique individuals in total). By the time unusable observations have been eliminated, this reduces to 27,468 individuals over 167,093 observations. The reasons behind the exclusions are explained throughout this section. The ages of respondents start at 16 and appear to be normally distributed between 25-64 with a mean of around 41, although numbers begin to increase again for each year below 25. As the focus of this study is working-aged individuals, the sample will be restricted to those aged between 16 and 64.[25]

For several decades, the retirement age in the UK was 60 for women and 65 for men. This was changed in the 1995 Pensions Act to bring the age for women in line with men, but it would not be phased in until 2010-2020. Women aged 60-64 are included in the sample because an increasing number of women are remaining in the workplace at this age (Hill, 2020). In October 2020, the retirement age for men and women was raised to 66 but the data does not extend this far. Whilst many wellbeing studies in the fields of psychology and sociology do not restrict their sample in terms of age, this study, which takes an economics viewpoint, does. It is a reasonable assumption that working-age individuals are affected differently by disability compared to children and retired people. There is evidence from the literature that when a disability is acquired in childhood or at birth, the individual makes human capital decisions to accommodate their disability and plan their careers accordingly (e.g., Diener *et al.*, 1999; Krause and Sternberg, 1997; Mehnert *et al.*, 1990). At the other end of the age distribution, retired people may reasonably be assumed to

[25] At age 16, an individual in the UK can legally work under an employment contract, be paid at the National Minimum Wage and pay tax and National Insurance contributions. Restricting the sample to this age range excludes 85,747 observations.

respond differently to disability onset compared to those who are still in work. This is because they need not make any human capital decisions or career adjustments to accommodate their disability (Charles, 2003). Permanent Income Hypothesis (Friedman, 1957) states that individuals save and invest during their working life so that their consumption needs are already catered for when retirement age arrives and thus, lifetime income should not be affected by disability onset in retirement. In addition to this, frequencies of disability are different for those of retirement age. Around 45% of over 65's report at least one disability, compared to 19% of working-aged individuals (DWP, 2019). For working-aged individuals however, disability onset may cause an upheaval in lifestyle, potentially resulting in changes in career, occupation, income and consumption, as evident in some of the literature (e.g., Charles, 2003; Charles and Stephens, 2004). Notably, Meyer and Mok (2019) uncover important relationships between working-age disability onset and a wide range of traditional economic outcomes including income, employment status, consumption and time-use. A further reason for using the 16-64 age range is that this is consistent with publications concerned with the working-age population from UK government agencies such as the Office for National Statistics or the Department for Work and Pensions. The restriction excludes 85,747 observations over the 9 waves, around 21% of the full sample. Further observations are dropped if there is missing data pertaining to the key variables of sex, marital status, highest qualification, life satisfaction, disability or residential status. If age, sex or race is missing in a single wave, it is imputed from other waves where possible. These restrictions exclude a further 52,954 observations across the 9 waves (around 13% of the full sample). For most variables, missing data arises from "don't know" responses or refusals, which occur in small numbers. Further restrictions are made based upon 'disability trajectories', which are explained in section 3.3.2.

3.3.2 Definitions of Disability

Definitions of disability in the existing literature fall into two broad categories: work-limiting disability and functional disability. Respondents in both cases are usually identified by an initial question asking whether they have a long-term health condition or disability. This is typically followed by a second question, which asks whether their condition limits the amount or type of work they do in the case of a work-limiting study, or whether their condition limits their ability to carry out day-to-day activities (e.g., climbing stairs, dressing oneself, walking outside for 15 minutes) in the case of functional disability studies. It is usually the case that a "yes" response to both questions will categorise the respondent as being disabled in that particular wave of the survey.

Work-limiting disability is commonly used in studies which examine the effects of disability upon the labour market and earnings (e.g., Charles, 2003; Jones *et al.*, 2018; Meyer and Mok, 2019). This chapter will use the functional disability definition because wellbeing is the only outcome variable. This is in line with other economics papers which explore the relationship between disability and wellbeing (e.g., Oswald and Powdthavee, 2008; Powdthavee 2009a; Pagán-Rodríguez, 2010, 2012). Moreover, the aim of this thesis is to examine the wellbeing of all working-aged individuals, regardless of their employment status. Polidano and Vu (2013) also note that using functional disability mitigates against potential justification bias (Bound, 1991) which may occur if some respondents misreport disability to explain their employment status.

The most recent equality legislation in the UK defines disability as "a physical or mental impairment which has a substantial and long-term adverse effect on his ability to carry out normal day-to-day activities." (Equality Act, 2010). Disability legislation is worded similarly in other countries in which economic studies of disability have been undertaken, and typically require that the condition is both long-term in nature and that it affects daily activities in a substantial (i.e., more than minor or trivial) manner. Therefore, there is a degree of consistency in disability definitions amongst studies carried out in the UK (e.g., Oswald and Powdthavee, 2008; Powdthavee, 2009; Jones et al., 2016), the US (e.g., Burchardt, 2000; Burkhauser and Daly, 1996; Meyer and Mok, 2019), and Australia (e.g., Jones, Mavromaras, Sloane and Wei, 2018; Oguzoglu, 2010). Understanding Society, the dataset analysed in this thesis, asks all adult respondents the following question:

(i) *Do you have any long-standing physical or mental impairment, illness or disability? By 'long-standing' I mean anything that has troubled you over a period of 12 months or that is likely to trouble you over a period of 12 months.*

Responses to this question are not used as a determinant of disability alone as it is too broad. Whilst a 'yes' response identifies all respondents with a disability, it also picks up those with health conditions, such as asthma or high blood pressure, who may otherwise not be affected in their work or typical activities. It is used by Understanding Society as a filter question to begin to identify respondents who may have a disability, who are then asked follow-up questions. 18,986 respondents (30.4%) report having a long-term condition in at least one wave over the course of the panel. Those who respond with a 'yes' to (i) were then asked the following question regarding disability:

(ii) *Do you have any health problems or disabilities that mean you have substantial difficulties with any of the following areas of your life?*

The respondent is shown a list of 12 disabilities: mobility, lifting and carrying, manual dexterity, continence, hearing (apart from using a hearing aid), sight (apart from wearing glasses), speech and communication, memory and ability to learn, recognising physical danger, physical coordination, problems with personal care, or any other disability. A 'yes' response to one or more of these 12 options categorises the respondent as disabled for the purpose of this thesis. By using (i) as a filter for long-term conditions, alongside (ii) as a qualifier to denote a 'substantial effect' upon daily activities, this definition satisfies the two main aspects of disability as outlined in the 2010 Equality Act, that the condition has a long-term (12 months or more) and a substantial (more than minor or trivial) effect upon the respondent's ability to carry out normal daily activities.

Those who had not reported a disability in (ii) were categorised as non-disabled, even if they reported a long-term condition in (i). This is either because their long-term condition is health-related rather than disability-related or because their condition does not limit their daily activities, in which case, they would not fall under the Equality Act definition for disability. Several other papers also categorise respondents as non-disabled despite giving a positive response to a question similar to (i) if their equivalent of (ii) returns a negative response (e.g., Jones *et al.*, 2018; Pagán-Rodríguez, 2010, 2012; Powdthavee, 2009a). Defining disability though questions similar to (i) and (ii) has also been practiced by other recent publications which use Understanding Society data (Davillas and Pudney, 2020; Emerson, 2018; Hackett, *et al.*, 2020). Under this definition, 11.4% of the sample (3,148 individuals) has experienced disability in at least one wave over the course of the panel. This compares with 19% of working-age people reporting a disability in the Department for Work and Pensions' most recent Family Resources Survey (which also reports disability rates of 45% for pension-age adults and 8% for children).[26] As seen in Table 3.2, the most common forms of disability (apart from 'other disability') are difficulties with lifting and carrying (35.2% of disabled individuals), mobility (17.3%), memory and learning (15.8%), co-ordination (11.6%) and manual dexterity (10.8%) although 47.7% of individuals the sample have 'other' disabilities which are not covered in the list. All other disabilities are reported by less than 10% of disabled individuals.

Table 3.2. Frequencies of disability by type.

Disability	No. of Obs.	% of Obs.	No. of Individuals	% of Individuals
Mobility	781	9.25	545	17.31
Lifting/Carrying	1785	21.14	1109	35.23
Manual Dexterity	480	5.69	340	10.8
Continence	388	4.6	254	8.07
Hearing	341	4.04	209	6.64
Sight	255	3.02	170	5.4
Communication/Speech	64	0.76	52	1.65
Memory/Learning	726	8.6	496	15.76
Recognising Danger	48	0.57	40	1.27
Co-ordination	565	6.69	366	11.63
Personal Care	445	5.27	294	9.34
Other	2564	30.37	1503	47.74
Total	**8,442**	**100**	**5,378**	**170.84**

Note: The last column adds up to more than 100% as individuals can report more than one type of disability at the same time.

[26] This discrepancy likely occurs as a result of the exclusion of unusable observations (the process of which will be explained later in the section). These include those who experienced disability onset before the time-period of the study, those who were disabled from birth or childhood and people who become disabled at retirement age. Before these individuals were excluded, 31% of individuals in the dataset reported a disability at some point across the 9 waves of the survey, and 15.7% reported a disability in all observations.

The validity of self-reported disability measures

The only viable alternative to using subjective forms of disability reporting would be to define disabled people by whether they claim disability welfare benefits, as this is the only other possibility that the data allows. The current literature is divided on whether to use subjective or objective measures, although a lack of welfare payments does not necessarily indicate that a person is not disabled (Bound, 1989; Nagi, 1969). It is also not easy to identify different severity levels using this method. More severe conditions may be proxied by higher welfare payments, but if income is in any way correlated with wellbeing, this variable cannot be argued to be entirely exogenous. A limitation to the subjective approach, as argued by Meyer and Mok (2019), is that the causal effects of disability on any outcome cannot truly be estimated as it is endogenous to the degree of material deprivation, compensation and other factors. On the other hand, objective reports may be subject to a lagging problem as the paperwork involved in filing for welfare assistance can be a lengthy process. Some disabled people may be unwilling to claim benefits or to disclose that they do in a survey. Other researchers have claimed that objective reports of disability are unbiased compared to when disabled individuals are identified by successful welfare applications (Benitez-Silva *et al.*, 2004) and close to being exogenous (Stern, 1989).

Disability severity

Whilst the definition of disability is fairly consistent across studies as it follows national legislation, severity of disability is arguably less so. In many academic studies, disability severity is self-reported, in line with the psychology literature which states that the perceived seriousness of a condition by the individual is a better estimator of wellbeing than observed data such as hospital visits (e.g., Diener *et al.*, 1999). In the economics literature, severity is usually measured by the extent to which typical day-to-day activities, or work-related activities are limited. For example, respondents in Meyer and Mok (2019) are asked how much their disability affects their work capability. Those who give positive responses, such as "completely" are classed as 'Severely Disabled', whilst those with negative responses, such as "not limiting" are classed as 'Not Severely Disabled'. A similar approach is taken by Jones *et al.* (2018), in which respondents are asked to rate the severity of their disability on a scale of 0-10, where reports of 6+ place the individual in the Severe category, or Non-Severe otherwise. In Oswald and Powdthavee (2008) and Powdthavee (2009a), respondents are asked "Does your condition limit typical day-to-day activities?", where four activities are listed: housework, climbing stairs, dressing oneself and walking for at least 10 minutes. A 'yes' response to at least one activity places the individual in the Severe category and a 'no' response to all activities places them in the Non-Severe category.

An alternative approach is to use multiple disabilities (i.e., more than one) as a proxy for disability severity. A disadvantage to this is that one cannot distinguish between differing severity levels within a single disability. However, multiple disabilities have been shown to be strongly related to subjective measures of severity (Berthoud, 2003). The use of number of disabilities as a severity indicator has been applied in a paper which adapts the Meyer and Mok (2019) model (Jones, Davies and Drinkwater, 2018) as well as in one study which uses Understanding Society data to predict disability using biomarkers (Davillas and Pudney, 2020). Both papers categorise severe disability if they report more than one impairment at the same time.[27]

Two options for measuring severity are carefully considered for this paper. In Understanding Society, the following follow-up questions are asked to those who gave a 'yes' response to (i):

> *The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?*
>
> *(iii) Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling or playing golf.*
>
> *(iv) Climbing several flights of stairs*

For both (iii) and (iv), the respondent is given the option of three answers: 'Yes, limited a lot', 'Yes, limited a little, or 'No, not limited at all.' This question was considered as both a possible way of defining disability and as a means to define severity. The first method considered for defining disability was by means of a 'Yes' response to (i) combined with a 'Yes, limited a lot' response to either (iii) or (iv). The reasoning behind this was that a 'Yes' response to (i) would identify those who self-report a long-standing health condition or disability, whilst a 'Yes, limited a lot' response to either (iii) or (iv) would identify those with substantial limitations on their daily activities. The combination of both would define the individual as disabled in line with the Equality Act. However, there is no straightforward method for then estimating disability severity. It was considered whether to use a response of either

[27] Davillas and Pudney (2020) categorise respondents into four groups: No Disabilities, One Disability, Two Disabilities, and Three or More Disabilities. This is done to reflect the relatively large jumps in observations between these groups.

'Yes, limited a little' or 'Yes, limited a lot' to (iii) or (iv) to initially determine disability, whilst then using the same responses to define a non-severe and severe disabilities, respectively. The main concern with this is that it is questionable whether it is appropriate to categorise an individual as being disabled when their condition affects them 'a little'. Alternatively, if a 'Yes, limited a lot' response is used to define disability, severity could still be defined using the number of disabilities reported. However, there is a mismatch between people who report a disability under the first definition and those who choose an item from the given list of disabilities. For the same reason, the opposite scenario also makes little intuitive sense - using the list of disabilities to define disability, with the responses to (iii) and (iv) to determine the level of severity. It makes the most sense to use the list of disabilities to determine both the definition and severity of disability (see Figure 3.2 for an illustration of the decision process for choosing each combination of disability and severity measures).[28] This is the same severity of definition used in studies by Berthoud (2003) and Jones et al. (2016), as well as other studies which use Understanding Society data (e.g., Emerson, 2018; Davillas and Pudney, 2020; Emerson, 2018; Hackett, *et al.*, 2020).

One other severity definition was considered; two questions in the survey were very similar to (iii) and (iv) except they asked whether the respondent's condition affected the amount and the kind of work they could do (rather than daily activities). It was decided not to use this definition as these questions were more aligned to methods to determine work-limiting disabilities, rather than the much broader activity-limiting disabilities, the focus of this study. Figure 3.2 illustrates the decision process for determining the disability and severity definitions within a decision tree.

[28] See Appendix [A3] and [A4] for further discussion on the choice of disability definitions.

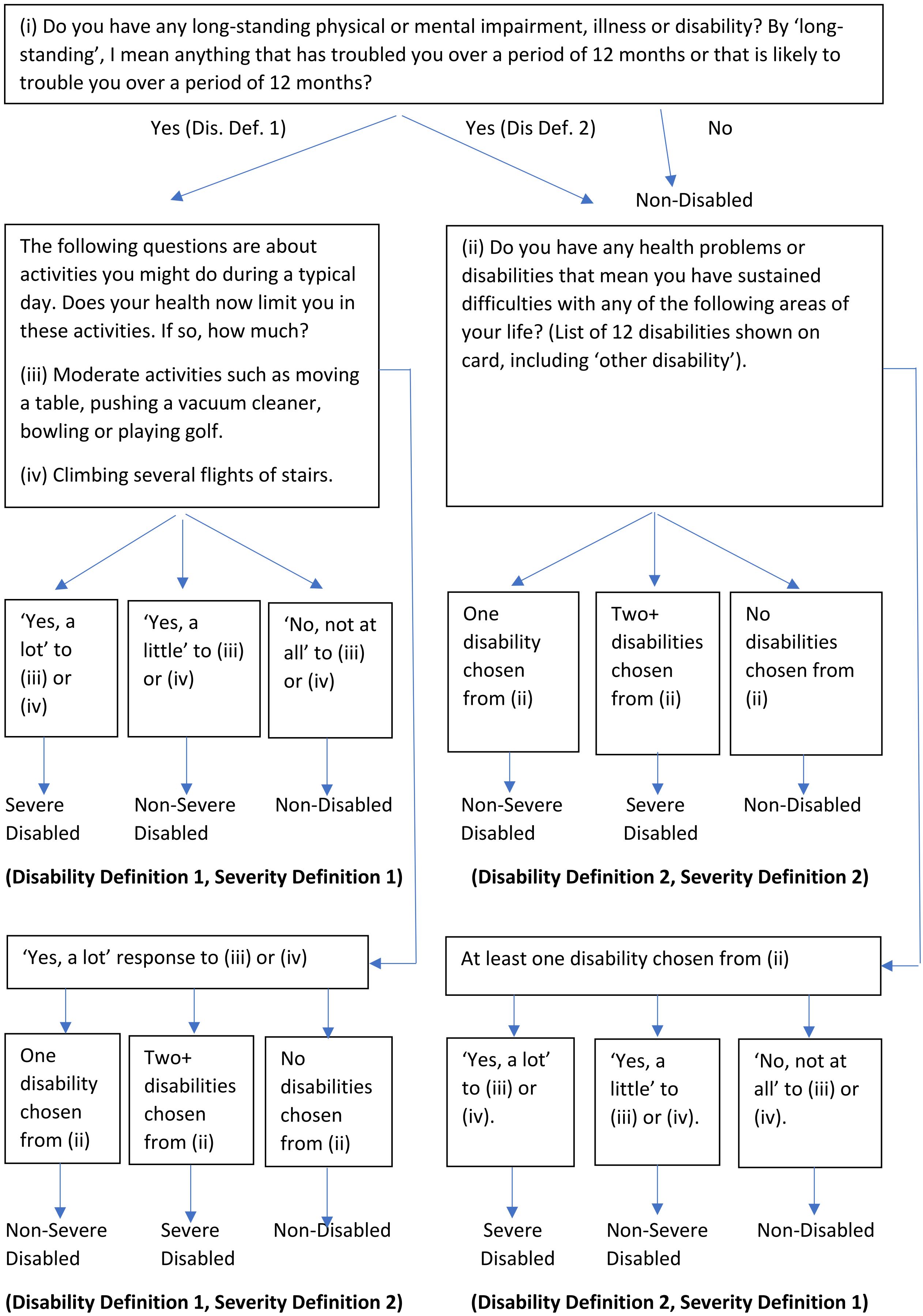

(i) Do you have any long-standing physical or mental impairment, illness or disability? By 'long-standing', I mean anything that has troubled you over a period of 12 months or that is likely to trouble you over a period of 12 months?
Yes (Dis. Def. 1)
Yes (Dis Def. 2)
No
Non-Disabled
The following questions are about activities you might do during a typical day. Does your health now limit you in these activities. If so, how much?
(iii) Moderate activities such as moving a table, pushing a vacuum cleaner, bowling or playing golf.
(iv) Climbing several flights of stairs.
(ii) Do you have any health problems or disabilities that mean you have sustained difficulties with any of the following areas of your life? (List of 12 disabilities shown on card, including 'other disability').
'Yes, a lot' to (iii) or (iv)
'Yes, a little' to (iii) or (iv)
'No, not at all' to (iii) or (iv)
One disability chosen from (ii)
Two+ disabilities chosen from (ii)
No disabilities chosen from (ii)
Severe Disabled
Non-Severe Disabled
Non-Disabled
Non-Severe Disabled
Severe Disabled
Non-Disabled
(Disability Definition 1, Severity Definition 1)
(Disability Definition 2, Severity Definition 2)
'Yes, a lot' response to (iii) or (iv)
At least one disability chosen from (ii)
One disability chosen from (ii)
Two+ disabilities chosen from (ii)
No disabilities chosen from (ii)
'Yes, a lot' to (iii) or (iv).
'Yes, a little' to (iii) or (iv).
'No, not at all' to (iii) or (iv).
Non-Severe Disabled
Severe Disabled
Non-Disabled
Severe Disabled
Non-Severe Disabled
Non-Disabled
(Disability Definition 1, Severity Definition 2)
(Disability Definition 2, Severity Definition 1)

Figure 3.2. Decision tree depicting different combinations of disability definition and disability severity definition.

Table 3.3 lists the number of disabilities reported by individuals at any one time, by observations and then by individuals. Having just one disability in a given period is more common than having any other number of disabilities (58.8% of all observations and 84.4% of all disabled individuals at some point), although nearly 40% of disabled individuals report having 2 disabilities at the same time at some point and 18.5% report having 3 or more at the same time at some period across the 9 waves of the panel.

Table 3.3. Number of disabilities per disabled individual.

No. of Disabilities	Obs.	%	Individuals	%
1	4,968	58.85	2,657	84.4
2	1,865	22.09	1,254	39.83
3	807	9.56	583	18.52
4	378	4.48	286	9.09
5	202	2.39	152	4.83
6	107	1.27	84	2.67
7	58	0.69	41	1.3
8	31	0.37	29	0.92
9	17	0.2	14	0.44
10	5	0.06	4	0.13
11	3	0.04	3	0.1
12	1	0.01	1	0.03
Total	**8,442**	**100**	**5,108**	**162.26**

Until now, severity has been allowed take an independent value in each wave. However, it makes sense to assign disabled individuals a time-invariant variable of either Severe or Non-Severe, based on their average severity level across all waves they are present in the data, as this can later be interacted with other dimensions of disability. This approach was taken by Oswald and Powdthavee (2008), Jones *et al.*

(2018) and Meyer and Mok (2019). Reports of non-severe and severe disabilities are assigned values of 1 and 2, respectively. The reports for every individual are summed and divided by the total reports of disability across all waves to create an average value called a severity ratio. Those with a severity ratio of 1.5 or greater are placed in the Severe category and those less than 1.5 but greater than zero are placed in the Non-Severe category. After this process, non-disabled individuals make up 88.5% of the sample, as shown in Table 3.4, whilst Non-Severe and Severe Disabled individuals make up around 7.2% and around 4.3% of the sample each, respectively.

Table 3.4. Disability severity (severity ratio method)

Severity	Obs.	%	Individuals	%
Non-Disabled	142,686	85.39	24,320	88.54
Non-Severe	15,298	9.16	1,964	7.15
Severe Disabled	9,109	5.45	1,184	4.31
Total	167,093	100	27,468	100

Note: This measure of severity is time-invariant. Those with Severe disabilities have, on average, more than one disability across all waves that they are present in the data.

Disability chronicity

Respondents who report a disability in at least one wave in the panel are also categorised along a time dimension into four groups using the Meyer and Mok (2019) framework: (i) *One-Time Disabled* refers to respondents who declare disability in a single wave but with no re-occurrences for the remainder of the panel; (ii) *Temporary Disabled* refers to respondents with one or two reports of disability after the initial report. Respondents who declare 3 or more reports of disability after the initial report are classed as *Chronically Disabled*. The latter group is further subdivided by severity using the definition discussed previously. This gives the remaining two categories of (iii) *Chronic Non-Severe* and (iv) *Chronic Severe*.

Next, restrictions are placed on the sample based upon disability 'trajectories', following the methodology of Burchardt (2000). This refers to an individual's pattern of disability and non-disability over the course of the 9 waves in the panel. For example, a trajectory of 00011.000 represents an individual who is non-disabled in the first 3 waves, is disabled in waves 4 and 5, is missing from the data in wave 6, and is non-disabled in waves 7 to 9, where 0 indicates a period of non-disability, 1 indicates a period of disability, and a dot indicates a wave where the individual is missing from the data. For each individual, it is necessary to observe at least one period of non-disability before onset, one period at onset, and at least 3 post-onset periods to establish whether the disability is One-time, Temporary or Chronic. This requires a minimum restriction of 5 waves. The exception to this rule will be those who never report a disability, who are restricted to a minimum of 3 waves, in line with Meyer and Mok (2019) and Jones *et al.* (2018). By only applying the 3-wave minimum to non-disabled individuals, 26,006 observations (8,464 individuals) are saved from exclusion, compared to applying a 5-wave minimum to all individuals.

Further restrictions are made because of the problematic nature of some of the trajectories. First, some trajectories cannot be included if the onset year occurs too late to determine the duration of the disability (a further 3 waves cannot be observed after onset). Second, trajectories are excluded if they are already disabled in the first observable wave as it is not possible to observe a transition from non-disability to disability and estimate the resulting change in wellbeing that occurs. Third, trajectories are excluded if the first report of a disability comes immediately after a missing wave. For example, the trajectory 00..11110 would be excluded as it is impossible to tell whether onset occurred in wave 3, 4 or 5. These exclusions have the effect of dropping around 39% of the full sample. Of these exclusions, 46,081 observations are dropped as the trajectories either contained fewer than 5 waves. In this new sample, 5.05% of observations are non-disabled, compared to 4.94% before the restrictions, so the composition is changed very little in this respect.

Of the 55,537 observations dropped due to one of the reasons above, around 19% were permanently disabled whilst many others came from individuals who were close to being permanently disabled, except they reported 1-3 periods of non-disability. Excluding those who are permanently disabled does not necessarily pose a problem in terms of creating a bias in the data because they do no not belong in either the control group (non-disabled people) nor the treatment group (people who experience onset) in the data analysis. Table 3.5 displays the number of waves that each individual is present for, before and after each of the restrictions described above.[29] A main limitation of imposing these restrictions is that disabled people become under-represented in the sample relative to the population, including those who experience disability onset at some point across the nine waves but they cannot be included due to the ambiguous nature of the trajectory (usually because of missing data).

After the trajectory restrictions, 3.6% of individuals fall into the One-Time disabled category, 4.6% are Temporary disabled, 1.3% are Chronic Non-Severe disabled, 1.9% are Chronic Severe disabled, and the remaining 88.6% are never disabled at any time across the 9 waves (see Table 3.6).

[29] Of the excluded trajectories, 34.4% would have otherwise fitted into the One-Time Disabled category as they included only one report of disability. Similarly, 23.8% of the exclusions would have been belonged to the Temporary Disabled category and 22.4% to either of the Chronic Disabled categories, with the remaining 19.4% of exclusions coming from individuals who are permanently disabled.

Table 3.5. Number of waves each individual is present for, before and after restrictions.

Wave	Freq.	Before wave restrictions Percent	Freq.	After wave Restrictions Percent	Freq.	After trajectory restrictions Percent
1	15,064	23.79				
2	9,568	15.11				
3	6,978	11.02	5,047	14.33	5,047	18.37
4	4,939	7.8	3,417	9.7	3,417	12.44
5	4,433	7	4,433	12.58	3,050	11.1
6	4,192	6.62	4,192	11.9	2,880	10.48
7	4,812	7.6	4,812	13.66	3,393	12.35
8	7,132	11.26	7,132	20.24	5,126	18.66
9	6,196	9.79	6,196	17.59	4,555	16.58
Total Observations	**63,314**	**100**	**35,229**	**100**	**27,468**	**100**

Notes: Wave restrictions refer to the stipulation that non-disabled individuals must be present for at least 3 waves and disabled individuals must be present for at least 5 waves. Trajectory restrictions refer to the stipulation that disabled individuals must be present for at least one wave prior to onset and for 3 waves after the onset period.

Table 3.6. No. of individuals by disability category.

Unbalanced Data			Balanced Data		
All Categories	**Freq.**	**Percent**	**All Categories**	**Freq.**	**Percent**
Non-Disabled	24,335	88.59	Non-Disabled	3,488	76.58
One-Time Disabled	997	3.63	One-Time Disabled	327	7.18
Temporary Disabled	1,252	4.56	Temporary Disabled	416	9.13
Chronic Non-Severe	367	1.34	Chronic Non-Severe	145	3.18
Chronic Severe	517	1.88	Chronic Severe	179	3.93
Total	**27,468**	**100**	**Total**	**4,555**	**100**
Just Disabled	**Freq.**	**Percent**	**Just Disabled**	**Freq.**	**Percent**
One-Time Disabled	997	31.82	One-Time Disabled	258	31.81
Temporary Disabled	1,252	39.96	Temporary Disabled	311	38.35
Chronic Non-Severe	367	11.71	Chronic Non-Severe	113	13.93
Chronic Severe	517	16.5	Chronic Severe	129	15.91
Total	**3,133**	**100**	**Total**	**916**	**100**

Note: figures represent numbers of individuals in each case and not the number of observations.

There are considerable effects of balancing the data; around 75.5% of the workable sample is lost, reducing the number of individuals in the dataset from 27,468 to 4,555. Of the individuals that are excluded, a higher proportion of them are Non-Disabled, so it will be useful to estimate models using both balanced and unbalanced data, as balancing may mitigate against the possible conservative nature of the estimates.

3.3.3 Definitions of Wellbeing

Understanding Society records four facets of wellbeing: health, income, amount of leisure time and life overall.[30] The latter is the main outcome variable in this chapter but the other three shall be used in alternative models. The respondent is asked how they would rate their satisfaction with each facet of wellbeing on a 7-point scale. The numbers on this scale correspond to the following choice of responses: 1 'Completely dissatisfied'; 2 'Mostly dissatisfied'; 3 'Somewhat dissatisfied'; 4 'Neither Satisfied nor Dissatisfied'; 'Somewhat satisfied'; 6 'Mostly satisfied'; 7 'Completely satisfied'.

There is little other option for measuring wellbeing using the Understanding Society dataset, except for the GHQ-12 measure discussed in the literature review. It was decided not to use this measure in this paper as the GHQ-12 measure is better suited to measuring levels of psychological distress, is too specific for the purpose of this chapter and perhaps too much of a departure from the idea of overall wellbeing. Further to what was discussed in the literature review, an advantage of using SWB for economics researchers is that much of the groundwork which links subjective and

[30] Job satisfaction is also included in a separate section of the survey, but it is not considered as it only applies to around 56% of individuals in the final sample.

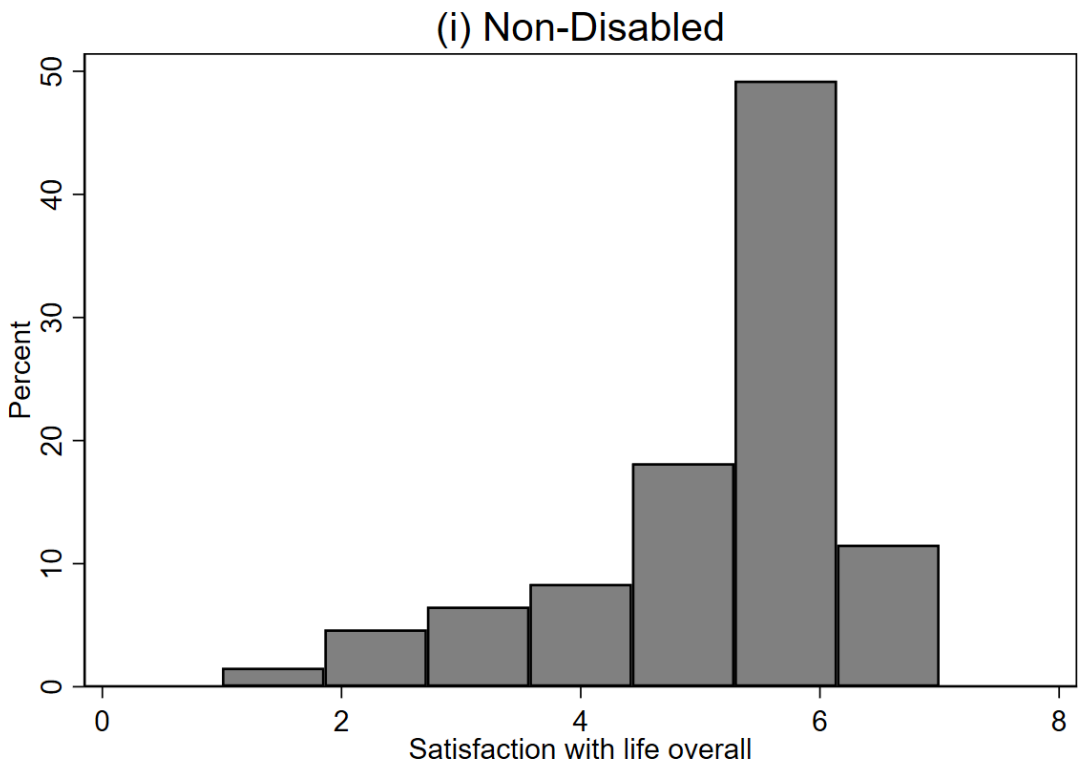
objective measurements of wellbeing has already been carried out by psychologists. Konow and Earley (2008) summarise the evidence in the psychological literature that subjective measures of happiness have been found to be statistically correlated with several objective measures. These include the individual's recall of positive and negative life events; assessments of happiness by friends, family and spouse; duration of authentic "Duchenne" smiles, which occur when both the zygomaticus major and orbicularis oris facial muscles fire; heart-rate and blood pressure responses to stress and illness; skin-resistance responses to stress; and electroencephalogram measures of prefrontal brain activity.

Figure 3.3 displays overall life satisfaction distributions for (i) non-disabled and (ii) disabled people. In both cases, the mode lies on the 6, "Mostly Satisfied", consistent with the psychology literature which reports that people on average have a generally positive, rather than neutral, view of life overall (e.g., Diener and Diener, 1996; Heady and Wearing, 1989). However, the distribution is flatter for disabled people, with 49.2% of non-disabled people reporting that they are "Mostly Satisfied", compared to 32.2% of observations of disabled people. Disabled people are more likely to report that they are neither satisfied nor dissatisfied with their lives, or worse. Similar patterns are found for the three facets of life satisfaction (see Table A3 in the Appendix). Table 3.7 shows the mean scores given for overall life satisfaction and the three facets of life satisfaction. Non-disabled individuals report average wellbeing of 5.31 out of 7, around a third of the way between "Somewhat Satisfied" and "Mostly Satisfied", whilst disabled people report an average of 4.55, around half way between "Neither Satisfied nor Dissatisfied" and "Mostly Satisfied". The facet of with the largest difference between groups is health satisfaction, with means of 5.13 for non-disabled people and 3.74 for disabled people, which is not unexpected due to the close relationship between health and disability. There are smaller differences between the two groups for satisfaction with income and with amount of leisure time.

Table 3.7. Facets of life satisfaction by disability status.

Facet of Life Satisfaction	Non-Disabled Mean	Disabled Mean
Overall	5.31	4.55
Health	5.13	3.74
Income	4.67	3.90
Amount of Leisure Time	4.62	4.17

Note: Values represent mean scores, reported on a scale of 1-7.



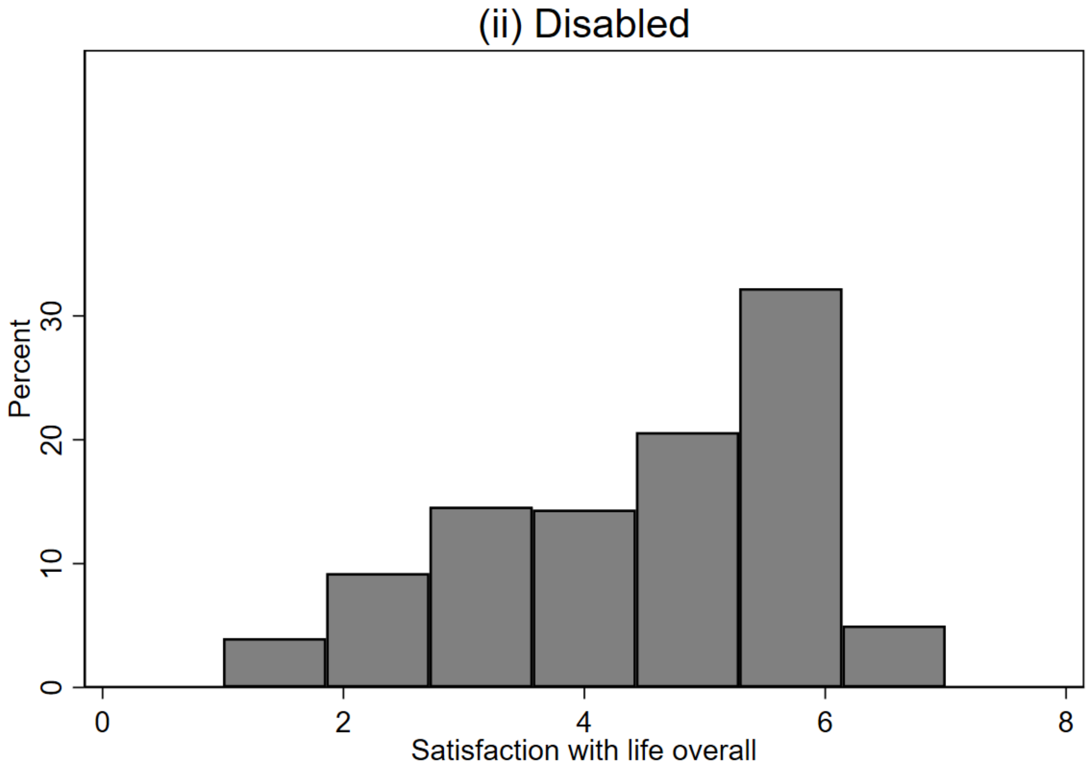


Figure 3.3. Distributions of overall life satisfaction by disability status (unbalanced panel). Life satisfaction is reported on a 7-point Likert scale. See Appendix [Table A3] for the full table of values.

3.3.4. Control Variables and Descriptive Statistics

In addition to the four disability categories, the estimation model will include a vector of control variables, comprised of those typically found in the literature: age, ethnicity, marital status, number of children, education level, UK region and a rural/urban residency indicator. Age-squared is included to pick up non-linearities; it is expected to take on a U-shaped function (e.g., Blanchflower, 2021; Blanchflower and Oswald, 2004b; Ferrer-i-Carbonell and Gowdy, 2007; Frijters and Beatton, 2012). As seen in Table 3.8, the average age of onset is not much different from the average age in the sample, suggesting that disability onset does not tend to occur more frequently at any particular age. Females make up 55% of the sample, although they are over-represented in all categories of disability and comprise two-thirds of all

Chronic Severe disabled people. Marital status and number of children are included as family relationships have been shown in the literature as having strong connections with wellbeing, and as such are standard controls in most wellbeing literature. Those in the Chronic Severe category are over-represented amongst those who are separated, divorced or widowed. This group also faces poorer outcomes in terms of education and net annual income, compared to all other groups. Education dummies are expected to pick up differences in such matters as the income and satisfaction derived from being in a worthwhile or fulfilling job, as well as the wellbeing effects of holding responsibility and contributing to society. People with chronic disabilities are more likely to be educated at just GCSE level or below compared to non-disabled people, consistent with findings in the literature.

Regional and rural/urban dummies are included to pick up the effects of any geographical heterogeneity between individuals. This includes matters such as commuting times, quality of life, overcrowding, cost of living, proximity to amenities and geographical inequalities such as different levels of regional GDP and regional unemployment rates as well as the effects of devolved governments and local authorities. Regional data is available at the EU NUTS 1 level and the rural/urban indicator is derived from the respondent's postcode. The data suggest that disabilities are relatively uniformly distributed across the UK.

Income will be included as a control in the model extensions in the forms of the natural log of real annual income and the natural log of real household income, both measures deflated to June 2015 prices. They are transformed into log form to normalise the distribution, which is positively skewed, but also to pick up non-linearities in the relationship between income and wellbeing. They are expected to affect wellbeing in different ways because personal annual income is not limited to the individual, especially when the disabled individual has a family. All income measures are selected to exclude deductions (e.g., tax, National Insurance), to include transfer payments (e.g., welfare benefits) and to include income from other sources such as interest, dividends and rent payments, as this measure is the most closely related to consumption levels. Individuals in the Chronic Severe group face the biggest income disparities; real personal income (£14,240) is 23.4% lower than those in the Non-Disabled group (£18,602), real household income is 28.3% lower and real household income per capita is 20.5% lower.

Another control to be included in the model extensions is employment status; 76.6% of non-disabled respondents in the sample are in some form of employment, whether full-time, part-time, employed or self-employed. This compares to 73% of the overall disabled sample and falls to 53.7% for respondents in the Chronic Severe category. Disabled people are slightly more likely to be retired during working age and up to twice as likely to apply their labour to the household rather than in formal employment, although this statistic includes people who help to run a family business. Disabled people are also at least half as likely to be a student or in training and are considerably more likely to be unemployed or out of the labour force. Several other variables are to be used in the model extensions. One refers to the respondent's subjective financial situation, which was argued in some of the literature to affect wellbeing more than simple measures of income, due to the strong negative wellbeing effects associated with being unable to meet basic needs (Di Tella and MacCulloch, 2006; Diener *et al.,* 1993; Ferrer-i-Carbonell, 2005). Respondents rate how they feel about their financial situation on a 5-point scale with the following possible responses: 1: "Living comfortably", 2: "Doing alright", 3: "Just about getting by, 4: "Finding it quite difficult", 5: "Finding it very difficult". In the empirical analysis, the responses will be simplified to a dummy variable, equal to 1 if the response is a 4 or a 5, or equal to zero otherwise. This means that the variable will equal one if the respondent feels that they are facing financial difficulties or zero otherwise. Disabled people are up to two and a half times as likely to find their financial situation 'quite difficult' and up to four and a half times as likely to find it 'very difficult' compared to non-disabled people.

The survey also includes three questions regarding the respondent's objective financial difficulties. One asks whether the respondent is behind with their rent or mortgage (applicable to 77% of the sample), and another asks whether they are behind with council tax (applicable to 92% of the sample). A third asks whether the respondent is up to date with all their bills. From the relevant portions of the sample, 9.4% of non-disabled respondents reported that they were behind with rent or mortgage payments, compared to 12.7% of all disabled and 16.7% of Chronic Severe disabled respondents. These figures were 6.5%, 9.6% and 13.3% for the same groups respectively, when asked about their council tax. For the other question, 4.6% of the sample describe themselves as being behind with some or all bills, rising to 7.5% of disabled people and 12.2% of Chronic Severe disabled people.

Table 3.8. Control variables and their means by disability category.

	Non-Disabled	One-Time	Temp.	Chronic Non-Sev.	Chronic Severe	All Disabled
Demographics						
Age	39.17	43.23	44.35	45.64	46.05	**44.44**
Age at onset		42.19	43.12	43.89	44.30	**43.11**
Female %	54.96	60.56	60.37	60.54	66.60	**61.49**
White %	81.81	86.89	87.21	90.63	87.34	**87.54**
Number of children	0.14	0.14	0.16	0.14	0.20	**0.16**
Marital Status						
Single %	27.35	19.43	19.83	21.02	19.33	**19.76**
Cohabiting %	14.10	13.87	13.44	14.80	11.30	**13.38**
Married %	51.83	56.61	54.80	51.41	48.86	**53.98**
Separated %	1.48	2.32	2.14	3.43	4.04	**2.67**
Divorced %	4.40	6.81	8.10	8.46	13.78	**8.68**
Widowed %	0.84	0.96	1.69	0.88	2.70	**1.53**
Highest education level						
Lower than GCSE/None %	26.48	28.25	33.05	31.07	38.08	**32.13**
GCSE %	23.74	23.23	27.22	28.73	25.42	**25.84**
Higher/AS Level %	3.43	1.62	2.13	0.85	1.54	**1.72**
A-Level %	9.44	8.15	5.62	6.62	5.57	**6.54**
Other higher education %	9.19	11.81	9.91	9.41	10.18	**10.5**
Degree %	16.20	14.02	12.59	13.89	11.45	**13.01**
Postgraduate %	11.51	12.92	9.47	9.44	7.76	**10.28**
Income (post-tax, post-transfer, June 2015 price level)						
Real Annual Income £	18,602	18,248	16,677	18,477	14,240	**16,988**
Real Annual HH Income £	43,014	39,484	36,915	37,357	30,848	**36,775**
Employment Status						
Employed %	76.62	77.58	74.12	75.28	53.64	**72.95**
Retired %	3.69	5.28	5.11	4.55	5.1	**5.10**
Family carer/Home worker %	5.66	7.01	8.25	6.52	10.92	**8.09**
Student/In training %	9.15	4.13	3.71	2.72	2.25	**3.48**
Unemployed %	4.32	4.93	6.76	6.52	10.93	**6.84**
Not working %	0.54	1.06	2.02	4.41	17.12	**4.51**
Residence						
London %	12.57	8.37	10.49	8.96	7.98	**9.22**
North-East %	3.52	5.22	3.80	5.57	3.15	**4.36**
North-West %	10.15	10.45	8.98	11.17	12.04	**10.22**
Yorkshire & Humberside %	8.00	8.23	7.63	7.78	8.65	**8.00**
East Midlands %	7.36	7.40	9.62	8.93	9.04	**8.74**
West Midlands %	8.04	7.23	7.24	8.69	7.46	**7.45**
East England %	8.60	8.16	7.14	10.56	10.13	**8.37**
South-East %	12.31	12.42	11.83	11.00	10.48	**11.69**

South-West %	7.92	9.40	9.84	9.03	7.88	**9.28**
Wales %	6.48	6.63	7.80	4.62	4.81	**6.55**
Scotland %	8.70	9.94	9.55	8.73	10.75	**9.77**
Northern Ireland %	6.35	6.57	6.07	4.96	7.63	**6.35**
Urban %	76.25	74.19	74.61	72.73	74.08	**74.16**
Financial Situation						
"Living comfortably" %	30.45	26.98	23.12	23.32	16.14	**23.21**
"Doing alright" %	39.94	38.10	35.21	33.96	27.02	**34.61**
"Just about getting by" %	22.20	24.78	28.44	28.82	33.66	**28.19**
"Finding it quite difficult" %	5.57	7.65	8.92	9.55	14.72	**9.56**
"Finding it very difficult" %	1.84	2.49	4.31	4.35	8.45	**4.43**
Behind with rent/mortgage %	9.37	10.63	13.16	11.04	16.72	**12.71**
Behind with council tax %	6.45	8.19	9.65	7.78	13.28	**9.56**
Behind with some or all bills %	4.55	5.96	7.12	6.46	12.18	**7.51**

3.4 Methodology

3.4.1 Main model

The benchmark model in this chapter is built up in a few stages, using five different specifications. In specification (i), a single time-variant dummy variable representing disability is regressed against wellbeing under Pooled OLS. In specification (ii), the single dummy is replaced with a pair of dummies to represent non-severe and severe disabilities. Specification (iii) uses three dummies which represent the three levels of disability chronicity (One-Time, Temporary and Chronic). Specification (iv) includes a vector of 11 leads and lags of disability which range from 3 periods before onset until 7 periods after onset. Data are available from 5 periods before onset, but data from periods -5 and -4 are combined to form a sufficiently large reference group. Specification (v) includes a vector of 44 variables which represent the interactions between the 11 leads and lags and the 4 disability categories (One-Time, Temporary, Chronic Non-Severe and Chronic Severe). All regressions include a variable to capture year-specific macroeconomic effects.

These five specifications are run for a second time, but with the inclusion of a vector of time-variant personal and household characteristics which are fairly standard in the literature (e.g., Clark *et al.*, 2001, 2008; Jones *et al.*, 2018; Meyer and Mok, 2019; Oswald and Powdthavee, 2008; Powdthavee, 2009a). These are age, age-squared, sex, ethnicity, marital status, number of children, highest education level, UK region, and a rural/urban indicator. The specifications are then estimated under random effects and fixed effects.

The fixed effects version of specification (v) will form the main model for this chapter. It is based on the model by Meyer and Mok (2019) and is specified as follows:

$$SWB_{it} = \alpha_i + \gamma_t + X_{it}\beta + \sum_g \sum_k \delta_k^g A_{kit}^g + \varepsilon_{it} \qquad (1)$$

where SWB refers to subjective wellbeing reported by an individual i, at time t. The terms α_i and γ_t capture time-invariant individual unobserved heterogeneity and year-specific macroeconomic effects, respectively. The term k ∈ [-3, 7] denotes the 11 dummies which represent the number of years away from onset. The term A_{kit}^g refers to the vector of 44 dummy variables discussed above. This term is equal to 1 if in year t, individual i belongs to disability group g and they are k years away from onset (negative figures indicate years prior to onset). The coefficient δ_k^g represents the effect of disability group g on SWB, k years away from onset and is the main coefficient of interest. The term X_{it} represents the vector of personal and household characteristics. Finally, ε_{it} is an idiosyncratic error term, clustered on the individual.

3.4.2 Channels and Facets of Wellbeing

The main model is adapted to investigate whether any channels can be identified through which disability operates to affect wellbeing. Meyer and Mok (2019) find that individuals tend to work fewer hours and earn less income in both the periods before and after disability onset, especially for those with both a chronic and severe disability. They are also more likely to work under zero-hour contracts and live beneath the poverty line. However, the authors make no explicit link between these outcomes and wellbeing. To investigate how such variables impact upon SWB, they are introduced into the main model as additional controls, so that not only can we observe the size of their coefficients but also examine the impact of controlling for them upon the wellbeing coefficients of disability. These controls are employment status, income, subjective financial situation and material deprivation.

Employment status is categorised into 'employed,' 'unemployed', 'retired', 'family worker (or carer)', 'student' and 'not working'. The latter group includes those who are out of the labour market through long-term disability or health issues. 'Employed' is the reference group as this is the typical status of someone who is working-aged. Household income is included as two controls, as discussed in section 3.3.4, which are the log of real (personal) annual income and the log of real (household) annual income. In another specification, both income and employment status will be included as controls as these variables are closely associated. As the relationship between income and wellbeing is complex, other model adaptations include controls for subjective financial status and for subjective material deprivation, the details of which are also discussed in section 3.3.4.

Finally, the main model is adapted to estimate the effects of disability onset upon facets of overall life satisfaction. Rather than include them as controls, they replace the outcome variable from the main model. Several different facets are discussed in the literature, although Understanding Society provides just three. It is hypothesised that health satisfaction will be negatively affected due to its close relationship with disability. Income satisfaction is also expected to be affected, especially if income is shown to be a channel of wellbeing, and also as it is a subjective measure. It is less clear from the literature whether satisfaction with amount of leisure time will be affected.

3.4.3 Heterogeneity Analysis

To explore heterogeneity in the response to disability onset between different groups, the main model (1) is extended to account for different groups in society, based on the disabled individual's pre-onset level of education, pre-onset income level, age of disability onset, gender and marital status. The specification of this extended model is shown below:

$$SWB_{it} = \alpha_i + \gamma_t + X_{it}\beta + \sum_d \sum_g \sum_k \delta_k^{gd} A_{kit}^{gd} + \varepsilon_{it} \qquad (2)$$

where 'd' represents some extra dimension to be introduced into the model, represented by a pair of dummy variables which denote either state (e.g., has a spouse or not). This approach is preferable to adding the dimension to the model in a linear manner as doing so would not pick up any interaction effects between disability onset and the extra dimension. In most cases, these are characteristics which do not vary over time and could not be included in a fixed effects estimation anyway. It is also a more effective method than using splitting the data into pairs of groups as in many cases, the separate models lack power because of the resulting reductions in sample size. The five dimensions of heterogeneity to be investigated are discussed in turn below.

Pre-onset education level

The existing literature is unclear on how pre-onset levels of human capital such as education level may affect the wellbeing response to disability onset. Polidano and Vu (2013) report that higher educated individuals find it easier to regain full-time work after onset, however those with lower education levels are found to receive higher income support after onset. On the other hand, disability has been shown to lead to lower returns on human capital investments (Charles, 2003). As such, they may have "more to lose" in terms of income, level of job responsibility, job satisfaction, power or social status that comes with their position, which may be at risk if disability leads to a reduction in their productivity. It is not entirely clear from the literature which types of job transitions are most likely to take place following disability onset, although there is ample evidence for job displacement and reduced hours. Part-time employment is not an uncommon way for people to accommodate their disability (Jones, 2007). Therefore, a second hypothesis is that whilst people with higher education levels may find work more easily after onset, they may also experience income drops through working fewer hours. The sample is divided by education level at the year prior to onset, with 'higher educated' people defined by having at least some level of tertiary education such as vocational qualifications, a university degree or postgraduate degree. "Lower educated" people consist of those educated at the school level or have no qualifications. Around 38% of individuals in the sample are in the higher educated group, although only 32% of disabled individuals are in this group in the period prior to onset.

Pre-onset income

Previous literature showed that being endowed with better levels of wealth does not necessarily lead to improved subjective wellbeing (e.g., Haring, Stock and Okun, 1984; Myers, 2000). However, it has been shown that being better financially resourced at the time of disability onset has a buffering effect upon wellbeing; Smith *et al.* (2005) demonstrated that whilst wealth alone was not an important source of happiness, it could help to protect against adverse life events, either by enabling the individual to purchase goods or services or by buffering wellbeing against the effects of the events. The literature is less clear on how pre-onset income, i.e., the flow rather than the stock of money, influences wellbeing after onset. Two opposing hypotheses are considered; in the first, higher pre-onset earners are expected to be better placed to deal with disability if either their incomes are not greatly affected, or if their incomes are sufficiently insured against onset. In the second, higher pre-onset earners will be worse placed to deal with disability if the conditions described in the first hypothesis are not met. The second hypothesis assumes that income loss is an important driving factor in wellbeing changes, consistent with the literature which argues that wellbeing is more closely related to income *changes* rather than absolute level (e.g., Diener *et al*., 1993; Clark, Frijters and Shields, 2008; Wildman and Jones, 2002). Average post-tax real annual income in the data is £18,602. Around 60% of observations fall below this amount in the period before onset and are classed as “low income”. Due to the close relationship between education level and income, it is expected that this model extension will return similar results to that of the extension which differentiates between pre-onset education levels.

Age of onset

The rationale for extending the model by age of onset also stems from Human Capital Theory. As discussed in section 3.2.1, Charles (2003) posited two competing hypotheses. In the first, people who experience disability onset at an older age are expected to be more negatively affected by disability onset. This is because human capital grows with age, so more ‘healthy capital’ will be destroyed, such as the ability to operate machinery. Younger people have less healthy capital to begin with and more time to make human capital investments which accommodate their disability. On the other hand, becoming disabled at a later age may be beneficial as the individual spends a greater portion of their life in a healthy state, thus accumulating a higher stock of capital over a greater period. Charles (2003) found in the empirical portion of his work that people who experienced onset at a later age experienced the greater income losses. 'Early onset' refers those individuals whose age at time of disability onset is reported as 44 or younger, with those aged 45 or older at onset are placed in the 'late onset' group. Whilst the mean age of onset is 43 years and 3 months, the median is 45, which splits the sample more evenly, with 11,998 early-onset individuals and 11,300 late-onset individuals.

Gender

Gender is included as an extension to the model in response to the findings in the psychology literature that men and women react differently to adverse life events. Based on the psychology literature, women are hypothesised to react to positive and negative life events more intensely at the time of onset (Clark and Georgellis, 2013; Fujita, Diener and Sandvik, 1991; Lee, Seccombe and Shahan, 1991; Wood, Rhodes and Whelan, 1989), and take longer to adapt. They have also been found more likely to be out of work following disability onset (Polidano and Vu, 2013), so this also may be a driver of poorer wellbeing following onset.

Marital status

There is a lot of evidence in the literature that wellbeing is positively related with being married or in a meaningful long-lasting relationship, co-habiting, and regular contact with friends and family (e.g., Blanchflower and Oswald, 2004a; Campbell *et al.*, 1976; George, Okun and Landerman, 1985; Diener, Gohm, Suh and Oishi, 1998), which is why marital status is an important control in the main model. However, the literature is limited in indicating whether the emotional or practical support which comes with being in a relationship provides a buffering effect against disability onset. Individuals are placed into two groups, with one including those who are married or are co-habiting with a partner, and the second group comprising of those who are single, widowed, divorced or separated. The dummy variables to indicate whether the individual has a spouse or not are time-invariant and are based on their marital status in the period immediately prior to disability, whilst marital status controls remain in place to account for changes in marital status over time.

3.5 Results

3.5.1 Main Model Results

Tables 3.9 to 3.12 present the regression results where the outcome variable is self-reported life satisfaction on a scale of 1 to 7, building up to the main model in part (v) of Table 3.12. The explanatory variables in each specification are: (i) a single time-variant dummy to denote disability; (ii) a pair of time-variant dummies to denote either Non-Severe or Severe disability; (iii) a set of three time-invariant chronicity dummies to denote whether the individual has a One-Time, Temporary, or Chronic disability; (iv) a vector of 11 dummies to denote the leads and lags of disability from 3 years before disability onset until 7 periods post-onset; (v) a vector of 44 variables to capture the interaction effects between the four disability group dummies and the eleven dummies which denote the time since onset. The constant term in most specifications of the model is around 5.3, the interpretation of which is that the average non-disabled individual in the sample rates their life satisfaction at around a third of the way between “Somewhat Satisfied” and “Mostly Satisfied”. Powdthavee (2009a) found a similar figure, also using UK data.

Estimations under Pooled OLS

Table 3.9 contains regressions based on pooled data from across the 9 waves. They are estimated using Ordinary Least Squares, which relies on the assumption that individuals interpret the seven levels of life satisfaction in a cardinal manner. Another assumption is that all individuals start off as non-disabled in periods -4 to -1, so statistically significant deviations from baseline subjective wellbeing are interpreted as effects of disability. According to specification (i), the average effect of disability is a reduction in life satisfaction by 0.816 points, which implies that the average disabled person rates their life satisfaction at 4.471 points out of 7, around halfway between "Neither Satisfied nor Dissatisfied" and "Somewhat Satisfied". This effect of disability on SWB is disaggregated in (ii) by severity. Non-Severe disabilities are associated with a reduction in life satisfaction by 0.524 points out of 7 while Severe disabilities are associated with a reduction of 1.219 points. It is seen from (iii) that duration of disability also exhibits a significant effect upon life satisfaction, with individuals who have One-time, Temporary and Chronic disabilities reporting SWB of 0.198, 0.455 and 0.920 points below that of non-disabled people, respectively. The results from (iv) imply that SWB already starts to fall for disabled individuals up to 4 years before onset, by around 0.2 to 0.4 points. This is not completely unexpected as some disabilities arise from degenerative health conditions, which exhibits its own effect upon SWB. At onset, SWB dips to 0.635 points below baseline, before making a slight recovery, however it declines further in the longer term, to as low as -0.773 at 7 years post-onset, with no evidence of adaptation.

In (v), it is apparent that the wellbeing response to disability onset is stronger for higher extents of disability (see also Figure 3.4 (i)). Individuals in the One-Time, Temporary, Chronic Non-Severe and Chronic Severe categories experience declines in SWB of 0.302, 0.644, 0.630 and 1.224 points at onset, respectively. There is limited evidence of adaptation in any category. The life satisfaction paths follow similar patterns to those found by Meyer and Mok (2019) and Jones et al. (2018), with the main difference being that the coefficients for the Chronic Non-Severe category lie between those of the Temporary and Chronic Severe coefficients, whereas in Meyer and Mok (2019) and Jones *et al.* (2018), this category tends to behave in a similar manner to the two non-chronic categories (remaining close to baseline), regardless of which outcome variable is being examined. The results for people in the Chronic Severe category are also consistent with Jones *et al.* (2018), who also report no evidence of life satisfaction adaptation several years after onset.

Pooled OLS with control variables

The next set of regressions include a set of control variables, and the results are shown in Table 3.10. The addition of these controls makes the estimates for disability in specification (i) and severity in specification (ii) slightly more conservative. The coefficient on disability in (i) reduces from -0.815 to -0.733, suggesting that a small amount of the wellbeing response to disability is explained by personal circumstances. When controls are added to the full model in (v), the effects are very slight, however the life satisfaction paths of the four disability categories become slightly further apart. In other words, the extent of disability becomes slightly more important when controlling for observable individual heterogeneity.

The coefficients on the control variables are similar to what has been observed in other literature. There is a negligible difference in the sexes, whilst non-white people experience life satisfaction of around a quarter point lower than white people. The coefficients on age suggest a U-shaped function as anticipated, with the lowest point occurring at around the ages of 42.5 to 45, depending on the specification, similar to other estimates in the literature. Living as a couple is estimated to raise life satisfaction by around quarter of a point and marriage by just under half a point. Being separated reduces life satisfaction by just over 0.2 points but the coefficients on being divorced or widowed are small and not significant. It is suspected that this is because there is no differentiation in the data between being divorced or widowed for short or long periods. The coefficient on the number of children was also small and not significant, but the relationship was also weak in the literature. The generally positive relationship between education levels and SWB is also consistent with previous studies. There are some geographical differences between wellbeing levels across the UK, the largest difference being 0.189 points higher than the reference region of London. The coefficient on the rural/urban indicator is very small but associates a slightly positive effect on SWB for living in rural areas. The macroeconomic effects upon life satisfaction are the largest in the year 2013, around 0.2 points lower than the reference year of 2009. It may be the case that the effects of the 2008-09 recession and government austerity measures have taken the greatest toll on life satisfaction by this time, although matters do improve much in the subsequent years.

Random effects and fixed effects estimations

The next stage in the process was to test whether the data could be pooled, or whether unobserved individual heterogeneity should be controlled for. A Breusch-Pagan LM test for random effects is conducted with the null hypothesis that the data can be pooled.[31] The null is strongly rejected ($\bar{\chi}^2$=44451.9, p-value=0.000), suggesting that the model should control for individual effects. The results of the random effects estimation are presented in Table 3.11. The model is estimated under Generalised Least Squares, which allows for non-cardinal values of SWB, and includes the controls from the previous model. Estimating the full model with RE does not change the magnitude of most of the coefficients by noticeable amounts,

[31] See Appendix [A5].

except for those in the Chronic Severe group, which are slightly dampened, lying around -1 to -1.3 post-onset, however this effect is reversed under FE.

A Hausman Test (Hausman, 1978) is then conducted, with the null hypothesis that the unobserved time-variant component of the model is not correlated with the regressors. This null was strongly rejected ($\bar{\chi}^2$=499.08, p-value=0.000), suggesting that fixed effects is the preferred estimation method.[32] A Modified Wald Test for FE models finds strong evidence of groupwise heteroskedasticity and a Wooldridge Test for panel data finds strong evidence of serial correlation. With this in mind, a Mundlak Test (Mundlak, 1978) is also conducted as an alternative test for FE as it is robust to heteroskedasticity and within serial correlation. Again, the null hypothesis, that FE is preferred, was strongly rejected ($\bar{\chi}^2$=326.71, p-value=0.000).[33]

Due to the presence of heteroskedasticity and serial correlation, the standard errors from the standard FE model are compared to robust (heteroskedastic) standard errors and standard errors clustered by individual.[34] The robust and clustered standard errors are identical, but the latter method is chosen as this is the conventional approach, taken for similar models in the existing literature (e.g., Meyer and Mok, 2019; Jones *et al.*, 2018), but also because the robust standard errors are not much larger than the homoscedastic standard errors (no more than around 1.5 times as large at most). Whilst the literature suggests that clustered standard errors should usually be reported when they are substantially larger than standard robust standard errors (Cameron and Miller, 2015; MacKinnon, Ørregaard

[32] See Appendix [A6].
[33] See Appendix [A7, A8, A9] for these tests.
[34] See Appendix [A10].

Nielsen and Webb, 2022), both methods return similar results, so there is no great concern here with clustering the standard errors.

The estimations from the FE model are presented in Table 3.12 and form the main results for this chapter. Note that it was not possible to estimate the effects of chronicity on their own in (iii) under FE as they are time-invariant. Under FE, the estimates become less conservative compared to the RE model but are largely consistent with the estimates under OLS.[35] Under FE, the coefficients in the One-Time Disabled category are now very small and not statistically different from zero. A similar case is true for those in the Temporarily Disabled category, whose only statistically significant period is at onset when their level of life satisfaction falls to 0.3 points below baseline. A possible explanation for these results is that those who experience the lowest extent of disability experience rapid adaptation and that this cannot be well represented using annual data; adaptation following disability has been observed to occur within a matter of months in studies by Brickman *et al.* (1978), Silver (1982) and Suh *et al.* (1996). The single-period negative wellbeing response is consistent with the findings of Jones *et al.* (2018), who find a similar response using Australian data, and also with Meyer and Mok (2019), who find single-period negative responses in non-wellbeing related economic outcomes using US data.

There are quite strong negative wellbeing effects for individuals in the Chronic Severe category, with evidence of what are commonly termed in the literature as "anticipation effects", although these likely pick up the effects of a deterioration in health prior to onset as well as any anticipation of an imminent disability. Wellbeing

[35] A likely explanation for the discrepancy in the results under RE is that this estimation does not allow for sample probability weights, which are important when using Understanding Society data as they account for the inclusion of the boost samples.

for this group declines in the period prior to onset to 0.52 points below baseline, before falling further to 0.91 points below at onset. Wellbeing remains at between 0.69 and 1.33 points below baseline in the post-onset periods without any evidence of adaptation. This contrasts with much of the previous literature (e.g., Oswald and Powdthavee, 2008), which implies that there is usually at least partial adaptation over time. Another notable observation from these results is that wellbeing for individuals in the Chronic Non-Severe category is not significantly different from that of non-disabled people despite the coefficients suggesting a wellbeing decline.

An interpretation of these results is that severity of disability is a more significant driver of wellbeing than chronicity because having a Chronic disability does not lead to statistically lower SWB alone. However, there is a significant interaction effect between severity and chronicity of disability which leads to much starker results for individuals in the Chronic Severe category. This makes sense if individuals tend to rate their current level of life satisfaction based on the pain, discomfort and inconvenience caused by the disability at the time, rather than concerning themselves with the effects of disability in the future. If severity does indeed matter more than chronicity, this may suggest that the non-chronic categories of One-Time and Temporary should also have a measure of severity incorporated within them, so this is explored later in section 3.5.3.[36]

In the process of building the main model, the lead and lag variables are interacted separately with severity and chronicity, without time leads and lags (see Appendix [Table A4, Table A5] for these results). In the severity model, all non-severe coefficients are small and statistically insignificant but for those with a severe

[36] Formal tests of wellbeing drops and adaptation effects, using tests of joint significance, are included in the Appendix [A11-A12].

disability, there is a small but significant anticipation effect (-0.169) in the period before onset, with most coefficients from the onset period onwards lying between around -0.62 and -0.39. In the chronicity model, the coefficients for the One-Time and Temporary categories are unchanged from the main model. The Chronic coefficients are significant from the period before onset, with an anticipation effect of -0.407, reducing to as low as -0.944 in period 6. These results help justify the use of four disability categories in the main model because when the effects of severity and chronicity are viewed in isolation, they do not identify that chronicity only exhibits significant effects when interacted with disability severity.

Table 3.9. Pooled OLS Regressions.

	(i) Disability	(ii) Severity	(iii) Chronicity	(iv) Leads and Lags	(v) One-Time	Temporary	Chronic Non-Severe	Chronic Severe
Disabled	-0.816***							
	(0.033)							
Non-Severe Disabled		-0.524***						
		(0.040)						
Severe Disabled		-1.219***						
		(0.052)						
One-Time Disabled			-0.198***					
			(0.028)					
Temporary Disabled			-0.455***					
			(0.028)					
Chronic Disabled			-0.920***					
			(0.036)					
4+ Periods before Onset				*Reference*				
3 Periods before Onset				-0.222***	-0.013	-0.296**	-0.490*	-0.446**
				(0.074)	(0.109)	(0.118)	(0.263)	(0.222)
2 Periods before Onset				-0.254***	-0.011	-0.402***	-0.261	-0.449***
				(0.060)	(0.079)	(0.100)	(0.205)	(0.175)
1 Period before Onset				-0.377***	-0.155**	-0.347***	-0.479***	-0.779***
				(0.052)	(0.079)	(0.084)	(0.147)	(0.146)
Onset Period				-0.635***	-0.302***	-0.644***	-0.630***	-1.224***
				(0.054)	(0.084)	(0.085)	(0.164)	(0.131)
1 Period After Onset				-0.609***	-0.234***	-0.495***	-0.731***	-1.464***
				(0.054)	(0.088)	(0.080)	(0.162)	(0.127)
2 Periods After Onset				-0.513***	-0.193***	-0.483***	-0.648***	-1.072***
				(0.050)	(0.072)	(0.082)	(0.135)	(0.135)
3 Periods After Onset				-0.579***	-0.257***	-0.438***	-0.699***	-1.402***
				(0.051)	(0.080)	(0.080)	(0.121)	(0.123)
4 Periods After Onset				-0.548***	-0.307***	-0.425***	-0.522***	-1.165***

				(0.056)	(0.102)	(0.085)	(0.148)	(0.133)
5 Periods After Onset				-0.637***	-0.251**	-0.400***	-0.504***	-1.623***
				(0.064)	(0.100)	(0.087)	(0.159)	(0.161)
6 Periods After Onset				-0.687***	-0.242*	-0.371***	-0.481**	-1.701***
				(0.086)	(0.125)	(0.126)	(0.205)	(0.182)
7 Periods After Onset				-0.773***	-0.237	-0.628***	-0.979***	-1.235***
				(0.106)	(0.172)	(0.183)	(0.241)	(0.222)
Constant	5.287***	5.287***	5.329***	5.327***	5.327***			
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)			
R-Squared	0.0186	0.0221	0.0267	0.0212	0.0317			
Observations:	167,093	167,093	167,093	167,093	167093			

Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets.
P-Values: *** 1%, ** 5%, *10%

Table 3.10. OLS Regressions with Controls.

	(i) Disability	(ii) Severity	(iii) Chronicity	(iv) Leads and Lags	(v) One-Time	Temporary	Chronic Non-Severe	Chronic Severe
Disabled	-0.734***							
	(0.033)							
Non-Severe Disabled		-0.448***						
		(0.039)						
Severe Disabled		-1.133***						
		(0.052)						
One-Time Disabled			-0.173***					
			(0.028)					
Temporary Disabled			-0.402***					
			(0.029)					
Chronic Disabled			-0.839***					
			(0.036)					
4 Periods before Onset				*Reference*				
3 Periods before Onset				-0.196***	-0.022	-0.266**	-0.434	-0.394*
				(0.074)	(0.105)	(0.121)	(0.265)	(0.215)
2 Periods before Onset				-0.208***	0.006	-0.354***	-0.189	-0.400**
				(0.060)	(0.079)	(0.100)	(0.203)	(0.170)
1 Period before Onset				-0.324***	-0.131*	-0.295***	-0.422***	-0.716***
				(0.052)	(0.077)	(0.082)	(0.151)	(0.144)
Onset Period				-0.550***	-0.249***	-0.561***	-0.527***	-1.127***
				(0.053)	(0.082)	(0.085)	(0.162)	(0.129)
1 Period after Onset				-0.499***	-0.162*	-0.395***	-0.588***	-1.316***
				(0.053)	(0.087)	(0.079)	(0.159)	(0.125)
2 Periods after Onset				-0.414***	-0.141**	-0.392***	-0.523***	-0.918***
				(0.049)	(0.067)	(0.082)	(0.133)	(0.133)
3 Periods after Onset				-0.525***	-0.246***	-0.386***	-0.620***	-1.296***
				(0.050)	(0.077)	(0.081)	(0.120)	(0.122)

4 Periods after Onset				-0.541***	-0.332***	-0.418***	-0.499***	-1.134***
				(0.056)	(0.100)	(0.084)	(0.145)	(0.132)
5 Periods after Onset				-0.659***	-0.281***	-0.432***	-0.498***	-1.637***
				(0.064)	(0.098)	(0.087)	(0.151)	(0.159)
6 Periods after Onset				-0.688***	-0.239*	-0.389***	-0.462**	-1.696***
				(0.086)	(0.130)	(0.128)	(0.203)	(0.178)
7 Periods after Onset				-0.726***	-0.187	-0.593***	-0.895***	-1.173***
				(0.106)	(0.161)	(0.177)	(0.221)	(0.228)
Age	-0.089***	-0.089***	-0.085***	-0.086***				
	(0.004)	(0.004)	(0.004)	(0.004)				
Age Squared	0.001***	0.001***	0.001***	0.001***				
	(0.000)	(0.000)	(0.000)	(0.000)				
Single	*Reference*							
Living as a Couple	0.271***	0.273***	0.259***	0.267***				
	(0.027)	(0.027)	(0.027)	(0.027)				
Married	0.447***	0.451***	0.426***	0.439***				
	(0.023)	(0.023)	(0.023)	(0.023)				
Separated	-0.229***	-0.233***	-0.240***	-0.230***				
	(0.060)	(0.060)	(0.060)	(0.060)				
Divorced	-0.014	-0.003	-0.008	-0.012				
	(0.036)	(0.036)	(0.036)	(0.036)				
Widowed	0.088	0.113*	0.095	0.070				
	(0.066)	(0.065)	(0.066)	(0.067)				
No. of Children	-0.003	-0.004	0.009	-0.004				
	(0.011)	(0.011)	(0.011)	(0.011)				
No Qualification	*Reference*							
GCSE	0.109***	0.107***	0.096***	0.107***				
	(0.025)	(0.025)	(0.025)	(0.025)				
Higher/AS Level	0.158***	0.155***	0.132***	0.153***				
	(0.040)	(0.040)	(0.040)	(0.040)				
A-Level	0.141***	0.140***	0.113***	0.134***				
	(0.031)	(0.031)	(0.031)	(0.031)				

Other Higher	0.203***	0.199***	0.185***	0.202***
	(0.028)	(0.028)	(0.028)	(0.028)
Degree	0.262***	0.256***	0.232***	0.252***
	(0.026)	(0.026)	(0.026)	(0.026)
Postgraduate	0.307***	0.301***	0.281***	0.302***
	(0.028)	(0.028)	(0.028)	(0.028)
London	*Reference*			
North East	0.218***	0.213***	0.223***	0.235***
	(0.039)	(0.039)	(0.039)	(0.039)
North West	0.181***	0.182***	0.191***	0.182***
	(0.031)	(0.031)	(0.031)	(0.031)
Yorks/Humber	0.169***	0.171***	0.176***	0.173***
	(0.034)	(0.034)	(0.034)	(0.034)
East Midlands	0.188***	0.187***	0.192***	0.191***
	(0.032)	(0.032)	(0.032)	(0.032)
West Midlands	0.144***	0.142***	0.151***	0.145***
	(0.032)	(0.032)	(0.032)	(0.032)
East	0.188***	0.187***	0.193***	0.182***
	(0.031)	(0.031)	(0.031)	(0.031)
South East	0.106***	0.108***	0.117***	0.108***
	(0.029)	(0.029)	(0.029)	(0.029)
South West	0.227***	0.227***	0.237***	0.232***
	(0.030)	(0.030)	(0.030)	(0.030)
Wales	0.202***	0.201***	0.216***	0.213***
	(0.041)	(0.041)	(0.041)	(0.041)
Scotland	0.132***	0.132***	0.147***	0.134***
	(0.036)	(0.035)	(0.036)	(0.036)
N. Ireland	0.258***	0.258***	0.264***	0.256***
	(0.042)	(0.042)	(0.042)	(0.043)
Urban	*Reference*			
Rural	0.084***	0.083***	0.087***	0.084***
	(0.015)	(0.015)	(0.015)	(0.015)

2009	*Reference*			
2010	0.028	0.026	0.022	0.007
	(0.026)	(0.026)	(0.025)	(0.026)
2011	-0.042	-0.046*	-0.063***	-0.070**
	(0.028)	(0.028)	(0.028)	(0.028)
2012	-0.148***	-0.151***	-0.173***	-0.172***
	(0.029)	(0.029)	(0.029)	(0.029)
2013	-0.195***	-0.198***	-0.217***	-0.212***
	(0.030)	(0.030)	(0.030)	(0.030)
2014	-0.134***	-0.136***	-0.154***	-0.141***
	(0.030)	(0.030)	(0.030)	(0.030)
2015	-0.043	-0.043	-0.055*	-0.036
	(0.030)	(0.030)	(0.030)	(0.030)
2016	0.007	0.007	-0.003	0.025
	(0.030)	(0.030)	(0.030)	(0.030)
2017	-0.144***	-0.145***	-0.157***	-0.114***
	(0.040)	(0.040)	(0.040)	(0.040)
2018	-0.081**	-0.082**	-0.092**	-0.051
	(0.039)	(0.039)	(0.038)	(0.039)
Constant	6.469***	6.471***	6.441***	6.447***
	(0.076)	(0.076)	(0.075)	(0.076)
R-Squared	0.0521	0.0555	0.0585	0.0539

Observations: 164,290

Sample probability weights applied.

Standard errors (clustered by individual) are displayed in brackets.

P-Values: *** 1%, ** 5%, *10%

Table 3.11. RE Regressions with Controls.

	(i) Disability	(ii) Severity	(iii) Chronicity	(iv) Leads and Lags	(v) One-Time	Temporary	Chronic Non-Severe	Chronic Severe
Non-Disabled	*Reference*							
Disabled	-0.385***							
	(0.019)							
Non-Severe Disabled		-0.247***						
		(0.021)						
Severe Disabled		-0.626***						
		(0.030)						
One-Time Disabled			-0.165***					
			(0.028)					
Temporary Disabled			-0.401***					
			(0.028)					
Chronic Disabled			-0.797***					
			(0.037)					
4 Periods before Onset				*Reference*				
3 Periods before Onset				-0.163***	-0.008	-0.107*	-0.469***	-0.437***
				(0.037)	(0.056)	(0.057)	(0.114)	(0.134)
2 Periods before Onset				-0.262***	-0.126**	-0.280***	-0.321***	-0.421***
				(0.032)	(0.051)	(0.051)	(0.095)	(0.094)
1 Period before Onset				-0.290***	-0.136**	-0.270***	-0.475***	-0.550***
				(0.027)	(0.043)	(0.042)	(0.077)	(0.069)
Onset Period				-0.488***	-0.220***	-0.518***	-0.572***	-0.931***
				(0.027)	(0.043)	(0.043)	(0.077)	(0.071)
1 Period after Onset				-0.458***	-0.117***	-0.421***	-0.635***	-1.118***
				(0.028)	(0.044)	(0.044)	(0.078)	(0.073)
2 Periods after Onset				-0.393***	-0.113***	-0.358***	-0.491***	-1.002***
				(0.027)	(0.041)	(0.042)	(0.075)	(0.075)
3 Periods after Onset				-0.461***	-0.205***	-0.415***	-0.562***	-1.032***

				(0.028)	(0.045)	(0.044)	(0.078)	(0.072)
4 Periods after Onset				-0.470***	-0.176***	-0.393***	-0.629***	-1.069***
				(0.031)	(0.049)	(0.048)	(0.084)	(0.076)
5 Periods after Onset				-0.496***	-0.125**	-0.374***	-0.687***	-1.243***
				(0.034)	(0.058)	(0.052)	(0.085)	(0.083)
6 Periods after Onset				-0.533***	-0.180**	-0.332***	-0.667***	-1.325***
				(0.042)	(0.078)	(0.064)	(0.104)	(0.096)
7 Periods after Onset				-0.493***	0.050	-0.476***	-0.726***	-1.070***
				(0.059)	(0.113)	(0.096)	(0.130)	(0.126)
Age	-0.075***	-0.075***	-0.071***	-0.073***	-0.072***			
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)			
Age Squared	0.001***	0.001***	0.001***	0.001***	0.001***			
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
Single	*Reference*							
Living as a Couple	0.236***	0.237***	0.228***	0.233***	0.231***			
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)			
Married	0.355***	0.355***	0.341***	0.347***	0.343***			
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)			
Separated	-0.098***	-0.096***	-0.099***	-0.103***	-0.097***			
	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)			
Divorced	0.024	0.027	0.032	0.027	0.035			
	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)			
Widowed	0.039	0.045	0.035	0.029	0.040			
	(0.054)	(0.053)	(0.053)	(0.054)	(0.053)			
No. of Children	0.010**	0.010*	0.017***	0.009*	0.008			
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)			
No Qualification	*Reference*							
GCSE	0.049***	0.048***	0.049***	0.050***	0.049***			
	(0.016)	(0.016)	(0.015)	(0.016)	(0.015)			
Higher/AS Level	0.109***	0.109***	0.102***	0.105***	0.103***			
	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)			
A-Level	0.113***	0.112***	0.103***	0.109***	0.104***			

	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Other Higher	0.101***	0.100***	0.098***	0.102***	0.098***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Degree	0.192***	0.191***	0.183***	0.185***	0.182***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Postgraduate	0.190***	0.188***	0.181***	0.186***	0.180***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
London	*Reference*				
North East	0.140***	0.139***	0.154***	0.156***	0.150***
	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)
North West	0.124***	0.124***	0.134***	0.131***	0.132***
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Yorks/Humber	0.079***	0.079***	0.087***	0.087***	0.087***
	(0.025)	(0.025)	(0.024)	(0.025)	(0.024)
East Midlands	0.099***	0.099***	0.113***	0.109***	0.111***
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
West Midlands	0.037	0.037	0.045*	0.041	0.042***
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
East	0.101***	0.101***	0.109***	0.105***	0.108***
	(0.024)	(0.024)	(0.023)	(0.024)	(0.024)
South East	0.105***	0.105***	0.111***	0.111***	0.109***
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
South West	0.113***	0.113***	0.123***	0.125***	0.121***
	(0.025)	(0.024)	(0.024)	(0.024)	(0.024)
Wales	0.121***	0.120***	0.126***	0.129***	0.124***
	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)
Scotland	0.130***	0.130***	0.141***	0.140***	0.140***
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
N. Ireland	0.249***	0.249***	0.256***	0.256***	0.256***
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Urban	*Reference*				
Rural	0.077***	0.077***	0.078***	0.078***	0.078***

	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
2009	*Reference*				
2010	0.017	0.016	0.022*	0.008	0.009
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
2011	-0.073***	-0.075***	-0.077***	-0.082***	-0.081***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
2012	-0.148***	-0.149***	-0.156***	-0.154***	-0.152***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
2013	-0.176***	-0.177***	-0.184***	-0.178***	-0.178***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
2014	-0.072***	-0.073***	-0.082***	-0.071***	-0.071***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
2015	-0.003	-0.003	-0.009	0.005	0.004
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
2016	-0.003	-0.003	-0.010	0.006	0.004
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
2017	-0.124***	-0.125***	-0.135***	-0.114***	-0.119***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
2018	-0.123***	-0.123***	-0.133***	-0.114***	-0.118***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Constant	6.359***	6.362***	6.316***	6.334***	6.331***
	(0.052)	(0.052)	(0.051)	(0.052)	(0.051)
R-Squared (within)	0.0073	0.0079	0.0064	0.0069	0.0081
R-Squared (between)	0.0741	0.0772	0.0824	0.0767	0.0846
R-Squared (overall)	0.0392	0.0413	0.0452	0.0418	0.0473

Observations: 167,093
Sample probability weights not applied
(not possible under random effects).
Standard errors (clustered by individual) are displayed in brackets.
P-Values: *** 1%, ** 5%, *10%

Table 3.12. FE Regressions with Controls.

	(i) Disability	(ii) Severity	(iii) Chronicity	(iv) Leads and Lags	(v) One-Time	Temporary	Chronic Non-Severe	Chronic Severe
Non-Disabled	*Reference*							
Disabled	-0.229***							
	(0.037)							
Non-Severe Disabled		-0.102***						
		(0.040)						
Severe Disabled		-0.473***						
		(0.053)						
One-Time Disabled			*Cannot estimate under FE*					
Temporary Disabled			*Cannot estimate under FE*					
Chronic Disabled			*Cannot estimate under FE*					
4 Periods before Onset				*Reference*				
3 Periods before Onset				0.007	0.028	0.069	-0.150	-0.265
				(0.085)	(0.112)	(0.140)	(0.267)	(0.332)
2 Periods before Onset				0.032	0.155	-0.080	-0.067	-0.158
				(0.091)	(0.115)	(0.146)	(0.366)	(0.331)
1 Period before Onset				-0.042	0.043	-0.012	-0.276	-0.524*
				(0.090)	(0.127)	(0.139)	(0.320)	(0.309)
Onset Period				-0.255***	-0.063	-0.269**	-0.373	-0.915***
				(0.095)	(0.145)	(0.137)	(0.369)	(0.293)
1 Period after Onset				-0.200**	0.029	-0.103	-0.429	-1.104***
				(0.097)	(0.147)	(0.132)	(0.374)	(0.312)
2 Periods after Onset				-0.102	0.057	-0.083	-0.351	-0.694**
				(0.092)	(0.136)	(0.133)	(0.334)	(0.308)
3 Periods after Onset				-0.201**	-0.030	-0.069	-0.443	-1.067***

			(0.098)	(0.146)	(0.144)	(0.372)	(0.291)
4 Periods after Onset			-0.211**	-0.089	-0.148	-0.324	-0.936***
			(0.101)	(0.154)	(0.152)	(0.362)	(0.312)
5 Periods after Onset			-0.274***	-0.018	-0.125	-0.355	-1.335***
			(0.104)	(0.161)	(0.151)	(0.357)	(0.324)
6 Periods after Onset			-0.268**	0.042	-0.075	-0.444	-1.323***
			(0.114)	(0.182)	(0.166)	(0.373)	(0.334)
7 Periods after Onset			-0.237**	0.013	-0.189	-0.675*	-0.880**
			(0.134)	(0.203)	(0.212)	(0.398)	(0.362)
Age	-0.074***	-0.074***	-0.073***	-0.073***			
	(0.012)	(0.012)	(0.012)	(0.012)			
Age Squared	0.001***	0.001***	0.001***	0.001***			
	(0.000)	(0.000)	(0.000)	(0.000)			
Single	*Reference*						
Living as a Couple	0.152***	0.152***	0.153***	0.153***			
	(0.044)	(0.043)	(0.044)	(0.044)			
Married	0.141***	0.143***	0.137***	0.139***			
	(0.049)	(0.049)	(0.049)	(0.049)			
Separated	-0.217***	-0.218***	-0.225***	-0.223***			
	(0.082)	(0.082)	(0.082)	(0.081)			
Divorced	0.046	0.049	0.046	0.045			
	(0.068)	(0.068)	(0.068)	(0.068)			
Widowed	-0.142	-0.130***	-0.151	-0.130			
	(0.172)	(0.166)	(0.172)	(0.161)			
No. of Children	0.001	0.000	0.002	0.000			
	(0.010)	(0.010)	(0.010)	(0.010)			
No Qualification	*Reference*						
GCSE	-0.096	-0.098	-0.091	-0.090			
	(0.071)	(0.071)	(0.071)	(0.071)			
Higher/AS Level	-0.069	-0.070	-0.069	-0.069			
	(0.075)	(0.074)	(0.074)	(0.075)			
A-Level	-0.107	-0.109	-0.104	-0.107			
	(0.078)	(0.078)	(0.078)	(0.078)			

Other Higher	-0.131	-0.132		-0.129	-0.131
	(0.090)	(0.090)		(0.090)	(0.090)
Degree	-0.119	-0.120		-0.121	-0.120
	(0.090)	(0.090)		(0.090)	(0.090)
Postgraduate	-0.189	-0.189		-0.183	-0.189
	(0.117)	(0.117)		(0.117)	(0.117)
London	*Reference*				
North East	0.460*	0.462*		0.466*	0.460*
	(0.252)	(0.252)		(0.250)	(0.251)
North West	0.072	0.073		0.078	0.073
	(0.156)	(0.155)		(0.154)	(0.155)
Yorks/Humber	0.178	0.176		0.187	0.180
	(0.163)	(0.162)		(0.164)	(0.164)
East Midlands	0.246	0.244		0.238	0.240
	(0.155)	(0.155)		(0.155)	(0.155)
West Midlands	0.101	0.100		0.101	0.106
	(0.167)	(0.165)		(0.166)	(0.168)
East	0.274	0.270		0.270	0.275
	(0.186)	(0.186)		(0.186)	(0.186)
South East	0.031	0.027		0.029	0.022
	(0.108)	(0.108)		(0.107)	(0.108)
South West	0.208*	0.205*		0.209*	0.204*
	(0.123)	(0.123)		(0.123)	(0.122)
Wales	-0.018	-0.021		-0.004	-0.007
	(0.155)	(0.154)		(0.153)	(0.152)
Scotland	0.007	0.010		-0.001	0.006
	(0.250)	(0.248)		(0.251)	(0.251)
N. Ireland	1.123***	1.151***		1.083***	1.127***
	(0.225)	(0.226)		(0.197)	(0.196)
Urban	*Reference*				
Rural	-0.006	-0.006		-0.004	-0.008
	(0.044)	(0.044)		(0.044)	(0.044)

2009	*Reference*				
2010	-0.006	-0.006		-0.007	-0.005
	(0.024)	(0.024)		(0.024)	(0.024)
2011	-0.068***	-0.070***		-0.070***	-0.068***
	(0.026)	(0.026)		(0.026)	(0.026)
2012	-0.159***	-0.160***		-0.163***	-0.160***
	(0.027)	(0.027)		(0.027)	(0.027)
2013	-0.195***	-0.196***		-0.200***	-0.199***
	(0.026)	(0.026)		(0.026)	(0.026)
2014	-0.115***	-0.116***		-0.118***	-0.116***
	(0.025)	(0.025)		(0.025)	(0.025)
2015	-0.002	-0.002		-0.002	-0.003
	(0.027)	(0.027)		(0.027)	(0.027)
2016	0.066**	0.066**		0.068***	0.068***
	(0.026)	(0.026)		(0.026)	(0.026)
2017	-0.049	-0.051		-0.050	-0.054
	(0.039)	(0.039)		(0.039)	(0.039)
2018	-0.040	-0.041		-0.040	-0.043
	(0.036)	(0.036)		(0.036)	(0.036)
Constant	6.879***	6.879***		6.780***	6.789***
	(0.295)	(0.295)		(0.294)	(0.293)
R-Squared (within)	0.0121	0.0134		0.0119	0.0142
R-Squared (between)	0.0069	0.0082		0.0111	0.0204
R-Squared (overall)	0.0063	0.0076		0.0091	0.0163

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets.
P-Values: *** 1%, ** 5%, *10%
Note: Chronicity dummies are time-invariant and cannot be estimated using fixed effects.

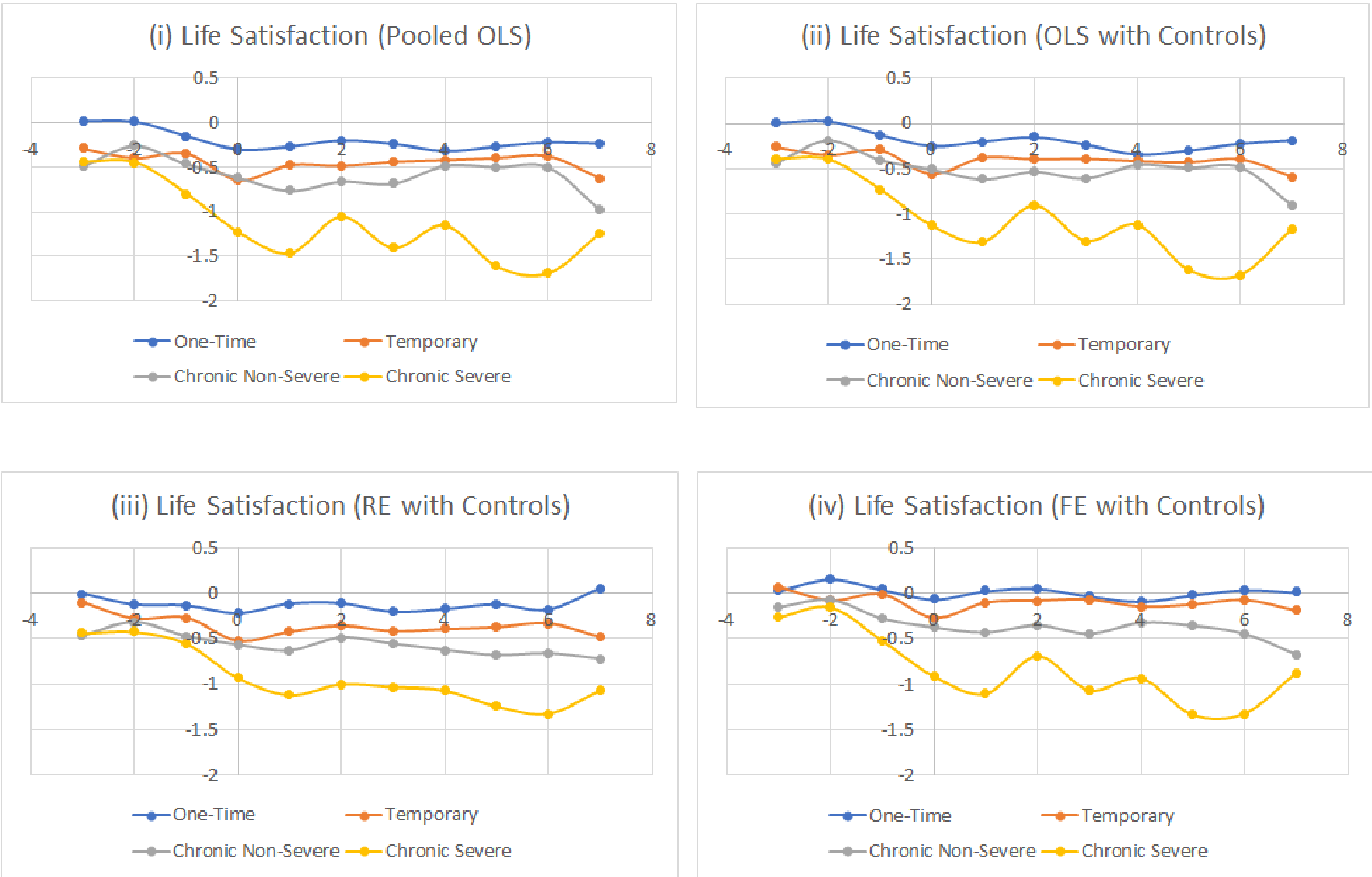


Figure 3.4. Life Satisfaction paths estimated by (i) OLS, (ii) OLS with controls, (iii) RE with controls (from Table 3.11) and (iv) FE with controls. Each diagram refers to specification (v) from the above models. The horizontal axis refers to years from disability onset. The vertical axis refers to deviations from the average life satisfaction level reported by a non-disabled person on a 7-point Likert scale (around 5.3 in all cases). LS paths represent deviations from this average for disabled people.

3.5.2 Robustness and Sensitivity Tests

Definitions of disability severity and chronicity

The first robustness test was to run the main model using the alternative definition for severity as discussed in section 3.3.1, in which severely disabled individuals are defined as those whose disability affected their daily activities "a lot", hence they subjectively state whether they feel that they are severely disabled, rather than using the number of disabilities as the severity measure.[37] Whilst the life satisfaction paths take slightly different shapes under this definition, the magnitudes of the coefficients for the first three disability groups are very similar. This is encouraging as it supports Berthoud's (2003) argument that multiple disabilities are strongly correlated with subjective declarations of severity. The life satisfaction path for Chronic Severe disabled people using this measure lies around 0.2 points below that of the main model in all time periods, including before onset (although these are only significant from period -1). This implies that there may a slight selection effect for Chronic Severe disabled individuals when this measure of severity is used, so the number-of-disabilities measure of severity remains the preferred method here.

A third severity definition was tested, similar to the method described above except that severely disabled individuals are identified as those who claim that their disability affects their *work-related* activities "a lot".[38] This was to reflect the prevalent use of work-limiting disabilities in the literature. Under this definition, the coefficients in the One-Time and Temporary categories remain relatively unchanged and Chronic Non-Severe individuals face marginally lower levels of SWB. The standout result was that those in the Chronic Severe category face more negative

[37] See Appendix [Table A6].
[38] See Appendix [Table A7].

wellbeing effects of disability, with a coefficient of -1.69 at onset, dropping to a minimum of -2.77 at 6 periods post-onset. When the constant term is added to this coefficient, SWB comes out at 4.08, close to “Neither Satisfied nor Dissatisfied” on the 7-point scale. This is a noteworthy finding, that the redefining of disability as something which limits one’s ability to work, has such a significant impact upon life satisfaction. However, there is also a large and unexplained selection effect in the Chronic Severe category when using this measure, with coefficients starting at 1.243 points below baseline at 2 periods before onset, so again, the benchmark definition is preferred here.

In another test, the chronicity definition is relaxed so that individuals are included in the data regardless of the number of observations present after onset.[39] This was done because the trajectory restrictions are relatively strict and resulted in many discarded observations. The number of individuals in the Chronic categories remain the same but the number of One-Time disabled people increases from 997 to 1,360 and the number of Temporary disabled people increases from 1,252 to 1,422. Under these relaxed restrictions, the size and the significance levels of the coefficients are relatively unchanged. The fact that the model can include observations of individuals with more ambiguous disability trajectories whilst maintaining very similar results is reassuring in terms of the model’s robustness.

Leads and lags of disability estimated separately

It was considered whether the lead and lag effects of disability onset should be estimated separately.[40] This approach was taken by Clark *et al.* (2008) in a similar

[39] See Appendix [Table A8].
[40] See Appendix [Tables A9-A10].

model but was criticised by Qari (2010) as the coefficients are not directly comparable because they rely on different reference groups. Clark and Georgellis (2013) argued that it still was a valid approach, but it would be bad practice to include both sets of coefficients in the same graph. Thus, the coefficients for the lags only ($k \in [-3, 0]$) and leads only ($k \in [1, 7]$) models are estimated separately, but excluding observations from the opposite model in each case. The results from this model are only negligibly different from the main model, but further models in this paper will continue to include all lags and leads in the same model on the advice of Qari (2010).

Monthly fixed effects

Whilst yearly fixed effects are included in the main model, it was also considered whether to include monthly fixed effects to control for seasonality as interviews took place all year round.[41] The results become marginally more conservative in the Chronic Severe category using this method but are otherwise relatively unchanged. Whilst this seemed an attractive approach, there were collinearity issues in the data, meaning that three months, January, June and September were omitted, forming an unattractive control group by which to compare the other months to. Various solutions were tried such as seasonal dummies, quarterly dummies, interacting the interview month with the year, and omitting different blocks of 3-month periods, such as different seasons, however the collinearity issue persisted so it was decided to avoid this approach. The conventional method in the literature is to use annual fixed effects.

[41] See Appendix [Table A11].

Balanced data

When the model is run using balanced data, the number of observations drops by 75.5% to 40,995.[42] The life satisfaction paths are slightly more erratic, but this may be attributed to noise in the data. The magnitude and significance of the coefficients are not greatly changed compared to the main model, which is reassuring as using the larger sample ensures consistency in the results without introducing a significant level of bias from the unbalanced data. Hence, the rest of the analysis can confidently be conducted using unbalanced data.

Prime age and retirement age

A check was carried out to isolate the effects of disability upon prime-age individuals, which for the purpose of this paper, is 35-54.[43] This eliminates younger individuals who may not have accumulated much human capital and potentially have more scope to change the course of their careers to accommodate disability. It also eliminates older individuals who may have retired early and are unlikely to change career or begin making new human capital investments. There are two noticeable results from this version of the model. The first is that the Chronic Severe coefficients are dampened by approximately 0.3 points in the post-onset periods. Second, Chronic Non-Severe coefficients are now statistically significant from the period -1 onwards and lie slightly lower than in the main model. These results are not straightforward to interpret; they seem to contradict each other as Chronic Severe disabled people are apparently better off in prime age, whilst Chronic Non-Severe disabled people are worse off in the same age range. The apparent improvement in

[42] See Appendix [Table A12].
[43] See Appendix [Table A13].

wellbeing levels amongst prime-age individuals in the Chronic Severe category may possibly be explained by their advantage over older (aged 55+) individuals as they are better placed to make human capital decisions to accommodate their disability, which was an argument made by Charles (2003). This is an area which requires further exploration, so the effects of age of onset are discussed later in section 3.5.5.

The model is also run using respondents who are aged 65 or older.[44] There are 31,924 observations of 5,083 individuals within this demographic. They are more likely to belong to higher extents of disability compared to prime age individuals, with 76% in the non-disabled group, 4.5% in the One-Time group, 9.9% in the Temporary group, 3.2% in the Chronic Non-Severe group and 6.49% in the Chronic Severe group (compared to 88.6%, 3.6%, 4.6%, 1.3% and 1.9%, respectively in the working-aged sample). The most noticeable change in the results from this estimation is that the life satisfaction path for the Chronic Severe group shifts downwards, by approximately 0.3 points. It is difficult however to ascertain whether people in this group are more affected by disability onset than working-aged individuals; the size of the 'drop' between periods -1 and 1 is similar to that in the main model, but the life satisfaction path also starts around 0.3 points below the non-disabled mean, suggesting that there is some unidentified selection effect affecting this group of individuals compared to the working-aged group.

[44] See Appendix [Table A14].

Weighted v unweighted sample

When probability sample weights are removed from the estimation, the post-onset coefficients in the Chronic Severe group shift by around 0.4 points closer to baseline, whilst the Chronic Non-Severe coefficients become statistically significant from the period prior to onset.[45] The problem with the unweighted version of the estimation is that ethnic minorities and residents of Scotland, Wales and Northern Ireland are over-represented. The proportion of people who fit into one of the four disability categories is around 15% regardless of whichever part of the UK they live in, however 10.8% of non-white respondents in the sample are disabled, compared to 15.4% of white respondents. As discussed in section 3.3.4, non-white residents are over-represented because of boosts to the sample designed to study the lives of ethnic minorities. This over-representation may have caused the results to become more conservative in this regression, justifying the inclusion of probability weights to remove this bias.

Alternative estimation method

Finally, as a consistency check, the model was estimated using fixed effects ordered logit as an alternative estimation method. A benefit of methods such as ordered probit or logit is that they provide an appropriate fit to the data whilst preserving the ordering of the values of the life satisfaction variable, making no assumptions of the interval distances between then. Until recently however, standard ordered probit models have not been able to control for unobserved heterogeneity and neither ordered probit or logit estimations allow for sample weights to be included.

[45] See Appendix [Table A15].

Therefore, a more recently developed method called 'feologit' (Baetschmann *et al.*, 2020) is applied to estimate the model. The results are shown in the Appendix [Table A16] and are relatively consistent with the main model.

Investigating potential dynamic bias

Recent literature has highlighted potential problems with estimates from event-type models in which are subject to potential "dynamic bias", caused by staggered timing of the treatment effects (e.g., Callaway and Sant'Anna, 2021; DeChaisemartin and d'Haultfœille, 2022; Goodman-Bacon, 2021; Roth, Sant'Anna, Bilinski and Poe, 2023). This issue may be relevant here, as individuals in the sample can experience disability onset in any year between 2010 and 2015. Hypothetically, it could be the case that the wellbeing response to disability onset may vary by year if, for example, the availability of health services, welfare benefits, or attitudes to disability changed across this time period. To explore this, a series of formal and informal tests are carried out, although evidence of dynamic bias is mixed and the results suggest that dynamic bias would affect the estimates by up to around 0.25 points in either direction depending on the number of years the individual is from onset. A full discussion of these tests can be found in the Appendix [A13].

Randomisation Tests

Randomisation inference tests are carried out as robustness checks as they can handle problems which may arise when the treated individuals in a statistical test are not likely to be drawn from a random distribution. Randomised control trials (RCTs) allow researchers to credibly identify causal relationships by assessing whether an observed realisation of a statistic is likely to be observed by chance (Hess, 2017).

RCTs follow an intuitive logic; consider a data-generating process which draws randomly from a known distribution and consider a null hypothesis that this random draw has no influence on any other aspects of the data, then the distributions of any statistics which are derived from the data are also known. Such distributions can be obtained through Monte Carlo methods by computing the desired statistics repeatedly for varying realisations of the random draw. To test the null hypothesis that there is no effect of the original random draw on the data, one needs to assess whether the sample realisation of the statistic is consistent with the numerically inferred distribution, usually done by using the rank statistic.

For the purpose of conducting a randomisation test the *ritest* command in STATA (Hess, 2017) is used. This involves estimating the Main Model from equation (1), before choosing which test statistics of interests to test. In this case, the model is estimated four times (once for each disability category), with the coefficients at the onset period for each disability category are chosen. The only difference between this estimation and the once presented in the main set of results (Table 3.12) is that the randomisation test does not allow for a set of sample probability weights to be included in the regression prior to the randomisation process. The distributions of these test statistics under the null hypothesis of 'no treatment effect' is obtained by computing the statistic for each possible alternative assignment of treatment. Fisherian randomisation inference (Fisher, 1935) produces the distribution of a test statistic under this null hypothesis, allowing the researcher to assess whether the observed realisation of the statistic is "extreme" and hence whether the null has to be rejected.

The results are shown in the Appendix [Table A29]. In the table, "T (obs.)" represents the realisation of the test statistic in the data (the estimated coefficient after the randomisation process), "C" represents the count of under how many of the re-sampled assignments the realisation of the test statistic was more extreme than "T (obs.)", "N" is the number of re-samplings, "P" is the actual randomisation-inference-based p-value, measuring the fraction of extreme realisations, "SE(p)" is the standard error of that p-value estimate, based on the "sample" of N re-samplings, and "95% Conf. Interval" is an estimated confidence interval for the p-value.[46] The values of the coefficients, "T (obs.)" in the onset period from the unweighted model are -0.049 (One-Time), -0.243 (Temporary), -0.404 (Chronic Non-Severe) and -0.540 (Chronic Severe). Additionally, an estimation is run using a single time-variant binary dummy, set equal to one if the respondent is disabled. It returns a value of -0.215, significant at the 1% level. The randomisation process resamples these five estimates by bootstrapping the data 200 times to generate new standard errors, after which new robust t-statistics and p-values can be calculated. These p-values suggest that the coefficients are statistically significant at the 1% level for the time-variant disability variable, and for the onset dummies for Temporary, Chronic Non-Severe and Chronic Severe disabilities, therefore these coefficients are robust to randomisation.

3.5.3 Investigating the anticipation effects

As discussed previously, an anticipation effect was found within the Chronic Severe group, with a decline of around 0.5 points in the period prior to onset. Also as

[46] Hess (2023) argues, however, that the p-value estimate does not say much about whether the hypothesis is to be rejected or not and is mainly a function of how many permutations have been chosen. The estimated confidence interval too is based on the p-value i.e., by choosing a large enough number of re-samplings, this can be made arbitrarily tight.

discussed previously, the term 'anticipation effect' is used to remain consistent with the literature, even although a decline in SWB before onset is likely to be driven by a decline in health which precipitates disability in the following period, rather than the "anticipation" of an imminent disability.

To investigate whether health does decline in this period, the main model is run using the physical and mental components of the SF-12 measure of general health replacing the outcome variable. This is shown in Table 3.13. When the physical component of health is the outcome variable in specification (i), the coefficients for all four disability categories take fairly intuitive paths, with statistically significant results within each category. On average, individuals in the Chronic Severe category experience a decline in physical health beginning at 3 periods before onset (-3.317**), although the sharpest decline is at the onset period (from -9.049*** to -17.770***). These results support the argument that a pre-onset decline in physical health at least partially drives the decline in SWB. In specification (ii), the outcome variable is replaced with the mental health component of SF-12, although this does not return very conclusive results as the health patterns it produces over time are not very consistent with either specification (i) nor those from the main model. However, it may be of note that the decline in mental health for Chronic Severe disabled people in the period before onset is not statistically significant, suggesting that physical health may play a larger part than mental health in driving the anticipation effect in this period in the main model.

Table 3.13. SF-12 physical and mental health components as outcome variables.

	(i) Physical Health Component			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods from Onset	*Reference*			
3 Periods from Onset	-0.356	-0.170	1.271	-3.317**
	(0.614)	(0.938)	(2.088)	(1.496)

2 Periods from Onset	-0.063	-1.242	-1.447	-5.988***
	(0.641)	(0.899)	(2.111)	(1.740)
1 Period from Onset	-0.373	-2.592***	-3.013	-9.049***
	(0.738)	(0.953)	(2.138)	(1.633)
Onset Period	-3.392***	-6.233***	-6.762***	-17.770***
	(0.855)	(0.985)	(2.146)	(1.529)
1 Period after Onset	-0.141	-4.811***	-6.102***	-18.311***
	(0.682)	(0.985)	(2.194)	(1.701)
2 Periods after Onset	0.122	-4.063***	-6.626***	-18.498***
	(0.681)	(0.950)	(2.426)	(1.544)
3 Periods after Onset	0.449	-4.389***	-7.112***	-18.605***
	(0.718)	(0.883)	(2.118)	(1.648)
4 Periods after Onset	0.749	-3.396***	-6.359***	-19.375***
	(0.734)	(0.952)	(2.324)	(1.631)
5 Periods after Onset	1.128	-4.441***	-6.156***	-19.174***
	(0.775)	(1.031)	(2.265)	(1.765)
6 Periods after Onset	1.137	-4.445***	-6.308***	-18.42***
	(0.932)	(1.140)	(2.285)	(1.724)
7 Periods after Onset	1.460	-4.226***	-6.361**	-19.068***
	(1.149)	(1.222)	(2.509)	(1.991)
Age	0.447***			
	(0.053)			
Age Squared	-0.005***			
	(0.001)			
Single	*Reference*			
Living as a Couple	-0.260			
	(0.228)			
Married	-0.728***			
	(0.266)			
Separated	0.353			
	(0.447)			
Divorced	-0.479			
	(0.335)			
Widowed	-0.996			
	(0.732)			
No. of Children	0.124			
	(0.055)			
No Qualification	*Reference*			
GCSE	-0.505			
	(0.370)			
Higher/AS Level	-0.372			
	(0.366)			
A-Level	-0.396			
	(0.386)			
Other Higher	-0.091			
	(0.455)			
Degree	0.009			
	(0.421)			
Postgraduate	0.085			
	(0.522)			
London	*Reference*			

North East	-0.760
	(1.255)
North West	-1.906**
	(0.763)
Yorks/Humber	-0.787
	(0.760)
East Midlands	-1.548*
	(0.853)
West Midlands	-1.095
	(0.815)
East	-1.002
	(1.103)
South East	-1.839***
	(0.607)
South West	-0.761
	(0.699)
Wales	-1.329
	(0.896)
Scotland	-1.382*
	(0.837)
N. Ireland	-2.800
	(2.925)
Urban	*Reference*
Rural	-0.040
	(0.210)
2009	*Reference*
2010	0.216*
	(0.122)
2011	0.361***
	(0.131)
2012	0.264**
	(0.124)
2013	0.282**
	(0.120)
2014	0.243**
	(0.115)
2015	0.106
	(0.118)
2016	-0.138
	(0.129)
2017	-0.504***
	(0.195)
2018	-0.174
	(0.169)
Constant	48.207***
	(1.342)
R-Squared (within)	0.0511
R-Squared (between)	0.2486
R-Squared (overall)	0.1872

Observations: 167,093

Sample probability weights applied.

Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table 3.13 (Cont.). SF-12 physical and mental health components as outcome variables.

	(ii) Mental Health Component			
	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
4 Periods from Onset	*Reference*			
3 Periods from Onset	-0.409	-0.572	-4.510*	2.619
	(0.900)	(1.253)	(2.703)	(1.784)
2 Periods from Onset	-1.030	-0.090	-1.530	1.195
	(1.003)	(1.244)	(3.229)	(1.594)
1 Period from Onset	-2.197**	-0.146	-3.198	-1.217
	(1.093)	(1.189)	(3.204)	(1.645)
Onset Period	-2.721**	-1.483	-3.676	-3.922***
	(1.273)	(1.110)	(3.221)	(1.518)
1 Period after Onset	-1.998*	-0.533	-4.021	-3.069*
	(1.225)	(1.083)	(3.275)	(1.706)
2 Periods after Onset	-2.036*	-0.629	-4.404	-2.318
	(1.141)	(1.125)	(3.181)	(1.566)
3 Periods after Onset	-2.091*	-0.272	-4.233	-4.431***
	(1.220)	(1.185)	(3.289)	(1.618)
4 Periods after Onset	-1.645	0.224	-3.747	-5.199***
	(1.163)	(1.187)	(3.209)	(1.682)
5 Periods after Onset	-2.133*	0.181	-3.825	-5.971***
	(1.258)	(1.346)	(3.222)	(1.752)
6 Periods after Onset	-2.411*	-0.004	-4.358	-6.314***
	(1.420)	(1.344)	(3.400)	(1.894)
7 Periods after Onset	-2.542*	-0.523	-4.902	-4.894**
	(1.543)	(1.437)	(3.463)	(2.103)
Age	-0.981***			
	(0.074)			
Age Squared	0.008***			
	(0.001)			
Single	*Reference*			
Living as a Couple	0.896***			
	(0.300)			
Married	1.373***			
	(0.357)			
Separated	-1.683***			
	(0.501)			
Divorced	0.677			
	(0.428)			
Widowed	-2.029**			
	(0.925)			
No. of Children	0.043			
	(0.076)			
No Qualification	*Reference*			
GCSE	-0.584			
	(0.544)			

Higher/AS Level	-1.502**
	(0.604)
A-Level	-0.605
	(0.592)
Other Higher	-1.102
	(0.677)
Degree	-1.321*
	(0.682)
Postgraduate	-0.777
	(0.754)
London	*Reference*
North East	1.314
	(1.566)
North West	-0.469
	(0.990)
Yorks/Humber	-0.597
	(1.110)
East Midlands	1.387
	(0.904)
West Midlands	-0.569
	(1.102)
East	0.338
	(0.713)
South East	0.030
	(0.719)
South West	-0.191
	(1.016)
Wales	-0.198
	(1.486)
Scotland	-3.499*
	(1.860)
N. Ireland	4.084
	(2.793)
Urban	*Reference*
Rural	0.258
	(0.309)
2009	*Reference*
2010	-0.063
	(0.162)
2011	-0.383**
	(0.172)
2012	-0.564***
	(0.165)
2013	-0.415**
	(0.166)
2014	0.002
	(0.161)
2015	0.349**
	(0.171)
2016	0.569***
	(0.186)

2017	0.403
	(0.257)
2018	-0.140
	(0.249)
Constant	73.771***
	(1.834)
R-Squared (within)	0.0266
R-Squared (between)	0.0137
R-Squared (overall)	0.0025

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

With the above results in mind, the main model is then run whilst excluding a small number of individuals who had experienced large declines in either the physical or mental component of the SF-12 prior to disability onset. This is to test whether such health declines are the source of the anticipation effects observed in the pre-onset period for Chronic Disabled individuals, assuming that some disabilities arise from degenerative health conditions.

Pre-onset health declines are found by Jones *et al.* (2018) to be more pronounced for people with Chronic Severe disabilities. It is hypothesised then that the remaining individuals in the sample experience disability onset as more of a shock. To identify these individuals, a commonly-used indicator called the 12-Item Short Form Survey (SF-12) is used to examine the respondents' general levels of physical and mental health in the years before onset.[47] It is measured on a scale of 0 to 100, where higher numbers represent better levels of general health, and is generated using the

[47] The SF-12 accounts for 8 'domains' of health: limitations in physical activities because of health problems; limitations in social activities because of physical or emotional problems; limitations in usual role activities because of physical health problems; bodily pain; general mental health; limitations in usual role activities because of emotional problems; vitality; general health perceptions.

aggregated responses to 12 questions on different aspects of the respondent's health. It is comprised of two components, physical health and mental health.

SF-12 values are measured in all 5 periods before onset and the differences between all pairwise combinations of SWB between these periods are calculated. A positive difference between any pairwise combination (for example, between periods -3 and -2, or between periods -5 and -1) indicates a decline in health. Of course, a health decline can take a wide range of values; in the periods prior to onset, the smallest physical health decline was by 0.01 points and the largest was by 45.61 points. The smallest mental health decline prior to onset was also by 0.01 points and the largest was by 46.96 points. Because of this, a minimum threshold was set on the size of a 'large' health decline at one standard deviation of the mean of each SF-12 component. The mean value of the physical component of the SF-12 was 54.02, with a standard deviation of 7.04, whilst the mean value of the mental component of the SF-12 was 49.86, with a standard deviation of 9.06. A pre-onset decline in either component by at least one standard deviation categorises that individual as having a 'large' health decline. Experiencing a health decline of at least one standard deviation prior to onset is not particularly common however, occurring in just 866 of pre-onset observations. This comprises 4.4% of One-Time, 3.6% of Temporary, 2.9% of Chronic Non-Severe and 2.2% of Chronic Severe disabled individuals.

Despite this relatively low number of observations, excluding them leads to a noticeable change in the results, which are shown below in two different specifications. Specification (i) simply removes these 866 observations from the sample, whilst specification (ii) does so whilst also controlling for the first-difference of both health measures. This is done in an attempt to disentangle the effects on SWB of changes in health and changes in disability status; the hypothesis is that removing any period-on-period changes in health will isolate any effects of disability which come to the individual as a "shock". From the results in specification (i), shown in Table 3.14, removing observations of people who have experienced a large decline in either health measure prior to onset appears to remove the anticipation effect for those who are Chronic Severe disabled, as the coefficient in the period before onset reduces to -0.273 and becomes statistically insignificant. As such, the first significant decline in SWB is observed in the onset period, rather than in the period before, effectively eliminating the anticipation effect. In (ii), period-wise changes in both components of the SF-12 health measure are also controlled for. This reduces the Chronic Severe coefficient in the period before onset even further to -0.068, however after this point, the only statistically significant lags are in periods 1, 3, 5 and 6 post-onset. This suggests that whilst controlling for period-wise changes in health does go some way to disentangling the effects of poor health and disability (hence diminishing the remaining anticipation effect[48]), these two factors are so closely entwined as to be difficult to separate.

In summary, the finding that measures of general health tend to diminish in the period before onset for people with Chronic Severe disabilities, combined with the observation that the anticipation effects largely diminish and become insignificant when accounting for health changes, provides evidence that the anticipation effects occur largely as a result of declining health levels prior to disability onset, rather than the actual "anticipation" of disability or because of the presence of some other selection effect.

[48] It should be noted that whilst there is still an (insignificant) anticipation effect in (i), this is based on the exclusion of people who had experienced a one-standard-deviation decline in either component of the SF-12 measure of general health. This definition is arguably somewhat arbitrary and the size of this remaining anticipation effect will change as the definition of a 'large decline' changes.

Table 3.14. Main model, excluding large pre-onset health declines.

	(i) Not controlling for health changes			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods from Onset	*Reference*			
3 Periods from Onset	0.029	0.086	-0.181	-0.074
	(0.112)	(0.149)	(0.274)	(0.341)
2 Periods from Onset	0.156	-0.046	-0.083	0.110
	(0.115)	(0.154)	(0.377)	(0.307)
1 Period from Onset	0.044	0.019	-0.286	-0.273
	(0.127)	(0.147)	(0.330)	(0.290)
Onset Period	-0.062	-0.231	-0.379	-0.675**
	(0.145)	(0.145)	(0.380)	(0.282)
1 Period after Onset	0.030	-0.070	-0.439	-0.860***
	(0.147)	(0.140)	(0.384)	(0.304)
2 Periods after Onset	0.057	-0.037	-0.361	-0.445
	(0.136)	(0.140)	(0.344)	(0.292)
3 Periods after Onset	-0.030	-0.028	-0.461	-0.841***
	(0.146)	(0.151)	(0.382)	(0.283)
4 Periods after Onset	-0.089	-0.112	-0.336	-0.697**
	(0.154)	(0.159)	(0.372)	(0.300)
5 Periods after Onset	-0.018	-0.089	-0.367	-1.094***
	(0.161)	(0.158)	(0.366)	(0.312)
6 Periods after Onset	0.042	-0.038	-0.456	-1.081***
	(0.182)	(0.172)	(0.382)	(0.322)
7 Periods after Onset	0.014	-0.151	-0.686*	-0.639*
	(0.203)	(0.217)	(0.407)	(0.351)
Age	-0.073***			
	(0.012)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.152***			
	(0.044)			
Married	0.137***			
	(0.049)			
Separated	-0.224***			
	(0.082)			
Divorced	0.044			
	(0.068)			
Widowed	-0.158			
	(0.163)			
No. of Children	0.000			
	(0.011)			
No Qualification	*Reference*			
GCSE	-0.090			
	(0.071)			
Higher/AS Level	-0.069			

	(0.074)
A-Level	-0.111
	(0.078)
Other Higher	-0.132
	(0.090)
Degree	-0.114
	(0.089)
Postgraduate	-0.188
	(0.117)
London	*Reference*
North East	0.461*
	(0.251)
North West	0.073
	(0.155)
Yorks/Humber	0.180
	(0.163)
East Midlands	0.241
	(0.155)
West Midlands	0.106
	(0.168)
East	0.275
	(0.186)
South East	0.022
	(0.108)
South West	0.205*
	(0.123)
Wales	-0.006
	(0.152)
Scotland	0.007
	(0.251)
N. Ireland	1.128***
	(0.197)
Urban	*Reference*
Rural	-0.008
	(0.044)
2009	*Reference*
2010	-0.006
	(0.024)
2011	-0.070***
	(0.026)
2012	-0.162***
	(0.027)
2013	-0.200***
	(0.026)
2014	-0.117***
	(0.025)
2015	-0.004
	(0.027)

2016	0.068***
	(0.026)
2017	-0.056
	(0.039)
2018	-0.045
	(0.036)
Change in SF-12M	
Change in SF-12P	
Constant	6.788***
	(0.293)
R-Squared (within)	0.0140
R-Squared (between)	0.0171
R-Squared (overall)	0.0140

Observations: 166,227
Probability sample weights included.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table 3.14 (cont.). Main model, excluding large pre-onset health declines.

	(ii) Controlling for health changes			
			Chronic	**Chronic**
	One-Time	**Temporary**	**Non-Severe**	**Severe**
4 Periods from Onset	*Reference*			
3 Periods from Onset	0.125	0.009	-0.158	-0.554
	(0.111)	(0.271)	(0.267)	(0.616)
2 Periods from Onset	0.077	-0.074	0.189	-0.003
	(0.143)	(0.280)	(0.440)	(0.559)
1 Period from Onset	0.054	-0.125	-0.259	-0.068
	(0.150)	(0.249)	(0.434)	(0.523)
Onset Period	0.029	-0.230	-0.361	-0.594
	(0.176)	(0.253)	(0.512)	(0.494)
1 Period after Onset	-0.008	-0.214	-0.371	-0.967*
	(0.182)	(0.252)	(0.519)	(0.507)
2 Periods after Onset	0.074	-0.157	-0.270	-0.562
	(0.164)	(0.251)	(0.504)	(0.502)
3 Periods after Onset	-0.018	-0.140	-0.420	-0.899*
	(0.173)	(0.261)	(0.516)	(0.496)
4 Periods after Onset	-0.086	-0.221	-0.292	-0.786
	(0.183)	(0.261)	(0.503)	(0.506)
5 Periods after Onset	0.009	-0.214	-0.323	-1.193**
	(0.188)	(0.261)	(0.508)	(0.515)
6 Periods after Onset	0.085	-0.147	-0.446	-1.248**

	(0.206)	(0.272)	(0.514)	(0.517)
7 Periods after Onset	-0.001	-0.268	-0.717	-0.830
	(0.228)	(0.302)	(0.540)	(0.544)
Age	-0.057*			
	(0.034)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.143***			
	(0.046)			
Married	0.131**			
	(0.054)			
Separated	-0.235***			
	(0.086)			
Divorced	0.038			
	(0.073)			
Widowed	-0.148			
	(0.192)			
No. of Children	0.143***			
	(0.022)			
No Qualification	*Reference*			
GCSE	-0.019			
	(0.146)			
Higher/AS Level	0.089			
	(0.134)			
A-Level	-0.041			
	(0.142)			
Other Higher	-0.054			
	(0.143)			
Degree	-0.039			
	(0.142)			
Postgraduate	-0.154			
	(0.164)			
London	*Reference*			
North East	0.484			
	(0.319)			
North West	0.083			
	(0.163)			
Yorks/Humber	0.111			
	(0.166)			
East Midlands	0.246			
	(0.164)			
West Midlands	0.115			
	(0.190)			
East	0.227			
	(0.159)			
South East	0.032			
	(0.114)			
South West	0.209*			

	(0.121)
Wales	0.101
	(0.178)
Scotland	0.231
	(0.239)
N. Ireland	1.184***
	(0.293)
Urban	*Reference*
Rural	-0.029
	(0.049)
2009	*Reference*
2010	0.044
	(0.222)
2011	-0.026
	(0.189)
2012	-0.130
	(0.158)
2013	-0.177
	(0.128)
2014	-0.109
	(0.099)
2015	-0.006
	(0.069)
2016	0.063
	(0.042)
2017	-0.066*
	(0.039)
2018	-0.066
	(0.045)
Change in SF-12M	0.023***
	(0.001)
Change in SF-12P	0.010***
	(0.001)
Constant	6.214***
	(1.345)
R-Squared (within)	0.0444
R-Squared (between)	0.0405
R-Squared (overall)	0.0415

Observations: 166,227
Probability sample weights included.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

3.5.4 Alternative Non-Chronic Disability Categories

As discussed in section 3.5.1, the results from the main model seem to suggest that disability severity is a more important driver of wellbeing than disability chronicity. Therefore, it was considered whether the two Non-Chronic categories of One-Time and Temporary should also be disaggregated by severity. It was hypothesised that the dip in wellbeing observed in the Temporary group in the main model may possibly have been driven by individuals with severe disabilities. To investigate this, two new disability categories are created. First, the One-Time and Temporary groups are combined so to create a single 'Non-Chronic Disabled' group. Next, this new group is split into two categories by severity in exactly the same manner as is done with individuals with Chronic disabilities. Hence, the four categories in this alternative estimation are Non-Chronic Non-Severe, Non-Chronic Severe, Chronic Non-Severe and Chronic Severe. The Non-Chronic Non-Severe category contains 12,305 observations (7.36%) of 1,589 individuals (5.78%) and the Non-Chronic Severe category contains 5,025 observations (3.01%) of 660 individuals (2.40%). The other two (Chronic) categories remain unchanged.

The main model specification is estimated with these new categories and the results are shown in Table 3.15 and Figure 3.5. There are no statistically significant coefficients in the Non-Chronic Non-Severe category, but there are in the Non-Chronic Severe group in the onset period (-0.515) and in the first period after onset (-0.287). In terms of magnitude and significance, these results are more prominent than those found in the Temporary category from the main model at onset (-0.269), and provide evidence that disability severity may be a greater driving factor of wellbeing than chronicity, especially as the life satisfaction path for the Non-Chronic

Severe group dips below that of the Chronic Non-Severe group at onset and also in the next period. Full adaptation is found in the second period after onset.

Table 3.15. Alternative Non-Chronic Categories Model.

	Non-Chronic Non-Severe	**Non-Chronic Severe**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.032	0.117	-0.150	-0.265
	(0.109)	(0.139)	(0.267)	(0.332)
2 Periods before Onset	0.079	-0.108	-0.067	-0.158
	(0.114)	(0.153)	(0.366)	(0.331)
1 Period before Onset	0.020	-0.004	-0.275	-0.524*
	(0.115)	(0.155)	(0.320)	(0.309)
Onset Period	-0.054	-0.515***	-0.373	-0.915***
	(0.121)	(0.160)	(0.369)	(0.293)
1 Period after Onset	0.045	-0.287*	-0.429	-1.104***
	(0.119)	(0.162)	(0.374)	(0.312)
2 Periods after Onset	0.006	-0.088	-0.351	-0.694**
	(0.115)	(0.157)	(0.334)	(0.308)
3 Periods after Onset	-0.023	-0.126	-0.443	-1.067***
	(0.126)	(0.160)	(0.372)	(0.291)
4 Periods after Onset	-0.129	-0.086	-0.324	-0.936***
	(0.129)	(0.187)	(0.362)	(0.312)
5 Periods after Onset	-0.135	0.099	-0.355	-1.335***
	(0.130)	(0.191)	(0.357)	(0.324)
6 Periods after Onset	-0.039	0.010	-0.444	-1.323***
	(0.149)	(0.198)	(0.373)	(0.334)
7 Periods after Onset	-0.113	-0.116	-0.676*	-0.882**
	(0.162)	(0.325)	(0.398)	(0.362)
Age	-0.073***			
	(0.012)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.152***			
	(0.043)			
Married	0.138***			
	(0.049)			
Separated	-0.225***			
	(0.081)			
Divorced	0.041			
	(0.068)			
Widowed	-0.132			
	(0.160)			
No. of Children	0.000			

	(0.010)
No Qualification	*Reference*
GCSE	-0.096
	(0.071)
Higher/AS Level	-0.074
	(0.074)
A-Level	-0.109
	(0.078)
Other Higher	-0.135
	(0.089)
Degree	-0.122
	(0.089)
Postgraduate	-0.189
	(0.116)
London	*Reference*
North East	0.452*
	(0.251)
North West	0.080
	(0.154)
Yorks/Humber	0.183
	(0.162)
East Midlands	0.241
	(0.155)
West Midlands	0.105
	(0.168)
East	0.278
	(0.186)
South East	0.020
	(0.108)
South West	0.202*
	(0.122)
Wales	-0.005
	(0.152)
Scotland	0.009
	(0.247)
N. Ireland	1.190***
	(0.239)
Urban	*Reference*
Rural	-0.008
	(0.044)
2009	*Reference*
2010	-0.005
	(0.024)
2011	-0.068**
	(0.026)
2012	-0.160***
	(0.027)
2013	-0.199***

	(0.026)
2014	-0.116***
	(0.025)
2015	-0.002
	(0.027)
2016	0.069***
	(0.026)
2017	-0.052
	(0.039)
2018	-0.042
	(0.036)
Constant	6.797***
	(0.292)
R-Squared (within)	0.0148
R-Squared (between)	0.0197
R-Squared (overall)	0.0159

Observations: 167,093

Sample probability weights applied.

Standard errors (clustered by individual) are displayed in brackets.

P-Values: *** 1%, ** 5%, *10%

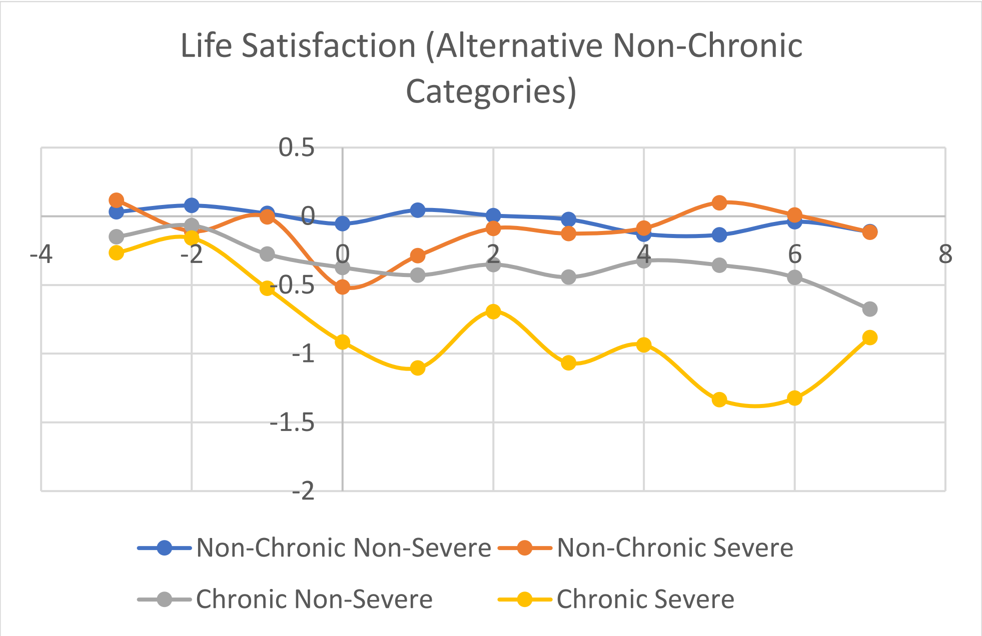


Figure 3.5. Life satisfaction paths estimated using alternative Non-Chronic disability categories.

3.5.5 Drivers and Facets of Wellbeing

Employment and income

The main model is run with the inclusion of controls for (i) log of real annual income, (ii) employment status, and (iii) both income and employment status and the results are shown in Table 3.16. When controlling for employment status, those who are in some manner of employment form the reference group as this is the majority case for working-aged people. The other groups are Unemployed, Family Worker/Carer, Student, Retired and Not Working. The 'Not Working' group includes those who are not in the labour market for reasons including long-term illness or disability.

In, (i), whilst the coefficient on log real income itself is not significant, the results are somewhat dampened, suggesting that income partially explains the differences in wellbeing between periods of disability and non-disability. In the onset period, the Temporary Disabled coefficient reduces in magnitude from -0.560 to -0.344 compared to the main results, whilst the Chronic Severe coefficient reduces from -1.129 to -0.824. Overall, the statistically significant Chronic Severe coefficients are reduced in magnitude by around 0.28 to 0.43 points post-onset.

In (ii), negative effects on SWB are associated with being unemployed (-0.208), being out of the labour force (-0.433), and doing caring or family work (-0.083), but positive effects are associated with being a student (0.177). Including controls for employment status causes the disability coefficients at onset for the Temporary group to dampen slightly further, to -0.259 (compared to -0.344 in specification (i) and -0.560 in the main model) but the Chronic Severe coefficients remain very similar to those in (i), lying at -0.846 at onset, falling to a low of -1.245 in period 5.

In (iii), controlling for both income and employment status dampens the disability coefficients slightly further. The statistically significant coefficients in the Chronic Severe category are reduced by around 0.30 to 0.51 points, and in the Temporary category by 0.23 points, suggesting that employment and income account for around 41% of the negative wellbeing effects of Temporary Disabled people and around 35% of the negative wellbeing effects of Chronic Severe Disabled people.

Three other potential channels of wellbeing, guided by the findings in the literature review, were investigated with a similar method to that described above. These were housing and energy costs; food, alcohol and tobacco expenditure; problems paying for housing, council tax or bills; subjective financial situation; and going out socially. However, including these controls did not significantly alter the main results. These results are shown in the Appendix [Tables A31-A35].

Table 3.16. Main Model, controlling for real annual income and employment status.

	(i) Controlling for Log Real Annual Income			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.051	-0.003	-0.253	-0.271
	(0.111)	(0.152)	(0.331)	(0.330)
2 Periods before Onset	0.120	-0.169	-0.254	-0.155
	(0.116)	(0.148)	(0.416)	(0.325)
1 Period before Onset	0.032	-0.134	-0.421	-0.450
	(0.130)	(0.138)	(0.371)	(0.304)
Onset Period	-0.057	-0.344***	-0.503	-0.824***
	(0.149)	(0.134)	(0.429)	(0.291)
1 Period after Onset	0.061	-0.207	-0.614	-1.022***
	(0.148)	(0.131)	(0.429)	(0.309)
2 Periods after Onset	0.059	-0.160	-0.531	-0.593*
	(0.138)	(0.132)	(0.399)	(0.304)
3 Periods after Onset	-0.027	-0.163	-0.607	-0.959***

	(0.149)	(0.143)	(0.424)	(0.290)
4 Periods after Onset	-0.099	-0.226	-0.510	-0.819***
	(0.154)	(0.150)	(0.412)	(0.309)
5 Periods after Onset	-0.013	-0.199	-0.569	-1.242***
	(0.164)	(0.149)	(0.411)	(0.320)
6 Periods after Onset	0.034	-0.170	-0.648	-1.251***
	(0.186)	(0.164)	(0.424)	(0.334)
7 Periods after Onset	0.006	-0.318	-0.845*	-0.805**
	(0.212)	(0.210)	(0.448)	(0.362)
Log Real Annual Income	0.007			
	(0.008)			
Employed	*Reference*			
Unemployed				
Not Working				
Family Work/Carer				
Student				
Constant	6.449***			
	(0.325)			
R-Squared (within)	0.0125			
R-Squared (between)	0.0181			
R-Squared (overall)	0.0158			

Observations: 167,093
Sample probability weights applied.
See Appendix [Table A30] for full table with controls.
Standard errors (clustered by individual) are displayed in brackets.
P-Values: *** 1%, ** 5%, *10%

Table 3.16 (cont.). Main Model, controlling for real annual income and employment status.

	(ii) Controlling for Employment Status			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.043	0.081	-0.137	-0.253
	(0.113)	(0.140)	(0.265)	(0.321)
2 Periods before Onset	0.158	-0.084	-0.065	-0.140
	(0.112)	(0.147)	(0.384)	(0.320)
1 Period before Onset	0.059	-0.004	-0.241	-0.499*
	(0.126)	(0.140)	(0.330)	(0.299)

Onset Period	-0.042	-0.259*	-0.338	-0.846***
	(0.142)	(0.138)	(0.383)	(0.280)
1 Period after Onset	0.051	-0.101	-0.377	-1.030***
	(0.143)	(0.133)	(0.387)	(0.301)
2 Periods after Onset	0.079	-0.073	-0.307	-0.596**
	(0.133)	(0.134)	(0.348)	(0.296)
3 Periods after Onset	-0.010	-0.069	-0.405	-0.978***
	(0.142)	(0.144)	(0.384)	(0.281)
4 Periods after Onset	-0.065	-0.149	-0.286	-0.846***
	(0.152)	(0.152)	(0.375)	(0.301)
5 Periods after Onset	0.002	-0.129	-0.332	-1.246***
	(0.159)	(0.151)	(0.370)	(0.312)
6 Periods after Onset	0.061	-0.087	-0.401	-1.237***
	(0.180)	(0.164)	(0.388)	(0.323)
7 Periods after Onset	0.033	-0.192	-0.638	-0.796**
	(0.201)	(0.206)	(0.407)	(0.353)
Log Real Annual Income				
Employed	*Reference*			
Unemployed	-0.208***			
	(0.045)			
Not Working	-0.433***			
	(0.099)			
Family Work/Carer	-0.083*			
	(0.051)			
Student	0.177***			
	(0.045)			
Constant	6.463***			
	(0.326)			
R-Squared (within)	0.0175			
R-Squared (between)	0.0270			
R-Squared (overall)	0.0216			

Observations: 167,093
Sample probability weights applied.
See Appendix [Table A30] for full table with controls.
Standard errors (clustered by individual) are displayed in brackets.
P-Values: *** 1%, ** 5%, *10%

Table 3.16 (cont.). Main Model, controlling for real annual income and employment status.

	(iii) Controlling for Income and Employment Status			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**

4 Periods before Onset	*Reference*			
3 Periods before Onset	0.063	0.007	-0.245	-0.245
	(0.113)	(0.151)	(0.328)	(0.318)
2 Periods before Onset	0.126	-0.171	-0.249	-0.133
	(0.114)	(0.148)	(0.417)	(0.313)
1 Period before Onset	0.044	-0.128	-0.402	-0.424
	(0.128)	(0.138)	(0.371)	(0.294)
Onset Period	-0.037	-0.332**	-0.483	-0.753***
	0.145)	(0.134)	(0.430)	(0.279)
1 Period after Onset	0.078	-0.202	-0.583	-0.946***
	(0.144)	(0.132)	(0.427)	(0.298)
2 Periods after Onset	0.078	-0.151	-0.506	-0.497*
	(0.135)	(0.133)	(0.400)	(0.294)
3 Periods after Onset	-0.012	-0.163	-0.589	-0.874***
	(0.145)	(0.143)	(0.423)	(0.281)
4 Periods after Onset	-0.077	-0.229	-0.486	-0.730**
	(0.152)	(0.150)	(0.411)	(0.298)
5 Periods after Onset	0.002	-0.203	-0.558	-1.152***
	(0.162)	(0.149)	(0.411)	(0.309)
6 Periods after Onset	0.051	-0.180	-0.620	-1.163***
	(0.184)	(0.163)	(0.426)	(0.324)
7 Periods after Onset	0.027	-0.327	-0.825*	-0.722**
	(0.208)	(0.206)	(0.446)	(0.354)
Log Real Annual Income	-0.005			
	(0.009)			
Employed	*Reference*			
Unemployed	-0.217***			
	(0.048)			
Not Working	-0.426***			
	(0.109)			
Family Work/Carer	-0.092*			
	(0.056)			
Student	0.086*			
	(0.048)			
Constant	6.463***			
	(0.326)			
R-Squared (within)	0.0147			
R-Squared (between)	0.0249			
R-Squared (overall)	0.0206			

Observations: 167,093

Sample probability weights applied.

See Appendix [Table A30] for full table with controls.

Standard errors (clustered by individual) are displayed in brackets.

P-Values: *** 1%, ** 5%, *10%

Facets of life satisfaction

Table 3.17 shows the estimates of the effects of disability onset upon three facets of life satisfaction, these being (i) health, (ii) income, and (iii) amount of leisure time. In (i), disability onset is associated with statistically significant declines in health satisfaction for all disability categories, with greater declines for higher extents of disability. In the onset period, health satisfaction lies at 0.324, 0.632, 0.868 and 1.519 points below baseline for individuals in the One-Time, Temporary, Chronic Non-Severe and Chronic Severe categories, respectively. Full adaptation occurs only for those with One-Time disabilities, partially for those with Temporary disabilities and not at all for those with Chronic disabilities.

These results are not surprising as ill health and disability are closely related concepts. However, we cannot tell how distinct they are in the minds of disabled people, in which case, disability may be driving these results rather than the opposite case. In the case of Temporary disabled people, there is little evidence of adaptation after onset, despite overall SWB returning to baseline after a year in the main model, suggesting that poor health stops being a driver of overall SWB, given enough time. Another finding is that health satisfaction for the Chronic Non-Severe group lies below that of those in the Temporary disabled group and continues to decline after onset. In the main model, the coefficients for this group take on a similar pattern but are not significant, and become close to zero when controlling for large pre-onset health declines. It is concluded in section 3.5.2 that the non-significant values of the coefficients in this group are likely explained by poor health rather than disability. This argument is also supported by the findings here; people in the Chronic Non-Severe category experience consistently poor health from the onset period onwards, but this does not translate into overall life satisfaction effects.

In (ii), the outcome variable is satisfaction with income. It was discovered in the previous section that income and employment status account for around 35-41% of the negative wellbeing effects associated with Temporary and Chronic Severe disabilities, so it was expected that disability onset should exhibit some impact upon this subjective measure of income satisfaction. There is no significant effect upon income satisfaction from One-Time disability, but there is in the onset period for people with Temporary disabilities (-0.315). There are also significant effects at onset for people in the Chronic Non-Severe and Chronic Severe groups at 0.498 and 0.749 points below baseline, respectively, which fall as low as 0.658 and 0.715 points below baseline at 7 periods after onset. Overall, the impact of disability on income satisfaction is considerably smaller than on health satisfaction. Whilst those with Chronic Non-Severe disabilities experience drops in both their health satisfaction and income satisfaction, neither of these translate into overall life satisfaction effects. This supports the previous argument that severity of disability is the main factor which influences SWB; those with non-severe disabilities return to baseline levels of SWB eventually, regardless of disability duration or its affect upon their heath or income. Finally, in (iii), the impact of disability onset upon satisfaction with amount of leisure time is estimated, but most of the coefficients are small and all are insignificant, so whilst disabled people tend to have more leisure time in terms of working fewer labour hours, this does not translate into any wellbeing effects.

Table 3.17. Facets of Life Satisfaction.

	(i) Health Satisfaction			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	-0.062	-0.276	-0.096	-0.054
	(0.137)	(0.170)	(0.251)	(0.282)
2 Periods before Onset	-0.059	-0.196	-0.287	-0.136

	(0.151)	(0.140)	(0.294)	(0.351)
1 Period before Onset	-0.104	-0.229*	-0.514*	-0.807**
	(0.149)	(0.138)	(0.269)	(0.333)
Onset Period	-0.324*	-0.632***	-0.868***	-1.519***
	(0.167)	(0.141)	(0.300)	(0.316)
1 Period after Onset	-0.064	-0.456***	-0.909***	-1.302***
	(0.174)	(0.138)	(0.314)	(0.313)
2 Periods after Onset	-0.056	-0.470***	-0.784***	-1.195***
	(0.166)	(0.143)	(0.272)	(0.311)
3 Periods after Onset	0.007	-0.424***	-1.028***	-1.553***
	(0.168)	(0.138)	(0.275)	(0.327)
4 Periods after Onset	-0.075	-0.470***	-0.819***	-1.641***
	(0.182)	(0.158)	(0.279)	(0.325)
5 Periods after Onset	0.013	-0.392**	-0.861***	-1.834***
	(0.192)	(0.157)	(0.283)	(0.340)
6 Periods after Onset	0.263	-0.342**	-1.064***	-1.739***
	(0.190)	(0.173)	(0.313)	(0.357)
7 Periods after Onset	0.006	-0.518**	-1.089***	-1.619***
	(0.235)	(0.219)	(0.325)	(0.348)
Constant	6.308***			
	(0.326)			
R-Squared (within)	0.026			
R-Squared (between)	0.061			
R-Squared (overall)	0.048			

Observations: 164,202
Sample probability weights applied.
See Appendix [Table A36] for full table with controls.
Standard errors (clustered by individual) are displayed in brackets.
P-Values: *** 1%, ** 5%, *10%

Table 3.17 (cont.). Facets of Life Satisfaction.

	(ii) Income Satisfaction			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.117	0.127	-0.272	-0.080
	(0.155)	(0.153)	(0.218)	(0.288)
2 Periods before Onset	0.207	-0.097	-0.319	-0.258
	(0.154)	(0.137)	(0.270)	(0.324)
1 Period before Onset	-0.009	-0.160	-0.341	-0.571*
	(0.148)	(0.132)	(0.259)	(0.292)
Onset Period	-0.039	-0.315**	-0.498**	-0.749**
	(0.144)	(0.138)	(0.253)	(0.300)
1 Period after Onset	-0.016	-0.121	-0.733***	-0.587*
	(0.144)	(0.137)	(0.250)	(0.303)

2 Periods after Onset	-0.199	-0.138	-0.520**	-0.518*
	(0.142)	(0.144)	(0.247)	(0.299)
3 Periods after Onset	-0.044	-0.183	-0.668***	-0.652**
	(0.144)	(0.138)	(0.245)	(0.311)
4 Periods after Onset	-0.166	-0.200	-0.523**	-0.670**
	(0.156)	(0.147)	(0.258)	(0.304)
5 Periods after Onset	-0.211	-0.254*	-0.518**	-0.839***
	(0.178)	(0.153)	(0.255)	(0.313)
6 Periods after Onset	-0.079	-0.234	-0.606**	-0.636*
	(0.178)	(0.176)	(0.284)	(0.339)
7 Periods after Onset	0.250	-0.293	-0.658**	-0.715*
	(0.260)	(0.231)	(0.306)	(0.406)
Constant	4.148***			
	(0.338)			
R-Squared (within)	0.0202			
R-Squared (between)	0.0109			
R-Squared (overall)	0.0129			

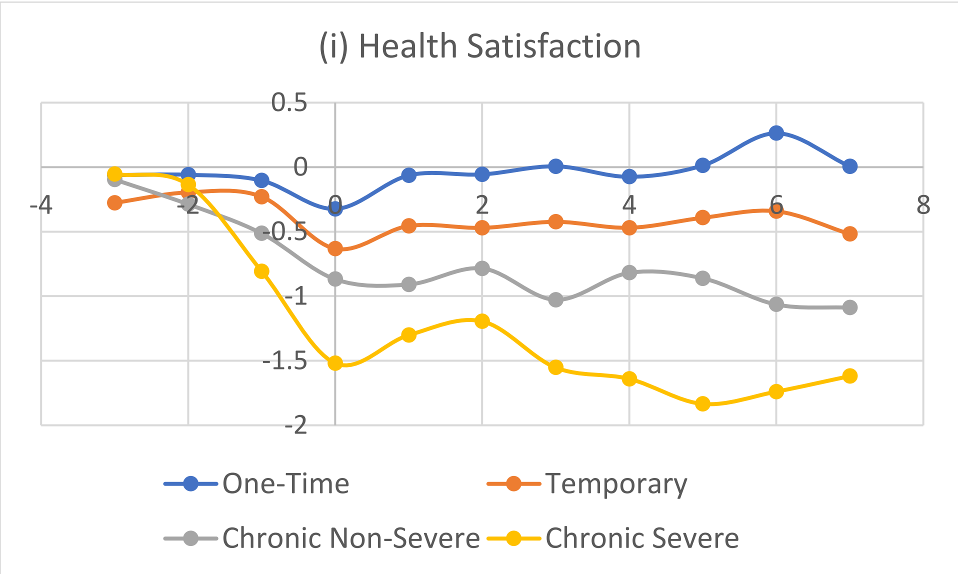
Observations: 164,132
Sample probability weights applied.
See Appendix [Table A36] for full table with controls.
Standard errors (clustered by individual) are displayed in brackets.
P-Values: *** 1%, ** 5%, *10%.

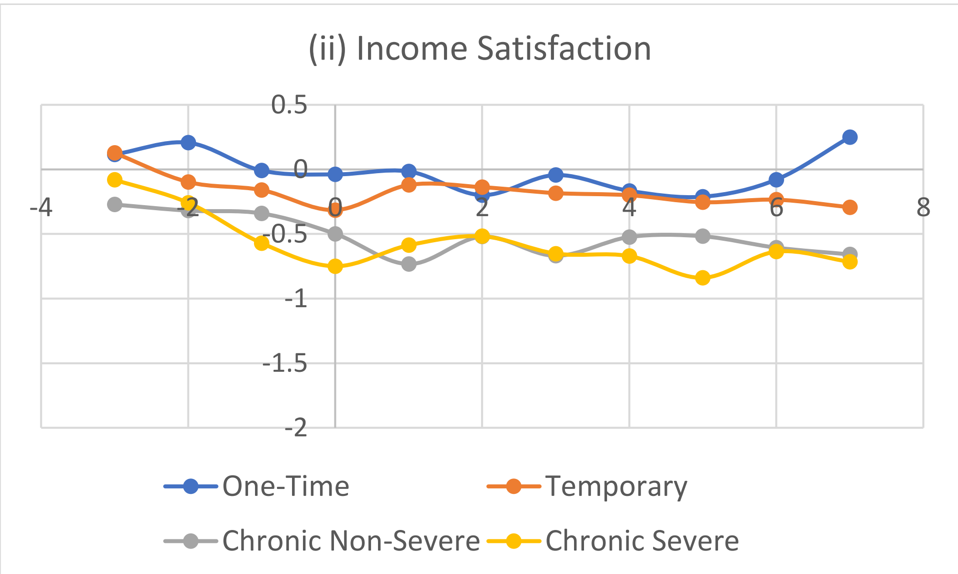
Table 3.17 (cont.). Facets of Life Satisfaction.

	(iii) Satisfaction with Amount of Leisure Time			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	-0.093	0.286	0.166	-0.032
	(0.126)	(0.187)	(0.325)	(0.236)
2 Periods before Onset	-0.141	0.198	0.257	0.173
	(0.133)	(0.205)	(0.389)	(0.287)
1 Period before Onset	-0.127	0.158	-0.136	-0.010
	(0.141)	(0.181)	(0.313)	(0.278)
Onset Period	-0.072	-0.001	-0.381	-0.320
	(0.126)	(0.183)	(0.343)	(0.260)
1 Period after Onset	-0.176	0.210	-0.485	-0.219
	(0.138)	(0.185)	(0.354)	(0.262)
2 Periods after Onset	-0.034	0.057	-0.401	-0.147
	(0.126)	(0.180)	(0.340)	(0.289)
3 Periods after Onset	-0.124	0.095	-0.418	-0.428
	(0.150)	(0.190)	(0.362)	(0.287)
4 Periods after Onset	-0.257*	-0.124	-0.244	-0.265
	(0.154)	(0.200)	(0.327)	(0.278)
5 Periods after Onset	-0.241	-0.063	-0.307	-0.494*

	(0.170)	(0.196)	(0.341)	(0.285)
6 Periods after Onset	-0.040	-0.216	-0.393	-0.112
	(0.172)	(0.214)	(0.352)	(0.305)
7 Periods after Onset	-0.111	-0.144	-0.555	-0.369
	(0.184)	(0.240)	(0.386)	(0.299)
Constant	5.698***			
	(0.362)			
R-Squared (within)	0.0118			
R-Squared (between)	0.0474			
R-Squared (overall)	0.0240			

Observations: 164,214
Sample probability weights applied.
See Appendix [Table A36] for full table with controls.
Standard errors (clustered by individual) are displayed in brackets.
P-Values: *** 1%, ** 5%, *10%





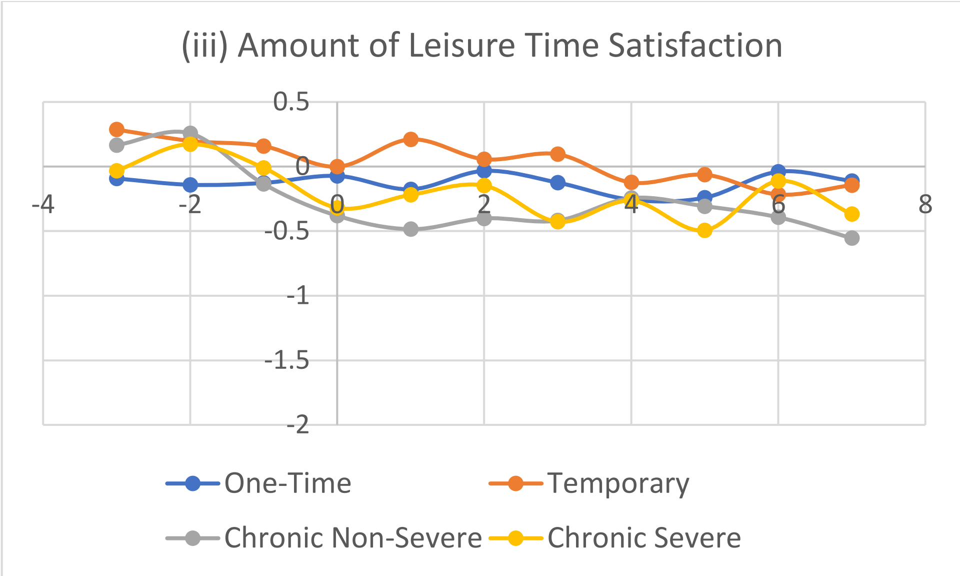


Figure 3.6 (i – iii). The effects of disability onset upon three facets of life satisfaction.

3.5.7 Heterogeneity Analysis

To explore heterogeneity in the results, equation (2), outlined in section 3.4.3 is used to introduce extra dimensions into the equation. These are the disabled individual's pre-onset education level, pre-onset income level, age of onset, gender and marital status. In addition to these, two methods were used in an attempt to explore heterogeneity in the results by disability type, however neither of these attempts were successful and the results were inconclusive. The first method involved placing individuals into four new categories called 'Physical', 'Sensory', 'Cognitive' and 'Other', which replaced the four disability categories from the main model. The second involved running separate versions of the main model for each of the 12 disability types discussed in section 3.3 (mobility, lifting and carrying, etc.). A discussion of the methodologies used and the results can be found in the Appendix [A14, A15].

Pre-onset education level

Dummy variables are generated to denote whether disabled individuals had a "high" education level (beyond secondary school level) in the period before onset or a "low" education level (school level or no qualifications). These are interacted with the vector of 44 dummy variables from the main model which denote time from onset and disability type. The results are shown in Table 3.18 and Figure 3.7, although the differences between the two subgroups are not large, especially for those in the Chronic Severe group. Whilst the onset coefficient in the Temporary category is significant in the Main Model, it is now only significant in the lower education group (-0.407), implying that a sufficient level of education can completely mitigate against the wellbeing effects of a temporary disability, which may be explained if these individuals are better resourced to deal with adversity, such as the ability to return to work. Polidano and Vu (2013) note that higher educated people find it much easier to regain full-time employment following onset, although they do not differentiate between different severity levels. The most unexpected result is found in the One-Time disabled group, in which the coefficients for periods 1, 2, 5 and 6 are not only significant but also positive, with values lying between 0.306 and 0.405. This implies that for those with lower levels of education, disability onset may even be a *positive* experience, which may hypothetically be the case if the disability is of such a non-severe and short-term nature that it causes the individual to re-evaluate their life following onset an upwardly adjust their current situation, which was what was proposed in *Shattered Assumptions Theory* (Janoff-Bulman, 1992).

Pre-onset income

Contrary to expectations, those in higher-than-average household income groups appear to be the most effected by disability (see Table 3.19 and Figure 3.8). At onset, people in this group with a Chronic Severe disability report SWB of 1.51 points below baseline, compared to 0.64 points below for the lower-income group, a difference of 0.88 points. Post-onset, people from higher-income families experience declines in SWB of between 0.32 and 0.78 points lower than those in the lower-income families. A suspected explanation for these results is that people from higher-income families experience a larger proportional drop in household income in response to disability onset because the incomes of both partners may be affected if they both need to reduce their labour hours to accommodate the disability.

Age of onset

There are no great differences in the results between the two age groups (see Table 3.20 and Figure 3.9), with most Chronic Severe coefficients lying around one point below the average wellbeing for non-disabled people, regardless of whether they experience disability onset at below or above the average age of onset. Charles (2003) discussed two opposing hypotheses regarding the impact of disability onset at different ages, the first stating that people who experience onset at younger ages are better able to accommodate their disability through human capital choices, the other arguing that people who experience onset later in life experience more productive years over the course of a lifetime, and so can accumulate more capital. It is possible that these two forces may cancel each other out, although Charles (2003) found more evidence for the latter hypothesis. Whilst there are slight differences in the results here, they are of no great magnitude.

Gender

When gender is included in the model (see Table 3.21 and Figure 3.10), the results for males and females are similar, with most Chronic Severe coefficients for both groups lying close to 1 point below baseline from onset. This is slightly contrary to the findings in the psychology literature, which report that life events affect women more severely and the effects last for longer (e.g., Diener *et al,* 1999). SWB for females is below baseline in the pre-onset periods, suggesting that women experience lower levels of SWB compared to men regardless of disability, although these coefficients are not significant, except for period -1. Another finding is that Temporary disabilities are associated with a single-period fall in SWB for women but not for men, lying at 0.415 points below baseline in the year of onset.

Marital status

When marital status is included in the model (see Table 3.22 and Figure 3.10), again the main difference in SWB lies in the Chronic Severe category. At onset, individuals with a Chronic Severe disability experience wellbeing of around 0.51 points below baseline if they have a spouse, or 1.29 points below for those without a spouse, a difference of 0.78 points. Wellbeing falls as low as 0.97 points below baseline for those with a spouse at 5 periods post-onset, compared to 1.65 points below for those with no spouse. These magnitudes suggest that being alone at the time of disability onset exhibits an additional negative wellbeing effect over and above any effects of not having a spouse. As marital status is already included within the controls, these results are not expected to be driven by any selection effect which would raise wellbeing for those who have a spouse. Nor are there expected to be any confounding factors between wellbeing and having a spouse which would drive these results, as these would be netted out by the use of fixed effects. Whilst those with a Temporary disability also report lower post-onset wellbeing if they do not have a spouse, the results are not statistically significant.

Table 3.18. Main Model by pre-onset education level.

	No Higher Education Prior to Onset				Higher Education Prior to Onset			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**	**One-Time**	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*							
3 Periods before Onset	0.004	-0.062	-0.515	0.103	0.025	0.155	-0.014	-0.432
	(0.151)	(0.239)	(0.249)	(0.398)	(0.168)	(0.162)	(0.306)	(0.451)
2 Periods before Onset	0.222	-0.183	-0.350**	-0.058	0.085	-0.013	0.017	-0.188
	(0.139)	(0.245)	(0.177)	(0.550)	(0.179)	(0.173)	(0.463)	(0.411)
1 Period before Onset	0.091	-0.060	-0.537**	-0.533	-0.028	0.033	-0.187	-0.518
	(0.139)	(0.241)	(0.214)	(0.529)	(0.206)	(0.162)	(0.394)	(0.378)
Onset Period	0.126	-0.407*	-0.336*	-0.935*	-0.226	-0.186	-0.406	-0.905**
	(0.126)	(0.233)	(0.176)	(0.522)	(0.241)	(0.161)	(0.467)	(0.354)
1 Period after Onset	0.306**	-0.156	-0.409**	-1.213**	-0.191	-0.056	-0.454	-1.065***
	(0.142)	(0.208)	(0.188)	(0.548)	(0.239)	(0.159)	(0.473)	(0.378)
2 Periods after Onset	0.306**	-0.188	-0.244	-0.827*	-0.146	-0.013	-0.413	-0.647*
	(0.126)	(0.225)	(0.194)	(0.506)	(0.223)	(0.155)	(0.414)	(0.379)
3 Periods after Onset	0.077	-0.196	-0.451**	-1.078**	-0.139	0.010	-0.458	-1.059***
	(0.147)	(0.253)	(0.193)	(0.492)	(0.236)	(0.163)	(0.468)	(0.357)
4 Periods after Onset	0.191	-0.110	-0.605***	-0.889*	-0.303	-0.138	-0.221	-0.948**
	(0.169)	(0.252)	(0.209)	(0.536)	(0.241)	(0.180)	(0.453)	(0.382)
5 Periods after Onset	0.405***	-0.339	-0.336*	-1.387**	-0.331	-0.003	-0.386	-1.315***
	(0.155)	(0.247)	(0.207)	(0.556)	(0.254)	(0.179)	(0.448)	(0.395)
6 Periods after Onset	0.365**	-0.231	-0.692***	-1.333**	-0.214	-0.037	-0.458	-1.123***
	(0.182)	(0.257)	(0.190)	(0.535)	(0.272)	(0.199)	(0.455)	(0.389)
Constant	6.789***							
	(0.293)							
R-Squared (within)	0.0148							
R-Squared (between)	0.0193							

R-Squared (overall) 0.0157
Observations: 167,093
Sample probability weights applied.
See Appendix [Table A39] for full table with controls.
Standard errors (clustered by individual) are displayed in brackets.
P-Values: *** 1%, ** 5%, *10%

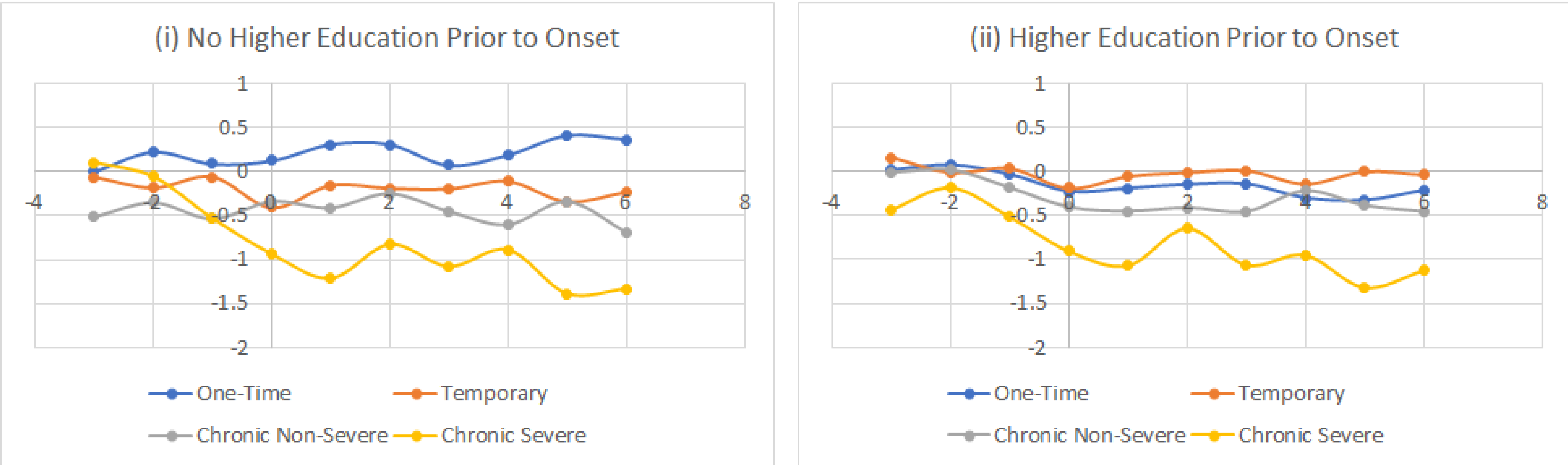


Figure 3.7 (i-ii). Life satisfaction by disability category and pre-onset education level. Diagram (i) represents disabled people whose highest level of education in the period before onset was at school level (or no qualifications). Diagram (ii) represents disabled people who have at least some higher education beyond school level.

Table 3.19. Main Model by pre-onset household income level.

	Lower Income Prior to Onset				Higher Income Prior to Onset			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**	**One-Time**	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*							
3 Periods before Onset	0.084	-0.157	-0.075	-0.042	-0.022	0.457***	-0.294	-0.702***
	(0.189)	(0.203)	(0.342)	(0.480)	(0.120)	(0.150)	(0.239)	(0.258)
2 Periods before Onset	0.242	-0.358*	0.084	-0.059	0.078	0.375*	-0.252	-0.270
	(0.191)	(0.195)	(0.483)	(0.447)	(0.125)	(0.196)	(0.279)	(0.401)
1 Period before Onset	0.041	-0.194	-0.234	-0.364	0.045	0.298	-0.345	-0.800**
	(0.232)	(0.178)	(0.397)	(0.416)	(0.114)	(0.196)	(0.325)	(0.360)
Onset Period	-0.170	-0.414**	-0.539	-0.636	0.038	-0.020	-0.122	-1.513***
	(0.269)	(0.175)	(0.496)	(0.401)	(0.116)	(0.197)	(0.241)	(0.331)
1 Period after Onset	-0.056	-0.346**	-0.458	-0.925**	0.111	0.308*	-0.388	-1.432***
	(0.266)	(0.173)	(0.491)	(0.426)	(0.134)	(0.178)	(0.328)	(0.360)
2 Periods after Onset	0.133	-0.295*	-0.368	-0.470	-0.017	0.278	-0.329**	-1.141***
	(0.240)	(0.169)	(0.454)	(0.421)	(0.132)	(0.191)	(0.161)	(0.351)
3 Periods after Onset	0.003	-0.244	-0.455	-0.862**	-0.063	0.230	-0.430**	-1.465***
	(0.265)	(0.191)	(0.512)	(0.403)	(0.130)	(0.189)	(0.182)	(0.306)
4 Periods after Onset	-0.120	-0.197	-0.452	-0.756*	-0.060	-0.053	-0.137	-1.266***
	(0.269)	(0.193)	(0.498)	(0.427)	(0.154)	(0.217)	(0.205)	(0.347)
5 Periods after Onset	0.147	-0.253	-0.492	-1.200***	-0.165	0.104	-0.169	-1.517***
	(0.268)	(0.196)	(0.478)	(0.437)	(0.178)	(0.207)	(0.250)	(0.384)
6 Periods after Onset	0.115	-0.197	-0.625	-0.928**	-0.054	0.029	-0.359	-1.703***
	(0.312)	(0.216)	(0.484)	(0.430)	(0.160)	(0.220)	(0.255)	(0.387)
Constant	6.798***							
	(0.293)							
R-Squared (within)	0.0152							
R-Squared (between)	0.0210							
R-Squared (overall)	0.0169							

Observations: 167,093
Sample probability weights applied.
See Appendix [Table A40] for full table with controls.
Standard errors (clustered by individual) are displayed in brackets.
P-Values: *** 1%, ** 5%, *10%

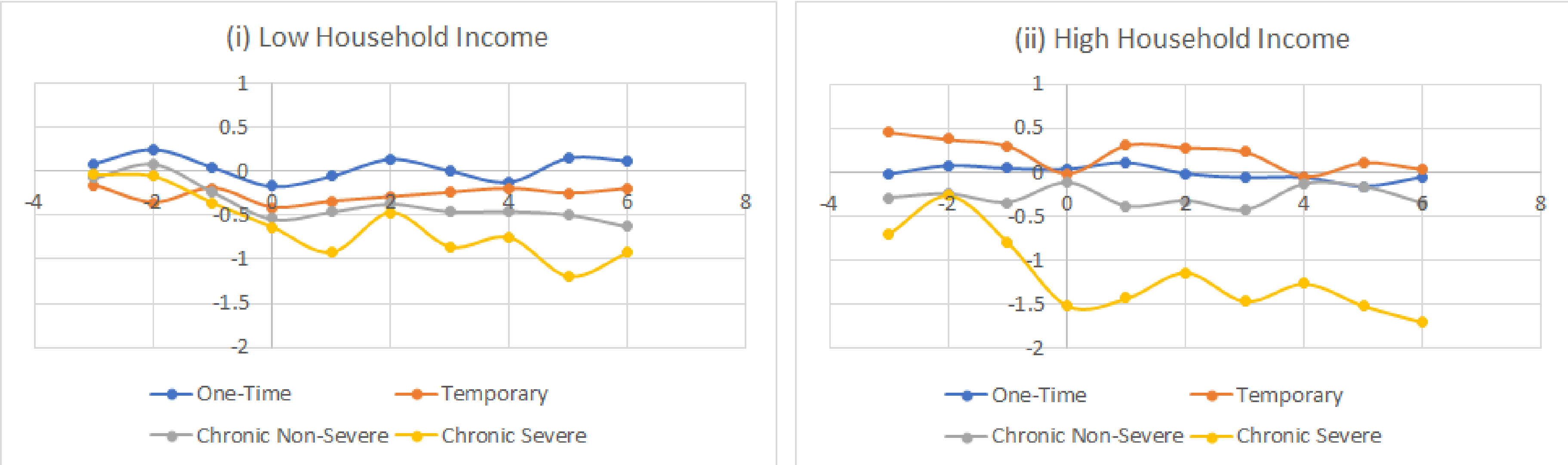


Figure 3.8. Life satisfaction by disability category and pre-onset household income level. Diagram (i) represents disabled people whose real annual household post-tax post-transfer income in the period before onset was below the sample average. Diagram (ii) represents disabled people whose household income in the period before onset was above the sample average.

Table 3.20. Main Model by age of onset.

	Early Onset				Late Onset			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**	**One-Time**	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*							
3 Periods before Onset	0.049	-0.257	-0.161	0.175	0.000	0.403***	-0.193	-0.658
	(0.166)	(0.231)	(0.321)	(0.456)	(0.136)	(0.137)	(0.389)	(0.431)
2 Periods before Onset	0.226	-0.309	0.075	0.132	0.060	0.166	-0.328	-0.406
	(0.165)	(0.229)	(0.481)	(0.490)	(0.151)	(0.168)	(0.448)	(0.423)
1 Period before Onset	0.017	0.125	-0.336	-0.408	0.078	-0.146	-0.248	-0.620
	(0.197)	(0.215)	(0.431)	(0.471)	(0.139)	(0.163)	(0.362)	(0.392)
Onset Period	-0.029	-0.412*	-0.202	-0.903**	-0.116	-0.118	-0.661*	-0.918**
	(0.228)	(0.222)	(0.518)	(0.405)	(0.144)	(0.146)	(0.360)	(0.403)
1 Period after Onset	0.044	-0.091	-0.409	-1.105**	0.005	-0.109	-0.511	-1.096***
	(0.227)	(0.204)	(0.527)	(0.454)	(0.161)	(0.155)	(0.349)	(0.413)
2 Periods after Onset	0.097	0.024	-0.229	-0.453	-0.005	-0.185	-0.572*	-0.901**
	(0.204)	(0.205)	(0.460)	(0.432)	(0.161)	(0.158)	(0.329)	(0.417)
3 Periods after Onset	-0.017	0.023	-0.508	-0.940**	-0.052	-0.156	-0.409	-1.172***
	(0.226)	(0.230)	(0.520)	(0.397)	(0.155)	(0.157)	(0.355)	(0.405)
4 Periods after Onset	-0.177	-0.057	-0.314	-0.903**	0.042	-0.238	-0.392	-0.954**
	(0.231)	(0.241)	(0.494)	(0.454)	(0.176)	(0.167)	(0.386)	(0.411)
5 Periods after Onset	0.059	-0.096	-0.347	-1.181**	-0.136	-0.143	-0.421	-1.465***
	(0.224)	(0.236)	(0.483)	(0.484)	(0.231)	(0.173)	(0.389)	(0.419)
6 Periods after Onset	-0.135	-0.222	-0.604	-1.206***	0.367*	0.020	-0.454	-1.111***
	(0.257)	(0.260)	(0.486)	(0.451)	(0.188)	(0.182)	(0.396)	(0.431)
Constant	6.804***							
	(0.301)							
R-Squared (within)	0.0159							
R-Squared (between)	0.0201							
R-Squared (overall)	0.0165							

Observations: 167,093
Sample probability weights applied.
See Appendix [Table A41] for full table with controls.
Standard errors (clustered by individual) are displayed in brackets.
P-Values: *** 1%, ** 5%, *10%

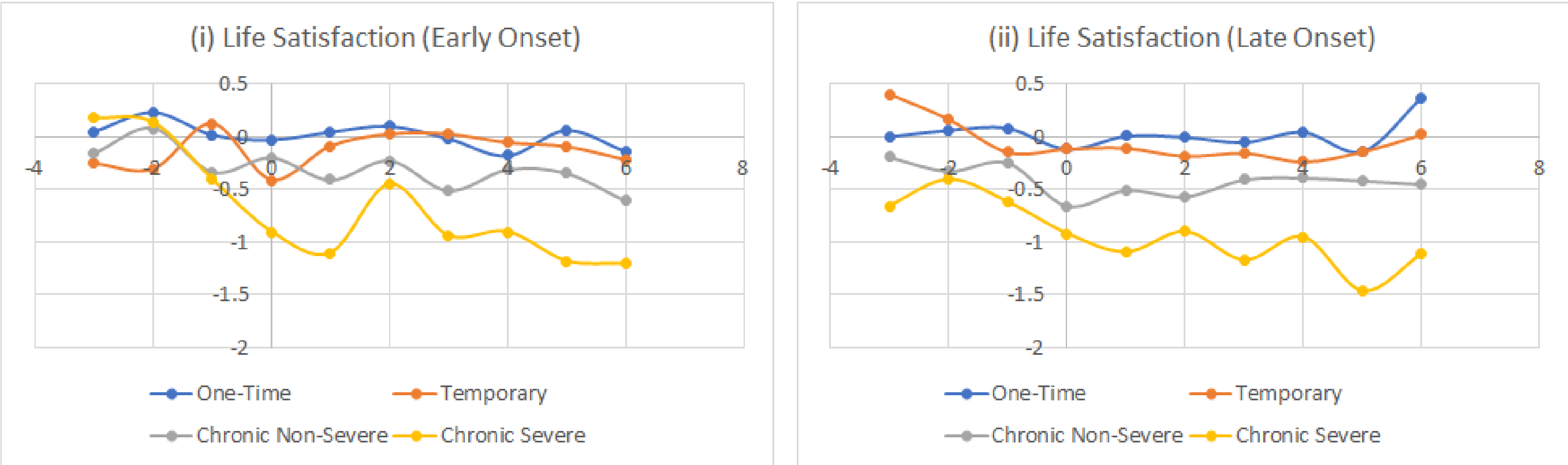


Figure 3.9. Life satisfaction by disability category and age of onset. Diagram (i) represents disabled people who became disabled before the median age of onset (44). Diagram (ii) represents disabled people who became disabled from age 44 onwards.

Table 3.21. Main Model by gender.

	Males				Females			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**	**One-Time**	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*							
3 Periods before Onset	-0.009	0.043	-0.096	-0.178	0.023	0.082	-0.163	-0.325
	(0.151)	(0.179)	(0.342)	(0.753)	(0.165)	(0.202)	(0.336)	(0.329)
2 Periods before Onset	0.299**	-0.085	-0.220	0.179	0.050	-0.081	0.117	-0.329
	(0.139)	(0.223)	(0.313)	(0.621)	(0.170)	(0.194)	(0.467)	(0.367)
1 Period before Onset	0.223*	0.023	-0.139	-0.241	-0.089	-0.035	-0.329	-0.690*
	(0.128)	(0.211)	(0.275)	(0.541)	(0.198)	(0.184)	(0.400)	(0.359)
Onset Period	0.166	-0.054	-0.029	-0.733	-0.238	-0.415**	-0.583	-1.009***
	(0.127)	(0.206)	(0.228)	(0.522)	(0.228)	(0.182)	(0.492)	(0.342)
1 Period after Onset	0.270*	0.004	-0.269	-1.037*	-0.155	-0.175	-0.499	-1.116***
	(0.148)	(0.194)	(0.325)	(0.561)	(0.226)	(0.176)	(0.478)	(0.366)
2 Periods after Onset	0.193	-0.083	-0.235	-0.362	-0.041	-0.082	-0.389	-0.895**
	(0.146)	(0.201)	(0.187)	(0.532)	(0.206)	(0.175)	(0.440)	(0.366)
3 Periods after Onset	0.175	-0.147	-0.156	-0.907*	-0.185	-0.015	-0.611	-1.145***
	(0.148)	(0.201)	(0.172)	(0.513)	(0.222)	(0.197)	(0.510)	(0.340)
4 Periods after Onset	0.001	-0.010	-0.307	-0.792	-0.142	-0.247	-0.282	-1.001***
	(0.186)	(0.232)	(0.251)	(0.552)	(0.221)	(0.198)	(0.478)	(0.365)
5 Periods after Onset	-0.006	-0.101	-0.257	-1.174**	0.013	-0.138	-0.378	-1.410**
	(0.196)	(0.220)	(0.268)	(0.577)	(0.228)	(0.202)	(0.465)	(0.375)
6 Periods after Onset	0.289	-0.147	-0.228	-1.053*	-0.192	-0.086	-0.688	-1.211***
	(0.197)	(0.234)	(0.279)	(0.554)	(0.269)	(0.223)	(0.466)	(0.379)
Constant	6.772***							
	(0.293)							
R-Squared (within)	0.0150							
R-Squared (between)	0.0204							
R-Squared (overall)	0.0164							
Observations: 167,093								

Sample probability weights applied.
See Appendix [Table A42] for full table with controls.
Standard errors (clustered by individual) are displayed in brackets.
P-Values: *** 1%, ** 5%, *10%

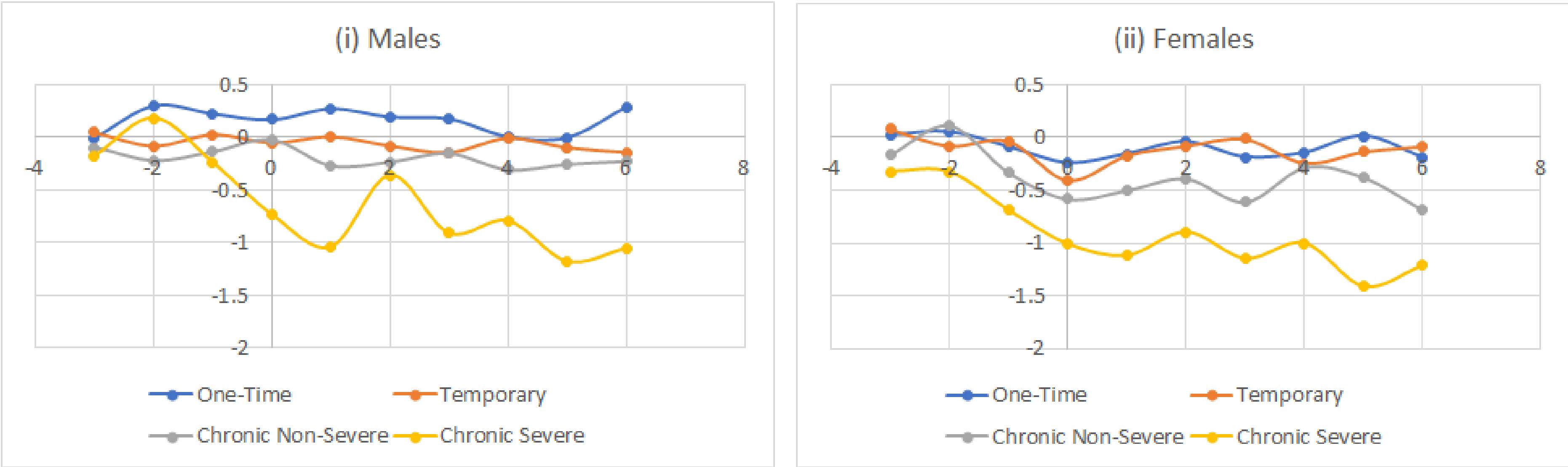


Figure 3.10 (i-ii). Life satisfaction by disability category for (i) males and (ii) females.

Table 3.22. Main Model by marital status.

	Has a Spouse Prior to Onset				No Spouse Prior to Onset			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**	**One-Time**	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*							
3 Periods before Onset	-0.040	0.191	-0.484*	0.062	0.192	-0.149	0.179	-0.525
	(0.113)	(0.175)	(0.291)	(0.389)	(0.233)	(0.208)	(0.390)	(0.478)
2 Periods before Onset	0.149	0.032	-0.664	0.149	0.162	-0.239	0.476	-0.356
	(0.114)	(0.179)	(0.411)	(0.365)	(0.255)	(0.243)	(0.442)	(0.490)
1 Period before Onset	0.155	-0.074	-0.525	-0.229	-0.159	0.114	-0.066	-0.731*
	(0.104)	(0.171)	(0.365)	(0.348)	(0.312)	(0.236)	(0.397)	(0.440)
Onset Period	0.034	-0.370**	-0.915**	-0.507*	-0.241	-0.084	0.154	-1.288***
	(0.108)	(0.167)	(0.438)	(0.308)	(0.360)	(0.234)	(0.407)	(0.422)
1 Period after Onset	0.074	-0.183	-0.813*	-0.676**	-0.063	0.050	-0.074	-1.507***
	(0.112)	(0.166)	(0.452)	(0.326)	(0.364)	(0.212)	(0.413)	(0.466)
2 Periods after Onset	0.083	-0.257	-0.846**	-0.287	-0.005	0.217	0.124	-1.066**
	(0.106)	(0.167)	(0.409)	(0.332)	(0.334)	(0.207)	(0.332)	(0.453)
3 Periods after Onset	-0.058	-0.166	-0.964**	-0.741**	-0.002	0.110	0.059	-1.323***
	(0.109)	(0.181)	(0.444)	(0.312)	(0.363)	(0.224)	(0.399)	(0.427)
4 Periods after Onset	0.082	-0.359*	-0.804*	-0.656**	-0.396	0.197	0.132	-1.122**
	(0.122)	(0.185)	(0.420)	(0.328)	(0.367)	(0.255)	(0.410)	(0.472)
5 Periods after Onset	0.057	-0.261	-0.832*	-0.974***	-0.176	0.119	0.100	-1.646***
	(0.134)	(0.184)	(0.428)	(0.347)	(0.394)	(0.251)	(0.398)	(0.496)
6 Periods after Onset	0.083	-0.266	-0.911**	-0.769**	-0.067	0.150	-0.183	-1.535***
	(0.174)	(0.183)	(0.441)	(0.342)	(0.384)	(0.305)	(0.389)	(0.478)
Constant	6.832***							
	(0.291)							
R-Squared (within)	0.0155							
R-Squared (between)	0.0185							
R-Squared (overall)	0.0150							

Observations: 167,093
Sample probability weights assumed.
See Appendix [Table A43] for full table with controls.
Standard errors (clustered by individual) are displayed in brackets.
P-Values: ***1%, ** 5%, *10%

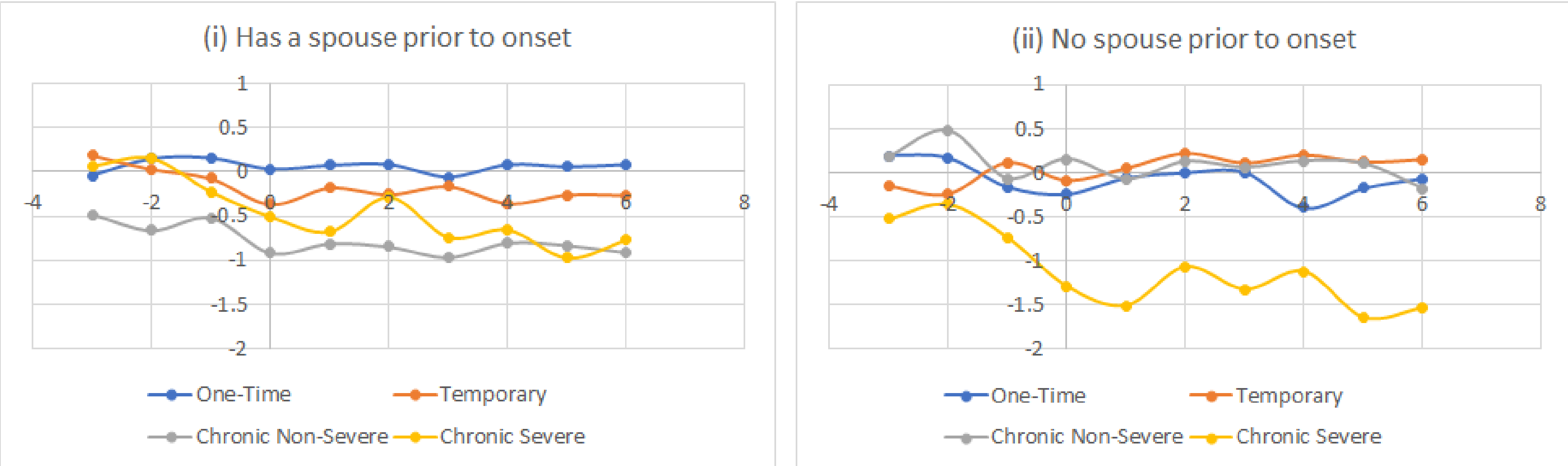


Figure 3.11 (i-ii). Life Satisfaction by disability category and pre-onset marital status. Diagram (i) represents disabled individuals who had a married or co-habiting partner in the period before onset. Diagram (ii) represents disabled individuals who were single, separated, divorced or widowed in the period prior to onset.

3.6 Discussion

The aims of this chapter were to estimate the subjective wellbeing of working-aged (16-64) individuals in the UK prior to, during, and after disability onset, and to measure how wellbeing responses differ by severity and duration of disability. It also aimed to explore heterogeneity in the wellbeing response to disability onset by various pre-onset characteristics such as income and marital status, and to identify any channels through which disability operates to affect wellbeing. Prior to this work, it had been well established in the literature that disability was associated with poorer outcomes with regards to more traditional economic variables such as lower employment probability, fewer working hours, lower incomes and lower returns on human capital.[49] However, it was not so clear how disability onset affects subjective wellbeing over time nor the extent to which the variables mentioned above act as channels of wellbeing through which disability operates. Much of the empirical literature which looks at the relationship between disability and wellbeing prior to this thesis is cross-sectional or restricted to a short number of waves, so it is not clear the extent to which people adapted to disability over time. The literature is also limited in its analysis of the heterogeneity of wellbeing responses to disability.

To explore these issues, the model from Meyer and Mok (2019), originally designed to measure changes in income, employment probability and consumption, is adapted to estimate changes in subjective wellbeing (on a 7-point scale). The data is taken from all nine available waves of *Understanding Society* (recorded between 2009 and 2018) and disabled individuals are placed into one of three categories called 'One-

[49] See e.g., Charles (2003); Charles and Stephens (2004); Chase, Cornille and English (2000); Jenkins and Rigg (2004); Jolly (2013); Jones (2007a); Jones, Mavromaras, Sloane and Wei (2018); Mehnert *et al.* (1990); Meyer and Mok (2019); Oguzoglu (2011); Singleton (2012) Stern (1989); Stephens (2001); Uppal (2006).

Time', 'Temporary' and 'Chronic', depending on whether they have 1 report, 2 to 3 reports, for 4 or more reports of disability across the 9 waves of the survey, respectively. The latter group is further divided by severity, with individuals in the 'Chronic Non-Severe' group reporting that they experience difficulties in just one area of day-to-day activities and individuals in the 'Chronic Severe' group reporting difficulties in more than one area. In an alternative model, the One-Time and Temporary groups are combined into a single Non-Chronic category, before being split by severity into Non-Chronic Non-Severe and Non-Chronic Severe categories. The models are estimated using fixed effects, which compares the same individual over time, holding personal characteristics constant.

Disability onset is found to be associated with negative wellbeing effects, as expected, with both severity and chronicity of disability playing a part in driving the results. Individuals with a Non-Chronic (up to 3 years) but severe disability experience a drop in SWB of 0.515 points at onset, followed by full adaptation two years later.[50] However, those with both a Chronic (4 years or more) and a severe disability fare the worst, with an anticipation effect in the year before onset, a drop in wellbeing by 0.915 points at onset, and a drop to 1.335 points below baseline at 5 years post-onset. People in this disability group experience life satisfaction of around 75-85% of that of non-disabled people in the years after onset. The life satisfaction of people with non-severe disabilities is found not to be significantly different from that of non-disabled people, even if their disability is chronic. Under the Meyer and Mok (2019) framework, people with Chronic Non-Severe disabilities report wellbeing declines which lie between those with a Temporary and a Chronic Severe disability, but these

[50] In the main model, a drop in wellbeing at onset is also found for those in the Temporary group (by 0.269 points) but it is suspected that this is largely driven by people with severe disabilities within this group.

are not statistically significant and lie close to baseline when pre-onset declines in general health are controlled for.

The findings from this chapter also contribute to the argument over the existence of the *Hedonic Treadmill* (e.g., Brickman and Campbell, 1971), the idea that wellbeing eventually returns to a set point following various life events, given enough passage of time. This is found to be the case for people with short-term severe disabilities, but there is no evidence of adaptation within longer-term severe disabilities up to 7 years after onset, consistent with findings from other papers which used the same disability categorisation (Meyer and Mok, 2019; Jones *et al.,* 2018).

When employment status and income are included as controls in the main model, they are found to explain around 35-41% of the wellbeing effects. The remaining 59-65% of variance in wellbeing is unexplained, although at least part of it is assumed to arise from the attributes of the disability itself such as pain, discomfort, or limitation of activities. It may also arise from employment-related problems such as having to change job or occupation, so this is an area for future investigation. An unexpected finding is that whilst consumption, socialising, financial difficulties and material deprivation contributed to wellbeing in their own respects, there is no evidence that these are mechanisms through which disability affects wellbeing.

Health satisfaction is by far the facet of overall life satisfaction most affected by disability onset, consistent with findings elsewhere in the literature (Jones *et al.*, 2018; Powdthavee, 2009a; Pagán-Rodríguez, 2012). Statistically significant declines in health satisfaction are experienced by individuals in all four disability groups, with steeper declines associated with higher extents of disability. This is not surprising due to the close relationship between health and disability. Only those with a One-Time disability experience adaptation in health satisfaction after onset. Health satisfaction adaptation is not experienced by those with Temporary disabilities even though it is found to occur with overall life satisfaction. Similarly, adaptation to declines in health satisfaction are not experienced by those with Chronic Non-Severe disabilities, even though their overall life satisfaction is not affected. Income satisfaction is affected by disability much less than health satisfaction but there are still significant results from this model, which are to be expected as income and employment contribute up to 41% of the wellbeing changes following disability onset, so this suggests that subjective satisfaction with income at least partially drives the results. Satisfaction with amount of leisure time is not affected at all by disability onset, so whilst disabled people are shown in the data to work fewer hours, this does not translate into any wellbeing effects.

The final research question asked whether any pre-existing characteristics influence how well individuals respond to disability onset. Temporarily disabled people experience poorer wellbeing following onset if they do not have tertiary education, which may be explained if they have poorer access to resources with which they can use to mitigate against the disability. Individuals from higher-earning households with a Chronic Severe disability experience larger falls in wellbeing (by around 0.5 points) than the low-income group. This is perhaps in contrast with the literature which shows that wealth can act as a wellbeing buffer to disability (Smith *et al.*, 2005; Kavanagh *et al.*, 2015) and the findings of Freedman *et al.* (2019), who find income to be a buffer against disability for people in the middle-income quartile. As employment status and income are found to explain up to 41% of the post-onset changes in wellbeing, it is perhaps not surprising that those with larger incomes prior to onset have the potential to be affected by disability onset the most as they experience larger income declines in absolute terms. The findings can be viewed as being consistent with Charles (2003), who argued that opportunities in the labour market are a channel through which wellbeing falls following disability onset. This happens because onset causes a loss of "healthy capital" and possible lower returns from "general capital".[51] For higher earners, the amount of healthy capital which can be lost is greater, as are the returns from general capital. The findings could also be argued to be consistent with Becker (1964), who stated that disabled people experience smaller returns in human capital investment, meaning that onset can cause existing human capital to suddenly lose value.

Having a temporary disability is associated with a single period wellbeing drop for those under the age of 45 but not older, and for women but not for men.[52] The latter result is in line with the psychology literature on heterogeneity of wellbeing responses between the sexes (e.g., Fujita, *et al.,* 1991; Lee *et al.,* 1991; Wood *et al.,* 1989), but the former result goes against the hypothesis and evidence of Charles (2003), that those who experience disability earlier in life are expected to be in a better position to accommodate it through human capital decisions. However, this may not be the case when it is anticipated that the disability is only temporary, hence the dip in wellbeing may be explained by temporary disruption to employment status or earnings. The findings may possibly be explained by the alternative hypothesis of Charles (2003), that those who experience onset later in life may be less severely affected because they have spent a larger proportion of their life in a healthy state, and are thus able to accumulate more human capital.[53] The final finding from the heterogeneity analysis was the difference in responses between those with and

[51] According to Charles (2003), "healthy capital" is human capital which is only of use if the person is healthy, and "general capital" is of use for people in all states of health but may have a higher per-unit payoff when the person is healthy.
[52] The results were not greatly between both pairs of groups for Chronic Severe disabilities.
[53] However, the empirical portion of the paper by Charles (2003) found evidence to the contrary.

without a spouse at the time of disability onset. This is, to the best of my knowledge, the first finding amongst the literature that marital status can buffer the negative wellbeing effects of disability onset. As mentioned in the literature review, Becchetti and Pelloni (2013) refer to being in a relationship as a type of good which enhances the wellbeing experienced when watching some form of entertainment, for example. The opposite case may then also be true, that a lack of companionship may enhance negative experiences such as disability onset.

One main limitation of this study is the sensitivity of the definition of disability, which is based on the extent to which typical day-to-day activities are limited. When a work-limiting definition is used instead, as is the case in many similar studies, the results are more pronounced. This is not necessarily unexpected as the wellbeing effects of being able to carry out meaningful work are noted in the literature (e.g., Csikszentmihali, 1990; Diener *et al.*, 1999; George *et al.*, 1985; Riddick, 1985; Scitovsky, 1976). As the measure used in this study is designed to capture the wellbeing effects of disability for people both in and out of the labour force, the results may be interpreted as essentially averages of these two groups, although similar research in the future could differentiate between them. Another potential limitation is the large number of observations which needed to be excluded for the analysis. Although this did not cause any obvious distortions in the composition of the data, disabled individuals are present for as little as 5 waves in some cases and therefore, it could not be guaranteed that the individual was non-disabled in the waves in which they were not present (especially pre-onset). This was not such a problem in studies with similar methodologies (e.g., Jones *et al*, 2018; Meyer and Mok, 2019) as they had access to more waves. The only suggestion to improve the methodology here is to update this research when new waves become available. This would also allow for a restriction to be placed at the start of each disability trajectory so that a certain number of waves of non-disability (perhaps 3) need be observed prior to onset to help assure that the first observation of disability is the onset period.

There are also potential limitations with regards to the fixed effects methodology used to estimate the results. The nature of FE means that any small measurement errors can potentially be magnified in the coefficients. Therefore, the results rely on the ability of the respondent to accurately report their life satisfaction in the survey year, another problem which may be improved by including future waves of data to increase the sample size. Moreover, in each regression, there appeared to be a considerable amount of noise in the data after the onset period, particularly within the Chronic Severe group. This would sometimes be exacerbated in the model extensions, which involved smaller sample sizes. It should also be considered that FE estimations examine within-person changes across time rather than differences between individuals, so an important assumption underlying these models is that the wellbeing of individuals in the first observable period should be no different to that of people who never become disabled. Whilst this appears to be true from the results, further waves of data would allow the reference group to be extended to more than 4 to 5 years before onset. Finally, there was limited information within the dataset with regards to how individuals change job role, industry, occupation or sector in response to disability onset, or whether respondents involved in non-standard forms of employment (part-time or temporary) did so voluntarily, so future research could focus specifically on changes in employment circumstances following disability onset as a driver of subjective wellbeing.

4 The Impact of Disability Onset upon the Disabled Person's Spouse

4.1 Introduction

In Chapter 3, it is found that subjective wellbeing responses to disability onset vary by combinations of several factors, including duration and severity of disability and by some pre-existing characteristics such as income and marital status. In this chapter, it is acknowledged that the subjective wellbeing effects of disability may not be limited to the individual and could spill over onto other family members such as their spouse. The existing literature in this area is limited although it is possible to draw upon studies which look at the responses to life events such as spousal job loss and spousal health shocks. These responses may take the form of changes in labour market participation (e.g., Charles, 1999; Siegel, 2006), consumption (e.g., Grossbard-Shechtman, 2003), wellbeing (e.g., Bakker, 2009; Mendolia, 2014) or feelings of loneliness (Korporaal *et al.,* 2008). Only one paper was found which looks directly at the subjective wellbeing (hereafter SWB) response to spousal disability onset (Braakmann, 2014). In the psychology literature, SWB between partners is found to be strongly correlated, especially for couples in long-term relationships (e.g., Wilson, 2001). The literature also discusses the existence of 'crossover effects', in which psychological strain is observed transferring from one partner to another following a life event shock such as unemployment, illness or bereavement (e.g., Burke, Wier and DuWors, 1980; Jones and Fletcher, 1993; Westman and Etzion, 1995; Westman and Vinokur, 1998). With these effects in mind, this empirical chapter tests the hypothesis that a negative relationship may exist between the presence of disability in one partner and wellbeing in the other.

This chapter uses the same 9 waves of Understanding Society survey data, recorded between 2009 and 2018, as in Chapter 3 but is reduced substantially so that it includes only those individuals with a co-habiting or married spouse.[54] In Chapter 3, the empirical estimations rely on the assumption that disability (and health changes which lead to disability onset) are exogenous with respect to the individual's labour supply decision and SWB. In this chapter, the same assumption is made, but is also extended to the labour supply and SWB of the spouse.

This empirical chapter will attempt to answer the following research questions:

1. How does disability onset in working-aged people affect the subjective wellbeing of their spouse over time? Are there anticipation and adaptation effects?
2. Through which channels and facets of wellbeing does spousal disability affect subjective wellbeing (e.g., leisure time, hours worked, hours spent giving informal care, household income)?
3. To what extent do changes in subjective wellbeing caused by spousal disability depend on pre-determined conditions, such as household income, age of onset, education level or own disability?

Research question 1 simply asks whether a statistical relationship can be found between spousal disability and own SWB and whether this relationship changes over time. This leads to the second research question; if spousal disability is found to affect SWB, it is useful to know the mechanisms through which this occurs. It was

[54] See section 3.3 for a full discussion of the dataset.

found in Chapter 3 that income and employment explain around 35-41% of the negative wellbeing effects of disability onset, so it is hypothesised that these may also be potential drivers of spousal wellbeing, especially if spousal disability is shown to affect both own and spousal income. It is also hypothesised that increased caregiving responsibilities may also be a driver. Finally, the third research question asks whether the SWB response to spousal disability is affected by pre-existing characteristics, such as pre-onset household income or the sex of the spouse.

The first step in attempting to answer these questions is to explore the existing literature (section 4.2). This is not intended to be a standalone review and follows on naturally from the conclusions arrived at in the review from Chapter 3. Hence, we must not disregard the most useful definitions of disability and SWB, nor the most appropriate empirical techniques for measuring the impact of one on the other, nor the main determinants of SWB, all of which remain relevant. The next step is to examine the available data (section 4.3) and to outline which methodologies are most appropriate to help answer the research questions (section 4.4). Naturally, not everyone will be in a relationship or live with a partner, so this limits the amount of data available for analysis and potentially the complexity of the empirical model. The results are shown in section 4.5 and a discussion of the results, their limitations, suggestions for future research and possible policy implications are found in section 4.6.

4.2 Literature Review

Whilst there is a growing body of literature which deals with the wellbeing effects of disability and health shocks upon the individual, the same cannot be said with regards to the impact of such shocks upon family members of disabled people, including the spouse. However, other strands of literature can be drawn upon as useful starting points. The main themes commonly found in these papers include responses to spousal health shocks (e.g., Ayotte *et al.*, 2010; Mendolia, 2014; Strawbridge *et al.*, 2007) and other life events such as spousal job displacement (e.g., Jolly, 2020), spousal job insecurity (e.g., Bakker, 2009; Westman, Etzion and Danon, 2001), and changes in marital status (e.g., Blanchflower and Oswald, 2002, 2004; Clark and Georgellis, 2013; Lucas *et al.*, 2003). The reactions to these events are typically measured by estimating the resulting changes in SWB, consumption, labour hours and caregiving hours. In general, spousal health and employment shocks tend to negatively affect household income and labour hours in both partners (Berger and Fleisher, 1984; Charles, 1999; Olsson and Thoursie, 2015; Siegel, 2006), although when an individual responds negatively to a spousal life event, it is not always obvious whether the individual is responding to aspects of the shock itself, such as lower expected future household income, or whether it is an altruistic response to the partner's wellbeing. To explore these issues, this review of the existing literature is divided into four sections; section 4.2.1 attempts to pin down a working definition of a spouse to be used in the empirical section, section 4.2.2 examines the labour market response of spousal health and disability shocks, section 4.2.3 examines the wellbeing effects of caregiving and section 4.2.4 looks at the wellbeing effects of marriage and how own SWB is affected by various spousal life event shocks.

4.2.1 The Definition of a Spouse

The definition of a spouse under UK law is an individual of either sex who is lawfully married to a single other individual of either sex, which can occur through either a religious or a civil ceremony. The Equality Act (2010) abolished the husband's common law duty to provide his wife with the necessities of life and replaced them with statutory provisions requiring both spouses to maintain each other. The Civil Partnership Act (2004) applied the rights and responsibilities associated with marriage to civil partnerships between same-sex couples. Marriages between same-sex couples were legalised in the Marriage (Same Sex Couples) Act (2013) and the Marriage and Civil Partnership (Scotland) Act (2014). Civil partnerships were then extended to opposite-sex couples in the Civil Partnerships, Marriages and Deaths (Registration etc.) Act (2019). Additionally, some co-habiting couples in the UK may choose to identify as being in a c*ommon-law marriage,* despite their 'marriage-like' relationship not being formally recorded. UK law does not formally recognise co-habitation, although unmarried couples can be recognised as co-habiting for certain purposes such as claiming means-tested benefits such as Jobseekers' Allowance.[55]

Much of the literature discussed in this review strictly uses husband and wife couples that live in the same household (Berger and Fleisher, 1984; Haurin, 1989; Johnson and Favreault,[56] 2001; Westman, Etzion and Danon, 2001; Winkelmann, 2005; Siegel, 2006; Mendolia, 2012). Braakmann (2014), which this chapter references at

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55 Whilst much of the academic literature contained within this review focuses on couples who are married or in civil partnerships, this is a gradually declining demographic in the UK. Between 2009 and 2019, the proportion of families containing a married or civil partnered couple decreased from 68.6% to 66.8%; meanwhile the proportion of co-habiting families increased in the same time period from 15.3% to 18.4% (ONS, 2019b). In 2018, 48.4% of births in the UK were outside of marriage, continuing a long-term increase in this statistic since the 1960s (ONS, 2019a).

56 Johnson and Favreault (2001) restrict their sample further to include only couples with male partners who work full-time.

several points, relaxes the marriage restriction to include co-habiting couples but stipulates that the disabled individual retains the same partner throughout the study. However, his results (relating spousal disability to own SWB) were unchanged when this restriction was relaxed and he found that there were relatively few separations following disability anyway.[57] Married and co-habiting couples are also treated identically by Powdthavee (2009b) and in Becker's (1973, 1974) Theory of Marriage.

4.2.2 The Effects of Health and Disability Shocks upon an Individual's Spouse in the Labour Market

Economic theory which tries to explain the labour market response to spousal health and disability shocks is somewhat ambiguous. For example, Berger and Fleisher (1984) argued that ill health in the husband reduces both the wage he can command and the hours he can work, thus lowering the wife's marginal value of labour exerted in the home, so she substitutes hours to the labour market. On the other hand, if the husband requires personal care and the external provision of this comes at a sufficiently high cost, the value of the woman's time at home is raised, leading her to spend less time at work. The economics literature views marriage as advantageous in that one partner can increase their hours in the workplace in response to a shock such as spousal disability, which may lead to a reduction in working hours on the part of the disabled partner. This is known as the 'added worker effect' (see for example, Juhn and Potter, 2007; Lundberg, 1985; Stephens, 2002), although this has been argued to be largely dependent on employment opportunities and wage rates at the time (Mincer, 1962, p.65). A theoretical framework to model the wife's labour

[57] This was also found to be the case by Charles and Stephens (2004).

market decision was proposed by Berger and Fleisher (1984), the full derivation of which can be found in the Appendix [B1]. The empirical results found by Berger and Fleisher (1984) support their theory, that the non-disabled partner's decision to increase or decrease their labour hours depends on other available income sources and the extent to which the disabled partner requires to be cared for. Similarly, Olsson and Thoursie (2015) find that higher health insurance coverage for couples in Sweden cause an unwell individual's partner to take more sick days because the marginal cost of reducing their labour supply is lower. Conversely however, Haurin (1989), using US data from 1979-1981, finds no significant reaction to spousal labour supply given worsening health in the husband. Using cross-sectional US data, Siegel (2006) finds that the wife's labour supply decision depends largely on the severity of the husband's health condition, but not on the husband's earnings. It is also thought that the earnings of the husband are endogenous as they are related to common characteristics between both partners. Leppel (2008) finds evidence, using cross-sectional data from the US, that it is mainly healthy married women who choose to work extra labour hours when their husband's health declines. In the case of same-sex couples or women with declining health, it is more often the case that the non-disabled partner would reduce their labour hours as time spent at home becomes more valuable. Using longitudinal data, Charles (1999) finds that women respond to their husbands' ill health by significantly increasing their working hours, however husbands tend to reduce theirs substantially in the opposite scenario. In a longitudinal study, Shen, Zheng and Tan (2019) estimate, using a difference-in-differences approach, that average weekly working hours reduce by 3.7 to 4.2 for wives in China and by 3.8 to 4.4 for husbands upon the onset of a diagnosis of a chronic disease in the opposite partner. The effect is greater for couples from lower socioeconomic backgrounds.

In another longitudinal study, Braakmann (2014) estimates employment probabilities for individuals in Germany between 1984 and 2006 using fixed effects probit models. Own disability is found to reduce own employment probability by 19-20% for men and 16-17% for women. But by contrast, partner disability has negligible and statistically insignificant effects upon labour supply and there are no significant interaction effects. The use of fixed effects ensured that selection bias is not a problem as individuals in the study are able to transfer in and out of disability.

4.2.3 The Wellbeing Effects of Caregiving

Depending on the nature of the disability or illness experienced by an individual, they may require a family member to take on the role of caregiver. It is possible for spousal caregiving to negatively impact on SWB through the channel of 'caregiver burden', defined as "the strain or load borne by a person who cares for a chronically ill, disabled, or elderly family member" (Stucki and Mulvey, 2000). A common definition across the literature is that the informal caregiver is not paid to provide care (e.g., Carmichael, Charles and Hume, 2010; Donelan *et al.*, 2002; Hollander, Lui and Chappell, 2009). Some papers specify that the carer lives with the care receiver (e.g., Wade, Legh-Smith and Hewer, 1986), although Donelan *et al.* (2002) report that 71 percent of carers in the US do not live with them. The types of care given tend to fall into two broad categories: emotional and practical assistance. The first usually involves companionship whilst the latter can vary from personal care duties to completion of household tasks such as shopping, cleaning and laundry. The extent of care is usually measure by the number of hours given spent caring in a day or the number of times a week care is provided (Donelan *et al.,* 2002).[58]

The wellbeing effects of caregiving are well documented in the literature (see Biegel, Sales and Schultz, 1991; Chappell, 1990; Given and Given, 1991; Horowitz, 1985 for reviews). Early studies tended to relate caregiving with above average levels of burden, depression, and sometimes poor physical health (Anthony-Bergstone, Zarit and Gatz, 1988; George and Gwyther, 1986; Lawton, Brody and Saperstein, 1989; Schultz, Visintainer and Williamson, 1990; Strawbridge, Wallhagen, Shema and Kaplan, 1997). Caregiving has been associated with both mental and physical health problems which have continued beyond the caregiving period (Gerlich and Wolbring, 2021; Hajek, König and Laks, 2016; Hirst, 2005; Kaufman *et al.*, 2019; Schmitz and Westphal, 2015; Uccheddu, Gauthier, Steverink and Emery, 2019).

Potential channels of poorer SWB amongst caregivers have been identified as decreased participation in social and leisure activities (Fengler and Goodrich, 1979; Moritz, Kasl and Berkman, 1989), a lack of organisation in work environments to facilitate the fulfilment of family responsibilities (Marks, 1998), and exposure to anger, depression and agitation on the part of the care receiver (Vitaliano, Zhang and Scanlan, 2003). Higher levels of distress, loneliness and resentment have been found among female caregivers (Fitting, Rabins, Lucas and Eastham, 1986; Miller, 1990; Miller and Cafasso, 1992; Zarit, Todd and Zarit, 1986), younger caregivers (Zarit, Todd and Zarit, 1986) and husbands of women with cognitive impairments (Moritz, *et al.*, 1989). Moreover, the costs of caregiving have been reported to include the direct cost of paying for carer time, opportunity cost of carers, such as lost working time, and extra medical costs for carers (e.g., Johnson, Davis and Bosanquet, 2000).

[58] See Appendix [B2] for a brief theoretical discussion of the role of the caregiver.

On the other hand, caregiving for another family member has also been reported to be a rewarding and experience despite the costs (e.g., Doris, Cheng and Wang, 2018; Grant *et al.,* 2002; Raschick and Ingersoll-Dayton, 2004). This includes a sense of accomplishment, mutuality in a dyadic relationship, family cohesion, and a sense of personal growth and purpose in life.

4.2.4 The Wellbeing Effects of Marriage and of Adverse Life Events upon an Individual's Spouse

As the sample used for analysis in this chapter consists only of people who are in a committed relationship (either married or co-habiting), it is important to note what the wellbeing effects of being in a relationship are, as these will likely exhibit an effect upon the results. Moreover, as the literature on the wellbeing effects of spousal disability is limited, it may be useful to look at the literature which explores the wellbeing effects of various life events which could exhibit a wellbeing effect on either partner. These include bereavement, job loss, ill health and divorce.

Economists have long known about the wellbeing effects of marriage, although perhaps the most well-known contribution is Gary Becker's *Theory on Marriage* (1973, 1974). In this theory, both partners are separate agents attempting to maximise their utility in a marketplace where marriage is a state of equilibrium (i.e., no individual can be made better off by choosing a different partner) and utility is measured by the consumption of household-produced commodities. Becker (1973) shows that the decision to marry depends positively on their incomes, human capital and relative difference in wage rates. The theory also implies that men who differ in physical capital, education or intelligence, height or race will tend to marry women with similar traits, although correlations of wage rates between partners will be negative. The theories have found general support in the subsequent literature, some of which has focused upon the economies of scale which can be gained from marriage (Rogers, 1995; Joung *et al.*, 1997), including the ability to afford a better quality of life through better food, housing and services (Ross, Mirowsky and Goldsteen, 1990). However, Stack and Eshleman (1998) find evidence for similar positive wellbeing effects regardless of whether the financial situation was controlled for.

The wellbeing effects of marriage and co-habitation are strong and significant across the literature (e.g., Blanchflower and Oswald, 2002, 2004; Frey and Stutzer, 2006; Gove, Hughes and Style, 1983; Marks and Lambert, 1998; Mastekassa, 1992, 1994; Myers, 1999; Oswald and Wilson, 2005), even when looking across different countries (Diener, Gohm, Suh and Oishi, 2000; Stack and Eshleman, 1998). Marriage has also been argued to positively affect physical health through several channels, including higher likelihood of detecting early medical symptoms, better diet and housing, affordability of healthcare, and discouraging unhealthy behaviours such as drinking, smoking and unhealthy eating (Joung *et al.*, 1997; Rogers, 1995; Ross, Mirowsky and Goldsteen, 1990; Umberston, 1992). It is also reported to be a source of self-esteem (Frey and Stutzer, 2006) and better mental health through emotional rapport and decreased social isolation (Ross *et al.*, 1990). Others note that there may be selection effects however, as happier people tend to get married (e.g., Frey and Stutzer, 2006; Mastekassa, 1992). Gove *et al.* (1983) find that the quality of marriage is what is important in driving positive wellbeing, rather than marriage *per se*. Some research finds that the benefits of marriage differ by gender (e.g., Gove *et al.*, 1983). Coombs (1991) argued that this is because men receive more emotional support from women than the opposite case, whereas Umberston (1987) and Ross *et* *al.* (1990) attribute it to women imposing a healthier lifestyle upon men, but also note that marriage raises income for women by 50%, compared to 25% for men.

Subjective well-being has been found to be correlated within couples (Bookwala and Shultz, 1996; Wilson, 2001), regardless of the sex of either partner (Winkelmann, 2005). SWB between partners has been found to be strongly correlated in later-life relationships in particular (Ayotte, Yang and Jones, 2010; Peek, Stimpson, Townsend and Markides, 2006; Townsend, Miller and Guo, 2001) and that spousal behaviours change over time in concordance with their partner (Sobal, Rauschenbach and Frongillo, 2003). It is also known within the economics literature that individuals care a lot about the wellbeing of their partner and act altruistically towards them (e.g., Becker, 1973, 1974; Ermisch, 2003; Foster and Rosenzweig, 2001; Friedman, 1986). Within the psychology literature, evidence has been found for the existence of 'crossover', the transference of psychological strain from one partner in an intimate relationship to another (Burke, Wier and DuWors, 1980; Jones and Fletcher, 1993; Westman and Etzion, 1995; Westman and Vinokur, 1998), including studies which show correlations between the development and changes in depressive symptoms within couples (Siegel, Bradley, Gallo and Kasl, 2004; Townsend, *et al.*, 2001). Evidence has also been found for emotional transmission in the short-term, with emotional states in an individual found to be predictive of the emotional state in the opposite partner on a daily basis (Larson and Almeida, 1999).

Job loss, job insecurity and burnout

There is evidence in the literature that adverse life events such as job displacement in one partner can negatively impact upon wellbeing in the other. Mendolia (2014) estimates the effects of a husband's unemployment on their female spouse's SWB using the first 14 waves of BHPS data. Estimating both partners' SWB using OLS and fixed effects, the author controls for whether the job loss arose from dismissal, redundancy or the ending of a fixed-term contract. In all cases, the wife's SWB is affected more than the husband's, measured by increases in the GHQ-12 measure of psychological distress. Despite citing several researchers who provide evidence that income shocks exhibit similar wellbeing effects to job displacement, Mendolia (2014) argues that the income shock associated with job loss is unlikely to be the major source of the mental health effect of job loss. A similar conclusion is arrived at by Nikolova and Ayhan (2019) using a fixed effects methodology upon GSOEP data; spousal job loss affects SWB by around a quarter of the effect on SWB experienced by the newly unemployed partner but this is not explained by income losses. However, using GSOEP data, Bünnings, Kleibrink, and Wessling, (2017) find evidence of strong negative SWB effects on the spouse associated with the fear of job loss alone, which is much greater for single-income households. Non-pecuniary effects on spousal SWB have been argued to be driven by worries about changes in time spent together, social stigmatisation and emotional contagion (Luhmann *et al.*, 2014). Job displacement in men has been found to negatively influence both the physical and health of their female spouse, which is made worse if the spouse is already in poor health, is unemployed or has children (Jolly, 2020). The opposite effects are not found to be present in men whose female spouse experiences job loss.

Related sources of wellbeing shocks are job insecurity and burnout. Burnout is a type of psychological strain caused by daily chronic stressors, and has been linked with exhaustion (Shirom, 1989). It was found by Westman, Etzion and Danon (2001) to be associated with feelings of job insecurity, self-control and social undermining, and there were strong crossover effects of burnout from husbands to wives. They also find evidence of a relationship between job insecurity and burnout for husbands but not for wives. A study by Bakker (2009) finds that burnout has negative crossover effects upon the both the individual's partner's physical and mental health. Westman and Etzion (1995) find that burnout in an individual increases the effects of burnout in the opposite partner in either direction, even when controlling for the individual's job stress and coping resources. Furthermore, sense of control impacts on own burnout and partner's burnout. However, the sense of control in one partner may also help evoke a stronger sense of control in their spouse, which in turn may serve as an additional resource to help alleviate one's own burnout.

Consumption shocks

Spousal disability may also potentially affect individual SWB through changes in consumption. Braakmann (2014) argues that household consumption will likely drop following an event such as disability onset for two reasons. First, the disabled partner may experience an income shock, arising either through lower earnings capacity, or from substituting consumption towards medical goods and services, or a combination of both. Second, an income shock may cause the non-disabled spouse to place a constraints on the time available for home production. As discussed previously, this constraint may either be placed upon the amount of time spent in the labour market, as home production (including caring duties) becomes more important, or the constraint may be placed on the amount of home production if the income shock is large enough that the spouse must work a minimum number of hours in the labour market.

Disability, health shocks and changes in marital status

Whilst there is a large body of literature which examines the effects of disability and ill heath upon own SWB, it is less common to find literature which relates these conditions to spousal SWB, although a few examples can be drawn upon. Studies have found a statistical links between poorer mental health, including depression, in one partner and disabilities or health conditions in the other, including vision impairment (Strawbridge, Wallhagen and Shema, 2007), rheumatoid arthritis (Lam *et al.,* 2009), functional limitations (Hoppman, Gerstorf and Hibbert, 2011) and various chronic conditions (Ayotte *et al.,* 2010), which can sometimes lead to poorer physical functioning, social involvement and marital quality (Strawbridge *et al.,* 2007). Valle, Weeks, Taylor and Eberstein (2013) find evidence of deteriorations in both mental and physical health as a result of spousal health shocks, however wellbeing falls significantly more, and stays lower for longer, for women following a spousal health shock compared to men.

Further to these studies, there is also literature which deals with the SWB effects of bereavement on the spouse, which may arguably be viewed in a similar manner to health shocks, despite the clear differences.[59] Death of a spouse ranks as the life-event associated with the most intense readjustment on the Social Readjustment Rating Scale.[60] The literature which deals with estimating the wellbeing effects of

[59] Reviews of the literature in this area are provided by Stroebe, Schut and Stroebe (2007) and Stroebe, Hansson, Schut and Stroebe (2008).

[60] The SRRS was developed by Holmes and Rahe (1967) as a questionnaire for identifying major stressful life events. Each of the 43 life events was assigned a *Life Change Unit,* depending on how traumatic it was felt to be by a sample of participants. At the bottom, minor law violations such as receiving a parking ticket are award a life change unit of 11. At the top of the scale, death of a spouse is assigned 100 points, followed by divorce (73), marital separation (65), imprisonment (63) and the death of a close family member (63). A major personal injury or illness (53) sixth, which is the closest definition on the list to disability onset. Assuming cardinality of this scale, it would seem that loss of a spouse is roughly equivalent in terms of stress as experiencing the onset of two forms of disability within the same year.

bereavement was previously discussed in section 3.2.6 and includes Blanchflower and Oswald (2002) who report a coefficient of around -1.3 for widowed men and around -1.0 for widowed women (on a 4-point scale), and Blanchflower and Oswald (2004), who report a coefficient of around -2.7 for widowed men and around -0.24 for women (on a 3-point scale). Using 15 waves of GSOEP panel data, Lucas *et al.* (2003) find, using a fixed effects estimation with dummies to denote the number of years away from bereavement, that married individuals report significant drops in life satisfaction in the year preceding widowhood (a coefficient of -0.539) and in the year of widowhood (-0.697), although the variability on these coefficients is quite large. Using a multilevel model to measure adaptation, the initial level before widowhood is 0.91, falling to -0.863 in the year of widowhood and partially adapting to -0.404 a year later. Using latent regression analyses, the reactivity parameter significantly predicts the adaptation parameter. Thus, the extent to which an individual experiences long-term changes from baseline following widowhood is strongly related to their initial reaction to widowhood, but not to their initial level of life satisfaction. Those who do not re-marry take 8 years to return to their baseline level of satisfaction, however the authors note that the results are based on average trends and that there is significant variability, which can easily be overlooked. Overall, they find that people have strong reactions to such life events which can ultimately travel in either direction, returning to the same baseline is not inevitable, and sometimes the life event is significant enough that many people establish a new baseline, as was also hypothesised by Diener, Lucas and Scollon (2006).

In a similar approach, Clark *et al.* (2008) estimate the effects of bereavement upon SWB, (on a 0-10 scale) using 20 waves of GSEOP panel data. For both sexes, small anticipation effects are present in the two years before bereavement, suggesting that some were preceded by periods of illness. It is a reasonable assumption that some bereavements could not be predicted, and therefore the anticipation effects are understated. In the year of bereavement, men report life satisfaction of just over a point below the control group, marginally lower than women. Women are found to adapt quicker to bereavement however, and experience higher life satisfaction in all subsequent periods. In a similar model, using BHPS data, Clark and Georgellis (2013) find strong short-term effects of widowhood for both sexes, anticipation effects in the two years before bereavement, and SWB of around half a point below baseline (out of 7) in the year of bereavement. Full adaptation is reported although it takes a little longer for women, contrary to Clark *et al.* (2008). The results are replicated by Bauer *et al.* (2015) using Russian data, but individuals were only found to adapt to widowhood by around half in the long-term, explained by cultural and economic differences between countries.

The current literature on the longitudinal effects of disability onset upon the spouse is sparse but one paper which tackles this issue is Braakmann (2014). The author uses 23 waves of panel data from GSOEP between 1984 and 2006 to measure the effects of disability onset on own and spousal labour market outcomes and SWB. In German social security legislation, disability is certified by means of a medical examination, where the individual is given a score of 0 to 100 by a doctor. A score of 30 is required for someone to be certified as disabled but must be over 50 to be certified as 'severely disabled'. As an example, the loss of use of a lower arm is equivalent to a score of 50. The empirical results rely on the assumption that an individual's health changes are exogenous to their spouse's labour supply or SWB. Braakmann estimates the outcome variable using a fixed effects model which uses a pair of dummy variables to denote own disability and spousal disability, as well as an interaction term between the two terms.[61] The results suggest that men's negative responses to own disability are marginally larger than that of women and that both men and women respond more negatively to their own disability compared to that of their spouse, but for women, the gap between the two is much smaller. The coefficient on the interaction term between own and spousal disability is not significant unless household income is controlled for, in which case it becomes significant and positive. This seems to indicate that the negative effect felt by men when they are disabled is mostly mitigated against when their partner is also disabled. The author interprets these outcomes through stereotypical gender roles in society; women being harmed by disability in their husband may be explained if either hypothesis is true that women react more emotionally towards negative life events, or that women are more dependent on their partners. In other words, if a woman's social status depends to some degree on that of their male partner's, then a woman has more to lose from a partner becoming disabled. The strong interaction term for men is also consistent with status concerns; if a man is disabled, he possibly feels less able to fulfil his role as a provider for the family, which may be alleviated if his partner is also disabled. Another specification of the model includes the addition of a variable which indicates the number of years which have passed since disability onset however results are very weak, returning significant but small positive adaptation effects. A possible reason why the years-from-onset coefficient returned a relatively small value may be because there is no interaction between this variable and other factors of disability such as severity. Severely disabled people may have

[61] The model also included time fixed effects and a vector of controls, which were age, years of schooling, work experience, unemployment experience, German nationality, marital status, monthly net income, weekly hours worked, employment status and number of children. The error term is clustered around the individual to allow for arbitrary autocorrelation and heteroscedasticity within individuals.

different adaptation rates, so it is possible that the years-from-onset coefficient may return different results for different severity levels.

4.2.5 Summary

The purpose of this review is to explore how existing studies approach the issue of how spousal disability affects own SWB. The literature is sparse in this area and only one paper is found which attempts to answer this question directly (Braakmann, 2014), so similar themes in the literature are explored, including papers which look at the responses to spousal health shocks, spousal job loss, and changes in marital status. Much of the early literature focuses upon the female labour supply response to ill health in the male spouse, although the outcomes are very mixed. Berger and Fleisher (1984) provide a theoretic framework, which explains that the non-disabled partner's labour market decision is based on a function of the disabled partner's earning capacity, external income sources, and the non-disabled partner's reservation wage, which is itself a function of the other factors.[62] Later empirical work also finds mixed results, although Charles (1999) finds strong evidence that women tend to increase their labour hours in response to their husband's disability while men tend to reduce theirs. It is not clear however whether the difference between men's and women's responses to spousal disability arises from gender-specific psychological reasons or whether the respective incomes earned by men and women are taken into account. By contrast however, spousal disability is shown to exhibit negligible labour supply effects in Germany (Braakmann, 2014), and leads to

[62] Only when external income sources become large enough that they cover the lost earnings by the disabled partner, does the outcome become less ambiguous as the marginal benefits of applying labour in the home exceed the marginal costs and the non-disabled partner would substitute hours away from the labour market.

both partners reducing their weekly labour hours by similar amounts in China (Shen *et al*., 2019).

Further to the effects on labour supply, another potential channel through which spousal disability may affect SWB is caregiving. Overwhelmingly, the literature discusses caregiving as a negative experience and provides empirical evidence to support this. The effects of giving care to someone in the same household are wide-ranging and include declines in both physical and mental health, which extend beyond the caregiving period. There can also be detrimental effects with regards to social and leisure activities and it can cause problems for those who work in environments which do not facilitate well those with family responsibilities. Caregiving is argued to affect females and younger caregivers the most, including through extra medical costs and lost work opportunities. It should be noted however, that not everyone with a disabled spouse is a caregiver and that large numbers of cared-for people receive care from outside the home. Moreover, caregiving for a close family member can also be a rewarding and fulfilling experience, therefore the use of caregiving data in any empirical analysis should be treated with caution.

The literature associates being married or co-habiting with many advantages, both in terms of emotional support as well as practical advantages, including the ability to pool resources to afford a better quality of life. When a shock life event happens to someone's partner (e.g., job loss, ill health, disability), there are potentially two main channels through which this tends to affect own SWB. One is the altruistic, or sympathetic, response to their partner's new situation, which has found support in both the economics and psychology literature.[63] The other is the more practical

[63] E.g., Becker (1973, 1974); Friedman (1986); Foster and Rosenzweig (2001); Ermisch (2003).

element, such as expected changes to household income or changes in either (or both) partner's labour supply decision. With regards to the first of these, there is a lot of evidence that the longer couples stay together, the more correlated are their levels of wellbeing, and the greater the likelihood that 'crossover' exists between them, the transference of psychological strain from one partner to another. This has important implications for any study which looks at the wellbeing effects of a life event upon the spouse as hypothetically, the response should be stronger the longer the couple have been together.

Evidence of declines in one's own SWB as a result of a life event experienced by their partner has been shown to exist in the case of spousal job loss, unemployment, the ending of a fixed-term employment contract, job insecurity and burnout,[64] whilst severe declines in spousal health have been associated with depressive symptoms in the other partner,[65] although these studies tend not to explore the longitudinal effects. There are however, longitudinal studies available on the effects on SWB of life events such as divorce and widowhood. Unsurprisingly, bereavement tends to exhibit strong negative SWB effects across the literature, although contrary to most other life events, the effects are stronger for men. There is evidence of anticipation effects of bereavement, which likely arise from illness in the spouse, although adaptation to baseline levels takes several years (8 years in one study). The evidence is mixed on whether men or women adapt quicker. Across the literature, both sexes respond similarly to divorce, with steady declines in SWB below baseline until the year of divorce, followed by a sharp increase above baseline in the year of divorce.

[64] E.g., Bakker (2009); Jolly (2020); Mendolia (2014); Shirom (1989); Westman and Etzion (1995); Westman, Etzion and Danon (2001).
[65] E.g., Ayotte *et al.* (2010); Hoppmann et al. (2011); Lam et al (2009); Strawbridge *et al.* (2007); Valle *et al.* (2013).

The methodologies across the literature are very similar for all types of life events and regression equations are typically estimated using a series of dummy variables to denote each time period relative to onset. Fixed effects methodologies are commonplace, which control for omitted variable bias and allow within-person comparisons to be made across time, rather than comparisons between people.

Only one paper was found which directly explores the impact of spousal disability onset upon own SWB (Braakmann, 2014). The findings vary noticeably by gender, with women responding much more negatively to spousal disability than men, and with men responding more negatively to their own disability than women do to their own. This is possibly explained by expectations formed from traditional gender roles. Interestingly, the interaction effect between own disability and spousal disability returns a *positive* coefficient for men, implying that men are considerably less negatively affected by disability when their spouse is also disabled. Braakmann includes a variable to control for the time passed since onset but this returns weak results, so future analysis could interact this with other key variables.

Whilst the literature discussed above is insightful, there are still large gaps that can be identified. For example, there are no known studies which explore different combinations of spousal disability severity, disability duration, nor the amount of time from onset (before or after) upon spousal SWB. In particular, it is not very well known how spousal disability affects own SWB across time, relative to the onset period. It is also not known which various pre-existing characteristics, such as income or education level, affect the impact of spousal disability channels, nor the extent to which there are any identifiable mechanisms through which spousal disability operates to affect own SWB. Hence, the research questions at the start of this empirical chapter remain largely unanswered.

4.3 Data and Definitions

4.3.1 The Dataset

As with Chapter 3, the data comes from Understanding Society, an annual survey consisting of 9 waves, conducted between 2009 and 2018. This dataset is chosen for its rich source of data on disability, wellbeing, personal characteristics and its longitudinal nature. It is also chosen for its use of identification numbers which allow family members within the same household to be linked with each other. Thus, it is possible to create a dataset which includes data pertaining to both the individual and the spouse within the same record. The full dataset contains 407,353 observations of 85,849 individuals,[66] although a restriction is applied to include only those who are working-aged (16-64), which allows for a degree of homogeneity in the data, especially as people above this age are more likely to experience disability onset. Moreover, as the UK retirement age at the time of the survey was 65, it is expected that people above this age have made the majority of, or all of, their lifetime human capital decisions and are unlikely to make any more to accommodate a new disability. This restriction excludes 85,769 of the observations. Another 53,309 observations are excluded due to missing data on life satisfaction or control variables and a further 34,177 are excluded due as a restriction is placed which limits all individuals to a minimum of 3 waves to be present for in the data.[67] This leaves 234,104 observations of 38,645 individuals. More observations are excluded in the process of identifying spousal partnerships, as explained in section 4.3.2.

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[66] See section 3.3 for a fuller discussion of the dataset.
[67] As with Chapter 3, this restriction is placed in order to be more certain that non-disabled people within the sample are genuinely non-disabled. Disabled people in the sample are subject to greater restrictions which means they must be present for at least 5 waves. This is explained in more depth in section 4.3.3.

4.3.2 Definition of a Spouse

Consistent with some of the more recent literature, the definition of a spouse extends beyond married couples to include civil partnerships and cohabiting couples who, as discussed in the literature review, enjoy similar emotional, economic and legal benefits to married couples. The Understanding Society dataset allows researchers to link individuals with other household members, which means that observations of individuals and their partners can be merged to form a single record which includes variables relevant to both partners. Understanding Society assigns a personal unique identifier to each individual in the sample which stays the same across waves, as well as a household identifier, which is allowed to change across waves to account for individuals who enter and exit different households. Additionally, people are identified by person numbers within the household, with the interviewee being assigned a 1 and spouses, followed by other adult household members and then children being assigned the numbers 2, 3, and so on. If a member leaves a household and joins another, they retain their unique identifier but are assigned a new household number and a new person number within their new household.[68] If a new individual joins a household, they automatically become a new sample member and are assigned a person number unique within that household, so that there is no ambiguity with former or future household members.

After the minimum age restriction has been applied (as discussed in section 4.3.1), spousal partnerships are identified in the dataset. This is done by generating a

[68] This is assuming that they are still contactable, which usually requires that they either inform the National Centre for Social Research of their change in circumstances themselves, or the main interviewee from their previous household passes on their details. Even then, they may choose not to continue being part of the survey. It's also possible, but uncommon, that an individual may move from one interviewed household to another, in which case they are assigned a new personal number which relates to the other household.

duplicate copy of the dataset, renaming all variables in the second set with the suffix '_spouse' and merging both datasets based on spousal household personal numbers. This creates a new dataset, which includes own variables and spousal variables within the same record, whilst retaining separate records for each partner. Observations of individuals who are not in a partnership in a given wave fail to merge and hence are excluded from the dataset, reducing the number of observations to 113,450. Next, the sample is restricted to observations in which the individual's spouse is the same person throughout the study, which excludes a further 1,801 observations.[69] A similar approach is taken by Braakmann (2014), who explains that a change in spousal disability status from disabled to non-disabled should arise from recovery and not through changing partners as there is little reason to suspect that adaptation will take place in response to the disability onset of a former partner. However, Braakmann reported that his results were nearly identical, regardless of whether this restriction was applied or not. He also remarked that it was rare in his data, and in other literature, for separations to occur following disability onset anyway, as was also found in Charles and Stephens (2004), the same also being true in the data used here. Finally, 161 observations are removed as they record marital statuses of 'single', 'separated' or 'divorced', which should not still be included in the sample as every individual must have a spouse. It is suspected that these anomalies may occur in the case when a relationship breaks up but both former partners have, for whatever reason, remained in the same household. It simplifies matters to

[69] For example, if we observe that an individual retains the same spouse for 3 years after spousal disability onset, but then the spouse changes, we retain observations for that individual as long as they're with the same spouse but exclude observations for that individual after the third year. The same works in reverse: starting from two periods before onset, the observation is retained if the spouse is the same person as in the observation at one period before onset. If a different spouse is then observed at 3 periods before onset, for example, all observations for that individual are excluded from this point backwards.

exclude this small number of observations from the sample, especially as it is preferable for divorces and separations to have no influence on the results.

This leaves 111,370 observations of 19,744 individuals. Of this sample, 81.9% are married at some point during the study, 29.4% are living as a couple and 184 (1.3%) are in a registered civil partnership. Marital status is allowed to change over time so that wellbeing effects of such changes can be controlled for. The data suggest that over the course of the study, exactly 1,800 individuals (900 couples) transitioned from co-habiting to being married or in a civil partnership.

4.3.3 Definitions of Disability

This chapter retains the same within-period definition of disability as in Chapter 3. A fuller discussion of how disability is defined can be found in section 3.3, where it was explained that disability is defined by the responses to two questions. The first asks the respondents whether they have any long-standing illness or disability. Those who respond with a 'yes' are asked a follow-up question of whether their illness or disability means that they have 'substantial difficulties' with any of a list of 12 areas of life.[70] Selecting at least one of these areas categorises the individual as disabled within a given wave. Based on the responses to this question across the 9 waves of the survey (or however many waves they were present in), each individual is assigned a 'disability trajectory', which represents their pattern of periods of non-disability,

[70] These areas are mobility, lifting and carrying, manual dexterity, continence, hearing (apart from using a hearing aid), sight (apart from wearing glasses), speech and communication, memory and ability to learn, recognising physical danger, physical coordination, problems with personal care, or any other disability.

disability, and missing data, respectively.[71] For individuals whose disability is being monitored, two trajectory restrictions are imposed: in the first, a period of non-disability must be observed in the period immediately prior to disability, so to be certain that it is the onset period. In the second, the individual must also be present in at least 3 waves after the onset period, so that the duration of the disability can be ascertained. Disabled individuals are placed into one of two categories based on the duration of their disability. These are 'Non-Chronic' for 3 or fewer observations of disability or 'Chronic' for 4 or more observations. This categorisation is based on the model by Meyer and Mok (2019), also used by Jones *et al.* (2018), although 'Non-Chronic' is split into 'One-Time' for those with a single disability and 'Temporary' for those who report 2 or 3 periods of disability.[72] In the final sample, 9,058 individuals (8.1%) have Non-Chronic disabled spouses and 3,173 individuals (2.8%) have Chronic disabled spouses.

This chapter also groups disability trajectories into two different forms depending on the pattern of the disability. These are referred to as 'defined trajectories' and 'undefined trajectories'. 'Defined trajectories' refer to the scenario discussed above, in which an individual is non-disabled in at least one observable period before onset, the period of onset can be identified, and the duration of disability can be categorised into either Non-Chronic or Chronic. 'Undefined trajectories' on the other hand refer to all other scenarios, in which either the period of onset or the duration of disability (or both) cannot be identified.[73] The data analysis shall be conducted in such a way

[71] For example, '0001110.0' would be the disability trajectory for someone who is non-disabled for 3 periods, then disabled for three periods, then non-disabled again in periods 7 and 9, with no data available in period 8.
[72] This is also the categorisation used in Chapter 3 of this thesis. These categories are combined in this empirical chapter because of the smaller sample size.
[73] For example, if there is missing data in the period immediately prior to the first observable period of disability, it cannot be ascertained whether onset occurred in the missing period.

that disabled spouses include only those with defined disabilities, whilst the partner whose SWB is being measured in response to their spouse's disability can be disabled with a defined trajectory, be disabled with an undefined trajectory, or be non-disabled. This approach is taken to maximise the sample size. There is no benefit to restricting disabled people in the sample to just those with defined trajectories if they are the ones whose SWB is being measured in response to their disabled partner, especially as the number of those with undefined trajectories is substantial; only 8.1% of individuals in the sample have a defined disability trajectory, whilst 28.5%% have an undefined trajectory, with the remaining 63.4% having no disability. It is important to note that even though the dataset which has been prepared for analysis contains 111,370 observations (as discussed in section 4.3.2), the analysis to be conducted requires that the disabled partner has a defined disability, whilst the partner whose wellbeing is being estimated can have a defined disability, an undefined disability, or no disability. This restricts the number of observations available for analysis to 81,307.

Disabled individuals with defined trajectories are also placed into two severity categories for the purposes of some of the analysis. They are classed as being severely disabled if they report having substantial difficulties with more than one area of day-to-day life from the list discussed previously, or non-severely disabled for just one area.[74] This measure is time-variant, but a time-invariant measure of severity is also generated as a sensitivity check, as will be explained more thoroughly in section 4.4.2. It is calculated using the 'severity ratio' method used by Oswald and Powdthavee (2008), Jones *et al*. (2018) and Meyer and Mok (2019), in which those with a severe disability for at least half of the periods in which they are disabled are

[74] Again, the full methodology is the same as described in Section 3.3.

classed as having a 'Severe' disability, or 'Non-Severe' for less than half. Using this approach, 1,173 individuals (8.2%) have a spouse with a Non-Severe disability and 655 individuals (4.58%) have a spouse with a Severe disability.

As reported by Braakmann (2014), if a person is disabled, there is an increased possibility that their spouse will be too. To examine whether the same is true in this dataset, own and spousal disability are cross-tabulated in Table 4.1. In a given wave, a person with a non-disabled spouse has a 12.1% probability of being disabled themselves, but someone with a disabled spouse has a 21.7% probability of being disabled, nearly twice as likely. Own and spousal disability is cross-tabulated by severity in Table 4.2 and by chronicity in Table 4.3. There is a general pattern that suggests that people have an increased probability of falling into a particular disability category if they have a partner who falls into the same category. For example, those with a severely disabled partner have a 26.4% probability of being disabled themselves, compared to 11.7% if their partner is not disabled. Similarly, those with a non-severely disabled partner are more likely to be non-severely disabled than severely disabled themselves; 5% of those with a chronically disabled partner are chronically disabled themselves, compared to only 1.9% of those with a non-disabled partner.

Table 4.1. Cross-tabulations of own and spousal disability.

	Spouse Non-Dis.		**Spouse Disabled**		**Total**
	Obs.	Percent	Obs.	Percent	Obs.
No Own Dis.	67,490	87.28	3,008	75.54	70,498
Own Dis.	9,835	12.71	974	24.46	10,809
Total	**72,325**	**100**	**3,982**	**100**	**81,307**

Note: Observations are restricted to couples in which the spouse is either non-disabled or has a disability with a defined trajectory. The other partner can exhibit any disability trajectory or be non-disabled.

Table 4.2. Cross-tabulations of own and spousal disability severity.

	Spouse Non-Dis.		Spouse Non-Sev. Dis		Severe Disabled	
	Obs.	Percent	Obs.	Percent	Obs.	Percent
No Own Disability	47,472	68.64	4,328	54.94	2,087	48.85
Non-Sev. Own Disability	13,579	19.63	2,239	28.42	1,058	24.77
Sev. Own Disability	8,107	11.72	1,310	16.63	1,127	26.38
Total	**69,158**	**100**	**7,877**	**100**	**4,272**	**100**

Table 4.3. Cross-tabulations of own and spousal disability chronicity.

	Spouse Non-Disabled.		Spouse Non-Chronic Dis.		Spouse Chronic Disabled	
	Obs.	Percent	Obs.	Percent	Obs.	Percent
Non-Disabled	63,652	92.05	7,692	85.50	2,678	85.12
Non-Chronic Disabled	4,214	6.09	1,000	11.12	312	9.92
Chronic Disabled	1,286	1.86	304	3.38	156	4.96
Total	**69,152**	**100**	**8,996**	**100**	**3,146**	**100**

4.3.4 Measuring Subjective Wellbeing

SWB is measured by asking respondents to rate their level of life satisfaction on a scale of 1 to 7, all things considered, with a 1 for “Completely Dissatisfied”, a 2 for “Mostly Dissatisfied”, a 3 for “Somewhat Dissatisfied”, a 4 for “Neither Satisfied nor Dissatisfied”, a 5 for “Somewhat Satisfied”, a 6 for “Mostly Satisfied” and a 7 for “Completely Satisfied”. The same scale is used for three facets of life satisfaction, which are health satisfaction, income satisfaction and satisfaction with amount of leisure time. The average level of life satisfaction is 5.22 out of 7, although this falls to 5.11 for those whose spouse is disabled and rises to 5.32 for those whose spouse is not disabled. Figure 4.1 displays SWB distributions for individuals who (i) do not have a disabled spouse, and (ii) who have a disabled spouse. The most common response to the life satisfaction question in either scenario is a 6, “Mostly Satisfied”.[75] People

[75] Wellbeing tables are included in the Appendix [Table B1].

without a disabled spouse report that they are completely satisfied with their lives 10.4% of the time and mostly satisfied 51.7% of the time, compared to 7.6% and 46.9% for those without a disabled spouse, respectively. However, the differences between the two categories are smaller amongst the other responses.

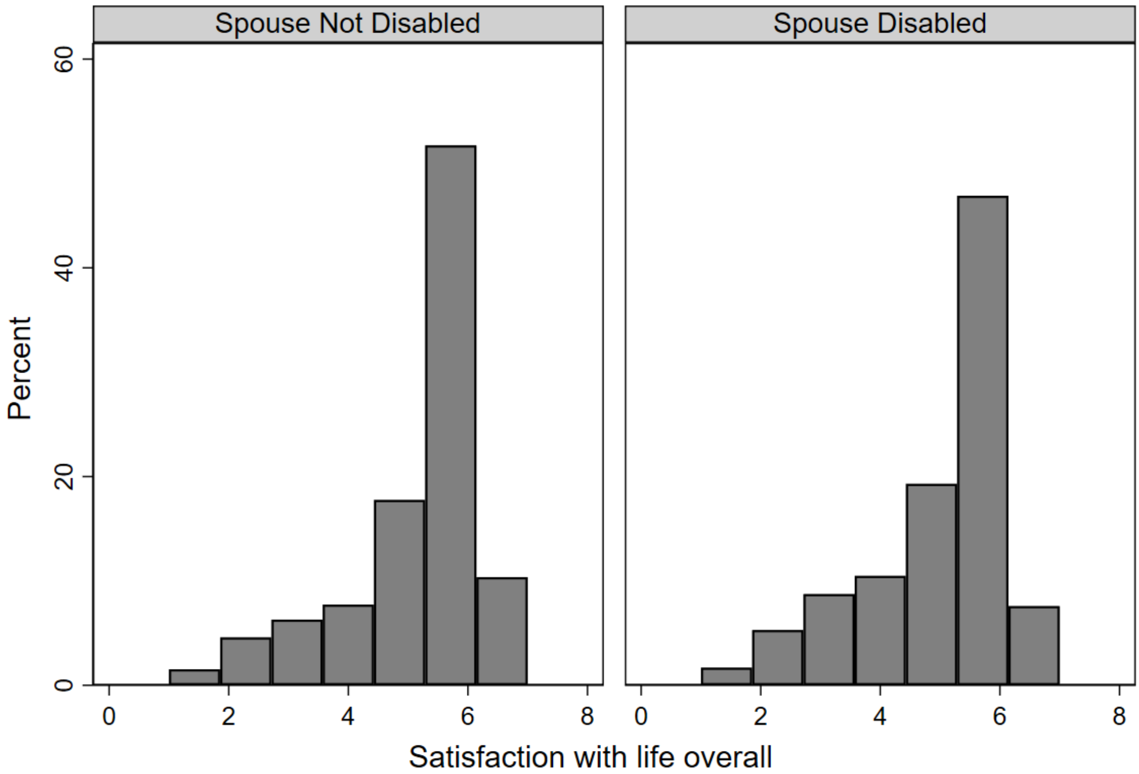

Figure 4.1. Distributions of SWB by spousal disability status. Based on 81,307 observations of 14,227 individuals across all 9 years of the panel. Disabled spouses include only those with defined disability trajectories. SWB is measured on a 7-point Likert scale.

4.3.5 Descriptive Statistics and Control Variables

Table 4.4 displays the mean values of all control variables to be used in the analysis. Column (i) refers to individuals who do not have a disabled spouse and column (ii) refers to individuals who do have a disabled spouse with a defined trajectory. The descriptive statistics do not reveal anything particularly unusual with regards to demographics, with a fairly even split between the sexes (50.36% female, 49.64%

male) and a roughly proportionate amount of non-white people within non-disabled couples. Similarly, the probabilities of being married (rather than co-habiting) are very close between people whose spouses are disabled or not. Education levels vary very little between both groups, although people with disabled spouses are slightly less likely to have any type of degree, which is also found in the literature.

Employment, income, financial and caregiving variables are included in the table, although these are included for the purposes of sensitivity analysis (see section 4.4.3), rather than in the main model, as they are likely to operate as a channel through which disability onset influences SWB and disability. The inclusion of additional income controls was particularly important in Braakmann (2014), where controlling for male partner income made a significant difference to estimates of own SWB. However, the literature was ambiguous with regards to how spousal disability affects the other partner's labour supply decision. Within this data, people with disabled spouses are around 3 percentage points less likely to be employed, suggesting that they substitute a portion of their labour towards the household. However, both those with and without a disabled partner work around the same, about 24 hours a week. The lower employment probability among those with disabled partners may also reflect the greater likelihood of people with disabled spouses being disabled themselves.

Individuals with a disabled spouse earn 7.3% less personal income and 9.5% less household income compared to those whose spouses are not disabled. However, differences in income may arise for reasons other than hours worked, such as career choice and managerial responsibilities; Hardoy and Schøne (2014) find that lost household income caused by disability is replaced more by social welfare payments than by spousal labour supply responses. The survey also asks respondents about their subjective financial status and the results are relatively consistent with the data on income. Among individuals whose spouse is non-disabled, 32.6% report that they are "living comfortably" and 1.5% are "finding it quite difficult", compared to 27.1% and 2.9% of those with a disabled partner, respectively. People with a disabled spouse are also around 3 percentage points more likely to report that they are behind with rent, mortgage, council tax or bills.

Only 2.6% of people in non-disabled partnerships care for another member of the household, which rises to 6.8% of people with a disabled spouse. The pattern is repeated when respondents are asked how many hours they spend caring; 11.7% of people without a disabled spouse spend up to 20 hours a week caring for another household member, compared to 15.9% of those with a disabled spouse.[76] Just 1.3% of people without a disabled spouse spend more than 20 hours per week caring for another household member, which rises to 2.4% for people with a disabled spouse, whilst 1% and 0.5% of people without and with a disabled spouse, respectively, report that they give continuous care. Caregiving responsibilities prevent at least some paid work opportunities for 0.8% of those without a disabled spouse and 2.2% of those with a disabled spouse. Couples are fairly evenly distributed around the UK, although people with a disabled spouse are slightly more less likely to live in London and the South East of England and are slightly more likely to live in the North East, the South West, Scotland and rural areas.

[76] It should be noted that this variable includes caring for any member of the household, and not just the spouse. The sample sizes in the data for caring for individual household members is too small to make useful inferences from, so this cruder measure is preferred.

Table 4.4. Descriptive Statistics.

	(i) Spouse is not disabled	(ii) Spouse is disabled
Demographics		
Age	42.95	45.46
Female %	51.14%	45.54%
Male %	48.86%	54.46%
White %	87.30%	90.20%
Non-white %	12.70%	89.80%
Number of children in HH	0.18	0.19
Marital Status		
Married/Civil Partnered %	79.47%	81.12%
Cohabiting %	20.53%	18.88%
Highest Education Level		
Lower than GCSE/None %	29.11%	30.98%
GCSE %	21.59%	26.05%
Higher/AS Level %	1.56%	1.84%
A-Level %	6.37%	6.61%
Other higher education %	10.02%	9.07%
Degree %	17.75%	13.31%
Postgraduate %	13.59%	12.12%
Employment Status		
Employed	84.02%	80.91%
Retired	3.83%	4.53%
Family Carer/Home Worker	6.75%	5.93%
Student/In training	0.79%	0.66%
Unemployed	2.66%	4.16%
Not Working	1.96%	3.80%
Income (post-tax, post-transfer, June 2015 price level)		
Real Annual Income £	21,256	19,707
Real Annual HH Income £	46,319	41,930
Financial Situation		
"Living comfortably"	32.56%	27.05%
"Doing alright"	39.68%	37.15%
"Just about getting by"	21.14%	25.73%
"Finding it quite difficult"	5.14%	7.21%
"Finding it very difficult"	1.49%	2.85%
Behind with rent/mortgage	7.51%	10.43%
Behind with council tax	5.26%	8.15%
Behind with some or all bills	3.16%	5.65%

Use of Time and Caregiving		
Labour hours	24.35	24.20
Cares for other in household %	2.57%	6.75%
Cares up to 20 hours/week	11.66%	15.94%
Cares over 20 hours/week	1.28%	2.44%
Gives continuous care	0.53%	0.97%
Caring partially prevents paid work	0.46%	0.93%
Caring prevents all paid work	0.35%	1.25%
Residence		
London	10.08%	7.63%
North East	3.70%	4.88%
North West	10.56%	10.15%
Yorkshire & Humberside	7.96%	7.73%
East Midlands	7.66%	9.76%
West Midlands	7.94%	7.21%
East England	9.20%	8.45%
South East	13.44%	11.55%
South West	8.66%	10.18%
Wales	6.65%	6.69%
Scotland	8.99%	10.29%
Northern Ireland	5.14%	5.47%
Rural	25.11%	27.04%
Urban	74.89%	72.93%

Note: Figures not in percentages are mean values.

4.4 Methodology

4.4.1 Main Model

The main model to be estimated in this chapter is built in stages and consists of four specifications. In specification (i), a simple regression is run between a spousal disability dummy variable and own SWB, estimated under Pooled OLS. The dummy is equal to one if the individual's spouse reports any type of disability in a given wave, or zero otherwise, and as such is a time-variant measure. This model and all others include annual time fixed effects. Specification (ii) replaces the single dummy from (i) with a pair of dummies to denote Non-Severe and Severe spousal disability. Specification (iii) uses a pair of dummies to denote Non-Chronic and Chronic spousal disability. Finally, specification (iv) uses a vector of dummies to represent the 11 time periods from 4 years before spousal disability onset until 7 years after. The above specifications will also be estimated including a set of controls to represent personal and household characteristics, which are typical within the wellbeing literature. These are age, age-squared, marital status, number of children, education level, UK region and an urban/rural residence indicator. The model with controls will also be estimated under random effects and fixed effects to account for unobserved individual heterogeneity. This final model (with controls, estimated under FE) is specified as follows:

$$SWB_{it} = \alpha_i + \gamma_t + X_{it}\beta + \sum_k \gamma\, L_{kit} + \varepsilon_{it} \qquad (1)$$

where SWB_{it} represents the subjective wellbeing (measured as overall life satisfaction on a 7-point Likert scale) for individual i at time t, α_i captures time-invariant individual fixed effects, γ_t captures the yearly time fixed effects, X_{it} represents the vector of individual and household controls, and ε_{it} is a potentially serially corelated error term, which is robust and clustered on the individual. The term $\sum_k L_{kit}$ represents the vector of leads and lags of spousal disability, where k ∈ [-4, 7]. The coefficient γ on this vector is the main coefficient of interest, as it represents the deviation from baseline life satisfaction for spouses of disabled people at different time periods relative to spousal disability onset.

4.4.2 Extended Model

An extension of the above specification will be included to include other dimensions of spousal disability. In these cases, the model will be specified as follows:

$$SWB_{it} = \alpha_i + \gamma_t + X_{it}\beta + \sum_d \sum_k \delta_k^d A_{kit}^d + \varepsilon_{it} \qquad (2)$$

where d represents the extra dimension of heterogeneity (severity, chronicity, pre-onset education level, pre-onset income level, early or late onset, and gender). These are represented by pairs of dummy variables in each case (for example, severe and non-severe disabled). The first observable period will be at -3, rather than -4 in the Main Model, because in most cases, when the data is split between pairs of groups, there are not enough observations in period -5 alone to form a sufficiently large reference group, so this group must now include observations in period -4. As there are now 11 leads and lags interacted with a pair of dummy variables to represent how the data is split, this means that the term $\sum_d \sum_k A_{kit}^d$ represents a vector of 22 dummy variables for each type of interaction.

In the first case, d represents whether the spouse either has a Severe or Non-Severe disability. In the second, d represents whether the spouse either has a Chronic or Non-Chronic disability. Third, d will represent whether the individual has a disability of their own, which was found to be an important factor in determining SWB in relation to spousal disability by Braakmann (2014). It was seen in section 4.3.3 that disabled individuals were much more likely to have a disabled spouse compared to the rest of the population, so it is useful to control for own disability so that any selection effects may be accounted for. As discussed in section 4.3.1, the definition of 'own disability' is relaxed so that it is not restricted to people with defined disability trajectories. A single dummy is created and set equal to one if they are disabled at any point across the 9 waves of the data, or zero otherwise. As such, it is time-invariant. A second dummy is set equal to one if the individual has no disability at all. These two dummies are then interacted with the 11 leads and lags, as described previously to generate 22 interaction dummies. Other pairs of dummies are generated to explore heterogeneity within the data, along the dimensions of gender (male or female), education level (tertiary or no tertiary education), marital status (married or co-habiting), age of spousal disability onset (up to age 45 or over age 45) and whether the individual has children or not.

4.4.3 Channels of Subjective Wellbeing.

After the exploratory regressions from model (1) and (2) have been estimated, models which return significant results are run with the inclusion of additional controls for income and caregiving, using five different specifications. These are to investigate whether changes in income or hours spent caregiving are channels through which disability operate to affect SWB. Specification (i) controls for real annual personal income, (ii) controls for real annual spousal income, (iii) controls for both incomes, and specifications (iv) and (v) control for own and spousal employment status, respectively. Specifications (vi) and (vii) control for own and spousal labour hours, respectively. Specification (viii) controls for hours spent caregiving, using three dummy variables; the first indicates that the individual spends up to 20 hours per week caring for another household member, the second indicates 20 or more hours of caregiving (but not continuously) per week, the third indicates continuous care, and the reference group includes those with no caring responsibilities. Specification (ix) includes a dummy to indicate whether caregiving prevents at least some paid employment. It is hypothesised that if spousal disability negatively affects own income, spousal income, or caregiving hours, and that any of these are channels of SWB, then controlling for them should dampen the absolute values of the coefficients on disability.

4.5 Results

4.5.1 Main Model Results

The results from the OLS estimations are shown in Table 4.5. Under OLS, the interpretation is that the coefficient represents the difference in SWB between the control group who do not have a disabled spouse and the treatment group of individuals who do. In (i), the coefficient is -0.338, statistically significant at the 1% level, implying that people with a disabled spouse report levels of SWB around 0.338 points out of 7 lower than people whose spouses are not disabled. In (ii), non-severe spousal disability is associated with a reduction in own SWB by 0.180 points and severe spousal disability by 0.396 points, lying either side of the single disability coefficient. A similar pattern is found in (iii), with coefficients of -0.180 for Non-Chronic and -0.396 for Chronic spousal disabilities, all significant at the 1% level. In (iv), the effects of spousal disability upon own SWB are estimated over time (see also Figure 4.2). SWB declines gradually over this period, falling to -0.251 points in the onset period, and to a low of -0.417 at 7 years post-onset, with no evidence of adaptation. All coefficients are significant from period -2 onwards. An unexpected result is that there is no evidence of a sudden wellbeing drop at onset but instead at 2 years before (-0.200), with a smaller drop at onset. It is not obvious why SWB would decline in this period, but this is investigated in section 4.5.4. Adding a set of controls to the estimations (see Table 4.6) dampens the results slightly in all specifications apart from (ii), where they increase slightly. The coefficient on the spousal disability dummy in (i) reduces in magnitude from -0.352 to -0.293 with controls.[77] This is not

[77] The coefficients on the controls returned relatively expected results. The coefficients on age and age-squared suggest that SWB reaches a minimum around the age of 35-36. Marriage increases SWB by around 0.166 points compared to co-habiting couples. As in

completely unexpected because, in accordance with previous literature, disabilities are more commonplace among older individuals and those with lower levels of education, so the inclusion of these controls explains a portion of the effects found under OLS.

A Breusch-Pagan LM test concludes that the estimations should control for individual effects, rather than pooling the data,[78] so the model (with controls) is then estimated under random effects (see Table 4.7). This dampens the results further, with the spousal disability dummy in (i) now returning a coefficient of -0.121. This suggests that a large proportion of the variance in wellbeing between spouses of disabled and non-disabled people is explained by unobserved heterogeneity at the individual level. A Hausman test is then conducted to ascertain whether this heterogeneity is drawn from a random distribution or whether it is related to the individual's personal characteristics. It concluded the latter, suggesting that fixed effects is the preferred estimation method.[79]

Under FE, the results are markedly different (see Table 4.8). The spousal disability dummy in (i) is now only -0.068 and is statistically insignificant. In (ii), the coefficients on Non-Severe and Severe spousal disability are also insignificant at -0.064 and -0.076, respectively. Specification (iii) cannot be estimated under FE as the chronicity variables are time-invariant. In (iv), the coefficients on leads and lags dampen slightly compared to under the RE estimation but all are still insignificant. The reason for the lack of significance in the results under FE is unknown, however under FE, coefficients are interpreted as within-person changes across time, rather

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Chapter 3, children are not found to exhibit a significant influence on SWB. Higher levels of education are associated with increased SWB. There are also significant differences depending on area of residence and the survey year.

[78] See Appendix [B3].

[79] See Appendix [B4].

than the differences between individuals. Therefore, the results imply that within-person SWB remains unchanged by the onset of spousal disability. Another explanation may be that FE controls for omitted variable bias. Therefore, the dampening of the results by its inclusion may suggest that there is some compounding factor between spousal disability and own SWB which was had not been controlled for, the effects of which are removed under FE.

Table 4.5. Pooled OLS regressions.

	(i) Disability Dummy	**(ii) Severity Dummies**	**(iii) Chronicity Dummies**	**(iv) Leads & Lags**
Disabled Spouse	-0.338*** (0.068)			
Non-Sev. Dis. Spouse		-0.242*** (0.046)		
Sev. Dis. Spouse		-0.464*** (0.096)		
Non-Chronic Dis. Spouse			-0.180*** (0.046)	
Chronic Dis. Spouse			-0.396*** (0.096)	
5 Periods Before Onset	*Reference*			
4 Periods Before Onset				0.042 0.112
3 Periods Before Onset				-0.061 0.089
2 Periods Before Onset				-0.200** 0.082
1 Period Before Onset				-0.276*** 0.065
Onset Period				-0.251*** 0.068
1 Period After Onset				-0.218*** 0.068
2 Periods After Onset				-0.187*** 0.062
3 Periods After Onset				-0.354*** 0.073
4 Periods After Onset				-0.202*** 0.07
5 Periods After Onset				-0.381*** 0.093

6 Periods After Onset				-0.376***
				0.113
7 Periods After Onset				-0.417***
				0.154
2009	*Reference*			
2010	-0.018	-0.019	-0.021	-0.025
	(0.028)	(0.028)	(0.028)	(0.028)
2011	-0.085***	-0.086***	-0.098***	-0.097***
	(0.029)	(0.029)	(0.029)	(0.029)
2012	-0.149***	-0.150***	-0.165***	-0.162***
	(0.031)	(0.031)	(0.031)	(0.031)
2013	-0.178***	-0.178***	-0.192***	-0.186***
	(0.031)	(0.031)	(0.031)	(0.032)
2014	-0.079**	-0.079**	-0.093***	-0.084**
	(0.033)	(0.033)	(0.033)	(0.033)
2015	-0.035	-0.034	-0.046	-0.037
	(0.033)	(0.033)	(0.033)	(0.034)
2016	0.017	0.018	0.009	0.025
	(0.031)	(0.031)	(0.031)	(0.031)
2017	-0.154***	-0.154***	-0.163***	-0.134***
	(0.049)	(0.049)	(0.049)	(0.050)
2018	-0.093**	-0.092**	-0.103**	-0.078*
	(0.047)	(0.047)	(0.047)	(0.047)
Constant	5.391***	5.391***	5.422***	5.416***
	(0.025)	(0.025)	(0.025)	(0.025)
Observations:	81,307	81,307	81,307	81,307
R-Squared:	0.0058	0.0061	0.0078	0.0078

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
P-Values: *10% **5% ***1%

Table 4.6. Pooled OLS regressions with controls.

	(i) Disability Dummy	**(ii) Severity Dummies**	**(iii) Chronicity Dummies**	**(iv) Leads & Lags**
Disabled Spouse	-0.293***			
	(0.065)			
Non-Sev. Dis. Spouse		-0.209***		
		(0.064)		
Sev. Dis. Spouse		-0.405***		
		(0.110)		
Non-Chronic Dis. Spouse			-0.146***	
			(0.044)	
Chronic Dis. Spouse			-0.343***	
			(0.094)	
5 Periods Before Onset	*Reference*			
4 Periods Before Onset				0.078

				(0.119)
3 Periods Before Onset				-0.014
				(0.092)
2 Periods Before Onset				-0.153*
				(0.082)
1 Period Before Onset				-0.233***
				(0.062)
Onset Period				-0.212***
				(0.066)
1 Period After Onset				-0.183***
				(0.066)
2 Periods After Onset				-0.155**
				(0.061)
3 Periods After Onset				-0.324***
				(0.072)
4 Periods After Onset				-0.169**
				(0.069)
5 Periods After Onset				-0.342***
				(0.093)
6 Periods After Onset				-0.332***
				(0.114)
7 Periods After Onset				-0.360**
				(0.145)
Age	-0.071***	-0.072***	-0.070***	-0.070***
	(0.011)	(0.011)	(0.011)	(0.011)
Age-Squared	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Cohabiting	*Reference*			
Married	0.166***	0.166***	0.166***	0.167***
	(0.040)	(0.040)	(0.040)	(0.040)
No. of Children	0.005	0.005	0.008	0.004
	(0.012)	(0.012)	(0.012)	(0.012)
No Qualifications	*Reference*			
GCSE	0.126**	0.126**	0.120*	0.125**
	(0.061)	(0.061)	(0.061)	(0.061)
Higher/AS Level	0.244**	0.242**	0.238**	0.241**
	(0.115)	(0.115)	(0.114)	(0.114)
A-Level/Bacc.	0.080	0.081	0.076	0.082
	(0.086)	(0.086)	(0.087)	(0.086)
Other Higher	0.278***	0.277***	0.269***	0.272***
	(0.064)	(0.064)	(0.064)	(0.064)
Degree	0.342***	0.341***	0.331***	0.336***
	(0.060)	(0.060)	(0.061)	(0.060)
Postgraduate	0.330***	0.328***	0.322***	0.327***
	(0.064)	(0.064)	(0.064)	(0.064)
London	*Reference*			
Northeast	0.178**	0.177**	0.182**	0.183**
	(0.087)	(0.087)	(0.087)	(0.087)
Northwest	0.102	0.102	0.101	0.101

	(0.074)	(0.074)	(0.074)	(0.074)
Yorks/Humber	0.207**	0.206**	0.208**	0.206**
	(0.081)	(0.081)	(0.082)	(0.081)
East Midlands	0.157**	0.156**	0.158**	0.157**
	(0.074)	(0.074)	(0.075)	(0.074)
West Midlands	0.203***	0.202***	0.203***	0.201***
	(0.073)	(0.072)	(0.073)	(0.072)
East	0.236***	0.235***	0.233***	0.232***
	(0.074)	(0.073)	(0.074)	(0.074)
South East	0.166**	0.166**	0.164**	0.165**
	(0.067)	(0.066)	(0.067)	(0.067)
South West	0.249***	0.249***	0.251***	0.253***
	(0.069)	(0.068)	(0.069)	(0.069)
Wales	0.179*	0.178*	0.171*	0.173*
	(0.091)	(0.092)	(0.092)	(0.092)
Scotland	0.113	0.112	0.113	0.114
	(0.094)	(0.094)	(0.095)	(0.095)
N. Ireland	0.216**	0.215**	0.213**	0.216*
	(0.104)	(0.103)	(0.104)	(0.104)
Rural	0.037	0.037	0.038	0.038
	(0.035)	(0.035)	(0.035)	(0.035)
2009	*Reference*			
2010	-0.011	-0.011	-0.012	-0.018
	(0.028)	0.028	0.028	0.028
2011	-0.075**	-0.076**	-0.082***	-0.086***
	(0.032)	0.032	0.032	0.032
2012	-0.144***	-0.145***	-0.154***	-0.156***
	(0.034)	0.034	0.034	0.034
2013	-0.173***	-0.173***	-0.182***	-0.180***
	(0.035)	0.035	0.035	0.035
2014	-0.077**	-0.078**	-0.087**	-0.082**
	(0.036)	0.036	0.036	0.036
2015	-0.036	-0.036	-0.043	-0.037
	(0.037)	0.037	0.037	0.037
2016	0.016	0.017	0.012	0.024
	(0.034)	0.034	0.034	0.034
2017	-0.157***	-0.158***	-0.163***	-0.140***
	(0.052)	0.052	0.052	0.052
2018	-0.096***	-0.095**	-0.102**	-0.083*
	(0.047)	0.047	0.047	0.047
Constant	6.405***	6.408***	6.396***	6.384***
	(0.252)	0.252	0.254	0.252
Observations:	81,307	81,307	81,307	81,307
R-Squared:	0.0226	0.0173	0.0240	0.0241

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
P-Values: *10% **5% ***1%

Table 4.7. RE regressions with controls.

	(i) Disability Dummy	**(ii) Severity Dummies**	**(iii) Chronicity Dummies**	**(iv) Leads & Lags**
Disabled Spouse	-0.121***			
	(0.024)			
Non-Sev. Dis. Spouse		-0.055**		
		(0.028)		
Sev. Dis. Spouse		-0.248***		
		(0.040)		
Non-Chronic Dis. Spouse			-0.146***	
			(0.027)	
Chronic Dis. Spouse			-0.327***	
			(0.047)	
5 Periods Before Onset	*Reference*			
4 Periods Before Onset				-0.134*
				(0.070)
3 Periods Before Onset				-0.043
				(0.051)
2 Periods Before Onset				-0.125***
				(0.044)
1 Period Before Onset				-0.167***
				(0.036)
Onset Period				-0.162***
				(0.036)
1 Period After Onset				-0.190***
				(0.037)
2 Periods After Onset				-0.185***
				(0.037)
3 Periods After Onset				-0.193***
				(0.036)
4 Periods After Onset				-0.207***
				(0.040)
5 Periods After Onset				-0.240***
				(0.046)
6 Periods After Onset				-0.339***
				(0.058)
7 Periods After Onset				-0.289***
				(0.079)
Constant	6.293***	6.297***	6.279***	6.289***
	0.113	0.113	0.113	0.113
Observations:	81,307	81,307	81,307	81,307
R-Squared (Within):	0.0058	0.006	0.0058	0.0059
R-Squared (Between):	0.0296	0.0304	0.0324	0.0321
R-Squared (Overall):	0.0176	0.0181	0.0193	0.0191

Sample weights not applied (not possible under random effects).
Standard errors (clustered on the individual) are reported in brackets.

For full table with controls, see Appendix [Table B2].
P-Values: *10% **5% ***1%

Table 4.8. FE Regressions with controls.

	(i) Disability Dummy	(ii) Severity Dummies	(iii) Chronicity Dummies	(iv) Leads & Lags
Disabled Spouse	-0.068			
	(0.047)			
Non-Sev. Dis. Spouse		-0.064		
		(0.058)		
Sev. Dis. Spouse		-0.076		
		(0.065)		
Non-Chronic Dis. Spouse			*Cannot estimate under FE*	
Chronic Dis. Spouse				
5 Periods Before Onset	*Reference*			
4 Periods Before Onset				0.119
				(0.172)
3 Periods Before Onset				0.030
				(0.202)
2 Periods Before Onset				-0.103
				(0.242)
1 Period Before Onset				-0.172
				(0.236)
Onset Period				-0.148
				(0.241)
1 Period After Onset				-0.122
				(0.245)
2 Periods After Onset				-0.079
				(0.229)
3 Periods After Onset				-0.251
				(0.249)
4 Periods After Onset				-0.085
				(0.240)
5 Periods After Onset				-0.272
				(0.246)
6 Periods After Onset				-0.235
				(0.255)
7 Periods After Onset				-0.267
				(0.267)
Constant	5.694***	5.694***		5.648***
	(0.583)	(0.583)		(0.585)
Observations:	81,307	81,307		81,307
R-Squared (Within):	0.0068	0.0068		0.0078
R-Squared (Between):	0.0020	0.0020		0.0033
R-Squared (Overall):	0.0016	0.0016		0.0024

Sample probability weights applied.

Standard errors (clustered on the individual) are reported in brackets.
For full table with controls, see Appendix [Table B3].
P-Values: *10% **5% ***1%

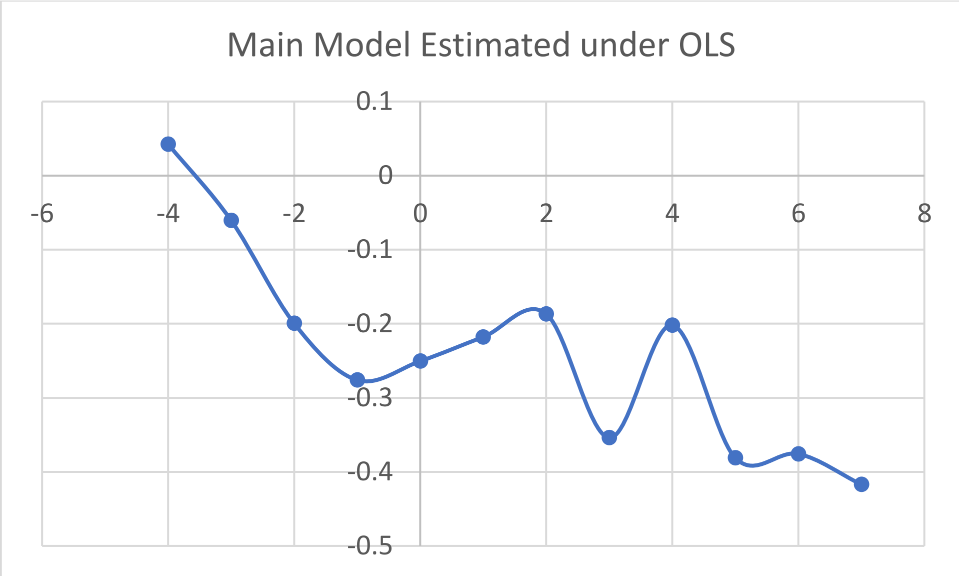


Figure 4.2. Main model estimated under Pooled OLS. Figures show the estimated effects of spousal disability upon own subjective wellbeing, from 4 periods before onset until 7 periods after. Subjective wellbeing is measured using a self-certified life satisfaction score from 1-7. Zero on the horizontal scale represents average wellbeing for an individual with a non-disabled spouse (around 5.4 out of 7).

4.5.2 Robustness and Sensitivity Tests

The main model for this paper is specification (iv) from the model above, which estimates the welfare effects of leads and lags of spousal disability using fixed effects and includes a set of controls. A number of statistical tests are applied to this model, the results of which can be found in the Appendix [B5, B6, B7][80].

[80] A Modified Wald Test picked up evidence of groupwise heteroskedasticity in the data and a Wooldridge Test found a degree of autocorrelation. To account for these issues, the model is run with robust standard errors, clustered on the individual. Under homoscedastic standard errors, the coefficients are only significant in periods 3, 5 and 7, but none apart from the constant term are significant under robust or clustered standard errors. In the latter two cases, the standard errors are identical. Clustering the standard errors on the individual is standard practice in the previous literature.

The first robustness test is to relax the restriction that individuals keep the same spouse throughout the survey.[81] This is to check whether the decrease in sample size resulting from this restriction affects the results, however they only change marginally, which was also the case when Braakmann (2014) ran the same test. In a second check, the sample is restricted to married couples only, reducing the number of observations to 64,815. This has the effect of reducing the magnitude of the negative coefficients by between 0.10 and 0.18 points. While this may be interpreted as marriage exhibiting a buffering effect upon spousal disability compared to people who are co-habiting, this should be treated with caution as the coefficients are still statistically insignificant. Third, individuals who belong to the 'undefined disability' group are excluded from the model, reducing the number of observations to 61,135. This is to check the sensitivity of the model to the inclusion of this extra group, which Understanding Society bring in to boost the sample size. It results in a downward shift of the life satisfaction path by around 0.1 points from period -2 onwards, which is not unexpected as under this restriction, all disabled individuals in this sample will experience onset at some point, with no individual having become acclimatised to a long-term or permanent disability. As the shift in the results is likely driven by own disability, this indicates the importance of controlling for this, so this will be further investigated in section 4.5.3. The model is then run without the inclusion of time fixed effects, which only causes small differences in the size of the coefficients. However, excluding controls for the survey year overestimates the negative wellbeing effects of spousal disability by approximately 0.01 to 0.05 in most of the post-onset coefficients. Whilst they are worth including for the sake of accuracy, macroeconomic factors do not play a great part in the results.

[81] All sets of results from the robustness checks are displayed in the Appendix [Table B4].

The model is quite sensitive to the exclusion of sample probability weights.[82] When Understanding Society's weighting strategy is not applied, the coefficients are increase by up to 0.33 points, taking most of them above the baseline. Including weights in the data is important otherwise ethnic minorities and residents outside of England (among other groups) become over-represented. The result of this sensitivity check implies that random effects estimators, which cannot include weights, should not be relied upon as an alternative estimation method. Finally, it is checked whether spousal disability severity exhibits an additive, rather than a multiplicative effect upon own wellbeing. This is done in two ways, first by including a dummy, equal to one if the spouse is severely disabled (more than one disability) in a given wave, and second by including a variable to indicate the actual number of disabilities present in a given wave. In both cases the coefficients are quite small (-0.052 and -0.036) and not significant. Controlling for the number of disabilities reduces the size of the coefficients in periods 1 and 2, but otherwise the difference between this specification and the main model is slight.

4.5.3 Model Extensions

In the results above, there is a negative statistical relationship between spousal disability and own wellbeing under OLS, but this diminishes when controls are included and becomes insignificant under FE. It was deemed that further exploration is needed to establish whether any significant relationships could be found in the data along various aspects of heterogeneity. For example, Braakmann (2014) finds that own disability, gender and income are important factors which determine an

[82] See section 3.3 for a description of the weighting strategy.

individual's wellbeing response to spousal disability, with the first of these exhibiting significant interaction effects with spousal disability. It should also be considered that because having a disabled spouse represents a higher probability of having a disability oneself, it is important to control for own disability to mitigate against any selection effects. To explore the data further, the main model from specification (iv) (leads and lags of spousal disability with controls, estimated under FE) is extended to account for own disability using the four methods outlined below. It should be noted that the main model was also extended, using equation (2) from section 4.4.2, to explore areas of heterogeneity other than own disability status, but the results were relatively inconclusive. These areas were spousal disability severity, spousal disability chronicity, spousal education level prior to onset, household income prior to onset, age of spousal onset, the gender of the disabled spouse and whether the individual is a caregiver. A discussion of these results can be found in the Appendix [B8].

Accounting for own disability

The Main Model is extended to control for own disability in four different specifications (see Table 4.9). Specification (i) includes a time-variant dummy to represent own disability, specification (ii) includes dummies to control for own disability severity, and specification (iii) includes both a dummy for own disability, a dummy for spousal disability and an interaction term to indicate the case where both partners are disabled at the same time. Specification (iv) uses model (2), outlined in section 4.2.2. A pair of dummy variables is created, one of which is equal to one if the individual has a disability of their own (with either a defined or an undefined disability trajectory) and the other is equal to one in the opposite scenario where they are not disabled. These two dummies are interacted with 11 dummies which represent time from spousal disability onset to create a vector of 22 variables.[83]

Specification (i) returns a coefficient on the own disability dummy of -0.159, significant at the 1% level, and specification (ii) returns coefficients of -0.084 for non-severe own disability and -0.316 for severe disability, significant at the 5% and 10% levels, respectively. However, the inclusion of these additional controls make very little difference to the main results in either specification. In (iii), the coefficient on spousal disability is significant at the 10% level and of a similar magnitude to previous results (-0.104). Own disability is associated with a reduction in wellbeing by 0.175 points, significant at the 1% level. However, despite own and spousal disability appearing to both reduce wellbeing, the interaction effect between the two dummies is positive (0.187) and significant at the 5% level. A possible interpretation is that spousal disability exhibits some form of mitigating effect upon own disability. This is similar to the findings from Braakmann (2014), who finds that SWB is mitigated against for disabled German men when their spouses are also disabled. When the coefficients in (iii) are summed, the results imply that a disabled individual with a disabled spouse experiences wellbeing of only 0.092 points below that of an individual in a couple in which neither partner is disabled.

In specification (iv), the results are displayed in two columns, the first represents individuals who have no disability of their own and the second represents those who are disabled themselves. The life satisfaction paths for both of these people are also displayed in Figure 4.3. There is a noticeable difference between the two groups; SWB for individuals with their own disability stays close to baseline throughout and

[83] As explained in section 4.2.2, only 11 time periods are used (-3 to 7) as the variables which represent 5 and 4 years prior to onset are combined to create a larger reference group.

the coefficients are not statistically different from zero at any point. By contrast, people with no disability of their own experience lower SWB from 2 periods before onset, with a drop to 0.416 point below baseline (significant at the 10% level). However, there is no obvious drop in the onset period and the coefficients are not statistically significant in periods 1 and 2 (p-values are 0.169 and 0.168). Finally, there is little evidence of adaptation, and wellbeing continues to decline to a low of -0.701 in period 7. These results are unexpected as it was hypothesised that the wellbeing of individuals in couples in which both partners are disabled may be lower than that of individuals who only have a disabled spouse. However, the results are consistent with the findings from specification (iii), in which spousal disability appears to mitigate against the negative wellbeing effects of own disability.

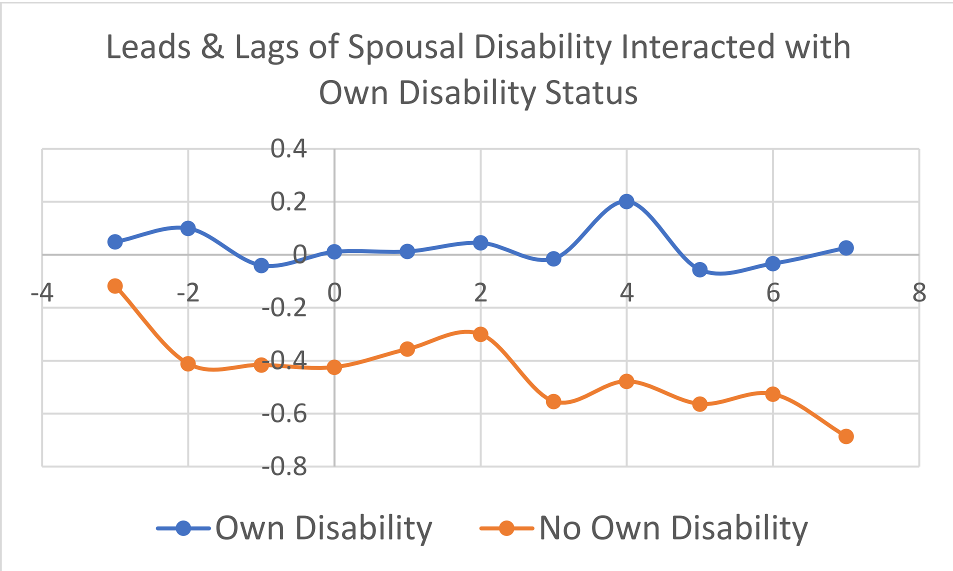


Figure 4.3. Own-disability Interaction Model. The effects of spousal disability upon own wellbeing, controlling for whether the individual has a disability themselves.

Table 4.9. Accounting for own disability.

	(i) Own Disability Dummy	(ii) Own Severity Dummies	(iii) Own and Spousal Dis. Interaction
Spousal Disability			-0.104*
			(0.053)
Own Disability	-0.159***		-0.175***
	(0.034)		(0.035)
Own Non-Severe Disability		-0.084**	
		(0.035)	
Own Severe Disability		-0.316***	
		(0.054)	
Own Dis.*Spousal Dis.			0.187**
			(0.094)
5 Periods Before Onset	*Reference*		
4 Periods Before Onset	0.122	0.125	
	(0.172)	(0.172)	
3 Periods Before Onset	0.028	0.024	
	(0.202)	(0.201)	
2 Periods Before Onset	-0.101	-0.103	
	(0.243)	(0.242)	
1 Period Before Onset	-0.171	-0.172	
	(0.236)	(0.236)	
Onset Period	-0.142	-0.144	
	(0.241)	(0.241)	
1 Period After Onset	-0.120	-0.124	
	(0.246)	(0.245)	
2 Periods After Onset	-0.076	-0.077	
	(0.230)	(0.229)	
3 Periods After Onset	-0.249	-0.249	
	(0.249)	(0.249)	
4 Periods After Onset	-0.081	-0.081	
	(0.241)	(0.240)	
5 Periods After Onset	-0.263	-0.263	
	(0.246)	(0.246)	
6 Periods After Onset	-0.233	-0.239	
	(0.255)	(0.255)	
7 Periods After Onset	-0.261	-0.261	
	(0.268)	(0.266)	
Constant	5.657***	5.654***	5.692***
	(0.585)	(0.585)	(0.583)
Observations:	81,307	81,307	81,307
R-Squared (Within):	0.0091	0.0102	0.0084
R-Squared (Between):	0.0083	0.0128	0.0062
R-Squared (Overall):	0.0055	0.0081	0.0043

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.

For full table with controls, see Appendix [Table B5].
P-Values: *10% **5% ***1%

Table 4.9 (continued). Accounting for own disability.

	(iv) No Own Disability	Own Disability
4 Periods Before Onset	*Reference*	
3 Periods Before Onset	-0.121	0.034
	(0.158)	(0.168)
2 Periods Before Onset	-0.416*	0.083
	(0.255)	(0.158)
1 Period Before Onset	-0.422*	-0.056
	(0.242)	(0.151)
Onset Period	-0.433*	0.006
	(0.250)	(0.152)
1 Period After Onset	-0.365	-0.015
	(0.260)	(0.161)
2 Periods After Onset	-0.310	0.014
	(0.219)	(0.164)
3 Periods After Onset	-0.565**	-0.066
	(0.262)	(0.164)
4 Periods After Onset	-0.491**	0.193
	(0.247)	(0.163)
5 Periods After Onset	-0.579**	-0.095
	(0.253)	(0.184)
6 Periods After Onset	-0.544**	-0.056
	(0.277)	(0.197)
7 Periods After Onset	-0.701**	0.046
	(0.305)	(0.215)
Constant	5.620***	
	(0.590)	
Observations:	81,307	
R-Squared (Within):	0.0086	
R-Squared (Between):	0.0017	
R-Squared (Overall):	0.0014	

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
For full table with controls, see Appendix [Table B5].
P-Values: *10% **5% ***1%

Investigating possible channels of wellbeing

Specification (iv), hereafter referred to as the Own-Disability Interaction Model, is examined further to investigate possible causes of poorer wellbeing amongst non-disabled people with disabled spouses. This model is extended to include controls for income, labour hours and hours spent caring to explore whether these act as wellbeing channels. As discussed in section 4.2.2, the effect of spousal disability upon own income and labour hours is ambiguous and appears to be a function of the individual's reservation income, how much the disabled spouse's income is affected by their disability and the level of disability severity. In Chapter 3, own income explains around 35-41% of the wellbeing effects arising from own disability, so it is hypothesised here that either own income or spousal income could operate as possible mechanisms through which spousal disability affects own wellbeing. If this is the case, the expectation is that their inclusion would dampen the size of the disability coefficients.

Five sets of controls are used: (i) log own real annual income,[84] (ii) log spousal real annual income, (iii) both incomes, (iv) own weekly labour hours, (v) spousal weekly labour hours (vi) own employment status, (vii) spousal employment status, (viii) weekly hours spent caregiving,[85] and (ix) whether caregiving duties prevent at least some paid employment. Caregivers are placed into three groups based on the time they spend caring per week: under 20 hours, over 20 hours, and continuous care.[86] It was seen in Table 4.4 that individuals whose partner is non-disabled earn an average

[84] As with Chapter 3, income is post-tax, post-transfer, and deflated to June 2015 prices.
[85] As sample sizes are too small to include a control for spousal caregiving alone, variables are included which capture weekly caregiving for any household member. Spousal disability is hypothesised to increase weekly caregiving hours.
[86] Continuous care is recorded in the data as 'continuous/over 100 hours per week' but the definition of continuous is subjective to the interviewee. Non-caregivers form the reference group.

salary of £21,256 (post-tax, post-transfer), compared to £19,707 for those with a disabled spouse. Meanwhile, 2.57% of individuals whose spouse is non-disabled are caregivers for someone else in the household, compared to 6.75% of people with a disabled spouse. This may appear to imply that spousal disability results in a substitution of hours away from the workplace and towards the household, but individuals work similar weekly hours regardless of whether they have a disabled partner or not; 24.35 hours and 24.2 hours, respectively. This suggests that people with non-disabled partners earn higher incomes per hour worked, indicating that the difference is a result of factors such as job choice, industry or managerial responsibilities.

The results from these specifications are shown in Table 4.10 and Figures 4.4 (i-ii). From specifications (iv) to (ix), it can be seen that there is no significant difference in the results when controlling for own labour hours, spousal labour hours, own employment status, spousal employment status, caregiving hours or whether caregiving prevents paid employment. The differences between these specifications and that of the original interaction model are so slight that most of these life satisfaction paths lie on top of each other in Figure 4.4 and are indistinguishable. However, controlling for own and spousal income (and both incomes) does exhibit a dampening effect on the results for those without a disability of their own, implying that income is a channel through which spousal disability, at least partially, affects wellbeing.

Controlling for own income in (i) reduces the magnitude of the disability coefficients by around 0.15 points, implying that this explains around 34% of the difference in wellbeing associated with spousal disability. Controlling for spousal income in (ii) reduces the coefficients by around 0.12 points, explaining around 27% of the wellbeing effects. When both incomes are controlled for in (iii), the coefficients are reduced by around 0.27 points, implying that both incomes explain around 59% of the variance in wellbeing. In this specification, not only are the coefficients in periods 0, 1 and 2 not statistically significant, but they are also close to zero. Only the coefficients from periods 3, 5 and 7 are significant (the p-values in periods 4 and 6 are 0.196 and 0.113, respectively). This seems to suggest that there is somewhat of a lag in the wellbeing effects of spousal disability, starting in the third year after onset, which is only partially explained by changes in income. Wellbeing continues to decline in years 4 to 7 after spousal disability onset, but the proportion of these negative wellbeing effects explained by income becomes smaller over time whilst the rest remains unexplained, although a possible channel is an increased sympathetic response to the partner's disability.

Table 4.10. Own-disability Interaction Model with additional controls.

	(i) Own Income		**(ii) Spousal Income**		**(iii) Both Incomes**	
	No Own Dis.	Own Dis.	No Own Dis.	Own Dis.	No Own Dis.	Own Dis.
4 Periods Before Onset	*Reference*					
3 Periods Before Onset	0.013	0.069	-0.012	0.064	0.125	0.112
	(0.159)	(0.171)	(0.142)	(0.174)	(0.144)	(0.177)
2 Periods Before Onset	-0.264	0.053	-0.218	0.146	-0.061	0.117
	(0.256)	(0.156)	(0.166)	(0.159)	(0.143)	(0.157)
1 Period Before Onset	-0.269	-0.066	-0.333	-0.007	-0.185	-0.017
	(0.165)	(0.151)	(0.230)	(0.153)	(0.146)	(0.154)
Onset Period	-0.268	-0.012	-0.312	0.046	-0.151	0.027
	(0.174)	(0.153)	(0.238)	(0.153)	(0.153)	(0.154)
1 Period After Onset	-0.209	-0.004	-0.245	0.011	-0.094	0.017
	(0.184)	(0.161)	(0.241)	(0.163)	(0.152)	(0.163)
2 Periods After Onset	-0.154	-0.009	-0.218	0.063	-0.070	0.038
	(0.187)	(0.164)	(0.186)	(0.164)	(0.143)	(0.164)
3 Periods After Onset	-0.371**	-0.070	-0.418**	-0.042	-0.268*	-0.048
	(0.187)	(0.166)	(0.208)	(0.166)	(0.145)	(0.168)
4 Periods After Onset	-0.337*	0.119	-0.352	0.249	-0.208	0.171
	(0.194)	(0.164)	(0.222)	(0.165)	(0.161)	(0.166)
5 Periods After Onset	-0.445**	-0.129	-0.441*	-0.027	-0.317*	-0.060
	(0.199)	(0.188)	(0.229)	(0.186)	(0.166)	(0.189)

6 Periods After Onset	-0.397*	-0.074	-0.452*	0.077	-0.316	0.056
	(0.228)	(0.199)	(0.255)	(0.197)	(0.200)	(0.200)
7 Periods After Onset	-0.564**	0.009	-0.588**	0.152	-0.463*	0.119
	(0.262)	(0.219)	(0.295)	(0.218)	(0.250)	(0.223)
Log Income	0.023				0.023*	
	(0.015)				(0.013)	
Log Spousal Income			0.022*		0.022*	
			(0.012)		(0.012)	
Constant	5.550***		6.108***		6.117	
	(0.671)		(0.470)		(0.472)	
Observations:	81,307		81,307		81,307	
R-Squared (Within):	0.0080		0.0085		0.008	
R-Squared (Between):	0.0020		0.0012		0.0012	
R-Squared (Overall):	0.0010		0.0010		0.0009	

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
For full table with controls, see Appendix [Table B7].
P-Values: *10% **5% ***1%

Table 4.10 (cont.). Own-disability Interaction Model with additional controls.

	(iv) Employment Status		**(v) Spousal Employment Status**	
	No Own Dis.	Own Dis.	No Own Dis.	Own Dis.
4 Periods Before Onset	*Reference*			
3 Periods Before Onset	0.038	-0.172	-0.116	0.035
	(0.169)	(0.174)	(0.157)	(0.169)
2 Periods Before Onset	0.063	-0.472*	-0.417*	0.080
	(0.160)	(0.272)	(0.251)	(0.157)
1 Period Before Onset	-0.053	-0.464*	-0.418*	-0.058
	(0.153)	(0.260)	(0.240)	(0.151)
Onset Period	-0.004	-0.479*	-0.430*	0.006
	(0.154)	(0.268)	(0.248)	(0.152)
1 Period After Onset	-0.015	-0.416	-0.360	-0.012
	(0.163)	(0.278)	(0.257)	(0.162)
2 Periods After Onset	0.007	-0.355	-0.305	0.018
	(0.166)	(0.235)	(0.217)	(0.164)
3 Periods After Onset	-0.070	-0.604**	-0.561**	-0.065
	(0.165)	(0.281)	(0.260)	(0.164)
4 Periods After Onset	0.188	-0.536**	-0.486**	0.198
	(0.164)	(0.265)	(0.246)	(0.163)
5 Periods After Onset	-0.097	-0.619**	-0.575**	-0.094
	(0.186)	(0.271)	(0.252)	(0.184)
6 Periods After Onset	-0.054	-0.594**	-0.532*	-0.051
	(0.198)	(0.293)	(0.276)	(0.197)
7 Periods After Onset	0.047	-0.747**	-0.698**	0.052
	(0.215)	(0.320)	(0.304)	(0.214)

Employed	*Reference*	
Unemployed	-0.368***	-0.098
	(0.079)	(0.068)
Not Working	-0.476***	-0.133
	(0.105)	(0.130)
Family Work/Carer	-0.013	0.015
	(0.073)	(0.057)
Student	-0.157	0.049
	(0.167)	(0.178)
Retired	0.186***	0.087
	(0.061)	(0.059)
Constant	5.645***	5.595***
	(0.569)	(0.604)
Observations:	81,307	81,307
R-Squared (Within):	0.0133	0.0090
R-Squared (Between):	0.0096	0.0024
R-Squared (Overall):	0.0063	0.0018

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
For full table with controls, see Appendix [Table B7].
P-Values: *10% **5% ***1%

Table 4.10 (cont.). Own-disability Interaction Model with additional controls.

	(vi) Own Labour Hours		**(vii) Spousal Labour Hours**	
	No Own Dis.	Own Dis.	No Own Dis.	Own Dis.
4 Periods Before Onset	*Reference*			
3 Periods Before Onset	-0.123	0.033	-0.120	0.033
	(0.161)	(0.168)	(0.159)	0.168
2 Periods Before Onset	-0.419	0.081	-0.416	0.081
	(0.258)	(0.158)	(0.256)	0.158
1 Period Before Onset	-0.426*	-0.053	-0.423*	-0.058
	(0.245)	(0.151)	(0.242)	0.151
Onset Period	-0.436*	0.006	-0.433*	0.005
	(0.254)	(0.152)	(0.250)	0.152
1 Period After Onset	-0.369	-0.016	-0.365	-0.017
	(0.263)	(0.161)	(0.260)	0.161
2 Periods After Onset	-0.315	0.015	-0.310	0.013
	(0.222)	(0.164)	(0.219)	0.164
3 Periods After Onset	-0.570**	-0.065	-0.566**	-0.067
	(0.264)	(0.164)	(0.262)	0.164
4 Periods After Onset	-0.494**	0.195	-0.492**	0.193
	(0.251)	(0.163)	(0.248)	0.163
5 Periods After Onset	-0.581**	-0.092	-0.580**	-0.095
	(0.257)	(0.184)	(0.254)	0.184
6 Periods After Onset	-0.549**	-0.056	-0.544**	-0.057
	(0.280)	(0.197)	(0.277)	0.197

7 Periods After Onset	-0.706**	0.047	-0.702**	0.045
	(0.308)	(0.215)	(0.305)	0.214
Labour Hours	0.004*			
	(0.002)			
Labour Hours Squared	0.000			
	(0.000)			
Spousal Labour Hours			-0.002	
			(0.002)	
Spousal Labour Hours Squared			0.000	
			(0.000)	
Constant	5.596***		5.628***	
	(0.589)		(0.591)	
Observations:	81,307		81,307	
R-Squared (Within):	0.0088		0.0086	
R-Squared (Between):	0.0022		0.0017	
R-Squared (Overall):	0.0016		0.0014	

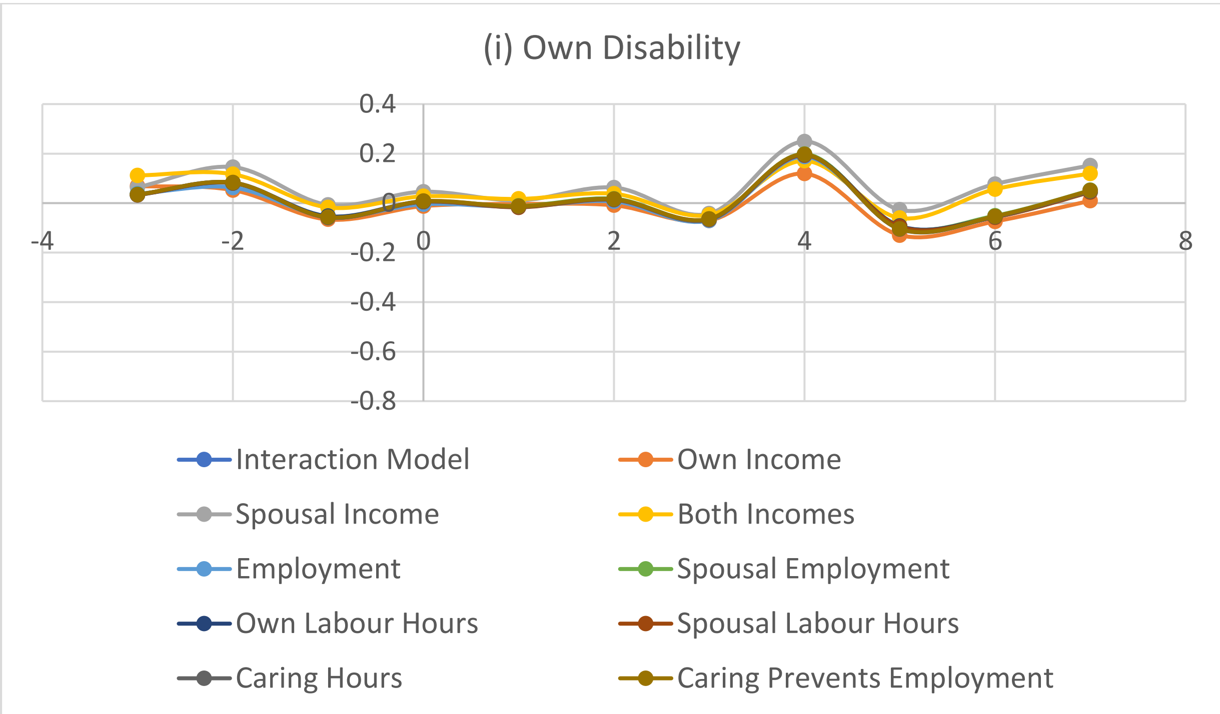
Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
For full table with controls, see Appendix [Table B7].
P-Values: *10% **5% ***1%

Table 4.10 (cont.). Own-disability Interaction Model with additional controls.

	(viii) Weekly Caregiving Hours		**(ix) Caring Prevents Employment**	
	No Own Dis.	Own Dis.	No Own Dis.	Own Dis.
4 Periods Before Onset	*Reference*			
3 Periods Before Onset	-0.117	0.034	-0.118	0.035
	(0.160)	(0.168)	(0.161)	(0.168)
2 Periods Before Onset	-0.408	0.082	-0.410	0.083
	(0.257)	(0.158)	(0.258)	(0.158)
1 Period Before Onset	-0.415*	-0.058	-0.417*	-0.057
	(0.244)	(0.151)	(0.244)	(0.151)
Onset Period	-0.427*	0.006	-0.428*	0.008
	(0.252)	(0.152)	(0.252)	(0.153)
1 Period After Onset	-0.360	-0.014	-0.362	-0.013
	(0.261)	(0.162)	(0.261)	(0.162)
2 Periods After Onset	-0.305	0.015	-0.307	0.016
	(0.220)	(0.164)	(0.220)	(0.164)
3 Periods After Onset	-0.560**	-0.066	-0.562*	-0.063
	(0.263)	(0.165)	(0.263)	(0.165)
4 Periods After Onset	-0.484*	0.195	-0.485*	0.197
	(0.249)	(0.164)	(0.249)	(0.164)
5 Periods After Onset	-0.570**	-0.105	-0.571**	-0.104
	(0.256)	(0.185)	(0.256)	(0.186)
6 Periods After Onset	-0.534*	-0.055	-0.535*	-0.053
	(0.279)	(0.198)	(0.279)	(0.198)
7 Periods After Onset	-0.688**	0.048	-0.691**	0.051

	(0.309)	(0.215)	(0.307)	(0.215)
No Hours Caring/Week	*Reference*			
Up to 20 Hours	-0.013			
	(0.030)			
Over 20 Hours	-0.031			
	(0.117)			
Continuous Care	-0.055			
	(0.136)			
Caring Prevents Employment			-0.067	
			(0.158)	
Constant	5.618***		5.611***	
	(0.590)		(0.590)	
Observations:	81,307		81,307	
R-Squared (Within):	0.0086		0.0086	
R-Squared (Between):	0.0018		0.0018	
R-Squared (Overall):	0.0015		0.0014	

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
For full table with controls, see Appendix [Table B7].
P-Values: *10% **5% ***1%



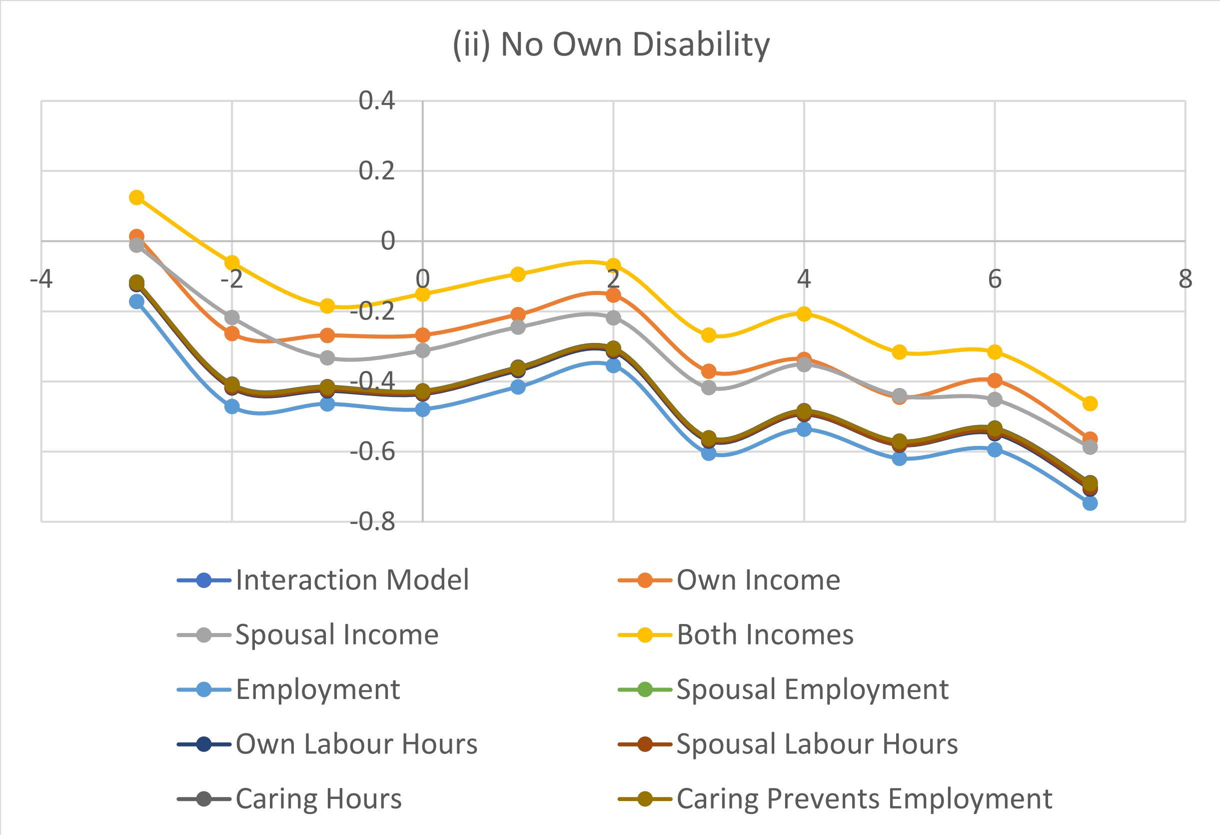


Figure 4.4 (i-ii). Own-disability Interaction Model with additional controls for own income, spousal income, employment, spousal employment, weekly labour hours, spousal weekly labour hours, hours spent caregiving, and a dummy to indicate whether caregiving prevents at least some paid employment.

4.5.4 Investigating the Anticipation Effects

A common occurrence throughout the results was the lack of a drop in SWB in the onset period, accompanied by an unexplained drop in SWB at two periods before onset.[87] It was suspected at first that this was the result of anticipation effects brought on by the onset of a long-term health condition prior to spousal disability onset. However, the declaration of a long-term health condition or disability, which was the first qualifier question to determine whether an individual had a disability or not, was found to occur at an average of 0.8 periods (about 10 months) before onset,

[87] The sudden decline in wellbeing in period -2 also occurred in the robustness check on the main model in which undefined own disabilities were excluded from the data.

rather than two years before. An attempt was made to differentiate between the cases in which spousal disability was "anticipated" (for example, because of a degenerative health condition) and when onset came as a shock (for example, because of an accident). As with the previous chapter, the term "anticipation effect" refers to a decline in SWB prior to the event. This terminology is used to remain consistent with the previous literature, even though a decline in spousal health may be driving the results rather than the anticipation of future disability.

To differentiate between "anticipated" and "shock" spousal disability onset, a version of the Own-Disability Interaction Model was estimated in which dummy variables indicated whether or not the disabled spouse had experienced a large physical or mental health decline prior to onset.[88] However, these were so highly collinear with spousal disability that it was not possible to run this regression, and there were too many individuals with pre-onset health declines that the observations could not simply be dropped without causing sample size problems in the lead and lag variables. Therefore, it was decided to control for spousal health shocks by including first differences of both the physical and mental health (as measured using SF-12 scores of general health) of the disabled spouse as explanatory variables. This would net out any between-period health changes experienced by the disabled spouse so that any shock effects of disability could be isolated. As can be seen from the results (Table 4.11, Figure 4.5), this caused the disability effects on SWB to become slightly more pronounced, with coefficients from period -2 onwards lying around 0.4 points below those of the original interaction model. The coefficients also became more

[88] As in Chapter 3, a 'large' health decline is defined as a reduction in the SF-12 measure of general health by at least one standard deviation between any two pairs of periods prior to disability onset. See section 3.5.2 for a fuller explanation. This is measured on a scale of 0-100 and is derived from a series of 12 questions. Higher scores indicate a higher state of general health. Spousal mental health has a mean of 49.6 and a standard deviation of 9.3. Spousal physical health has a mean of 51.7 and a standard deviation of 9.45.

significant using these health controls, with all periods from -2 to 7 being significant at the 1% or 5% level. However, the period which saw the only sharp decline in SWB was still 2 years prior to onset.

Table 4.11. Own-Disability Interaction Model, controlling for changes in spousal health.

	(i) No Own Disability	**(ii) Own Disability**
4 Periods Before Onset	*Reference*	
3 Periods Before Onset	-0.258	0.014
	(0.205)	(0.246)
2 Periods Before Onset	-0.897**	-0.001
	(0.362)	(0.249)
1 Period Before Onset	-0.836**	-0.097
	(0.334)	(0.232)
Onset Period	-0.811**	0.042
	(0.345)	(0.230)
1 Period After Onset	-0.771**	-0.032
	(0.354)	(0.235)
2 Periods After Onset	-0.707**	-0.036
	(0.314)	(0.244)
3 Periods After Onset	-0.969***	-0.095
	(0.356)	(0.237)
4 Periods After Onset	-0.888***	0.171
	(0.343)	(0.245)
5 Periods After Onset	-1.002***	-0.063
	(0.350)	(0.258)
6 Periods After Onset	-0.996***	-0.079
	(0.369)	(0.277)
7 Periods After Onset	-1.172***	0.073
	(0.396)	(0.290)
Change in Spousal Physical Health	0.001	
	(0.001)	
Change in Spousal Mental Health	0.004***	
	(0.001)	
Constant	3.630*	
	(2.021)	
Observations:	81,307	
R-Squared (Within):	0.0095	
R-Squared (Between):	0.0016	
R-Squared (Overall):	0.0005	

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
For full model with controls, see Appendix [Table B8].
P-Values: *10% **5% ***1%

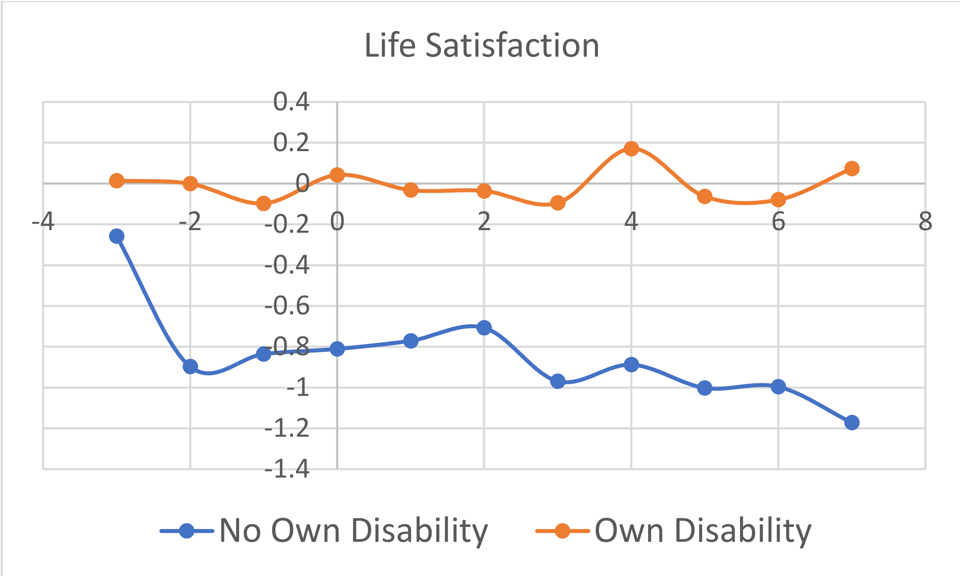


Figure 4.5. Own-disability Interaction Model, including controls for between-period changes in spousal physical and mental health.

As an extra check, the Main Model was run using own mental and physical health as outcome variables, again using SF-12 measures. It was hypothesised that if either of these measures declined in magnitude prior to spousal disability onset, this could indicate that they are drivers of the pre-onset declines in SWB. The results, shown in Table 4.12 and Figure 4.6 appear to indicate that the physical health of the disabled person's spouse exhibits a sharp decline two years before their spouse becomes disabled, followed by a smaller mental health decline in the following year. It is therefore possible that the changes in wellbeing could in fact be driven by their own health, although as there is no intuitive explanation as to why spouses of disabled people should become unwell in the two years prior to spousal disability onset, these results should be treated with caution.

Table 4.12. Main Model, with own physical and mental health as outcome variables.

	(i) Own Physical Health	(ii) Own Mental Health
4 Periods Before Onset	*Reference*	
3 Periods Before Onset	0.090	-0.442
	(0.797)	(0.605)
2 Periods Before Onset	-1.558*	-0.575
	(0.874)	(0.700)
1 Period Before Onset	-1.275*	-1.129*
	(0.703)	(0.659)
Onset Period	-1.568**	-1.172*
	(0.776)	(0.679)
1 Period After Onset	-1.641**	-0.568
	(0.792)	(0.698)
2 Periods After Onset	-1.410**	-0.621
	(0.719)	(0.692)
3 Periods After Onset	-1.251	-1.485**
	(0.774)	(0.726)
4 Periods After Onset	-2.043*	-1.104
	(0.800)	(0.815)
5 Periods After Onset	-1.131	-1.803**
	(0.844)	(0.818)
6 Periods After Onset	-0.977	-1.869*
	(0.932)	(1.076)
7 Periods After Onset	-0.97	-1.364
	(1.163)	(1.191)
Constant	51.132***	74.425***
	(3.040)	(3.327)
Observations:	81,307	81,307
R-Squared (Within):	0.0125	0.0167
R-Squared (Between):	0.0005	0.0135
R-Squared (Overall):	0.0011	0.0032

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
For full table with controls, see Appendix [B9].
P-Values: *10% **5% ***1%

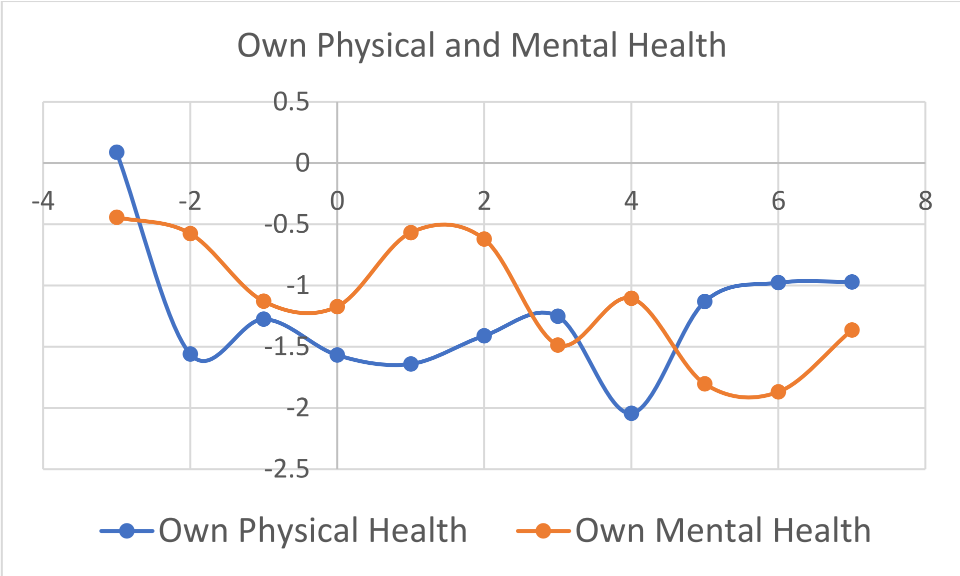


Figure 4.6. Main Model with own physical and mental health as the outcome variables. Health is defined using SF-12 measures of general health.

As a final check, the outcome variable from the Main Model was replaced in turn by the three facets of life satisfaction included in the data. As seen in Table 4.13 and Figure 4.7, spouses of disabled people appear to experience lower than sample average levels of health satisfaction in the two periods prior to onset, although the significance levels are weak and there is no theoretical explanation to why individuals should experience poor health satisfaction in the two periods prior to their spouse becoming disabled, so there is not a robust argument that this is a driver of the anticipation effects. Unfortunately, the anticipation effects in the two periods prior to onset remain largely unexplained, which is a limitation of this study. It should be noted however, that when the sample average SWB of disabled people's spouses is taken for each period, rather than the estimated result, SWB tends to decline much more smoothly over this time, with no sudden drop at two periods prior to onset.

Table 4.13. Main Model with facets of life satisfaction as the outcome variables.

	(i) Health Satisfaction	**(ii) Income Satisfaction**	**(iii) Satisfaction with Amount of Leisure Time**
4 Periods Before Onset	*Reference*		
3 Periods Before Onset	-0.219	-0.125	0.240**
	(0.211)	(0.149)	(0.113)
2 Periods Before Onset	-0.359*	-0.076	0.212*
	(0.210)	(0.205)	(0.119)
1 Period Before Onset	-0.334*	-0.043	0.185
	(0.174)	(0.173)	(0.118)
Onset Period	-0.216	-0.004	0.024
	(0.185)	(0.179)	(0.121)
1 Period After Onset	-0.253	-0.081	0.133
	(0.182)	(0.183)	(0.123)
2 Periods After Onset	-0.205	-0.006	0.140
	(0.172)	(0.176)	(0.122)
3 Periods After Onset	-0.322*	-0.110	0.047
	(0.193)	(0.186)	(0.126)
4 Periods After Onset	-0.382**	-0.065	-0.091
	(0.191)	(0.186)	(0.134)
5 Periods After Onset	-0.292	-0.095	-0.008
	(0.195)	(0.194)	(0.143)
6 Periods After Onset	-0.321	0.009	0.025
	(0.199)	(0.202)	(0.157)
7 Periods After Onset	-0.386*	0.036	-0.104
	(0.224)	(0.224)	(0.204)
Constant	6.504***	3.817***	5.173***
	(0.561)	(0.616)	(0.808)
Observations:	81,283	81,286	81,296
R-Squared (Within):	0.0170	0.0238	0.0121
R-Squared (Between):	0.0035	0.0090	0.0245
R-Squared (Overall):	0.0061	0.0108	0.0121

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
For full table with controls, see Appendix [Table B10].
P-Values: *10% **5% ***1%

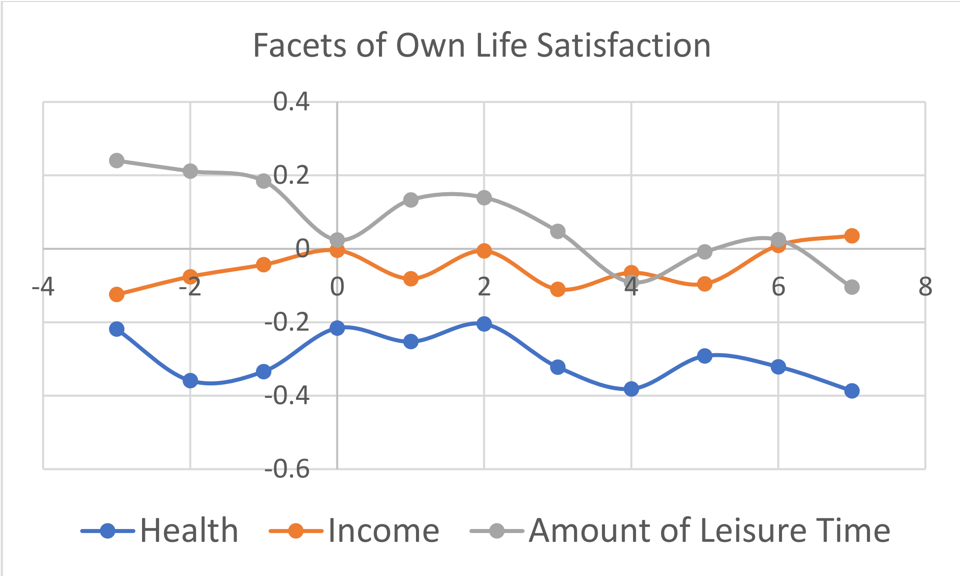


Figure 4.7. Main Model with facets of own life satisfaction as the outcome variables (health satisfaction, income satisfaction and satisfaction with amount of leisure time). The only statistically significant coefficients are in the health satisfaction path, in periods -2, -1, 3, 4 and 7. These are all significant at the 10% level, apart from period 4, which is significant at the 5% level.

4.5.5 Robustness checks

A few tests are conducted on the results from this chapter for the purpose of checking their robustness. These are the similar to those used on the main model from Chapter Three. First, tests are run to check for evidence of potential dynamic bias. A series of estimations are run based on the model from Table 4.9 (iii) in section 4.5.3, (which includes dummy variables for own and spousal disability and an interaction term which represents when both partners are disabled). These three terms are included in a new model alongside a set of three additional terms which represent the interactions between these and a dummy which denotes that disability onset has occurred after a particular year. Further to this test, the more formal tests of Callaway and Sant'Anna (2021) and DeChaisemartin and d'Haultfœille (2022) are carried out, although evidence of dynamic bias is very limited. A full discussion of these tests can be found in the Appendix [B9].

As with Chapter 3, a selection of randomisation tests are also carried out to test the causal relationship between spousal disability and own SWB, and whilst these tests support the robustness of the relationships identified in the models, the results are not completely reliable as they are based on versions of the models which exclude sample probability weights, which distorts the results. A discussion of these tests can be found in the Appendix [B10].

4.6 Discussion

The first research question in this chapter simply asks whether a statistical relationship between spousal disability and own subjective wellbeing can be identified and whether this changes over time. The initial regressions, conducted under OLS, suggest that people with a disabled spouse report lower levels of SWB by around one third of a point on a 7-point scale. This figure is larger for people with severe or long-term disabilities. When a series of dummy variables representing the number of years from spousal onset are regressed against own SWB, the results suggest a gradual decline in SWB over time, which starts before the onset period and reaches as low as 0.42 points below baseline at 7 years after spousal disability onset. However, these figures diminish in absolute value when controls for personal characteristics are included, diminish further under RE and come close to zero under FE, suggesting that any negative wellbeing effects of spousal disability can be explained by either observed or unobserved personal characteristics.

The second research question asks whether the results change depending on various pre-existing characteristics. Heterogeneity analysis is conducted by splitting the sample into different pairs of groups (based on income levels, education levels, age of onset, gender and own disability status). A pair of dummy variables is generated to represent each subsample and are interacted with 11 dummies which represent time from spousal disability onset. Most of the results are inconclusive, with the exception of the analysis which looks at whether the individual whose SWB is being estimated has a disability of their own. Contrary to expectations, instead of exhibiting an additive negative wellbeing effect, spousal disability appears to mitigate the effects of own disability. This is also found to be the case in a separate model which includes dummy variables to represent own disability, spousal disability and an interaction effect between the two factors.

Non-disabled people with a disabled spouse are found to experience levels of SWB around 0.4 to 0.6 points out of 7 below that of individuals in a partnership in which both partners were non-disabled or both were disabled from 2 periods before onset onwards (although the first two years post-onset are not statistically significant). SWB continues to decline with no evidence of adaptation up to 7 years post-onset, at which point, SWB has declined to 0.7 points below baseline. When controlling for changes in the disabled partner's health, the post-onset coefficients drop further to around 0.8 to 1 point below baseline, implying that shock spousal disabilities impact upon own SWB slightly more severely than those which are anticipated.

The third research question asks whether spousal disability affects SWB through any identifiable channels. As the only significant results are found in the model discussed above, which interacted own and spousal disability over time, this is the only model that this extra analysis is applied to. Controlling for both own and spousal incomes dampen the results by around 60%, implying that income is a partial channel through which spousal disability affects own SWB.[89] However, changes in the weekly number of hours worked and the weekly number of hours spent providing informal care are small and insignificant and are not found to be significant drivers of SWB. Similarly, Braakmann (2014) finds negligible labour market responses to spousal disability. For people with no disability of their own, their SWB continues to decline gradually from the third year after spousal disability onset, but proportionally less and less of this is explained through incomes. It has not been identified what other

[89] This applies only to non-disabled individuals with disabled spouses, who were the only group to be affected by spousal disability.

channel could be causing SWB to continue to decline but a feasible explanation would be a sympathetic response to the spousal disability itself. There is strong evidence in the literature that the correlation between spouse's mutual SWB increases over time (e.g., Bookwala and Shultz, 1996; Wilson, 2001; Winkelmann, 2005) and that couples experience 'crossover' from negative wellbeing effects (e.g., Burke *et al.*, 1980; Jones and Fletcher, 1993; Westman and Etzion, 1995; Westman and Vinokur, 1998). Whilst most of the changes in SWB close to the onset period may be explained through income, as time goes on, the implication from these results is that the non-disabled spouse becomes increasingly emotionally affected by their partner's disability in addition to the income effect.

Overall, this chapter contributes to the existing literature by providing some seminal insights into how spousal disability onset affects own subjective wellbeing, how the effects change over time, and how the role of incomes and (especially) own disability status explain and drive the results. An important part of the study is to determine how SWB changes over time; there are strong anticipation effects in all cases, with SWB drops occurring in the two periods prior to spousal disability onset. The main limitation of this paper is the inability to fully account for these effects. Anticipation effects prior to negative life events commonly occur in the existing wellbeing literature, but not as sharply, and are often confined to a single period before onset (e.g., Blanchflower and Oswald, 2002, 2004; Clark *et al.,* 2008; Lucas *et al., 2003*; Valle *et al.,* 2013). It is suspected that they may arise from multiple factors, including pre-onset spousal health declines, unexplained declines in own health prior to spousal disability onset, as well as possible noise in the data; the wellbeing of individuals with disabled spouses reduces fairly smoothly over time in the raw data. There is no evidence of adaptation effects in any of the models and when time from onset is removed from the model altogether, this makes little difference to the results, suggesting that spousal disability exhibits more of a general effect on SWB over time, rather than a dynamic effect. This is fairly consistent with Braakmann (2014), who also finds little effect of controlling for the number of years since onset. This finding justified the use of an alternative time invariant model, which includes own and spousal disability and an interaction effect between the two factors. Spousal disability is found to reduce SWB by around half as much as own SWB[90] but there is also a positive interaction effect between own and spousal disability which nearly cancels out the effect of own disability completely. The lack of evidence of adaptation is similar to that of Valle *et al.,* (2013), who finds no adaptation to spousal health shocks even after several years.

Whilst the existing literature on this topic is limited, the results can be compared to those of Braakmann (2014), who finds a substantial negative SWB effect for women in Germany with disabled male spouses but not for men with disabled female spouses, driven though income.[91] He argues that his results may have been driven by gender roles within families, which are based on relatively traditional values in Germany. Whilst the interaction effect between own and spousal disability in this chapter is positive, Braakmann (2014) only finds this to be the case for disabled men. Such differences between the two studies may come down to country-specific effects as the SWB literature is relatively heterogeneous over countries. As such, future research which replicates the methodologies from this paper may wish to consider using data from multiple countries.

[90] The coefficients on own and spousal SWB were -0.189 and -0.095, respectively.
[91] Additionally, men were found to be affected more by own disability.

5 The Impact of Parental Disability upon Children's Wellbeing

5.1 Introduction

Chapters Three and Four explore the impact of disability onset upon the wellbeing of the disabled person and their spouse. This chapter takes the next step of investigating the effects of parental disability upon the subjective wellbeing of children of disabled people. This is a scarcely explored topic in the existing literature but an important one in investigating the full impact of disability onset upon the family. It is much more common to find papers, particularly from the field of psychology, which look at the effects of disability in children upon the parent, rather than the reverse relationship (e.g., Gilson *et al.*, 2017; Resch, Benz and Elliot, 2012; Sloper and Beresford, 2006). In economics, there are papers which look at the wellbeing effects on children of other parental outcomes, such as bereavement, unemployment and divorce (e.g., Amato and Anthony, 2014; Bubonya *et al.*, 2017; Powdthavee and Vernoit, 2013), but not disability. A possible reason for this scarcity is that the recording of children's wellbeing, especially at the subjective level, is still fairly new. It was arguably not until the United Nations' Convention on the Rights of the Child in November 1989 that there was an international framework for governments to follow with the intention of measuring and improving children's wellbeing. The British Household Panel Survey, run by the Institute for Social and Economic Research, were early pioneers in collecting children's wellbeing data at the subjective level when in 1994, they introduced a self-completion survey for children with questions asked on a Walkman cassette player, alongside the mainstage adult survey. The data analysed in this chapter, as with the previous chapters, come from *Understanding Society,* the successor of the BHPS, which includes a youth survey for 10- to 15-year-olds. The questions are designed in conjunction with teachers and psychologists so that they can be easily understood by this age group. The survey is a rich source of subjective data on various facets of the child's life, which can be merged with data from the household and linked to their parents' survey data.

The main research questions for this chapter are:

1. What is the effect of parental disability upon the subjective wellbeing of children (aged 10 to 15)?
2. How do these effects change depending on the characteristics of the child, such as their sex, their age, the sex of the disabled parent, different types of parental disability and family structure?
3. Are there any identifiable channels through which parental disability affects children's wellbeing (e.g., household income, parental wellbeing)?

The first research question involves constructing a simple model to regress parental disability (of either sex) against children's subjective wellbeing, in order to investigate whether a relationship exists between these two variables. Whilst this has not really been investigated in the literature before, the hypothesis to be tested is that there will be a negative wellbeing response to parental disability, which may operate through various potential channels.

The second question explores whether the child's wellbeing response to parental disability differs depending on personal characteristics of the child or the disabled adult, or the nature of the parental disability itself. The literature tends to suggest that adolescent boys report better levels of wellbeing on average compared to girls (e.g., Nolen-Hoeksema and Girgus, 1994, Nolen-Hoeksema and Jackson, 2001; Raja *et al.*, 1992; Rutter, 1985) and that psychological wellbeing declines with age through adolescence (e.g., Children's Society, 2021; Ofsted, 2008), however it is not clear whether the response to life events such as parental disability also differs by age or by sex. However, this is the case in Powdthavee and Vernoit (2013), in which the wellbeing response to parental unemployment depends on the age-sex combinations of the child. It is unclear from the existing literature whether maternal or paternal disability would exhibit the greatest effect upon children's wellbeing, although one hypothesis is that disability in the highest earning parent may have the greater wellbeing effect due to its impact upon access to resources.

The third question asks whether there are any identifiable channels through which parental disability operates to affect children's wellbeing (assuming that a wellbeing effect has been found). The literature suggests that these channels may include poorer resources and lack of opportunities (e.g., Jack and Gill, 2003; Prilleltensky and Nelson, 2000; Tomlinson), transference of wellbeing between parent and child (e.g., Downey, Purdie and Schaffer-Neitz, 1999; Larson and Almeida, 1999; Mervin and Frijters, 2014), increased caregiving duties (e.g., Cree, 2003; Dearden and Becker, 2000; Frank, 1995; Hill, 1999) or the social stigma associated with disability (e.g., BBC, 2019; Green *et al.*, 2005; Jacob, Canchola and Preston, 2019).

This chapter begins with a literature review in section 5.2, which includes a summary of the methods used in the psychology and economics literature for defining, collecting, and measuring children's wellbeing. This is followed by a discussion of the most common determinants of child wellbeing, which examines specific areas of the child's life such as family, school and leisure activities. Finally, the review focuses on the economic literature which estimates child wellbeing empirically and how it is influenced by factors such as parental death, divorce and unemployment. This is intended to inform the design of the most appropriate empirical model for estimating the longitudinal wellbeing effects on children of parental disability.

Section 5.3 provides an outline of the data that will be used in the analysis. The dataset is taken from the *Youth Survey* which accompanies the mainstage adult survey of Understanding Society and is completed anonymously by children of the adult respondents, aged between 10 and 15. The dataset has a workable sample of 25,941 observations of 8,372 children. Section 5.4 outlines the methodologies to be used to estimate the effects of parental disability upon children's subjective wellbeing. The main model in the analysis uses fixed effects, which estimates within-child differences between periods of parental disability and non-disability. Further analysis examines how children's wellbeing response is affected depending on different combinations of their age, sex, and the sex of the disabled parent. Where wellbeing effects of parental disability are identified, the next stage is to identify any potential channels which act as mechanisms of children's wellbeing. The results from the analysis are shown in section 5.5 and are discussed in section 5.6.

The implications of any findings may be of interest to disability charities, children's charities or any other charitable or public body who is interested in raising the wellbeing of families who live with disability. If any wellbeing effects of parental disability are identified, this alone is a notable finding as it is something which has not been reported in the previous literature and it may influence how charities choose to allocate their resources within families with parental disabilities. If any channels of wellbeing are identified (e.g., bullying, caregiving, etc.), the findings can potentially direct policy implications towards these specific areas.

Academically, this study is potentially the first, to the best of my knowledge, to empirically measure the effects of parental disability upon children's subjective wellbeing. The findings extend the current literature on children's subjective wellbeing, particularly within an economics context and add a wellbeing dimension to the limited studies on the effects of parental disability upon children, which currently includes lower household incomes (Olkin *et al.*, 2006), poorer health and social outcomes (Murphy *et al.*, 2017), poorer quality of life through the domains of emotional health, self-esteem, social and economic wellbeing (Bee *et al.*, 2013), and disability stigma (Austin *et al.*, 2004). It also adds to the longitudinal literature on children's subjective wellbeing, which until now has focused on areas such as parental divorce (Gruber, 2004; Sun, 2001), parental unemployment (Bubonya, Cobb-Clark and Wooden, 2017; Christoffersen, 1994; Kind and Haisken-DeNew, 2013; Powdthavee and Vernoit, 2013) and the onset of parental mental distress (Powdthavee and Vignoles, 2007).

5.2 Literature Review

This review of the existing literature is divided into four main sections. Section 5.2.1 looks at the most common definitions and methods used for measuring child wellbeing. Section 5.2.2 explores the most common determinants of child wellbeing, drawing largely from the psychology literature, including an examination of how subjective wellbeing is transmitted from parent to child. In section 5.2.3, there is a discussion of the limited literature available on the wellbeing of individuals who have disabled parents. Finally, in section 5.2.4, there is an exploration of the longitudinal empirical studies which estimate children's wellbeing, over time, with a particular focus on the child's response to exogenous life events experienced by the parent.

5.2.1 Defining and Measuring Childhood and Children's Wellbeing

The psychology literature tends to divide childhood into three stages: early childhood (new-born to 7 years old), middle childhood (7 to 11 years old) and adolescence (11 to 16 years old), however it is rare to find literature on children's wellbeing at the subjective level below the age of 10, where various measures of wellbeing are usually reported by the parent or wellbeing is discussed in the context of psychological theories such as *Attachment Theory* or the fulfilment of fundamental needs (discussed in the Appendix [C1]). Such theories are common threads in the literature, but they affect children differently at different ages, for example, the psychological effects on a child of their parents becoming separated or unemployed are much stronger in adolescence than in early childhood (e.g., Fitzsimons and Villadsen, 2019).[92] Age is a particularly important determinant of children's subjective wellbeing (hereafter SWB); growing up is associated with numerous emotional and developmental complexities, such as the physical and mental changes associated with the process of puberty, increased pressure to perform in school, social and romantic relationships, potential exposure to alcohol, tobacco and narcotic drugs, and increased responsibilities. These factors mean that whilst children's overall and mental wellbeing are often reported as being relatively steady in middle childhood, they tend to decline in adolescent years (e.g., Chanfreu *et al.*, 2008; Children's Society 2021; Powdthavee and Vernoit, 2013; Rees, Goswami and Bradshaw, 2010), typically more so for girls than for boys (e.g., Children's Society, 2021; Rees *et al.*, 2010; Powdthavee and Vernoit, 2013). Datasets which use the distinct age range of 10 to 15 include *The Good Childhood Report,* Ofsted's *Tellus* report, *Healthy Behaviour in School Children,* the University of Essex's *Understanding Society,* and the Office for National Statistics' *Annual Population Survey*. The questionnaires used by the Children's Society (2021) and Rees *et al.* (2010) however, include children as young as 8 years old, although these were carefully designed alongside teachers and child psychologists so that they would be easily understood by children from this age. The literature typically treats individuals from the age of 16 as adults, although some distinguish between younger and older adults due to the more "settled" nature of the lives of older adults, including studies which use the Annual Population Survey, which includes additional questions for the 16 to 24 age group.

Another important definition of a child concerns their family structure. Typically, children are only observed in empirical studies of SWB if they live in the same

[92] Although, parental unemployment has actually been shown to *improve* children's wellbeing at younger ages (Powdthavee and Vernoit, 2013).

household as the parent who is also being observed (e.g., Bubonya, Clark and Wooden, 2017; Powdthavee and Vignoles, 2007; Powdthavee and Vernoit, 2013). Much empirical literature treats double-parent and single-parent families the same in their analysis, although there are usually methods to distinguish between the two groups, for example, Bubonya *et al.* (2017) run different estimations for both types of family when estimating children's SWB and this paper, and several others (e.g., Children's Society, 2021; Powdthavee and Vernoit, 2013) analyse male and female children differently due to the perceived differences in their psychological responses to various family shocks during adolescence. Bubonya *et al.* (2017) and others also stipulate that in the case of separated parents, the mother's de facto opposite-sex partner at the start of the survey is treated as the child's male parental figure, with only observations kept in the case where the mother remains in a relationship with the same partner.

Methods for collecting and measuring children's subjective wellbeing

It is not too common to see studies on children's SWB which use a single measure such as a 10-point scale. More often, a score comprised of multiple measures from different life domains is used. This methodology is largely influenced by Bronfenbrenner's (1977) 'ecological' theory of children's development, which argues that the different domains of a child's life develop simultaneously. As such, a change in one domain can easily influence another. For example, a sudden disruption to homelife due to family breakdown may exhibit a strong negative effect on a child's ability to perform academically and how well they get on with friends. Therefore, the different domains of a child's life should not be considered in isolation. A common method to measure children's SWB is the Huebner (1991) scale, which can trace its origins to the Satisfaction With Life Scale (SWLS), first developed by Diener, Emmons, Larson and Griffin (1985). The authors argue that general life satisfaction scales measured using a single item are problematic (see Diener, 1984 for a discussion) as it can be difficult for an individual to aggregate all domains of their life at the same time, especially if each domain score may has very different values. Thus, a multi-item scale was deemed to be required to "measure life satisfaction as a cognitive-judgemental process".[93] Diener *et al.*'s survey asked undergraduate students to give a score of 1 to 7 in response to five statements to show the extent to which they agreed with them[94]. The statements were:

- "In most ways my life is close to ideal"
- "The conditions of my life are excellent"
- "I am satisfied with my life"
- "So far I have gotten the important things I want in life"
- "If I could live my life over, I would change almost nothing"

The responses were summed to give an aggregate score of between 5 and 35. The questions were asked to the same respondents two months later and a correlation coefficient of 0.82 was found between the two sets of results. The same questions were then administered to a second group of students, who were asked to report their wellbeing using a variety of methods drawn from the literature. The method which proved the most consistent with the SWLS was Cantril's (1965) Self-Anchoring Ladder, in which a drawing of a ladder with ascending numbers from bottom to top

[93] This is a reference to Shin and Johnson's (1978) paper which defines life satisfaction as "a global assessment of a person's quality of life according to his chosen criteria" i.e., the individual sets their own criteria of what a good standard of life is, rather than against some external criteria.
[94] The 7-point scale is: 1 = "strongly disagree"; 2 = "disagree"; 3 = "slightly disagree"; 4 = "neither agree nor disagree"; 5 = "slightly agree"; 6 = "agree"; 7 = "strongly agree".

(using 0 to 10) on or between the rungs acts as a visual aid. Respondents are asked to rate their life on the ladder, where zero represents the worst possible life and 10 represents the best possible life. Rungs 0 to 4 are labelled as "suffering", 5 and 6 are labelled as "struggling" and 7 to 10 are labelled as "thriving".[95] Diener *et al*. (1985) claimed that the results showed that the SWLS exhibited "favourable psychometric properties" and had high correlation between domain and global measures of satisfaction.

Huebner (1991) adapted the SWLS to develop a questionnaire specifically for children and young people called the Student's Life Satisfaction Survey (SLSS). It included ten self-report items designed to capture children's global life satisfaction. The nine items were designed to be comprehensible across different ages and intellects.[96] These were: 1 "I like the way things are going for me"; 2 "My life is going well"; 3 "My life is just right"; 4 "I would like to change many things in my life"; 5 "I wish I had a different kind of life"; 6 "I have a good life"; 7 "I feel good about what's happening to me"; 8; "I have what I want in life"; 9 "My life is better than most kids". The children were asked about their wellbeing during the past several weeks on a four-point scale of 'never', 'sometimes', 'often' and 'almost always'. The distributions for each answer were skewed towards the most positive responses in each case. To assess the validity of the survey, the results were compared to a separate sample, which allowed for the cross-validation of the factor structure of the SLSS as well as

[95] Correlation coefficients between Cantril's Ladder and SWLS were 0.62 for the first sample and 0.66 for the second sample.
[96] Teachers and reading specialists were consulted to ensure it was worded in a way which was appropriate for children aged 8 and above. When it was observed that the first class (grade 3) did not have difficulty with the instrument, the survey was repeated with other year groups.

make checks of its reliability and validity for the use of this questionnaire with children.

Huebner (2004) went on to review the literature that utilised his scale and made a few main conclusions. First, he found support for the convergent validity of different life satisfaction measures. Second, he found that life satisfaction is related to, but separable from various psychological wellbeing constructs such as self-esteem and positive and negative effect so these should be treated as different, but not entirely unrelated concepts. Third, most papers differentiate between different groups of children, such as those with learning difficulties, however he found that multidimensional measures may offer a more complete assessment for some groups. Finally, he found moderate stability among life satisfaction measures, which he argues to reflect more than just the influence of transitory affective states. Huebner's scale influenced several other indices of child wellbeing, including that of Bradshaw and Richardson (2009) and the Personal Wellbeing Index (PWI), commonly used in Australian studies.[97]

By contrast, some economics papers take a simpler approach by using a single measure for children's SWB but take care to include explanatory variables which cover the main domains of children's lives. For example, Powdthavee and Vernoit's (2013) study on parental unemployment uses a 1-7 scale of happiness as the outcome variable, with responses to questions on the child's experiences at school and at

[97] Tomyn and Cummins (2011) test the children's version of the PWI (the PWI-C), which includes eight domains of a child's life, all of which apart from two (relationships and community) show a statistical relationship with overall wellbeing. The domain with the strongest association with overall life satisfaction is achieving, followed by standard of living, safety, health, school satisfaction, and future. The authors evaluate the PWI-C measure using principal component factor analysis and conclude that it was a valid and reliable tool for measuring the subjective wellbeing of adolescents. Consistent with other literature, wellbeing falls as the participants get older.

home as controls. Similarly, Bubonya *et al.*'s (2017) study on parental unemployment includes data-rich vectors of personal and household characteristics, whilst Powdthavee and Vignoel's (2007) study on the transmission of wellbeing between parents and children includes a rich set of controls which captures the child's homelife.[98] They defend the use of the single measure with evidence from the psychology literature, which shows that subjective reports of wellbeing are substantially correlated with other measures such as assessments of wellbeing by friends and family (Costa and McRae, 1988; Diener, 1984; Pavot and Diener, 1993; Sandvitz *et al.*, 1993), and physical measurements such as "Duchenne smiles" (Eckman, Davidson and Friesen, 1990), and heart rate and blood pressure (Shedler, Mayman and Manis, 1993).

Collecting and analysing children's subjective wellbeing data in the UK

As with adult SWB, literature on child wellbeing at the subjective level is sparse and quite recent (from mid-2000s). The first organisation in the UK to collect national data on children's subjective wellbeing was the Institute for Social and Economic Research at the University of Essex in 1994, through its youth questionnaire, completed by children aged 11-15 as part of the British Household Panel Survey. It collected longitudinal data on children's happiness (on a scale of 0-30), worries (on a scale of 0-6) and self-esteem (on a scale of 0-15) until 2009. As part of the 18th wave in 2010, BHPS participants (both adults and children) were invited to join the larger and more wide-ranging survey *Understanding Society*, with children aged 10 to 15

[98] These included how often the child lost sleep from worrying, how many days they felt unhappy, how often they argued with their parents and how often they spoke with their parents about things that mattered to them.

completing a shorter *Youth Survey*. The questions regarding SWB fell into five categories, with children being asked, "How do you feel about your: a) schoolwork; b) appearance; c) family; d) friends; e) life as a whole?". Answers lay on a 7-point scale from "not happy at all" to "very happy". Elsewhere in the survey, there were questions which related to each of the first four domains, for example, how much importance they placed on exams or how many close friends they had.

The Children's Society was another organisation which collected SWB data on children (aged 11-15) in the UK, with the aim of determining the most common causes for children running away from home (see Children's Society 1999; Rees and Lee, 2005; Rees, 2011). Using Huebner's (1991) wellbeing scale, their questionnaire included six sections: personal characteristics; overall subjective wellbeing; feelings about school and aspirations; friendships; type of home and family structure and relationships with family or other carers; and experiences of running away. Lower levels of SWB were associated with higher risks of running away and was measured using the aggregated responses to five statements regarding their life, each scored on a 5-point scale,[99] but was also supplemented with a single measure of happiness, measured on a scale of 0-10, ranging from "Very Unhappy" to "Very Happy". There were no significant gender differences using the Huebner scale and only a very small difference using the single-item scale.[100]

Additionally, the authors explored 12 "domains" of children's wellbeing (influenced by the existing literature at the time), under the assumption that global wellbeing consists of a summary of judgements on multiple aspects of their lives. The domains

[99] The statements were: "My life is going well", "My life is just right", "I wish I had a different kind of life", "I have a good life" and "I have what I want in life". The 5-point scale ranged from "Strongly Disagree" to "Strongly Agree".
[100] The single-item scale showed a mean level of life satisfaction of 7.73 for girls and 7.88 for boys.

were: health, appearance, time use, the future, family, friends, home, money and possessions, school, local area, choice and safety. The children reported that they were most happy with family (mean score = 8.5 out of 10), health (8.2), friends (8.1), home (8.0) and safety (7.9).[101] Girls were found to be unhappier than boys in all domains apart from school and their future, the largest discrepancy being that 17% of girls were unhappy with their appearance compared to 8% of boys. When the single-item life satisfaction measure was used as the outcome variable, all domains apart from safety and local area were significant as explanatory variables, so the authors used the remaining ten domains to include in their proposed 'Short Index of Children's Wellbeing', measured using Huebner's (1991) life-satisfaction scale. The ten domains[102] were aggregated to produce a life satisfaction score of 0 to 100. The mean overall score is 75, a typical result for this type of measure, and the measure has good reliability and stability. A limitation is that it has not been tested on small sample sizes nor longitudinally to estimate changes over time.

More recently, The Children's Society has used data from Understanding Society in the *Good Childhood Report* (Children's Society, 2021), with the aim of improving the wellbeing of children in the UK. Its latest report shows that around 306,000 10- to 15-year-olds (7%) are unhappy with their lives (up from 173,000 in 2011). The main sources of unhappiness are dissatisfaction with school, friends and their appearance. Similar themes are identified in another UK children's survey called *TellUs* (Ofsted,

[101] This was followed by time use (7.4), money and possessions (7.3), school, local area, appearance (all 7.0), choice (6.9) and the future (6.8).
[102] I.e., family, friends, health, appearance, time use, the future, home, money and possessions, school, and amount of choice.

2008.[103] There are a few other less well-known sources of longitudinal child wellbeing data in the UK. These are discussed in the Appendix [C2].

5.2.2 Determinants of Children's Wellbeing

As with adult wellbeing, the academic literature which measures child wellbeing at the subjective level is quite recent (from mid-2000s) but is much sparser. Aside from subjective measures, two common themes in the psychology literature related to children's wellbeing are *Attachment Theory* and theories relating to the fundamental fulfilment of needs. However, these are fundamental psychological determinants of wellbeing, rather than factors which affect a child more transiently and so are less relevant to this study, however, a brief discussion can be found in the Appendix [C1]. Much of the literature does not include subjective measures, but related concepts such as confidence, self-esteem, self-identity, psychological health and school performance. Whilst many of the determinants are the same as, or similar to, the explanatory variables for adult wellbeing found in Chapter 3, young children and adolescents have sets of circumstances which are specific to their age and stages of development. These themes are discussed in turn below under the broad category headings of school, after-school activities, friendships, family relationships and structure, family financial situation, parental employment, child caregiving and children's health and personal care.

[103] Tellus find that the main areas of worry for children are exams (57% are worried about this), their future (49%), friendships (34%), their body (32%), schoolwork (31%) and their parents or family (30%).

School

Education and school-based activities are associated with various positive wellbeing effects for children. These include playing an important role in their social, emotional and behavioural wellbeing (Gutman and Feinstein, 2008), gaining self-esteem and dignity from success, sometimes through the channels of pleasing teachers or good peer relationships (Meadows, 1986); self-efficacy (Rutter, 1991), especially when it occurs through learning and achievement (Gilligan, 1998, 2000); developing resistance against adversity; (Daniel, Wassell and Gilligan, 1999) and allowing opportunities to "identify, develop and establish a fresh, more robust and socially valued aspects of the self" (Howe, Brandon and Schofield, 1999). Barber (1996) finds that children are generally happy at school unless there are specific circumstances which negatively affect their wellbeing. These include not having access to teachers when they need additional help, feeling that they cannot discuss their learning with their peers, and not having access to appropriate books or equipment to do their work. This is similar to the findings by The Children's Society's (2021), that happiness at school is associated with factors such as feeling safe at school, positive relationships with teachers and being listened to. Lower levels of SWB are associated with bullying and disruptive behaviour at school (Chanfreau *et al.*, 2008) and overall dissatisfaction with school (Children's Society, 2021), especially for boys (Ofsted, 2008).

After-school activities

Community groups and youth projects have been shown to help children form a positive self-identity (Jack and Gill, 2003) and can be especially helpful for children experiencing disruption or disadvantage (Gilligan, 1998). They allow opportunities for children to enhance their self-esteem and self-confidence through the use of "non-competitive, mastery-orientated activities and supplementary educational projects" (Thompson, 1995, p.174), which can include physical activities or something artistic, such as playing a musical instrument (Aldgate and McIntosh, 2006). Physical exercise in particular has been shown to reap physical, social, affective and cognitive benefits for young people (e.g., Baily *et al.*, 2007). Physically active children have been shown to report higher levels of SWB, even when controlling for other personal characteristics (Children's Society, 2021). Similar results are found for passive activities (e.g., listening to music, reading, surfing the internet). However, poorer levels of happiness with family, appearance, school, schoolwork and overall life satisfaction are associated with excessive internet use (over 4 hours per day). Poorer life satisfaction has also been associated with excessive gaming (Chanfreau *et al.,* 2008).

Friendships

Being part of a peer group is important for social development. Having friends is associated with opportunities for learning social skills, fun, companionship, exchange of knowledge and emotional support (Dowling, Gupta and Aldgate, 2006). Close friendships are associated with building resilience against adversity (Daniel and Wassell, 2002). Conversely, children with fewer closer friends they can turn to in a time of trouble report significantly lower levels of subjective wellbeing (Children's Society, 2021) and children's psychological development can be stunted if they experience a long period without friends. The effects can include emotional problems and poor school adjustment (Schaffer, 1996), and anti-social behaviour (Rutter, Giller and Hagell, 1998). Children and adolescents can also be socially excluded if their family cannot afford to buy them designer clothing or the latest toy (Dowling *et al.*, 2006), if they come from an ethnic minority group (Dwivedi, 2002) or if they are same-sex attracted (Remafedi, 1987). Jack and Gill (2003) argue that positive social interactions depend largely on the community in which the children are raised. They suggest that child wellbeing and other positive childhood outcomes are improved in communities where children feel they are in a good place to live (which might include those with anti-poverty resources, organised clubs and out-of-school activities), where children feel safe and have access to opportunities which develop their talents and interests.

Family relationships and structure

Bronfenbrenner's (1986) *Ecology Theory* argues that the wellbeing of family members is intrinsically linked to the family environment, especially for children for whom the family is the "principal context in which human development takes place". Family systems are seen by Minuchin (1974) as part of an interdependent ecosystem in which each family member impacts and is impacted by each other family member. Reviewing the literature in this area, Moore *et al.* (2002) report that SWB in children is strongly linked with "family strengths", in which 9 common indicators of "strong families" are identified: communication, encouragement of individuals, appreciation, religiosity or spirituality, time together, adaptability, clear roles, commitment to family, and social connectedness. SWB in children has since been shown to be positively impacted by home dynamics such as feeling supported by the family and sharing meals and time together (Chanfreau *et al.*, 2008). Children who are allowed to eat fast food on a weekly basis have higher wellbeing, although this may be explained by the social aspects of eating out, such as the family coming together. When such family effects are controlled for, poor parental health and disability are found not to exhibit any wellbeing effects.

In terms of family structure, several studies conclude that children from families with two married parents experience the best outcomes (e.g., Amato, 2005; Ribar, 2015). A mechanism for this is access to resources, which can especially be a problem for single parents (McLanahan, Knab and Meadows, 2009; Thomas and Sawhill, 2005), who may have less money for items such as books, clothes and after-school activities (Ryan, Kalil and Leininger, 2009). Household incomes may also be lower because single parents are more likely to be less educated (Brown, 2004; Graefe and Lichter, 2004). Children from single-parent families may also suffer from scarce time resources as there is no division of labour, with the parent splitting their time between the labour market, household tasks, financial management, childcare and their own welfare (McLanahan and Sandefur, 1994), although this may be alleviated, depending on the amount of support they can call upon from social networks (McCormick, Shapiro and Starfield, 1981). Single mothers are also more likely to suffer from depression and other psychological problems, which can impact their capacity to function as a parent (Friedlander, Weiss and Traylor, 1986; Osborne, McLanahan and Brooks-Gunn, 2004), and can in turn negatively affect the child's wellbeing (Dush and Adkins, 2009).

When parents divorce, there is large variability in the ways in which children adjust (Afifi and Schrodt, 2003; Lansford, 2009). Some exhibit poor academic, psychological and social functioning (e.g., Størksen *et al.*, 2005), whilst others function just as well as other children (e.g., Amato, 2001; Ruschena *et al.*, 2005). Re-marrying parents can be a further source of stress, which can impact upon academic performance (Jeynes, 2002). However, the child's response to divorce may also depend on their age and the amount of time since the divorce (Hetherington, 1989).[104] There are many developmental and health-related benefits to having a father actively involved in the upbringing, even if they are not resident in the household, including improving the quality of the mother's parenting (Carlson and McLanahan, 2009).

Estimating relationships between child wellbeing and parental divorce is complex, however. As Amato, Loomis and Booth (1995) explain, divorce is associated with other forms of upheaval in the child's life such as family conflict, possible remarriage, and relocation, so these would need to be controlled for in any empirical estimation. Furthermore, as child behavioural problems have been shown to be a factor leading to eventual divorce, any regression between child behaviour and divorce will be spurious. Parental conflict is also associated with dysfunctional social interactions, which can lead to emotional and behavioural problems (Cummings and Davies, 2002; Peterson and Zill, 1986; Osborne, McLanahan and Brooks-Gunn, 2004).

Family stability can also be an important factor. This is defined as having the same set of parents that were present at childbirth. Disruption can be a source of stress to the child, especially if the parent's new partner may not be as good a caretaker as the parent or guardian from birth (e.g., Fomby and Cherlin, 2007; Osborne and McLanahan, 2007). Cohabiting families have been shown to be most susceptible to instability, followed by single-parent families, then traditional married-couple

[104] Some of the early literature in this area uses a 'crisis' model which states that children struggle to adjust to the new circumstances in the short-term, but they stabilise over time (e.g., Chase-Lansdale and Hetherington, 1990). Later literature uses a 'chronic stress model', which suggests that the effects of parental divorce are long-lasting and may not be fully realised until much later in life (e.g., Wallerstein and Lewis, 2004; Huurre, Junkkari and Aro, 2006).

families (Craigie, 2008). In fact, stability appears to be more important than family structure itself; children from stable single-parent families tend to do better than those from unstable two-parent families (Heiland and Liu, 2005), including achieving better grades at school (Craigie, 2008) whilst children from stable co-habiting families have been found to do just as well as those from stable married-couple families if the co-habiting parents go on to later marry (Carlson and Corcoran, 2001).

Some studies have found that 'broken families' are not necessarily a source of poor wellbeing in children (Mooney, Oliver and Smith, 2009; Rees *et al.*, 2009). The extent to which family members get along with each other appears to be more important. Rees *et al.* (2009) finds family conflict to be the strongest factor associated with child unhappiness, whilst Gutman *et al.* (2010) finds improvements in child wellbeing to be positively associated with positive family relationships. Similarly, The Children's Society (2021) find that family relationships influence overall subjective wellbeing in teenagers much more than any other domain. Finally, family structure may affect child wellbeing through the channel of health; Bzostek and Beck (2008) find that children of single mothers have worse health outcomes across a range of measures,[105] consistent with findings in previous literature. There is no difference when looking at families with different levels of stability.

[105] These are being overweight or obese, having an asthma diagnosis, the mother's assessment of the child's health, whether the child was hospitalised in the last year, and whether the child had any accidents or injuries over the last year.

Family financial situation

The financial situation of the child's parents can affect their wellbeing in two ways; directly, for example, through material deprivation or its impact upon the child's health due to poor nourishment or living in cold and damp houses, or indirectly through bullying from peers or the behaviour of the parents or other carers towards them (Dowling *et al.,* 2006). Prilleltensky and Nelson (2000) suggest that parents with better financial resources are able to provide a wellness-enhancing environment for their children. In the opposite case, family poverty is argued to diminish the opportunities available for children to socially integrate and negatively impacts their self-esteem (Jack and Gill, 2003). Tomlinson, Walker and Williams (2008) find that growing up in impoverished households in the UK directly impacts upon children's SWB, with such children more likely to have a difficult home life, to feel isolated, suffer from anxiety, have negative attitudes towards school and learning, and to engage in antisocial or risky behaviour. The Children's Society (2021) come to similar conclusions, finding that any experience of household poverty at the age of 14 is associated with lower SWB and any experience of financial strain is associated with depressive symptoms and lower life satisfaction. One channel through which this operates is access to material goods; children's perceptions of their parent's financial situation are shown to be linked to their own happiness. Children's wellbeing may also suffer if they perceive that they are impoverished compared to other families (Robinson, McIntyre and Officer, 2005). Furthermore, children who live in areas of deprivation or temporary accommodation due to poverty are much more at risk from developing mental health problems (BMA, 2006).

Parental employment

As well as parental income, the nature of the parent's job and the amount they work can also impact the child's wellbeing because of the reduced time and energy they have to spend with their children (Jack and Gill, 2003). Jobs can provide opportunities for parents to create networks and become socially integrated within the community, whilst unemployment, or fear of unemployment, can cause stress to the parent which, in turn, can negatively impact how sensitively they can pay attention to their child (Jack and Jack, 2000). This is especially true when the nature of the parent's work results in the need for childcare. Children's wellbeing has also been shown to be negatively affected when parents work non-standard hours,[106] which can negatively affect children's wellbeing through mental health and behavioural problems, cognitive development, parental time spent with children, parent-child closeness, school engagement, extra-curricular activities, and sleep patterns (Li *et al.*, 2012).

Another issue is that of parental *unemployment,* which may impose stress upon the parent (Clark, 2003; Clark and Oswald, 1994), which can in turn transfer to the child (Powdthavee and Vignoles, 2008). The effects are likely worse for older children as parental unemployment may be a source of embarrassment or anxiety to them, whilst reducing their life aspirations and expectations (Christoffersen, 1994; McLoyd, 1989), and decreasing their SWB through an increased chance of being bullied (Brown and Taylor, 2008; Powdthavee, 2012). Using 15 waves of the youth sample from the BHPS survey, Powdthavee and Vernoit (2013) estimate the effects of parental unemployment upon children's SWB using a fixed effects model. The results

[106] This is defined as working the majority of labour hours outside of the standard Monday-to-Friday daytime schedule.

depend heavily on both the sex of the parent and the age-sex combination of the child. Younger children are actually found to experience a *positive* wellbeing effect from parental unemployment, explained by the extra time the parent was able to spend at home, but this either turns insignificant or negative as the child gets older.

Child caregiving

Children and adolescents are sometimes required to take on caring responsibilities (which would normally be undertaken by an adult) for a family member who is disabled, has special needs or a long-term illness.[107] Child caregiving is reported to impact wellbeing in two main ways; *physically,* if the child has to lift their ill or disabled family member in and out of furniture, which can lead to back problems (Hill, 1999); and *socially* if the number of social opportunities is restricted, especially if this leads to social exclusion and isolation (Aldridge and Becker, 1993; Frank, 1995). Caregiving has also been related to poorer school attendance and performance (Dearden and Becker, 2000), missing out on extra-curricular activities (Tatum, 1999), poorer wellbeing, expressed by feelings such as anger, resentment, isolation or exhaustion (Dearden and Becker, 2000; Frank, 1995), and higher frequency of reporting problems over and above those experienced by other children (Cree, 2003). The most frequently reported problem by young carers are with friends, followed by sleeping, school and home life.[108] Reports of various worries and problems increases

[107] At present, there is no single agreed definition for the term 'young carer'. The Welsh Government has defined the term as: *"…children and young people under the age of 18 who provide care, support or assistance to a family member with care needs. The majority of young carers care for a parent, but the person with care needs may be a sibling, grandparent or any other family member"* (Welsh Government, 2013, p.24).

[108] Although less prominent, they also reported problems related to suicide, truancy, self-harm, bullies, eating, the police and drugs, all at rates higher than people without caring duties.

with age, including sleeping problems, eating problems, truancy, trouble with the police, substance misuse, self-harm and worries about not having many friends. However, worries about bullying decrease with age. Girls are more likely to discuss worries and problems than boys, although this may be explained by girls' higher willingness to share their feelings (Carli, 1990). It may also be the case that girls are more likely to take on caregiving roles due to societal expectations (Dearden and Becker, 1995; Tucker and Liddiard, 1998). Cree (2003) also finds that the number of reported problems increases the longer the child has been a caregiver. Caregiving can also have positive effects however if it is deemed to be a fulfilling experience (Becker, 1995).

Children's health and personal care

When a child has a long-term health condition, wellbeing has been shown to significantly improve when the child is given an appropriate level of involvement in managing the condition (Eiser, 1993). For example, a study of children with asthma showed that if the children were educated about their condition, they were happier to take the required medicine (Holzeimer, Mohay and Masters, 1998). Possibly the most common health condition to appear in the literature amongst children is obesity. Overweight children have been reported to experience poorer wellbeing through the channels of social discrimination, teasing, psychological problems and poorer academic performance (Warschburger, 2005; Williams, Wake and Hesketh, 2005). They are also more likely to be bullied (Hill and Waterston, 2002) or stigmatised at school (Must and Strauss, 1999). The effects of obesity upon wellbeing may not be entirely exogenous as people who have poorer wellbeing have been shown to eat food which is high in fat or sugar as a response to distress (Cameron and Jones, 1985). Healthy eating in general has an effect upon young people's wellbeing; one study gave a group of undergraduates a healthy snack (fruit) to eat mid-afternoon for 10 days and another group an unhealthy snack (chocolate or crisps). Members of the group who ate the fruit report lower levels of anxiety, depression, emotional distress, cognitive difficulties and levels of fatigue (Smith and Rogers, 2014). Children in lower socio-economic groups have been shown to eat less healthily, which may be because their parents are restricted to purchasing food items with higher levels of fat and sugar because they are richer in energy and cheaper than fruit and vegetables (e.g., Acheson, 1998; Leather, 1996).

Other health-related themes in the literature were drinking alcohol, smoking, taking drugs and sexual activities. Studies have shown an association between teenage pregnancy and a dislike for school (Bonell *et al.*, 2005; Harden *et al.*, 2009) and a negative relationship between sexual activity and wellbeing whilst at school (Phillips-Howard, *et al.*, 2010). Binge drinking has been associated with poor school engagement (Viner and Taylor, 2007) whilst alcohol use has been associated with poor wellbeing in both school and at home (Phillips-Howard, *et al.*, 2010).

5.2.3 Transference of Wellbeing from Parent to Child

The presence of positive correlations between the wellbeing of family members was discussed in the Chapter 4, but for a review of the 'contagious' effects of wellbeing between family members, see Larson and Almeida (1999). There can also be strong spillover effects, particularly of mental distress, from one family member to another (e.g., Fletcher, 2009; Mervin and Frijters, 2014). Transient parental stress from, for example, having a bad day at work has been shown to directly impact upon their child's mental wellbeing in the short-term (Almeida, Wethington and Chandler, 1999; Downey *et al.*, 1999; Repetti and Wood, 1997). A diary-led study by Downey *et al.* (1999) uses a treatment group of parents who are in chronic pain and a control group of parents with no chronic pain. Whilst anger in a parent in the control group would get transmitted to the child through harsher parenting, the effects are not exacerbated in the treatment group, even though parents with chronic pain are more susceptible to becoming angry. However, in one study which includes only single mothers, it is demonstrated that signs of distress in the mother can significantly impact upon the wellbeing of the child, with levels of anger and anxiety in the mother being statistically related with those in the child (Larson and Gillman, 1999). In some studies, adolescent females often fare worse in response to transmission relationships as adolescent males normally possess higher psychological resources (e.g., Children's Society, 2021; Rutter, 1985), especially with regards to dealing with anxiety and depression (e.g., Nolen-Hoeksema and Girgus, 1994; Nolen-Hoeksema and Jackson, 2001; Raja, McGee and Stanton, 1992).

As discussed in Chapter 4, the literature points towards four possible transmission channels of wellbeing from one family member to another, and these apply to the parent-child dyad as well as between partners. The first is a potential spurious relationship as long-term couples and family members tend to share personality traits, common experiences and a common environment (e.g., Westman and Etzion, 1995; Westman and Vinokur, 1998). The second channel is what Westman and Vinokur (1998) describe as an "empathic reaction", a direct transmission of emotions from one family member to another. It occurs between close family members who have empathy for one another, to the extent that a feeling of stress in an adult can cause a concerned reaction in the child which affects their wellbeing. The third possible channel is indirect transmission through social interactions between family members. For example, if a parent is experiencing a high level of distress, this may trigger worsen negative parenting behaviours, causing distress to the child, which can reduce their life satisfaction over the longer term. (e.g., Jones and Fletcher, 1993; Schaefer, Coyne and Lazarus, 1981). A possible fourth explanation is that a parental life event such as unemployment can affect the wellbeing of the child in more practical ways; a few papers have found an empirical relationship between parental unemployment and poorer child wellbeing (e.g., Bubonya *et al.*, 2017; Kind and Haisken-Denew, 2012; Komarovsky, 1940; Powdthavee and Vernoit, 2013), but this effect often has specific channels such as lower incomes or the perceived stigma of having an unemployed parent.

5.2.4 Measuring Wellbeing of People with Disabled Parents

The wellbeing literature available on children or adults with disabled parents is not extensive. It typically consists of small sample sizes and focuses on the long-term relationships between children and parents with specific disabilities such as hearing loss (e.g., Bishop and Hicks, 2008; Mellett, 2016) or blindness (e.g., Bacon, 2006), in which the child's rights are discussed more frequently than their wellbeing. Several studies have shown that children of disabled parents are more likely to end up in the care system (e.g., Glaun and Brown, 1999; Swain and Cameron, 2003; Taylor *et al.*, 1991), and that disabled parents are more likely to face a termination of their parental rights (e.g., Powell, 2019; Singh *et al.*, 2012; Theodore *et al.*, 2018). Braun (2013) argues that in the US legal system, disabled parents are the most discriminated against with regards to retaining custody of children. Removal rates are as high as 70 to 80 percent among parents with a psychiatric disorder, 40 to 80 percent among parents with an intellectual disability and 13 percent where the parent has a physical disability. Disabled parents in general are more likely to lose custody or parental rights following a divorce, although what impact this has upon the child's wellbeing is not clear.

Disability can also impact someone's ability to parent effectively. Hogan, Shandra and Msall (2007) find that maternal disability is associated with a less enriching home environment[109] and a lower level of parental school involvement,[110] whilst paternal disability is associated with lower maternal monitoring and fewer positive family activities, explained by the mother dedicating more time to the disabled father than she normally would. In a more extreme example, Lightfoot and Slayter (2014) find that disabled parents in the US are 2.5 times more likely to engage in violence against their children, which helps to explain the over-representation of children from disabled parents in the care system. The risk factors for being an abusive parent included witnessing violence themselves as a child, mood or substance use disorders and engaging in or being the victim of violence as an adult.[111]

There are few sources of literature available which focus directly on the wellbeing of the child of a disabled parent. Early studies, reviewed by Olsen (1996), typically focus on the child as a caregiver and view this role in a negative light. A lot of the early literature was criticised by Kirshbaum and Olkin (2002) for allegedly claiming that disability severely limited parenting ability and for assuming a causal relationship

[109] An enriching home environment is defined as one in which there is availability of educationally enriching materials such as books and electronic resources.
[110] Parental school involvement includes being involved in educational activities such as helping with homework and attendance of parent-teacher meetings, and school participation.
[111] Note that this only refers to permanently disabled parents and not those who experienced onset after becoming a parent.

between parental disability and child behaviour problems without considering common factors such as poverty and lack of adequate support. The literature was also criticised for being small scale (N = 20 or less), not distinguishing between types of disability and between the age brackets of the children, overgeneralising from case studies and the use of clinical populations only (Jacob *et al*., 2019).

A reasonable starting point then may be the study by Olkin *et al.* (2006), which compares teens (aged 11-17) across the US with disabled and non-disabled parents. Disabled parents are only around half as likely to have worked in the previous week (39% versus 73%), are more likely to be single parents, less educated and less likely to be employed. These factors all negatively affect the household incomes of families with a disabled parent,[112] and around 25% of these families live below the poverty level when controlling for family size and geographical location. Type of disability also plays an important role because parents with multiple sclerosis, for example, are the least likely to be employed (34% at least part-time employed), whilst deaf parents are the most likely to be working out of all disabled parents (74%), compared to 75% of non-disabled parents. Parental disability is not found to increase the number of household responsibilities placed on teens such as chores. Parents with disabilities report greater positive attributes in their teenage children than non-disabled parents, particularly with how comfortable the teens feel around other disabled people, although some disabled parents feel that their children are less aware of what they feel was right and just. Parents with disabilities also report a few barriers that they feel their children have to deal with. These include worrying about rejection amongst

[112] The average income of a family with a disabled parent was $40,000, compared to $55,000 for a family without a disabled parent.

peers, greater transportation issues after school, and poorer overall health than teenagers without disabled parents.

Children living with a parent with a mental disability or poor psychiatric health have been shown to experience poorer health and social outcomes, and ongoing personal distress (e.g., Murphy *et al.*, 2017). It is noted in the literature that such children are at a greater than normal risk of developing poor mental health themselves, largely through the channels of reduced social engagement and social functioning (e.g., Afzelius, Plantin and Ostman, 2017; Vigano *et al.*, 2017), but also possibly through changes in family composition and living arrangements (Ranning *et al.*, 2016). Their quality of life, through the domains of emotional health, self-esteem, self-actualisation, social wellbeing and economic wellbeing are also argued to be negatively impacted (Bee *et al.*, 2013).

Another theme in the literature is that of stigma. Despite changes in attitudes over time, disabled people still experience a degree of stigmatisation (e.g., Austin *et al.*, 2004; Grinker, 2020; National Council on Disability, 2012; Vallabh *et al.*, 2014), including the stigma associated with disabled people becoming parents (e.g., BBC, 2019; Franklin *et al.*, 2021; Ivins-Lukse and Lee, 2021; Colic and Milacic-Vidojevic, 2020; National Council on Disability, 2012). Children of disabled parents have been reported as experiencing what has been termed “courtesy stigma”, or “stigma by association”, which involves public disapproval of associating with a stigmatised individual (Gill and Liamputtong, 2011; Green *et al.*, 2005). There is also evidence that the level of courtesy stigma increases with parental disability severity (Pakenham and Cox, 2012).

Criticising the lack of subjective measures of children’s wellbeing, Jacob *et al.* (2019) conduct a 55-item survey of 2,340 young people (aged 17-21) in the US, some of whom grew up with disabled parents. They find that those with disabled parents actually report fairly high levels of self-esteem, perceived relatively low levels of stigma associated with having a disabled parent, and most of them find the experience positive overall. This is consistent with the previous findings of Orth, Robins and Widaman (2012), who argue that self-esteem is an important indicator for young people. It is seen as a predictor of adjustment and well-being, positively associated to future relationship satisfaction, job satisfaction and positive affect, and negatively associated with depression and negative affect. This builds upon the family ecology model of Pederson and Revenson (2005), which sees self-esteem in children as a domain of wellbeing which has been shown to be positively related to parental illness. Parental disability is also argued to improve the quality of the parent-child relationship, with several papers showing that the quality and closeness of this relationship is a significant predictor of adolescents' self-esteem (e.g., Bulanda and Majumdar, 2009; Laible, Carlo and Roesch, 2004). A more recent study finds that self-esteem in children of disabled parents can be predicted with not only the level of perceived stigma, but also the amount of family support and resources available and the amount of socialisation with other families with disabilities (Krauss and Olkin, 2020).

5.2.5 Longitudinal Studies of Children's Wellbeing

Longitudinal studies of children's subjective wellbeing are relatively new to the literature, although a few examples can be drawn upon which deal with parental divorce, poor mental health and unemployment. For example, Sun (2001) takes US survey data from two waves (1990 and 1992) of the National Educational Longitudinal Survey of 15,000 students to examine the psychological effects upon them of parental divorce. A dummy variable denotes students who lived with both biological parents in 10th grade, but experience some form of disruption, such as parental separation or divorce by 12th grade. A second dummy captures any interaction effects between parental relationship disruption and the child's gender. Disruption is found to be negatively associated with children's SWB, with no significant gender differences between children, however all disruption effects could be totally or largely explained by pre-disruption changes in family circumstances. Looking across the longer term, Gruber (2004), using 40 years of US census data, finds evidence of poorer outcomes including increased suicide risk amongst young adults who experienced parental divorce during childhood.

Some longitudinal studies explore the effects of parental unemployment upon children. These include loss of self-esteem and self-destructive behaviour when the children become young adults (Christoffersen, 1994). Kind and Haisken-DeNew (2012) find that parental transition into unemployment affects the child's (aged 17-24) wellbeing, but it depends on whether the parent leaving work does so voluntarily or not. Furthermore, sons are found to be affected but not daughters. A more recent study by Bubonya, Cobb-Clark and Wooden (2017) uses multi-dimensional (individual, family, time) panel data from surveyed children in Australia to investigate the relationship between lagged parental job loss and adolescent children's mental health. It controls for both time-variant and time-invariant individual and family characteristics. A negative relationship is found, but only affecting girls. Their approach is very similar to that of Powdthavee and Vignoles (2007), who control for the same fixed effects whilst regressing lagged mental distress variables against children's SWB. Parental distress in the previous year is found to be a predictor of children's SWB in the next year, but not in subsequent years.

A slightly different approach, taken by Powdthavee and Vernoit (2013), acknowledges that adolescents change a lot psychologically between the ages of 10 and 15 and thus they may respond to life events of parents differently by age. Their empirical model uses data from the BHPS, an unbalanced panel which surveyed between 773 and 1217 children aged 11 to 15 each year over 15 years. It includes dummy variables to denote maternal and paternal unemployment, the age of the child, and interactions between the child's age and parental unemployment for each parent. The within-child estimates suggest that job-loss is associated with higher levels of happiness when the child is relatively young, perhaps explained by the extra time the parent is able to spend with the child. However, this relationship becomes either statistically insignificant or turns negative when the child grows older and the implications of unemployment become more apparent. The effects are unrelated to family income, parental interaction and school experience. Children act differently by gender; boys react worse to maternal unemployment whilst girls react much worse to paternal unemployment. The use of fixed effects estimation is argued to come with certain advantages, including being the ability to control for unobserved child-specific heterogeneity, thus eliminating the "influence of individual's inborn predispositions of self-reported happiness" which are constant over time (Powdthavee and Vernoit, 2013). This is particularly important if children's personality traits are correlated with those of their parents.

5.2.6 Summary

This review has shown that there are distinct differences in some of the determinants of children's SWB and the way they are measured and estimated empirically compared to their adult counterparts. The commonly used 'ecological approach', which argues that a change in one aspect of a child's life can have a strong impact upon another aspect, means that wellbeing is typically divided into several domains in many datasets, which the respondents are asked to rate separately on short scales. Despite this, more recent literature has tended to move away from multi-dimensional measures of children's wellbeing and towards a single overall measure, which has been shown to be consistent with aggregated measures from individual domains, whilst ensuring that all domains are covered by including variables from each of the domains as controls (e.g., Powdthavee and Vernoit, 2013).

There are many determinants of children's SWB prominent across the literature, some of which are more important than others. The experience of school is usually very positive, although wellbeing can be negatively affected through lack of resources, bullying or disruption. However, what children do *after* school appears to be just as important. Interacting with friends and engaging in leisure activities are crucial for building wellbeing, self-esteem, self-identity, and resilience against adversity, especially for those with difficult home circumstances or a disability. It is no surprise then that a lack of friends and social exclusion has been shown throughout the literature to exhibit the opposite wellbeing effects. The wellbeing of both boys and girls appears to decline from the ages of 10 to 15 as they deal with the complexities associated with growing up, but the decline tends to be steeper for girls.

Overall, children appear to derive the most wellbeing from spending time with family, but can also suffer significant wellbeing declines when family relationships go wrong, such as parental divorce and separation. Over the longer term, children from 'non-traditional' families appear to experience slightly poorer life outcomes but there is little evidence that family structure alone contributes significantly to children's wellbeing. More important is stability, positive relationships with family members and living in a household with minimal conflict. In summary, positive relationships with others, whether they are with friends, family or teachers can be argued to be the most significant driver of wellbeing in children. It is perhaps understandable then that parent wellbeing and child wellbeing appear to be closely related, as was concluded in several studies, although the transmissions for this channel are not entirely clear. They may arise from an empathetic basis, from sharing a similar set of circumstances or personality traits, or it may simply be because a shock such as disability or unemployment causes a set of practical problems which have consequences for both parent and child. If the child takes on a caregiving role, this can lead to problems with friends, sleeping and schoolwork, but young carers can also find caregiving rewarding and self-esteem building.

Finally, there is limited research on changes in children's SWB over time. Much of the literature has shown that SWB declines with age, possibly explained by the increasing responsibilities and complexities of life that children are exposed to as they get older, rather than underlying psychological reasons. This decline is commonly reported to be sharper for girls than for boys. The literature which explores the effects of parental disability on children is very limited, tends not to consider children's wellbeing, and does not consider any interaction effects between the gender of the parent, the gender of the child and the age of the child. However, a few studies which used longitudinal data offered an empirical approach for measuring children's wellbeing over time, taking account of exogenous shocks such as parental unemployment, which may affect children differently depending on their age or gender. These shall provide a useful framework from a which a model to test children's response to parental disability can be formulated. The use of fixed effects estimations proved to be particularly useful in the studies where longitudinal data were available (e.g., Bubonya *et al.*, 2017; Powdthavee and Vernoit, 2013; Powdthavee and Vignoles, 2008), as this allowed the researchers to control for unobserved child-specific heterogeneity. These include time-invariant characteristics such as personality traits which may be common between the parent and child, as well as genetic health conditions, which may be associated with a higher risk of developing a disability. Overall, the research questions posed at the start of this chapter remain largely unanswered, but work carried out by researchers such as Bubonya *et al.* (2017) and Powdthavee and Vernoit (2013) provide useful starting points for developing an empirical approach to estimating children's SWB, which can be adapted to measure the impact of parental disability.

5.3 Data and Definitions

5.3.1 Defining a Child and a Parent

As with previous chapters, the data is drawn from the annual survey *Understanding Society* across 9 waves between the years 2009 and 2018. This dataset provides a rich source of UK-based data covering multiple aspects of children's lives across several years of adolescence, including measures of SWB.[113] A child, for the purpose of this study, is any respondent from Understanding Society's *Youth Survey*. Children of adult respondents are given the opportunity to fill in self-completion questionnaires, which allow them to anonymously record their subjective responses to a variety of questions covering various domains of their lives. The full panel across the 9 waves of data includes a total of 35,222 responses of 13,344 children. All children in this survey are aged between 10 and 15, consistent with similar studies (e.g., Powdthavee and Vernoit, 2013). Below the age of 10, data are not available at the subjective level, whilst respondents aged 16 and over complete the adult questionnaire, which asks a different set of questions, including different wording for the questions on wellbeing. Despite this restriction, focusing only on children aged 10 to 15 ensures a level of homogeneity in the data, as every child is of school age.

Understanding Society and its predecessor, the British Household Panel Survey is a long-established data source for children's SWB in the UK, with BHPS panel surveys stretching back as far as 1991. Data from Understanding Society are used to inform The Children's Society's *Good Childhood Report* and are commonly used to analyse life satisfaction of children in the UK (e.g., Beardsmore, 2019; Daly, 2022; Orben *et al.*, 2022) and children's mental wellbeing (e.g., Blanden *et al.*, 2021; Smith *et al.*,

[113] See Section 3.3 from Chapter 3 for a fuller discussion of the dataset.

2021). Children who complete the Youth Survey can be linked to their parents using household identifiers and household person numbers. If one parent leaves the household through divorce or separation, data for the departed parent are no longer collected. As such, parent-child dyads are restricted to those that live in the same household.[114] Similar to other studies (e.g., Bubonya *et al*., 2017), the definition of a parent is broad and can include adoptive, foster, and stepparents in addition to natural parents, although different types of parent will be controlled for in the data analysis. Also consistent with previous studies, in the case where a natural mother is co-habiting with an unmarried male partner, that partner is classed as the *de facto* father to the child, and vice-versa where the sexes are reversed, (e.g., Bubonya *et al*., 2017; Powdthavee and Vernoit, 2013). The mainstage survey in Understanding Society is conducted alongside the youth survey and includes 407,353 observations of 85,849 adults between the ages of 16 and 104. This reduces to 321,233 observations of 72,879 adults when restricted to working-aged individuals and after omitting observations where there is missing data on sex, marital status, or geographical location.

Constructing the dataset for the purpose of analysis involves several stages. First, children are matched to their fathers using household identifiers to merge the youth and adult datasets. From this process, a total of 9,283 father-child dyads are identified from the 13,272 children in the panel, suggesting that 69.9% of children had a father who lived with them in the same household in at least one wave of the survey. Separately, children are matched to their mothers in the same way. This time, 12,551 mother-child dyads are identified, suggesting that 94.6% of children lived with

[114] This allows for a level of consistency with the previous chapter, in which a spouse was defined as the partner of someone who lived in the same household.

their mothers in at least one wave. These two new datasets are then merged to create a single dataset of 34,190 observations of 12,975 children,[115] which reduces to 25,941 observations of 8,372 children after excluding observations with missing data on wellbeing, disability or controls which could not be imputed from data in other waves.[116] The dataset includes 18,501 observations of 6,353 children from two-parent families. Of all observations of male parents in the data, 1,913 (10%) are not the child's natural born father and of the female parents, 336 (1.3%) are not the natural born mother. The data analysis will not include any controls which pertain to the mother or father alone, for example, instead of controlling for both parents' highest level of education, a variable will be generated which captures the highest level of education between both parents. This ensures that single-parent families are not excluded from the regressions because of missing data.

5.3.2 Defining and Measuring Parental Disability

Disabled parents within a given wave are identified in the same manner as disabled individuals in Chapters 3 and 4,[117] by choosing whether they have "substantial difficulties" with any areas of life from a given list.[118] When the adult data is linked to the child data, it can then be easily determined whether a child has a disabled parent or not in any given wave. This negates the need for children to declare whether their parent is disabled or not, so we can rely on the parents to declare their own disability

[115] This is 297 children fewer than the uncleaned version of the full youth panel. This discrepancy is explained by cases in which neither parent survived the data cleaning process in the mainstage survey.
[116] The imputation process is discussed in section 5.3.4.
[117] See section 3.3 from Chapter 3.
[118] This list is: mobility, lifting and carrying, manual dexterity, continence, hearing (apart from using a hearing aid), sight (apart from wearing glasses), speech and communication, memory and ability to learn, recognising physical danger, physical coordination, problems with personal care, or any other disability.

status, regardless of whether the child observes the disability or not. This is however, a potential limitation of the study, that it cannot be ascertained whether the child is able to accurately observe the parent's disability. Over the course of the survey, 22.4% of children had a father with a disability at some point across the 9 waves, and 27.4% had a mother with a disability in at least one wave. In just over half (52.2%) of the observations, neither parent has a disability, 13.1% of observations include a disabled father, 16.8% include a disabled mother and in just 2.6% of observations, both parents are disabled. These statistics do not account for the disability status of a parent who lives outside of the child's home.

5.3.3 Defining and Measuring Children's Wellbeing

The Youth Survey includes several measures of child wellbeing, including an overall measure. Children are asked to match how they feel about each measure against a series of drawings of faces, with the 'happiest' looking smiling face rated a 1 and the 'saddest' looking frowning face rated a 7. This order is the reverse of that used in the adult mainstage survey, so these responses are re-coded (reversed) in the data analysis to remain consistent with the previous chapters. Whilst much of the psychology literature uses complex methods to build an overall measure of children's wellbeing from multiple facets, this study retains a simple measurement using a 7-point scale. This approach is not only consistent with the rest of the thesis, but also with the approach taken in other economic literature (e.g., Bubonya *et al.*, 2017; Chanfreau *et al.*, 2008; Children's Society, 2021; Powdthavee and Vignoles, 2007) and has been shown to be a consistent measure of children's wellbeing in comparison to other methods, such as aggregating satisfaction scores from different facets of life which have been scored separately. Mirroring the approach of some other studies (e.g., Powdthavee and Vernoit, 2013), the other facets of children's wellbeing included in the youth survey (schoolwork, appearance, family, friends, and the school the child goes to) are still included in the empirical model, but through a series of controls. These are discussed more in section 5.4.4. The wellbeing question in the survey is worded as follows:

"The faces express various types of feelings. Below each face is a number where '1' is completely happy and '7' is not at all happy.

Please put an "x" in the box which comes closest to expressing how you feel about each of the following things…"

This is followed by five aspects of wellbeing:

"Your school work"

"Your appearance"

"Your family"

"Your friends"

"The school you go to"

Finally, a question is included to capture the child's subjective level of their overall wellbeing, considering all five aspects above. It is worded as follows:

"Which best describes how you feel about your life as a whole?"

Table 5.1 displays the means and standard deviations for overall life satisfaction, ordered by parental disability status. Children who do not have disabled parents rate their life satisfaction at 5.83 out of 7 on average. Whilst children with disabled parents report lower wellbeing scores, the differences are small; children with at least one disabled parent report average wellbeing of 5.72. Differences in wellbeing between the children's sexes, shown in Table 5.2, are not quite as large as suggested in the literature, although girls still report lower levels on average than boys, with the greatest difference found between children with disabled mothers. In this group, boys report a mean wellbeing score of 5.83, compared to 5.66 for girls. As shown in Table 5.3, for children with non-disabled parents, wellbeing declines from a mean score of 6.02 at age 10 to 5.61 at age 15. The greatest decline, however, is found for children with disabled mothers, whose mean wellbeing falls from 5.97 to 5.48 over the same age range.

Table 5.1. Mean children's subjective wellbeing by parental disability status.

	Obs.	%	Mean	Std. Dev.
Neither Parent Disabled	19,868	76.59	5.83	1.29
Either Parent Disabled	6,073	23.41	5.72	1.30
Father Disabled	2,521	9.71	5.67	1.39
Mother Disabled	4,227	16.29	5.74	1.24
Both Parents	675	2.60	5.70	1.28
Total	33,364	128.6		

Note: Consists of 25,941 observations.

Table 5.2. Mean children's subjective wellbeing by parental disability status and child's sex.

	Boys	Girls
Neither Parent Disabled	5.86	5.80
Either Parent Disabled	5.79	5.65
Father Disabled	5.71	5.63
Mother Disabled	5.83	5.66
Both Parents	5.71	5.68

Table 5.3. Mean Children's Subjective Wellbeing by Parental Disability Status and Child's Age.

	Age 10	Age 11	Age 12	Age 13	Age 14	Age 15
Neither Parent Disabled	6.02	6.00	5.90	5.77	5.68	5.61
Either Parent Disabled	5.92	5.85	5.86	5.69	5.55	5.46
Father Disabled	5.86	5.77	5.79	5.68	5.51	5.45
Mother Disabled	5.97	5.90	5.88	5.69	5.56	5.48
Both Parents	5.99	5.87	5.75	5.71	5.47	5.49

The literature frequently shows that adolescent boys report higher wellbeing than girls and that wellbeing declines for both sexes but more rapidly for girls. The pattern is present in this data also, as displayed in figure 5.1. The mean wellbeing for girls at age 10 is 6.05, dropping to 5.44 at age 15. The decline is less steep for boys, with a drop from 5.94 to 5.71 over the same age range.

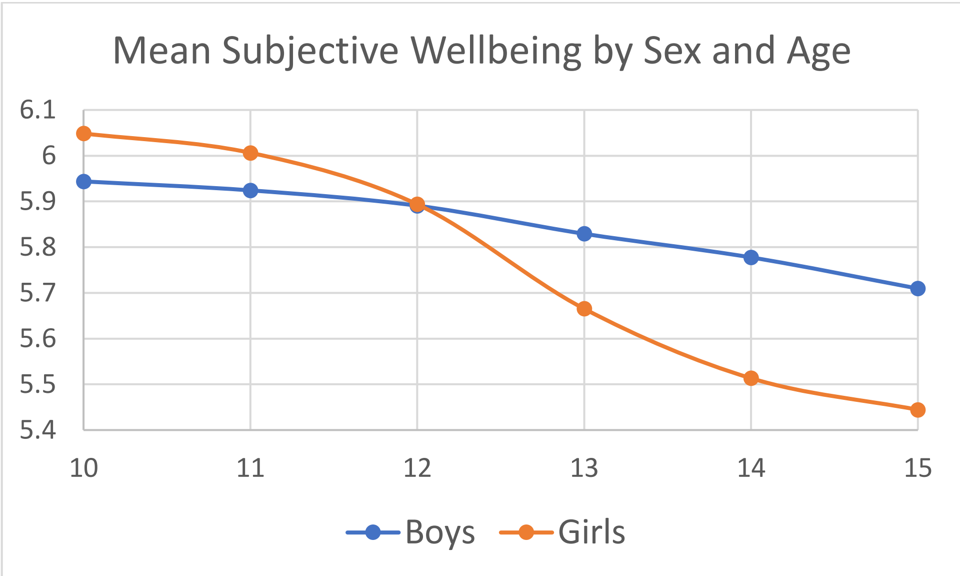


Figure 5.1. Mean subjective wellbeing by children's age and sex. Wellbeing is measured on an ascending scale of 1 to 7, where a 1 is 'Not at all happy' and a 7 is 'Completely happy'.

Figure 5.2 (i-viii) tracks SWB for boys and girls across the ages of 10-15 for different combinations of own sex, parent's sex and parent's disability status. In most cases, average SWB is lower for children of both sexes with disabled parents at all ages, which suggests that parental disability exhibits a negative wellbeing effect over and above the effects of age and gender, which will be tested later in the analysis. The life satisfaction paths for children with and without disabled fathers tends to diverge for boys and converges for girls, although the pattern is not repeated when the mother is disabled. There is no great difference in SWB for either sex between children who have two disabled parents, compared to just one.

5.3.4 Descriptive Statistics and Control Variables

The control variables included the data analysis are informed by the existing academic literature, which provides a substantial range of predictors of children's wellbeing. These can be broadly placed into roughly five domains: home and family life; school life; after-school activities; friendships; and health and personal care. These domains can be broken down further still, for example, 'home and family life' covers matters as diverse as family structure, stability and conflict in the household, parental education level, employment and income, and child caregiving. As discussed in the literature review, it is difficult to disentangle these five domains from each other, so the literature tends to take a holistic, or 'ecological' approach to these explanatory variables, assuming that a change in one domain of a child's life can easily influence another. Hence, an appropriate set of controls should be carefully chosen so that they represent each of the domains minimise whilst minimising collinearity between them, and also remaining as exogenous to children's subjective wellbeing as possible.

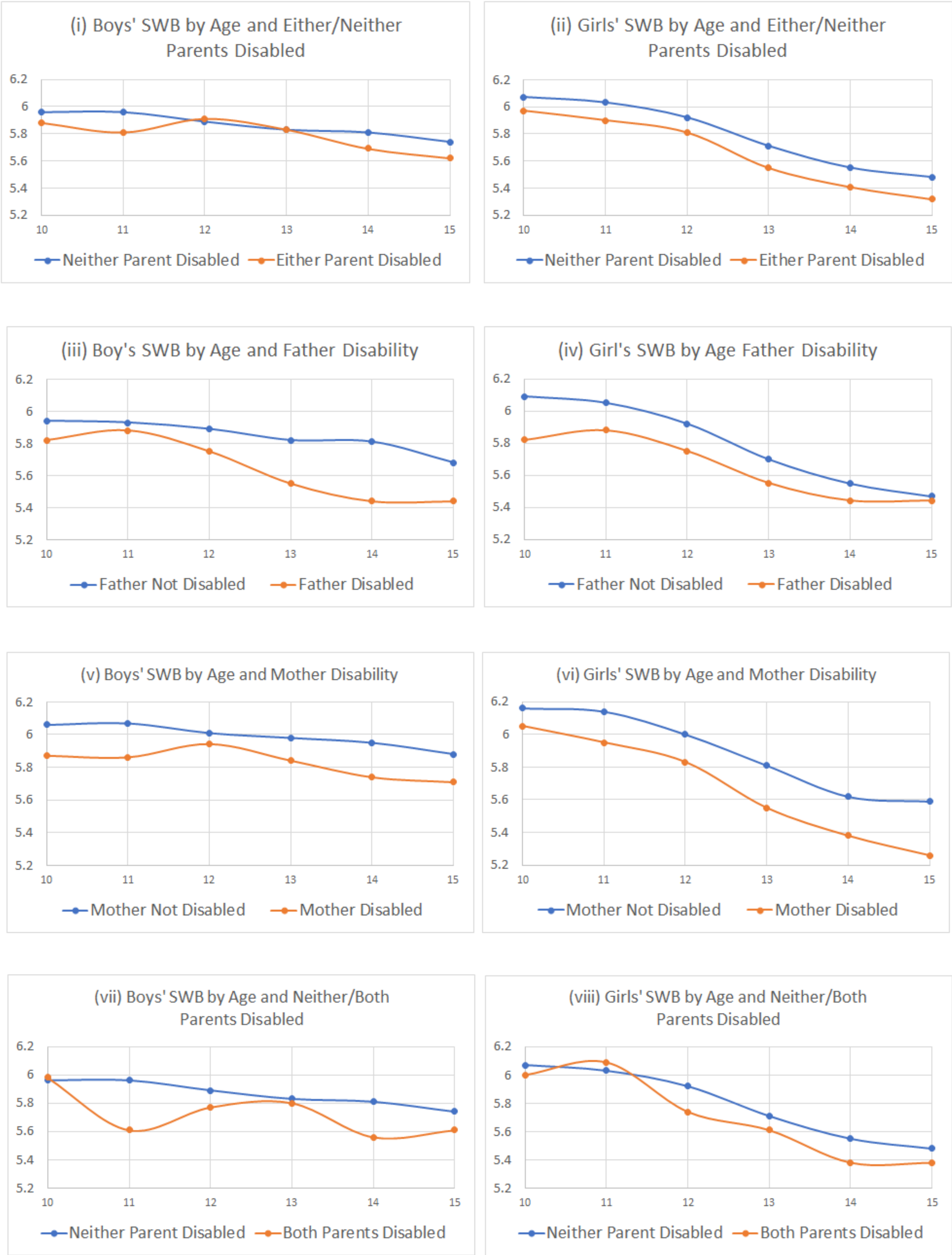


Figure 5.2 (i-viii). Mean subjective wellbeing by children's sex, children's age and parental disability status.

The study by Powdthavee and Vernoit (2013), which investigates the relationship between children's wellbeing and parental unemployment, includes questions from the five domains by analysing the BHPS, which includes data such as the parents' age, marital status, employment status and income level, as well as data on children's experiences at home and school. These include the fear of being bullied, whether they fought with someone in the last month, how often they talk with their parents about things that matter to them, and how many close friends they have. This chapter draws upon Powdthavee and Vernoit (2013) as a starting point to inform which controls should be used but is able to use a slightly wider selection of variables relative to those available in the BHPS. The variables which cover the five main domains are discussed below under the slightly broader headings of 'Family Life and Health' and 'School Life, Afterschool and Friendships' which cover matters outside and inside the home, respectively. Descriptive statistics for the control variables are shown in Table 5.4.

Family life and health

Several controls are included to capture elements of children's home life. Family structure was a prominent theme in the literature, with the best outcomes tending to arise from two-parent families (Amato, 2005; Ribar, 2015), especially compared to single mothers who may lack resources (Ryan, Kalil and Leininger, 2009), experience scarcity of time (McLanahan and Sandefur, 1994) and are at increased risk of mental health issues, which may transfer to the child (Dush and Adkins, 2009; Friedlander *et al.,* 1986; Osborne *et al.,* 2004). A variable is included which indicates whether the child is from a one-parent family, with two-parent families forming the reference group.[119] 69.3% of children with non-disabled parents come from two-parent families, which increases to 77.8% for those with a disabled parent, including 95.7% of children with disabled fathers. Dummy variables are also included to indicate how many siblings live at home with the child, with 1-2 siblings forming the reference group, the case in 62% of all observations. There are also dummies to denote that the child has 3-4 siblings, more than 4 siblings, or no siblings. The age of the oldest parent (mean parental age is 44.6) is also included to account for the higher prominence of disability among older adults. A set of dummies is included to control for the highest level of education between the parents and to reduce any potential selection effects which may arise from the tendency for disabled parents to have fewer years of schooling than non-disabled parents. They are also important as it influences household wellbeing in many ways including access to financial resources, housing and quality of food. Similar to findings in other studies, non-disabled parents tend to be slightly higher educated.

There are several other family-related variables within the dataset, although these are not included in the main regression as they are likely to be mechanisms through which parental disability may affect children's wellbeing.[120] These include parental

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[119] This variable determines whether, in a given wave, the child can be linked to both a father's and a mother's personal identification numbers in the mainstage survey, or whether if it can only be linked to either a mother or father. Identifying one-parent and two-parent families in this way is more accurate than determining family structure from the parents' declared marital statuses, as there can be inconsistency between parents' responses.

[120] Several other controls were considered, including questions on how often the child quarrels with their mother and father. They are not used as the question on how often children talk with their parents is already used as a measure of family closeness and there are also many missing observations. A question on how much fruit and vegetables the child eats was not used because it may be too closely related to parental income and education level, e.g., the average household income for families whose children claim not to eat any fruit or vegetables is £36,445 compared to £41,119 for those who eat at least 5 portions a day. Similarly, a question on the child's participation in sport was excluded as there was considerable cross-over between higher household income and engagement in sports. The dataset also includes variables which capture the child's engagement in hobbies and interests. However, the data are only available in four waves and again, high participation levels for most hobbies cross over strongly with parental income.

income, household income, parental labour hours, and a variable which measures closeness of the parent-child relationship by asking how often the child talks to their parents about things that matter to them. It is well established across the literature that disability is strongly associated with poorer economic outcomes such as lower incomes (e.g., Burkhauser, 1998; Charles, 2003; Stephens, 2004), fewer working hours (e.g., Meyer and Mok, 2018) and a decreased probability of unemployment and labour force participation (e.g., Jenkins and Rigg, 2004; Polidanu and Vu, 2013). Household income is included as it potentially affects children's wellbeing in a separate manner to individual parent's income, for example, pooled incomes allow the family to live in a larger house or in a preferred area. It is important to note that these figures are not conditional on employment status, so working hours recorded for parents who are unemployed, for example, are set at zero. This is because the purpose of controlling for labour hours is as a proxy for free time, rather than a control for income. It is hypothesised that working fewer hours may possibly be positively correlated with children's wellbeing, as was the case in Powdthavee and Vernoit (2013) for younger children. Naturally, labour hours are likely to at least partially explain the lower incomes earned by disabled parents. The average post-tax, post-transfer household income for families with non-disabled parents is £43,664, compared to £40,200 for families with at least one disabled parent and £37,894 for families with two disabled parents.

A subjective measure of the child's health is included as a control. Children are asked to rate their own health on a 5-point scale, ranging from 'Excellent' to 'Poor'. Whilst there may be a relationship between household income and the child's general level of health, it is also worth considering that there may also be common genetic or lifestyle factors between a disabled parent and their child, which should be controlled for. For example, a genetic health condition may be common between the parent and child. There are five options which the child can chose from to describe their own level of health, which are ‘Excellent’, ‘Very good’, ‘Good’, ‘Fair’ and ‘Poor’.[121] A slight concern with including this variable is that it is only present in 5 out of the 9 waves, so missing observations of this variable are imputed by taking the average scores from adjacent waves.[122] This is not an ideal approach, although as the only reason the data is missing is because the question was not asked in these waves and not from any potential selection effect, this is not a great concern. Furthermore, the main model in the analysis will be computed with the exclusion of imputed variables as a sensitivity check. Within the domain of home and family, there is also a variable in the dataset which can be used as a measure for how close the child feels to their parents. This will also be introduced as a sensitivity check, rather than as part of the main model. In Powdthavee and Vernoit (2013), the authors control for how often the child talks with each parent but in this paper, a combined variable is generated so that single parent families are not excluded from any regressions.[123] The most common response children give when asked how often they talk to a parent about such matters is “hardly ever”, given by 35.6% of children without a disabled parent and 39% of children with a disabled parent, although this rises to 41.5% of children with a disabled mother.[124] It is not obvious from the literature why children may discuss important matters with their mothers less often when their mother is

[121] There is an indication that children of disabled parents have slightly poorer health; 24.9% of children with non-disabled parents describe their health as ‘excellent’, compared to 20.6% of children with at least one disabled parent. At the other end of the scale, out of the children in the sample with non-disabled parents, 4.5% describe their health as ‘fair’ and 0.7% describe their health as ‘poor’, compared to 6.6% and 1.1%, respectively, for children with at least one disabled parent.
[122] The imputation process is discussed in the Appendix [C3].
[123] i.e., if a child states that they talk with their mother on ‘most days’ but their father ‘hardly ever’, they will be recorded as talking with a parent on most days.
[124] The other responses are ‘Less than once a week’, ‘More than once a week’ and ‘Most days’.

disabled, although it may possibly be related to feeling isolated (Ranning *et al.*, 2016), or poor social functioning (Afzelius, Plantin and Ostman, 2017; Vigano *et al.*, 2017).

School life, afterschool and friendships

An important driver of wellbeing is the relationships that children build outside the home (e.g., Children's Society, 2021; Daniel and Wassell, 2002; Dowling*, et al.,* 2006; Rutter, *et al.,* 1998), so a variable is included which asks how many close friends they have. The range of answers is quite large, so the responses are aggregated in the same manner as Powdthavee and Vernoit (2013): '6 to 10 close friends', 'over 10 friends', 'no close friends', and '1 to 5 close friends'. The latter category forms the reference group and contains the largest number of observations (55.1%). There is no obvious pattern which suggests that children with disabled parents have fewer or more friends than those without disabled parents.

Next, a variable is included to control for the child's ambitions and optimism about the future by asking them how much importance they place on exams. As discussed in the literature review, wellbeing and self-esteem can be derived from academic success (Meadows, 1986), although similar proportions of responses are found among children in all parental disability groups, so there is nothing to indicate from these statistics that children of disabled people are any more or any less ambitious. In 78.6% of responses, the child declares that their exams are 'very important', 19.5% say their exams are 'important', and only 1.3% feel their exams are 'not very important', with 0.6% feeling that they are 'not all important'.

Another question asks how much disruption they experience in the classroom caused by other pupils. Children with disabled parents appear to report disruption more frequently, for example, the response of ‘Most or all of classes’ is reported by 24% of children with non-disabled parents and 36% of children whose parents are both disabled. There is no obvious reason why disruption would vary among children with different parental disability statuses, although a suggestion may be that disruptive classrooms are found more frequently in low-income communities, where disability rates tend to be higher. The inclusion of this variable is treated with caution as it is not available in all waves, as was the case with the health variable discussed above, and missing observations are imputed. Again, a sensitivity check on the main model in the data analysis will be run whilst excluding this variable.

There is also a pair of questions in the survey which asks the child how often they are bullied, either physically or in other ways, however there is a lot of crossover between the two sets of responses. For example, of the children who say they are physically bullied ‘a lot’ (a few times a week), 61.2% also get bullied in other ways ‘a lot’, whilst only 11% are never bullied in other ways. To simplify matters, the two variables are combined into one which effectively asks, ‘How often do you get bullied at school in any way?’, where the highest-level response from either question is recorded as the answer. Within this new variable, 65% of children claim they do not get bullied at all, 24.1% are bullied ‘Not much’ (1-3 times in the last 6 months), 6.8% ‘Quite a lot’ (more than 4 times in the last 6 months), and 4% are bullied ‘a lot’. From the sample, 9.9% of children no disabled parents are bullied ‘Quite a lot’ or ‘A lot’, compared to 15.5% of children with two disabled parents. A problem with using these variables is that there is a high level of missing data as it is only available in certain waves. Missing data on bullying is imputed using information taken from other waves.[125]

Finally, a question is included which asks whether the child is a caregiver for another family member. Around 24.6% of children with non-disabled parents mention that they care for another household member. This rises to 33.6% if either parent is disabled and to 34.5% if both are disabled. There is limited data on caregiving within the dataset, so this variable is the only one which has sufficient enough numbers to be used in the analysis. However, there are limitations with this variable; first, the question refers to caring for any family member, not just parents; second, the reason for caregiving may be for causes other than disability, such as poor health; third, there may be measurement error, for example, the question, '*Do you care for another family member?*' may be open to interpretation (e.g., caring *about* another family member, doing household chores for them); fourth, the question is only asked in four of the nine waves (waves 3, 5, 7 and 9). It is possible to limit caregiving data so that it includes only children who care for a parent, however, the sample sizes are too small for the purpose of statistical analysis. Therefore, a single measure of weekly caregiving hours is used, which covers caregiving for any family member, but is hypothesised to either stay the same or increase as a result of parental disability.

[125] See Appendix [C3] for tables of samples sizes before and after imputations and a brief discussion of the imputation process.

Table 5.4. Descriptive statistics.

	Neither Parent Disabled	Either Parent Disabled	Disabled Father	Disabled Mother	Both Parents Disabled
Whole Sample	76.59%	23.41%	13.12%	16.76%	2.60%
Child's Age					
10	14.66%	13.64%	13.50%	13.66%	13.19%
11	17.68%	16.38%	16.28%	16.38%	16.00%
12	17.99%	17.42%	17.43%	17.28%	16.59%
13	17.92%	19.33%	19.77%	19.03%	19.11%
14	17.59%	18.67%	18.34%	19.12%	20.30%
15	14.16%	14.57%	14.69%	14.53%	14.81%
Child's Sex					
Male	50.22%	49.63%	51.96%	48.21%	49.48%
Female	49.78%	50.37%	48.04%	51.79%	50.52%
Family Structure					
One parent in household	30.67%	22.16%	4.32%	29.26%	0.00%
Two parents in household	69.33%	77.84%	95.68%	70.74%	100.00%
Only child	27.06%	32.29%	31.22%	32.81%	31.56%
1-2 siblings	63.35%	57.73%	58.03%	57.25%	55.85%
3-4 siblings	8.20%	8.55%	9.44%	8.33%	10.52%
Over 4 siblings	1.38%	1.43%	1.31%	1.61%	2.07%
Age of Oldest Parent					
Age of Oldest Parent	44.39	45.11	46.27	44.54	45.94
Highest Education Level Between Parents					
No Qualifications	24.83%	28.90%	29.31%	29.50%	34.22%
School	30.15%	33.57%	31.22%	34.37%	29.78%
Higher Education	45.02%	37.53%	39.47%	36.12%	36.00%
Parental Labour Hours					
Father labour hours	28.61	22.70	20.11	23.71	17.48
Mother labour hours	17.91	12.78	14.24	11.74	11.43
Parents' Incomes (£ Post-Tax, Post-Transfer)					
Father's income	27,858	23,270	20,139	24,522	17,119
Mother's Income	17,602	16,431	15,773	16,654	15,474
Household income	43,664	40,200	39,931	39,993	37,894
Subjective Level of General Health					
Excellent	24.87%	20.58%	19.60%	20.51%	16.44%
Very good	45.37%	43.26%	44.51%	42.70%	44.44%
Good	24.60%	28.45%	27.85%	29.98%	29.48%
Fair	4.49%	6.57%	6.90%	6.55%	7.70%

Poor	0.66%	1.14%	1.15%	1.25%	1.93%
Number of Close Friends					
1 to 5	53.26%	55.59%	54.15%	56.75%	57.48%
6 to 10	30.19%	27.71%	28.96%	26.69%	25.93%
More than 10	12.59%	12.51%	13.01%	12.33%	13.19%
None	1.65%	1.99%	1.67%	2.08%	1.33%
Importance of Exams					
Very important	79.06%	77.08%	78.02%	76.44%	76.59%
Important	19.21%	20.48%	19.67%	20.94%	20.30%
Not very important	1.19%	1.71%	1.55%	1.85%	1.93%
Not at all important	0.54%	0.72%	0.75%	0.78%	1.19%
Others Misbehave in Class					
Most or all of classes	22.78%	29.12%	30.50%	29.40%	36.02%
More than half of classes	22.40%	20.45%	19.32%	20.66%	17.49%
About half of classes	18.08%	17.46%	16.21%	17.87%	15.40%
Now and then	33.23%	29.55%	30.26%	28.79%	27.35%
Not a problem	3.51%	3.41%	3.71%	3.28%	3.74%
Talks to Parents About Personal Matters					
Most days	19.17%	20.01%	21.58%	19.40%	22.07%
More than once a week	21.33%	19.50%	22.05%	18.67%	23.85%
Less than once a week	23.92%	21.51%	22.49%	20.46%	18.67%
Hardly ever	35.58%	38.99%	33.88%	41.47%	35.41%
Frequency of Bullying					
Never	66.28%	60.97%	61.61%	60.03%	57.46%
1-3 times in last 6 months	23.84%	25.06%	24.73%	25.56%	27.01%
4+ times in last 6 months	6.12%	8.96%	8.44%	9.52%	10.60%
Few times a week	3.77%	5.01%	5.22%	4.88%	4.93%
Cares for Other Household Member					
Yes	24.61%	33.59%	32.35%	34.50%	34.49%
No	75.39%	66.41%	67.65%	65.50%	65.51%
UK Region					
London/South	32.36%	30.43%	28.44%	31.25%	28.15%
Midlands	25.36%	24.49%	25.55%	24.49%	28.44%
North	21.39%	23.35%	23.28%	23.26%	22.52%
Scot/Wales/N. Ire.	20.49%	21.67%	22.57%	21.01%	20.89%
Rural/Urban Residence					
Rural	24.68%	20.68%	20.35%	21.01%	21.48%
Urban	75.32%	79.32%	79.65%	78.99%	78.52%

Note: Figures in percentages represent proportions of the observations in the dataset.
All other figures represent the average value for each variable.
Includes 25,941 observations of 8,372 children aged 10 to 15 over 9 waves between 2010 and 2018.

5.4 Methodology

5.4.1 Main Model

The first research question asks whether there is any evidence of an empirical relationship between parental disability and children's subjective wellbeing. The main model that will be used to estimate this relationship is specified as follows:

$$SWB_{it} = \alpha_i + \beta X_{it} + \gamma PD_{it} + \lambda_t + \varepsilon_{it} \qquad (1)$$

where SWB_{it} represents the overall subjective wellbeing of child i at time t, measured on an ascending 7-point scale; α_i represents individual child fixed effects; X_{it} is a vector of individual and household characteristics; PD_{it} is a dummy variable, equal to one if at least one of child i's parents is disabled at time t (although later specifications differentiate between the sex of the disabled parent); λ_t represents yearly fixed effects from 2010 to 2018, with 2009 forming the reference group, and ε_{it} is a robust error term, clustered on the individual child. The coefficient of interest is γ, which is interpreted as the within-child difference in wellbeing associated with disability in at least one parent, relative to the child's level of wellbeing when neither of their parents are disabled. It is hypothesised that parental disability is associated with negative wellbeing effects.

The model is built in stages, starting with a regression of parental disability upon children's SWB under Pooled OLS, before being estimated under random effects (RE) and fixed effects (FE). All estimations will include a series of time dummies (λ_t). An advantage of Pooled OLS and is that it allows for comparisons between children with and without disabled parents. An advantage of RE over Pooled OLS is that it allows for a degree of individual heterogeneity, although it assumes that the constant term in the equation is drawn from a random distribution. FE, however, assumes that individual heterogeneity is related to the personal characteristics of the child and also estimates the within-child deviations from the mean or changes over time. By controlling for child fixed effects, the inference is driven only by time-varying characteristics. As such, the interpretation of the coefficient on the parental disability dummy is the wellbeing difference between the child with a disabled parent and the same child without a disabled parent.

The FE model is initially run without a set of control variables, followed by a standard set of 'pre-determined controls' which are not expected to have a mediating effect through which parental disability may affect SWB. These are: a set of dummies to represent the child's age from 11 to 15 (with age 10 forming the reference age), a set of dummies to represent the number of siblings the child has, ('3 or 4', 'more than 4', and 'only child', with '1 or 2' forming the reference group), the highest level of education between the parents ('School', and 'Higher Education', with 'No qualifications' forming the reference group[126]), the area of the UK the respondent lives in ('North', 'Midlands', 'Scotland, Wales or Northern Ireland', with London and the South forming the reference group[127]), and a dummy to represent whether the respondent lives in an urban area.

In the next step, a series of 'mediating controls' are included one at a time, which are suspected to have a potential mediating effect upon children's SWB. A control for

[126] These categorisations have been condensed due to low sample sizes. Qualifications at the 'School' level include GCSE, AS Level, A Level and Baccalaureate or equivalents. Qualifications at the 'Higher Education Level' include trade apprenticeships, college qualifications such as HNC and HND, undergraduate degrees and postgraduate degrees.

[127] These areas have also been condensed due to low sample sizes. 'North' covers northwest England, northeast England and Yorkshire and Humberside. 'Midlands' includes the West Midlands, the East Midlands and East Anglia. 'London and the South' includes London, southwest England and southeast England.

single-parent families accounts for the possibility that parental disability may contribute to the break-up of a family (e.g., Singleton, 2012). A control for the child's health is included as this may deteriorate if disability affects the parent's ability to raise their children. Household income is included, which may diminish following parental disability. Disability is strongly associated with lower incomes across the literature (e.g., Charles, 2003; Jolly, 2013; Meyer and Mok, 2019; Singleton, 2012; Stephens, 2001), and this is also true in this dataset. There is also a lot of crossover in the data between lower household incomes and other variables associated with child wellbeing, such as the amount of fruit and vegetables they eat on a typical day and how often they engage in sporting activities or other hobbies, so this variable potentially covers several possible drivers of wellbeing. In a similar vein, controls for the number of labour hours each parent is able to work are included. While higher labour hours are usually associated with higher parental incomes, the hypothesis here is that children may also derive positive wellbeing from parents working fewer hours if it means that they spend more time at home. This was the case in Powdthavee and Vernoit (2013), who found that unemployment in parents was associated with higher levels of wellbeing in younger children. Both parents' SWB are included as the literature provides a lot of evidence for transference of wellbeing between family members (e.g., Larson and Almeida, 1999), including between parents and children (Almeida, Wethington and Chandler, 1999; Downey *et al.*, 1999; Repetti and Wood, 1997). A control is included which accounts for whether the child feels that they are able to talk to their parents about matters that are important to them and provides a proxy for the level of closeness between parent and child. It is shown in section 5.3.4 that children with disabled parents are less likely to talk with them about personal matters, although the reasons are not entirely clear. However, closeness between the child and parent has been shown to be a significant predictor of self-esteem in adolescents (Bulanda and Majumdar, 2009; Laible, Carlo and Roesch, 2004). Controls are included which account for whether the child is bullied at school, and relatedly, how much disruption there is in class, which may potentially increase due to the stigma which can be associated with bullying (e.g., Franklin *et al.,* 2021; Ivins-Lukse and Lee, 2021; Vallabh *et al*., 2014). A control for the number of close friends a child can turn to at a time of crisis is included in case this provides a buffering effect against parental disability. A control for the importance the child places on passing exams is included under the speculation that a child with a disabled parent may view their life differently as a response, for example, they may view themselves as a long-term carer and as such may feel that they can no longer live away from home for university. Finally, a dummy is included as a control, which is equal to one if the child cares for at least one of their parents.

Use of fixed effects estimation

There has been some discussion in the literature over the use of fixed effects estimations with children's data, particularly by Amato and Anthony (2014) and McLanahan, Tach and Schneider (2013). The latter of these papers discusses the problems when estimating the causal effects on father absence on children's wellbeing, where traditional approaches relied on OLS estimations of cross-sectional data. The main issues with OLS were omitted variable bias, the possibility that multiple (and reciprocal) causal effects are at work, and the fact that there may be multiple treatment conditions and that these may change across subgroups and over time. If the inference is that the treatment condition (fatherlessness in the case of McLanahan *et al*., 2013) is causal, this relies on the assumption that there is no correlation between it and the error term, which is violated if some omitted variable influences both the treatment condition and the outcome variable (children's wellbeing). Adding additional controls is not necessarily the correct solution as it does not guarantee to capture the omitted variable and can make matters worse as including multiple parental and child characteristics may result in these two sets of controls reciprocatively influencing each other, or if any of the controls are endogenous with the treatment condition. The ability to deal with omitted variable bias was the main reason argued by Amato and Anthony (2014) that it was the best method to estimate the causal effects of divorce and parental death on various childhood outcomes over several alternatives. It was deemed possible in the case of parental death that there may be a degree of self-selection, such as risky behaviours prior to death, therefore FE was useful to adjust for stable, unobservable parental traits which increased the risk of death. FE is seen as advantageous by McLanahan *et al.* (2013) over other panel data methods such as Lagged Dependent Variable models and Growth Curve Models as it exploits the longitudinal nature of the data to hold individual child characteristics constant. Thus, it can estimate the effects of the treatment condition upon child wellbeing using only the associations between within-child changes in family structure and within-child changes in the child's wellbeing, effectively by including a time-invariant dummy variable for each child and removing the effects of any time-varying omitted variables from the error term. FE is also advantageous in that it controls for aspects of the child that are difficult or impossible to observe, such as personality traits (Allison, 2005; Rabe-Hesketh and Skrondal, 2012). In the case of this chapter, FE ensures that if there is some variable which influences both children's wellbeing and parental disability (e.g., health problems or risky behaviours which make the parent more likely to become disabled), this potential bias does not influence the results. Another reason to use FE is the potential efficiency gains over other methods. Reinhard *et al.,* (2018) examines the effects of economic recession on children's health and argues that FE is more effective than first-difference models when there are more than two waves of data, citing Allison (2009), although a first-difference model yielded similar results.

A disadvantage of FE to estimate children's wellbeing is that it cannot control for unobserved time-variant cofounders which jointly influence the treatment condition and child wellbeing. Another concern, raised by McLanahan *et al.* (2013), is that it provides an estimate of the child's change in experiences of being with and without a father (or in the case of this thesis, with and without parental disability), rather than providing an estimate of the effects of living in stable family (or parents who are consistently disabled or non-disabled). This is because FE compares children within the treatment group, rather than between the treatment and the control group, so this should be considered when interpreting the results. A final concern is that FE is sensitive to measurement error because estimates of the effect of a change in father absence (or parental disability) rely on within-child changes; it is theoretically possible that children become better able to report their life satisfaction more accurately as they get older (or more mature). There may also be measurement error regarding the parent's disability status, which may be exacerbated if the child is not easily able to observe the disability or its effects.

5.4.2 Model Extensions

The second research question asks whether the results from the main model change depending on the nature of the parent's disability or the characteristics of the child. To investigate this, the main model is extended in several ways. First, the parental disability dummy is replaced with a pair of dummies to denote severe or non-severe parental disability. The Severe dummy is equal to one if at least one parent is severely disabled whilst the Non-Severe dummy is equal to one if at least one parent is non-severely disabled (but neither parent is severely disabled). The definitions of severity remain consistent with previous chapters; a parent is severely disabled if they report difficulty with more than one area of life from a given list or non-severely for a single area.[128] Severe parental disabilities are expected to exhibit a larger impact upon children's wellbeing because the parent is able to carry out fewer daily tasks such as working in the labour market, working in the household or attending leisure activities. In the second extension, the longitudinal aspect of the data is exploited by differentiating between new and recurring parental disabilities. A 'new' parental disability is defined as one which occurs immediately after a period of non-disability, whilst a 'recurring' parental disability occurs immediately after a previous period of disability, in which case the effect of disability in this period is hypothesised to affect children's wellbeing by less as there is no 'shock' effect of a new disability. Alternatively, the effect may be in the opposite direction if there is a scarring effect from previous parental disability. In the third extension, the model is run on a sample which includes only children who belong to two-parent families (18,501 observations). It is hypothesised that two-parent families may find it easier to pool resources when one parent becomes disabled, whereas single-parent households may be more affected by disability as there is no division of labour between parents, so resources may be stretched between the home and the labour market (see McLanahan and Sandefur, 1994). Single parents are also already prone to mental

[128] These areas are mobility; lifting, carrying or moving objects; manual dexterity; continence; hearing; sight; communication or speech; memory or ability to learn, concentrate or understand; recognising danger; physical co-ordination; difficulties with personal care; and other disability.

health issues which can impact on their ability to parent, which may be also exacerbated by disability (Dush and Adkins, 2009).

In another extension, the main model is run separately so that the parental disability dummy, PD_{it}, represents either paternal or maternal disability in each case, whilst the disability status of the opposite-sex parent is allowed to take any value. There is also a specification which includes dummies for both maternal and paternal disability and an interaction effect between the two factors. It is hypothesised that paternal disability may exhibit a greater impact than maternal disability as it is likely to have the greatest effect upon household income, whereas the effects of maternal disability may be mitigated by the substitution effect of the mother spending more time at home following disability.[129] Next, the model is extended to interact the children's age and sex with the parental disability dummy, separately and then together. This is to take account of the ways in which children of different age-sex combinations potentially respond differently to exogenous life events (such as found by Powdthavee and Vernoit (2013) with parental unemployment). The first model extension is specified as follows:

$$SWB_{it} = \alpha_i + \beta X_{it} + \gamma PD_{it} + \delta\ (PD_{it} \times S_i) + \lambda_t + \varepsilon_{it} \qquad (2)$$

This is the same as (1) but with the addition of the term $(PD_{it} \times S_i)$, which is an interaction between the child's sex and parental disability. The time-invariant term S_i represents the sex of child i. As one category (boys) must remain as the reference group, S_i is simply a dummy, equal to one if the child is female. There are two main coefficients of interest here, the first is γ on the dummy on parental employment, which was also included in (1). The other is δ the on the interaction term, which will

[129] See section 3.44 under the 'Parental Employment' sub-heading for a discussion of the effect of maternal labour hours.

show whether there are any additional wellbeing effects of parental disability experienced by girls alone. The second specification is as follows:

$$SWB_{it} = \alpha_i + \beta X_{it} + \gamma PD_{it} + \sum_{a=11}^{15} \zeta_a (PD_{it} \times A_a) + \lambda_t + \varepsilon_{it} \qquad (3)$$

This is similar to (2), although the parental disability dummy is now interacted with a vector of five dummies, A_a, which represent the ages 11 to 15, leaving age 10 as the reference group. This interaction is represented by the term $(PD_{it} \times A_a)$. There are also two main coefficients of interest in this specification. Again, one of these is γ on the parental disability dummy, and the other is ζ_a, which represents any additional wellbeing effects of parental disability which occur at each respective age.

The third specification is:

$$SWB_{it} = \alpha_i + \beta X_{it} + \gamma PD_{it} + \delta\,(PD_{it} \times S_i) + \sum_{a=11}^{15} \zeta_a (PD_{it} \times A_a)$$

$$+ \sum_{a=11}^{15} \eta_a\,(PD_{it} \times A_a \times S_i) + \lambda_t + \varepsilon_{it} \qquad (4)$$

This includes three-way interactions between parental disability, children's age and children's sex, represented by the term $(PD_{it} \times A_a \times S_i)$, in which 10-year-olds and boys form the reference groups. To properly isolate the effects of disability upon different combinations of age and sex amongst children, this model also includes both sets of two-way interactions, $(PD_{it} \times S_i)$ and $(PD_{it} \times A_a)$ from equations (2) and (3). The main coefficients of interest from equations 1-3 (γ, δ and ζ_a) are included here alongside a fourth, η_a, which represents the effects of parental disability on each children's sex-age combination.

5.5 Results

5.5.1 Main Model Results

Table 5.5 displays the first set of results, in which parental disability dummies are regressed against children's subjective wellbeing. In (i), the coefficient on parental disability is negative (-0.109) and statistically significant at the 1% level when estimated under Pooled OLS, implying that children with at least one disabled parent report lower levels of wellbeing than children whose parents are not disabled, by 0.109 points (on a 7-point scale). A Breusch-Pagan Lagrange Multiplier test is carried out with the null hypothesis that the data can be pooled.[130] This null is strongly rejected ($\bar{\chi}^2$-statistic = 4665.58), so the equation was estimated under RE in (ii). Under this estimation, the coefficient on parental disability is diminished by around two-thirds (-0.036) and is now only significant at the 10% level. Under fixed effects in (iii), the sign of the coefficient switches to positive (0.034), suggesting a positive effect of parental disability upon children's SWB, although this time it is not statistically significant. Under FE, the coefficients are interpreted as within-child, rather than between-child differences in SWB, holding personal characteristics of the child constant over time. A Hausman test is conducted and the null hypothesis that the RE models is the preferred estimator was strongly rejected (χ^2-statistic = 158.78).[131] A Wooldridge test finds strong evidence of autocorrelation and a Modified Wald test finds strong evidence of groupwise heteroskedasticity in the data,[132] so

[130] See Appendix [C4].
[131] See Appendix [C5].
[132] See Appendix [C6, C7] for these tests.

robust standard errors are used, clustered on the individual, as is standard practice in similar studies.[133]

The inclusion of the set of 'pre-determined controls' in (iv), in what shall henceforth be referred to as the 'main model', has little effect on the result (0.035), although this is not surprising as they were chosen for their non-mediating effects upon SWB. The coefficients on the controls suggest that children's SWB declines with age, however no other controls, except for time fixed effects, exhibit a statistically significant effect upon SWB.

The non-significant result under FE was unexpected, as it was hypothesised that parental disability would exhibit some form of negative effect upon children's wellbeing, especially as there were several potential channels of transmission. The main implication of these findings is arguably a positive one – that on average, children experience no difference in SWB between periods of parental disability and parental non-disability. These results should be treated with caution however because of the negative and significant result found under OLS, that children with disabled parents experience lower SWB compared to children with non-disabled parents. Under FE, the results imply that a child does not experience significantly different levels of SWB in periods of parental disability and non-disability. Whilst FE nets out potential omitted variable bias arising from factors which may influence both parental disability and children's SWB (and possible heterogeneity bias – evidenced by the opposite signs on the disability coefficients under OLS and RE), it cannot factor omitted variables which change over time. One possible variable which could influence both of these variables is the parents' health, however when the

[133] See Appendix [C8] for a comparison of the results under homoscedastic, heteroscedastic and robust standard errors.

model is run with the inclusion of SF-12 measures of health as a control, the results change very little, although this result should be viewed with caution due to the strong link between disability and health. It is feasible that risky behaviours which can affect both the probability of disability and the SWB of the child could vary over time, but there is nothing in the dataset which can control for this. It should also be considered that FE is more sensitive to measurement error; small inaccuracies in how the child reports their wellbeing over time may result in larger differences in the results. There may also be a degree of measurement error on behalf of parents incorrectly recording disabilities, especially if a severe health condition is erroneously recorded as a disability, which is possible if it limits the ability to carry out day-to-day activities. It may also be the case however that the above model is too crude and needs to be subject to further analysis to look at whether there are various groups within the data that experience parental disability differently to others. Hence, in the remainder of this section, the main model will be subject to various extensions to investigate this possibility.

Table 5.5. Regressions of parental disability on children's subjective wellbeing.

	(i) Pooled OLS	**(ii) Random Effects**	**(iii) Fixed Effects**	**(iv) FE with Controls**
Either Parent Disabled	-0.109***	-0.036*	0.034	0.035
	(0.024)	(0.020)	(0.026)	(0.026)
Age 10				*Reference*
Age 11				-0.031
				(0.024)
Age 12				-0.122***
				(0.029)
Age 13				-0.276***
				(0.035)
Age 14				-0.403***
				(0.041)
Age 15				-0.501***
				(0.048)
No. of siblings				

1 or 2				*Reference*
3 or 4				0.033
				(0.068)
More than 4				-0.055
				(0.198)
Only Child				-0.041
				(0.037)
Age of oldest parent				0.006
				(0.006)
Highest parental education level				
No qualifications				*Reference*
School				-0.035
				(0.094)
Higher Education				-0.028
				(0.111)
UK area				
London/South				*Reference*
North				0.166
				(0.301)
Midlands				-0.416
				(0.404)
Scotland/Wales/NI				-0.464
				(0.348)
Urban area				0.037
				(0.137)
Year				
2009	*Reference*			
2010	0.111***	0.156***	0.229***	0.072**
	(0.032)	(0.030)	(0.033)	(0.034)
2011	0.096***	0.120***	0.178***	0.090***
	(0.033)	(0.030)	(0.034)	(0.034)
2012	0.109***	0.117***	0.146***	0.138***
	(0.034)	(0.032)	(0.035)	(0.034)
2013	0.066*	0.045	0.039	0.107***
	(0.036)	(0.032)	(0.036)	(0.035)
2014	0.054	0.017	-0.017	0.122***
	(0.036)	(0.033)	(0.036)	(0.036)
2015	0.004	-0.068**	-0.143***	0.066*
	(0.037)	(0.033)	(0.036)	(0.037)
2016	0.001	-0.113***	-0.233***	0.030
	(0.035)	(0.032)	(0.035)	(0.037)
2017	-0.077*	-0.241***	-0.459***	-0.054
	(0.046)	(0.042)	(0.050)	(0.056)
2018	-0.125***	-0.260***	-0.441***	-0.129***
	(0.047)	(0.041)	(0.045)	(0.048)
Constant	5.784***	5.789***	5.802***	5.847***
	(0.029)	(0.027)	(0.027)	(0.350)
Observations:	25,941	25,941	25,941	25,941
R-Squared (within):		0.0210	0.0221	0.0369
R-Squared (between):		0.0000	0.0002	0.0010

R-Squared (overall):	0.0037	0.0027	0.0020	0.0043

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

5.5.2 Including Additional Controls

The main model from specification (iv) above is then run several times with the inclusion of a number of controls which were thought may have potential mediating effects on the transmission channel between parental disability and children's SWB. Only one of these controls exhibits a noticeable effect upon the coefficient of interest, which was the dummy to denotes that the child cares for a parent. All other controls had very little effect (see Appendix [Table C9] for these results). Table 5.6 shows the results when including the control for caregiving in specification (i) and all other controls that were considered in combination in specification (ii). When the control for child caregiving is included, the coefficient on disability rises to 0.051 and becomes significant at the 10% level, although the caregiving is small and insignificant itself (-0.011).

Table 5.6. Main Model, with additional controls.

	(i) Cares for Parent	**(ii) All Controls**
Either Parent Disabled	0.051*	0.046
	(0.029)	(0.029)
Age 10	*Reference*	
Age 11	-0.152***	-0.156***
	(0.046)	(0.046)
Age 12	-0.362***	-0.338***
	(0.083)	(0.083)
Age 13	-0.634***	-0.571***
	(0.121)	(0.120)
Age 14	-0.877***	-0.789***
	(0.160)	(0.159)
Age 15	-1.126***	-0.988***
	(0.200)	(0.198)
No. of siblings		
1 or 2	*Reference*	

3 or 4	0.033	0.012
	(0.073)	(0.067)
More than 4	-0.229	-0.303
	(0.219)	(0.199)
Only Child	-0.063	-0.040
	(0.045)	(0.042)
Age of oldest parent	0.136***	0.115***
	(0.040)	(0.040)
Highest parental education level		
No qualifications	*Reference*	
School	-0.132	-0.099
	(0.188)	0.181
Higher Education	-0.161	-0.151
	(0.203)	0.182
UK area		
London/South	*Reference*	
North	0.670	0.501
	(0.482)	0.456
Midlands	-0.461	-0.585
	(0.442)	0.365
Scotland/Wales/NI	-0.564	-0.463
	(0.428)	0.38
Urban area	0.017	0.022
	(0.137)	0.14
Single parent		-1.524***
		0.281
Own Health		
Excellent		*Reference*
Very good		-0.172***
		0.031
Good		-0.413***
		0.042
Fair		-0.610***
		0.079
Poor		-0.850***
		0.207
Household Income		-0.002
		0.026
Talks to Parents		-0.075***
		0.013
Class Misbehaviour		
Not at all		*Reference*
Most/all of classes		-0.143*
		0.077
More than half of classes		-0.130*
		0.074
About half of classes		-0.117
		0.076
Now and then		-0.069
		0.071
Importance of Exams		

Very Important		*Reference*
Important		-0.187***
		0.026
Not very important		-0.086
		0.107
Not at all important		-0.300*
		0.155
Bullied		-0.167***
		0.022
No. of close friends		
1 to 5		*Reference*
6 to 10		0.068***
		0.021
More than 10		0.067**
		0.029
No friends		-0.339***
		0.093
Cares for Parent	-0.011	-0.007
	(0.060)	0.06
Year		
2009	*Reference*	
2010	0.101**	0.088**
	(0.044)	0.044
2011	0.133***	0.089**
	(0.042)	0.042
2012	0.151***	0.111***
	(0.043)	0.042
2013	0.115***	0.075*
	(0.042)	0.041
2014	0.148***	0.118***
	(0.042)	0.042
2015	0.081*	0.051
	(0.044)	0.043
2016	0.029	0.013
	(0.044)	0.043
2017	-0.050	-0.041
	(0.066)	0.065
2018	-0.127**	-0.125**
	(0.058)	0.056
Constant	0.180	1.988
	(1.779)	1.798
Observations:	25,941	25,941
R-Squared (within):	0.0399	0.0399
R-Squared (between):	0.0020	0.0020
R-Squared (overall):	0.0020	0.0020

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

5.5.3 Robustness Checks

As a sensitivity check, the specifications from Table 5.5 are also run using an alternative measure of children's SWB which is closer in nature to the Huebner (1991) scale, as discussed in section 5.2.1. This is calculated by taking an average of the five scores for each facet of children's life satisfaction, rather than the single overall life satisfaction score. It has a similar distribution to that of the overall measure, with a mean of 5.75 and a standard deviation of 1.02, compared to 5.80 and 1.29, respectively for the overall measure. The result, shown in the Appendix [Table C10], returns a coefficient of 0.036 (significant at the 10% level) when including either no controls or pre-determined controls. It rises to 0.057 when including all of the potentially mediating controls (as per specification (ii) in Table 5.6), significant at the 1% level. Whilst the coefficient of interest from main model is sensitive to this change in the definition of children's SWB, the coefficients are still small in either case, both being less than one-tenth of a point.

As with the previous two chapters, tests are carried out to investigate whether there is any dynamic bias present in the results, although there is little evidence for this, implying that the year in which a parent becomes disabled does not affect the results (see Appendix [C9] for a discussion of these results).

In a final check, a randomisation test is conducted on the main coefficient of interest (see Appendix [Table C13]), which still comes out at 0.035 after the data is bootstrapped 200 times, but is now statistically significant at the 5% level, compared to the insignificant result from the main model (p-value = 0.177).

5.5.4 Model Extensions

The main model is extended in various ways, the results of which are shown in Tables 5.7 to 5.17. Three specifications of each model are estimated each time, each with (i) no controls, (ii) a set of pre-determined controls which, as discussed previously, are not expected to act mechanisms through which parental disability affects children's SWB, and (iii) a set of both pre-determined controls and additional controls as used in specification (ii) of Table 5.6., the latter set of which may potentially act as mechanisms.

Parental disability severity

In Table 5.7, the single dummy on parental disability is replaced by a pair of dummies which denote whether the parent's disability is of a severe or non-severe nature. When no controls are included, the coefficient on severe parental disability jumps to 0.753 and is significant at the 1% level, and jumps as high 3.181 (also significant at 1%) when mediating controls are included. Perhaps the only feasible channel through which severe parental disability can positively affect children's wellbeing is through decreased labour hours. As discussed previously, parental unemployment can hypothetically improve children's SWB if the parent is able to spend more time at home (Powdthavee and Vernoit, 2013). In this dataset, 76.6% of non-disabled mothers are employed, compared to 64% of non-severely disabled mothers and only 42.2% of severely disabled mothers (these figures are 93.1%, 81.8% and 56%, respectively for fathers). When maternal labour hours are included in the regression in specification (iv),[134] the coefficient on severe parental disability becomes small and insignificant, suggesting that the high value returned on this coefficient was possibly explained by the extra time the children's mothers were able to spend at home.

New or recurring parental disability

In Table 5.8, the parental disability dummy is replaced with a pair of dummies which indicate whether the disability is new or recurring. The results across the three specifications are mixed. When no controls are included, the coefficient on recurring disability is negative (-0.067), but this becomes insignificant when pre-determined controls are included and the coefficient on new disabilities becomes positive and significant (0.057) when mediating controls are included, so overall the results are relatively inconclusive. However, this may be down to the limitation in the length of the panel, in which it is difficult to see many occurrences of past parental disability. Another problem with interpreting these results is that under FE, the comparison being made is between the SWB of the same child in periods of parental disability and non-disability, rather than with other children, so it may be the case that children in the treatment group have become accustomed to their parent entering and exiting disability.

[134] As the variance of maternal labour hours was quite large (mean = 17.3, standard deviation = 15.2, min = 0, max = 97), labour hours squared is also included, which will also pick up any non-linearities in this relationship.

Table 5.7. Model Extension: Parental disability severity.

	(i) No Controls	(ii) Pre-Determined Controls	(iii) Additional Controls
Parent Non-Severe Dis.	-0.108	-0.097	-0.048
	(0.072)	(0.071)	(0.626)
Parent Severe Dis.	0.753***	0.730***	2.708***
	(0.192)	(0.199)	(0.655)
Constant	5.644***	5.977***	2.470
	(0.058)	(0.350)	(2.027)
Observations:	25,941	25,941	25,941
R-Squared (within):	0.0251	0.0396	0.0921
R-Squared (between):	0.0025	0.0005	0.0118
R-Squared (overall):	0.0002	0.0002	0.0115

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.
Note: For full model with controls, see Appendix [C14].

Table 5.8. Model Extension: New or recurring parental disability.

	(i) No Controls	(ii) Pre-Determined Controls	(iii) Additional Controls
New Parental Disability	0.005	0.050	0.046
	(0.031)	(0.031)	(0.033)
Recurring Parental Disability	-0.067**	-0.003	-0.026
	(0.032)	(0.032)	(0.035)
Constant	5.813***	5.848***	1.986
	(0.026)	(0.351)	(1.795)
Observations:	25,941	25,941	25.941
R-Squared (within):	0.0223	0.0370	0.0811
R-Squared (between):	0.0001	0.0012	0.0591
R-Squared (overall):	0.0026	0.0045	0.0534

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.
Note: For full model with controls, see Appendix [C15].

Two-parent families only

Restricting the sample to include only two-parent families reduces the number of observations from 25,941 to 18,501. This has the effect of reducing the positive coefficient on parental disability and rendering it non-significant, as shown in Table 5.9. If the reason for the positive effect of SWB in previous results is the increased amount of time the parent is able to stay at home, this may affect two-parent families differently.

Table 5.9. Model extension: Two-parent families only.

	(i) No Controls	**(ii) Pre-Determined Controls**	**(iii) Additional Controls**
Parent Disabled	0.016	0.017	0.019
	(0.027)	(0.027)	(0.026)
Constant	5.921***	7.612***	8.625***
	(0.032)	(0.946)	(1.020)
Observations:	18,501	18,501	18,501
R-Squared (within):	0.0232	0.0417	0.0868
R-Squared (between):	0.0005	0.0004	0.1115
R-Squared (overall):	0.0023	0.0017	0.0975

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.
Note: For full model with controls, see Appendix [C16].

Father disability only, mother disability only and both parents disabled.

As shown in Table 5.10 and Table 5.11, when only the father's disability or the mother's disability is included in the model, the positive coefficients on parental disability reduce in size and become non-significant. This may suggest that the results from the main model may be partially driven by those children in the sample whose both parents are disabled. This is perhaps weakly supported in the results shown in Table 5.12, in which in all three specifications show a larger interaction effect between father disability and mother disability than for either individual parent's disability, although these results are still statistically insignificant.

Table 5.10. Model extension: Fathers only.

	(i) No Controls	(ii) Pre-Determined Controls	(iii) Additional Controls
Father disabled	0.018	0.011	0.012
	(0.037)	(0.036)	(0.036)
Constant	5.777***	0.157	1.979
	(0.033)	(1.776)	(1.795)
Observations:	19,222	19,222	19,222
R-Squared (within):	0.0213	0.0396	0.0809
R-Squared (between):	0.0002	0.0020	0.0587
R-Squared (overall):	0.0015	0.0020	0.0530

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.
Note: For full model with controls, see Appendix [C17].

Table 5.11. Model extension: Mothers only.

	(i) No Controls	(ii) Pre-Determined Controls	(iii) Additional Controls
Either Parent Disabled	0.002	0.017	0.042
	(0.030)	(0.029)	(0.033)
Constant	5.917***	6.300***	8.632***
	(0.026)	(0.328)	(1.016)
Observations:	25,220	25,220	25,220
R-Squared (within):	0.0237	0.0413	0.0869
R-Squared (between):	0.0003	0.0007	0.1103
R-Squared (overall):	0.0029	0.0045	0.0967

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.
Note: For full model with controls, see Appendix [C18].

Table 5.12. Model extension: Both parents.

	(i) No Controls	(ii) Pre-Determined Controls	(iii) Additional Controls
Father Disabled	0.014	0.002	-0.002
	(0.037)	(0.036)	(0.036)
Mother Disabled	0.010	0.021	0.028
	(0.036)	(0.036)	(0.035)
Both Parents Dis.	0.049	0.068	0.068

	(0.074)	(0.073)	(0.072)
Constant	5.919***	7.652***	8.662***
	(0.032)	(0.943)	(1.014)
Observations:	18,501	18,501	18,501
R-Squared (within):	0.0233	0.0419	0.087
R-Squared (between):	0.0007	0.0003	0.1094
R-Squared (overall):	0.0021	0.0016	0.0963

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.
Note: For full model with controls, see Appendix [C19].

Interactions between parental disability and the child's age and sex.

The final ways in which the model is extended is to explore whether the child's response to parental disability changes depending on interactions between parental disability and the child's sex, the child's age and both the child's sex and age. In Table 5.13, the interaction term between parental disability and the child's sex (being a girl) is negative and insignificant (-0.092), but controlling for this increases the parental disability coefficient to 0.99, significant at the 5% level. However, this reduces to 0.64 (significant at the 10% level) in (ii) when including pre-determined controls and becomes 0.084 (significant at the 5% level) in (iii) when including potentially mediating controls.

Table 5.13. Model extension: Child's sex interaction.

	(i) No Controls	(ii) Pre-Determined Controls	(iii) Additional Controls
Either Parent Disabled	0.099**	0.064*	0.084**
	(0.041)	(0.036)	(0.040)
Either Parent Disabled*Girl	-0.092	-0.056	-0.075
	(0.059)	(0.052)	(0.057)
Constant	0.166	5.849***	1.987
	(1.783)	(0.351)	(1.798)
Observations:	19,222	19,222	19,222
R-Squared (within):	0.0406	0.0370	0.0812
R-Squared (between):	0.0021	0.0011	0.0584
R-Squared (overall):	0.0021	0.0044	0.0529

Standard errors (clustered on the individual) are displayed in brackets.

P-Values: ***1%, **5%, *10%.
Note: For full model with controls, see Appendix [C20].

When parental disability is interacted with dummies to represent the child's ages from 11 to 15 in Table 5.14, the results are markedly different from previous specifications. When no controls are included in (i), the coefficient on parental disability rises to 0.183 and is significant at the 1% level. The coefficients on the interaction effects between the child's age and parental disability are negative and significant at the 1% level at ages 13 (-0.171), 14 (-0.290), and 15 (-0.329). This suggests that parental disability is a positive experience at younger ages, which eventually turns neutral and then negative over time. These results follow similar patterns found by Powdthavee and Vernoit (2013), who find positive wellbeing responses to parental unemployment at younger ages, before this reverses for older children. The results diminish when further controls are included in (ii) and (iii).

Table 5.14. Model extension: Child's age interactions.

	(i) No Controls	**(ii) Pre-Determined Controls**	**(iii) Additional Controls**
Either Parent Disabled	0.183***	0.108***	0.139**
	(0.050)	(0.053)	(0.059)
Either Parent Dis*Age11	-0.030	-0.073	-0.095
	(0.052)	(0.059)	(0.067)
Either Parent Dis*Age12	-0.043	-0.038	-0.055
	(0.055)	(0.061)	(0.069)
Either Parent Dis*Age13	-0.171***	-0.069	-0.072
	(0.058)	(0.064)	(0.071)
Either Parent Dis*Age14	-0.290***	-0.134**	-0.179**
	(0.060)	(0.065)	(0.071)
Either Parent Dis*Age15	-0.329***	-0.110	-0.143*
	(0.066)	(0.070)	(0.078)
Constant	5.791***	5.823***	1.975
	(0.027)	(0.350)	(1.802)
Observations:	19,222	19,222	19,222
R-Squared (within):	0.0253	0.0410	0.0817
R-Squared (between):	0.0000	0.0021	0.0587
R-Squared (overall):	0.0038	0.0021	0.0532

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.
Note: For full model with controls, see Appendix [C21].

In Table 5.15, the interaction effect between parental disability and being a girl raises to 0.182 (significant at 10%) when no controls are included in (i), and the three-way interactions between parental disability, being a girl and age are significant at the 1% level at ages 13 (-0.359), 14 (-0.416%) and 15 (-0.498)[135], relative to boys and 10-year-old children in the reference group. These wellbeing effects are present in addition to the negative wellbeing effects associated with gender and age, so they can be viewed in isolation from these. This result implies that there is still a positive effect on SWB of parental disability for girls aged under 13 and boys of all ages, however this turns negative for girls aged 13 onwards. When pre-determined controls are included in (ii), the results change by very little. When mediating controls are included in (iii), the positive interaction effect between parental disability and being a girl becomes non-significant, implying stronger negative effects on SWB for girls aged 13-15 (although the 3-way coefficients for ages 13, 14 and 15 drop to -0.331, -0.341 and -0.366 respectively). The lack of significant response for boys in either direction was slightly unexpected, although there are some possible explanations from the literature; boys tend to deal with changes in circumstances better as they have more psychological resources at their disposal and therefore remain more stable over the course of adolescence (e.g., Rutter, 1985; Children's Society, 2021), whilst it is well-established that girls mature at a faster rate than boys (e.g., Peterson, 1961). This has been linked to stronger emotional responses to external life events, which

[135] This is assuming that we ignore the coefficient values for 'Either Parent Disabled' (in specification (iii) only) and 'Either Parent Disabled*Girl' (in all three specifications), which are not aggregated with the 3-way interaction terms as they were statistically insignificant. If these insignificant results are type-2 errors, the effects on children's SWB are smaller.

are more likely to result in depression and anxiety amongst adolescent girls (e.g., Raja, McGee and Stanton, 1992; Nolen-Hoeksema and Girgus, 1994; Nolen-Hoeksema and Jackson, 2001). As discussed earlier, the results should be interpreted with an element of caution due to the potential issues with measurement error which can arise under FE.

Table 5.15. Model extension: Child's age and sex interactions.

	(i) No Controls	**(ii) Pre-Determined Controls**	**(iii) Additional Controls**
Either Parent Disabled	0.095	0.019	0.088
	(0.068)	(0.071)	(0.076)
Either Parent Dis.*Girl	0.182*	0.185**	0.116
	(0.097)	(0.097)	(0.109)
Either Parent Dis.*Age 11	-0.036	-0.079	-0.109
	(0.075)	(0.080)	(0.087)
Either Parent Dis.*Age 12	0.005	0.007	-0.033
	(0.076)	(0.081)	(0.088)
Either Parent Dis.*Age 13	0.008	0.112	0.089
	(0.081)	(0.084)	(0.089)
Either Parent Dis.*Age 14	-0.084	0.072	-0.016
	(0.080)	(0.084)	(0.089)
Either Parent Dis.*Age 15	-0.079	0.141	0.034
	(0.091)	(0.094)	(0.102)
Either Parent Dis.*Age 11*Girl	0.015	0.014	0.029
	(0.103)	(0.103)	(0.117)
Either Parent Dis.*Age 12*Girl	-0.097	-0.091	-0.050
	(0.108)	(0.108)	(0.121)
Either Parent Dis.*Age 13*Girl	-0.359***	-0.361***	-0.331***
	(0.114)	(0.114)	(0.125)
Either Parent Dis.*Age 14*Girl	-0.416***	-0.417***	-0.341***
	(0.116)	(0.116)	(0.127)
Either Parent Dis.*Age 15*Girl	-0.498***	-0.501***	-0.366***
	(0.127)	(0.127)	(0.139)
Year			
2009	*Reference*		
2010	0.202***	0.071	0.089**
	(0.033)	(0.034)	(0.044)
2011	0.164***	0.091	0.093**
	(0.034)	(0.033)	(0.042)
2012	0.146***	0.138	0.113***
	(0.035)	(0.034)	(0.042)

2013	0.051	0.109	0.078*
	(0.035)	(0.035)	(0.041)
2014	0.005	0.123	0.120***
	(0.036)	(0.036)	(0.041)
2015	-0.112***	0.065	0.050
	(0.036)	(0.037)	(0.043)
2016	-0.192***	0.031	0.015
	(0.035)	(0.037)	(0.043)
2017	-0.398***	-0.056	-0.040
	(0.050)	(0.056)	(0.065)
2018	-0.388***	-0.128	-0.122**
	(0.045)	(0.048)	(0.056)
Constant	5.790***	5.837	1.958
	(0.027)	(0.350)	(1.812)
Observations:	25,941	25,941	25,941
R-Squared (within):	0.0277	0.0396	0.0836
R-Squared (between):	0.0000	0.0010	0.0581
R-Squared (overall):	0.0048	0.0046	0.0531

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.
Note: For full model with controls, see Appendix [C22].

A further concern is the question of whether children are able to accurately observe parental disability, especially if the parent's disability is mild or not visible. This is tested by running the 3-way interaction model for severe parental disabilities only (which are assumed to be more visible) but the coefficients on the interaction variables mostly do not increase in magnitude.[136]

As a final check, the model which interacts the child's age and sex with parental disability is run separately for the father's and mother's disability. The results from Table 5.16 imply that there is no positive effect on children's SWB arising from the father's disability, however there is a negative effect for 15-year-old girls under the models with no controls (-0.392*), the model with pre-determined controls (-0.414**) and the model with additional controls (-0.347*), as well as for 13-year-old

[136] See Appendix [Table C23] for these results.

girls under the model with pre-determined controls (-0.328**). The lack of any positive coefficient on parental disability implies that these negative effects are greater than in the model which includes both parents. The conclusion would be that girls experience starker effects of paternal disability (compared to disability in either parent) at older ages.

When exploring the effects of mother's SWB, there remains significant and positive interaction effects between the mother's disability and being a girl of 0.289 (without controls and 0.279 with pre-determined controls. This coefficient takes a value of 0.209 when additional controls are included but is no longer significant at the 10% level as the p-value rises to 0.119. The three-way interactions between the child's sex, the child's age and parental disability also increase in absolute value to their greatest extents at age 15 of -0.590 (i), -0.585 (ii), and -0.414 (iii), although when considered in conjunction with the two-way interaction discussed previously, the overall effect is very similar to the results from when the sex of the parent is not distinguished. Overall, the results imply that maternal disability is associated with a positive effect upon girls' SWB at younger ages, but a negative affect at older ages (13-15), and that maternal disability negatively affects girls' SWB more than paternal disability at ages 13 and 14, but this switches at age 15.

As a final check, these models are run again with the inclusion of controls for the respective parents' own SWB and labour hours, but these are not found to have any mediating effect on the results (see Appendix [Tables C26 - C27]).

Table 5.16. Model extension: child's age and sex interactions, father's disability only.

	(i) No Controls	(ii) Pre-Determined Controls	(iii) Additional Controls
Father Disabled	0.087	0.003	-0.002

	(0.108)	(0.107)	(0.103)
Father Dis.*Girl	0.088	0.103	0.069
	(0.164)	(0.161)	(0.158)
Father Dis.*Age 11	-0.016	-0.044	-0.016
	(0.122)	(0.124)	(0.125)
Father Dis.*Age 12	0.046	0.040	0.054
	(0.122)	(0.124)	(0.121)
Father Dis.*Age 13	0.059	0.164	0.176
	(0.129)	(0.130)	(0.123)
Father Dis.*Age 14	-0.160	-0.022	-0.025
	(0.121)	(0.122)	(0.116)
Father Dis.*Age 15	-0.077	0.168	0.168
	(0.147)	(0.147)	(0.139)
Father Dis.*Age 11*Girl	0.056	0.048	0.020
	(0.177)	(0.175)	(0.175)
Father Dis.*Age 12*Girl	-0.063	-0.075	-0.052
	(0.185)	(0.182)	(0.180)
Father Dis.*Age 13*Girl	-0.299	-0.328**	-0.297
	(0.190)	(0.187)	(0.182)
Father Dis.*Age 14*Girl	-0.292	-0.297	-0.224
	(0.191)	(0.186)	(0.182)
Father Dis.*Age 15*Girl	-0.392*	-0.414**	-0.347*
	(0.204)	(0.201)	(0.195)
Constant	5.770***	0.155	1.930
	(0.033)	(1.777)	(1.794)
Observations:	19,222	19,222	19,222
R-Squared (within):	0.0245	0.0245	0.0821
R-Squared (between):	0.0001	0.0001	0.0584
R-Squared (overall):	0.0024	0.0024	0.0529

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.
Note: For full model with controls, see Appendix [C24].

Table 5.17. Model extension: Child's age and sex interactions, mother's disability only.

	(i) No Controls	**(ii) Pre-Determined Controls**	**(iii) Additional Controls**
Mother Disabled	0.073	0.023	0.142
	(0.080)	(0.083)	0.093
Mother Dis.*Girl	0.289**	0.279**	0.209
	(0.115)	(0.115)	0.134
Mother Dis.*Age 11	-0.058	-0.118	-0.187*
	(0.088)	(0.092)	0.103
Mother Dis.*Age 12	-0.027	-0.036	-0.094
	(0.091)	(0.095)	0.109
Mother Dis.*Age 13	-0.033	0.053	0.007

	(0.094)	(0.098)	0.109
Mother Dis.*Age 14	-0.076	0.086	-0.038
	(0.097)	(0.100)	0.111
Mother Dis.*Age 15	-0.119	0.068	-0.136
	(0.105)	(0.107)	0.122
Mother Dis.*Age 11*Girl	-0.044	-0.040	-0.018
	(0.121)	(0.121)	0.144
Mother Dis.*Age 12*Girl	-0.175	-0.165	-0.141
	(0.128)	(0.128)	0.152
Mother Dis.*Age 13*Girl	-0.460***	-0.455***	-0.450***
	(0.135)	(0.135)	0.156
Mother Dis.*Age 14*Girl	-0.521***	-0.519***	-0.444***
	(0.137)	(0.137)	0.158
Mother Dis.*Age 15*Girl	-0.590***	-0.585***	-0.414**
	(0.152)	(0.151)	0.173
Constant	5.907***	6.265***	8.541***
	(0.025)	(0.329)	1.018
Observations:	25,220	25,220	25,220
R-Squared (within):	0.0295	0.0444	0.0903
R-Squared (between):	0.0000	0.0008	0.1130
R-Squared (overall):	0.0062	0.0051	0.1005

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.
Note: For full model with controls, see Appendix [C25].

5.5.5 Model Extension Robustness Checks

As the set of results from the above model extension were significant, unlike those from the main model, it was deemed suitable to run some robustness checks on these results. The first was to check for evidence of dynamic bias, however, rather than interacting a multitude of different explanatory variables with a dummy to denote whether parental disability occurred before or after a particular year, a simpler approach was taken. The model was re-run in pairs, splitting the sample each time into a pair of sub-samples including observations from either side of a given year. The results, (shown in the Appendix [Table C28]) seem to suggest that girls respond to parental disability worse from 2011 onwards compared to before 2011, worse before 2014 onwards compared to 2014 onwards, and worse before 2015 compared to 2015 onwards, although the differences are not huge and the cell sizes become small in the earliest and latest years.

Randomisation tests are also carried out on the main coefficients from this model, which are 'Parent Disabled', 'Parent Disabled*Girl', 'Parent Disabled*Girl*Age 13', 'Parent Disabled*Girl*Age 14' and 'Parent Disabled*Girl*Age 15' (see Appendix [Table C29]). Bootstrapping returns statistically significant coefficients for all five of these coefficients at the 1% level of 0.095, 0.182, -0.359, -0.416, and -0.498, respectively. The positive and significant result on the 'Parent Disabled*Girl' interaction suggests that the results from this particular model extension may need to be treated with a degree of caution as this effect would dampen the overall negative effects of parental disability upon children's SWB.

5.6 Discussion

Prior to the findings outlined in this chapter, there was no direct empirical study linking parental disability and children's SWB in the existing literature, to the best of my knowledge. As such, the first research question of this chapter simply asks whether such a link could be identified. When parental disability is initially regressed against children's SWB under Pooled OLS, a small but significant negative relationship is found. However, most of this effect diminishes when estimated under random effects and fixed effects estimations, the implication being that the variance in children's response to parental disability is explained by the individual characteristics of the child and that there may not be any policy intervention case to be made. Unexpectedly, the effect becomes slightly *positive* when controlling for whether the child provides caregiving duties.

The second research question asks whether the results change depending on the nature of the parental disability or the characteristics of the child. However, there are still insignificant results regardless of family structure, or whether it is a new or recurring parental disability. An anomaly in the results is that severe parental disability is found to be associated with a *positive* wellbeing effect upon children, however, this is explained by a decrease in the mother's labour hours, resulting in an increase in the time the mother is able to spend at home, in line with the findings of Powdthavee and Vernoit (2013).

In further extensions to the main model, the parental disability coefficient remains insignificant and close to zero regardless of whether the mother or father (or both) is disabled, or whether the child belongs to a single-parent or two-parent family but the results are sensitive to the child's age-sex combinations. The results from the model with 3-way interactions between the child's age, the child's sex and parental disability imply that boys experience no significant wellbeing effects from parental disability at all, but girls experience increasingly negative effects on SWB from the age of 13 onwards. Whilst it is well established in the literature that wellbeing declines with age for adolescents and is generally lower for girls than for boys, the results in this chapter identified that for girls aged 13 and above, there are significant and negative wellbeing effects of parental disability, which exist over and above the wellbeing effects expected as a normal part of adolescence. The response to parental disability appears to change depending on the sex of the disabled parent. Girls' appear to experience positive SWB effects from maternal disability up to the age of 12, at which point, the effects turn negative. Girls appear to only experience negative effects of paternal disability on SWB at the age of 15, at which point, the effect is greater than that of maternal disability. This may be explained if more girls understand the implications of disability better as they get older, such as the constraints to household income. However, these results need to be treated with an element of caution as randomisation tests show a positive interaction between parental disability and being a girl, which would slightly dampen the results. It would be recommended to repeat these estimations when more waves of data become available, as this interaction effect may be larger when estimated under a larger sample.

The final research question asks whether any mechanisms can be identified through which parental disability affects children's wellbeing is found. The mother's labour hours and wellbeing also explain nearly half of the wellbeing effects. The finding that younger girls potentially experience positive wellbeing effects from maternal disability, but older girls experience negative effects echoes the findings of

Powdthavee and Vernoit (2013) on the positive wellbeing effects of parental unemployment, suggesting that changes in the mother's labour status are a driver of wellbeing for girls but the direction of the effect changes as girls get older and become more aware of the consequences of parental disability. However, these conclusions are not supported when the parent's SWB and labour hours are included as additional controls. However, mother's labour hours are found to be a mediating factor which explain the positive effect on children's SWB which appears to occur when the parental disability is of a severe nature.

It could argued however, that in relation to the estimated coefficients from Chapters Three and Four, the wellbeing effects identified for 13- to 15-year-old girls with disabled parents are relatively small, at around one third of a point on a 7-point Likert scale, so attempting to identify various channels which make up the difference in wellbeing for girls when their parents are disabled compared to when they are non-disabled is challenging as we are dealing with relatively small margins, especially if the overall effect is comprised of several different channels; there are possibly not enough examples of children within these specific categories to be able to identify channels with much degree of certainty. Another limitation is that, as discussed previously, it is important that these results are treated with a degree of caution because of potential measurement error which FE is sensitive to; it is unknown whether children are better able to accurately record their own levels of SWB as they get older and become more mature, or whether they accurately observe parental disability, especially where disabilities are less visible. They should also be treated with caution due to the significant positive coefficient found on the interaction between parental disability and being a girl, which would dampen the overall results. Future research should make use of further waves of data when they become available to make these estimates more robust. A final limitation of this study is that there is a maximum of 6 waves of data per child, which limits the extent to which it is possible to accurately estimate differences in periods with and without parental disability. A suggestion would be to conduct a similar study using data from older children (e.g., 16-24) of disabled parents who live at home, to examine whether the decline in wellbeing associated with parental disability continues as they get older.

6 Conclusion

The purpose of this study is to investigate the effects of disability onset upon the subjective wellbeing of working-aged individuals and their family members in the UK. Much of the literature prior to this study focused on the impact of disability upon more traditional economic variables such as employment status, labour hours and income, without explicitly linking these outcomes to subjective wellbeing. The previous literature which explored the relationship between disability and wellbeing tended to be cross-sectional or short-term, or did not differentiate between many different types of disability or levels of heterogeneity (e.g., Brickman *et al.,* 1978; Oswald and Powdthavee, 2008; Pagán-Rodríguez, 2012; Powdthavee, 2009a). As such, there is limited evidence on whether individuals experience adaptation in their wellbeing back to pre-onset levels, given enough passage of time. Moreover, there is very little literature available to the best of my knowledge which estimates the longitudinal wellbeing effects of disability upon spousal wellbeing and none at all on the effects of parental disability upon children's wellbeing.

The first empirical chapter in this thesis explores the impact of disability onset upon individual subjective wellbeing. Disabled individuals are placed into disability categories based on the model by Meyer and Mok (2019), called 'One-Time', 'Temporary', 'Chronic Non-Severe' and 'Chronic Severe',[137] depending on the duration and severity of their disability. In an alternative model, the One-Time and Temporary categories are combined into a 'Non-Chronic' group which is then divided into 'Non-Chronic Non-Severe' and 'Non-Chronic Severe' categories. Life satisfaction, reported on a scale of 1-7, is estimated for people belonging to each of

[137] One-Time, Temporary and Chronic refer to one year, 2-3 years, and 4 or more years of disability, respectively.

these categories from 3 periods before onset until 7 periods after, using a fixed effects estimation based on 9 waves of data taken from Understanding Society, recorded between 2009 and 2018.

Several conclusions are drawn from this chapter. The first is that a statistically significant negative relationship is found between disability onset and SWB, but the response to disability onset strongly depends on several factors. Severity of disability is found to be the most important driver of wellbeing following onset, where 'severe' disabilities are defined by experiencing multiple disabilities, rather than just one. Having a chronic disability (disabled for at least 4 years) is not associated with negative subjective wellbeing effects alone, but people with both a severe *and* a chronic disability experience notably worse wellbeing effects. Individuals in this category experience SWB of around 0.9 to 1.335 points (on a 7-point scale) below baseline, or around 75-85% of the SWB of non-disabled people from the onset period. The findings from this chapter support those of Jones *et al.* (2018) who also report considerably lower subjective wellbeing for individuals with both a long-term and severe disability in the years after onset. They are also consistent with Meyer and Mok (2019) who find that people in this category experience considerably poorer economic outcomes post-onset, including lower working hours, income and employment probability.

This chapter also provides some nuance to the debate over whether and to what extent wellbeing adaptation occurs post-onset. Early literature claimed that adaptation was a complete process given enough passage of time (e.g., Brickman and Campbell, 1971), although later work argued that this was only a partial process (e.g., Oswald and Powdthavee, 2008). Adaptation of SWB to baseline levels is found within a year for people with temporary disabilities (whose SWB dips by around 0.3

points in the onset year). Using the alternative measure, those with short-term (up to 3 years) but severe disabilities report a drop in subjective wellbeing by around 0.5 points out of 7, but still adapt back to baseline within 2 years. Hence, the two new Non-Chronic categories discussed above are a useful addition to the Meyer and Mok (2019) framework, especially if disability is the primary driver of SWB.

Furthermore, there is no adaptation to health satisfaction unless the disability occurs within a single year. A possible explanation for this is the close relationship between severe disability and poor health; Binder and Coad (2013) found limited evidence of adaptation following onset of a serious illness. Health satisfaction is by far the facet of SWB most affected by disability, but income satisfaction declines also, but by much less. Income and employment status are shown to account for 35-41% of the negative wellbeing effects arising from disability onset. This is relatively consistent with human capital theories, such as that of Charles (2003), in which disability is argued to affect the returns on past human capital investments. The remaining 59-65% of variance in wellbeing is unexplained, although at least part of it is assumed to arise from the attributes of the disability itself such as pain, discomfort, or limitation of activities. It may also arise from employment-related problems such as having to change job or occupation, so this is an area for future investigation. The other facet of life satisfaction is satisfaction with amount of leisure time. Despite the fact that disabled people tend to have more leisure time, this does not translate into any wellbeing effects.

Disability onset is experienced very similarly by different groups in society, although having a cohabiting spouse is shown to lessen the negative effects of disability onset upon SWB by around half. Whilst this buffering effect may be explained the emotional support offered by a spouse, the result also makes sense from an economic perspective. A couple may have more flexibility to substitute between their combined labour hours and leisure time, for example, the non-disabled partner can maximise the couple's combined utility by working extra hours to make up at least some of any shortfall in income resulting from disability. Pre-onset levels of income and education level are not found to make much difference to the wellbeing response of disability onset, perhaps in slight contrast to Kavenagh *et al.* (2015) and Smith *et al.* (2005) who find that wealth acts as a wellbeing buffer to disability onset, but is also in contrast with Freedman *et al.* (2019) who find that income is a buffer against the wellbeing effects disability for those in the middle-income quartile. In fact, those with higher incomes prior to onset are found to experience slightly larger declines in wellbeing, possibly explained by the argument that disability onset results in lower returns to previous human capital investments (Charles, 2003) and diminishes the value of existing human capital (Becker, 1964). Hence, these individuals potentially have the most to lose from disability onset.

Limitations of the findings in this first chapter include that they are quite sensitive to changes in the definition of disability severity, especially when it is defined by the extent to which work-related activities are affected by disability. Another concern is the limited availability of waves. Similar studies in the future which have access to more waves could place a restriction on the number of periods of non-disability which should be observed prior to onset, helping the researcher to be surer that the reference periods are unaffected by disability.

The main research question explored in the second empirical chapter asks whether there are any effects of disability onset upon the SWB of the spouse. This is a sparsely covered topic in the current literature and prior to this thesis, there was only one paper, to the best of my knowledge, which explored a statistical link between disability onset in one partner and SWB in the other (Braakmann, 2014). In the initial set of results, no significant relationship is found in any period relative to onset. It is only when heterogeneity in the data is explored that the response to spousal disability is found to rely on one's own disability status; negative wellbeing effects are only found to occur in non-disabled partners. For people who are disabled themselves, onset of disability in a partner appears to exhibit a mitigating effect against their own disability. A possible explanation for this is that disability onset exhibits a greater disruptive shock effect on the family if they have no prior experience of disability. It may also be explained by a possible 'empathy effect' because they are no longer alone in their experience of disability.

These findings are unexpected as it can be seen in the data that people in couples in which both partners are disabled have lower incomes, work fewer hours and are less likely to be employed on average compared to couples in which neither partner, or only one, is disabled, yet these do not translate into wellbeing effects. It is also contrary to the evidence in the literature of 'crossover' of negative wellbeing shocks between partners (e.g., Burke *et al.*, 1980; Jones and Fletcher, 1993; Westman and Etzion, 1995; Westman and Vinokur, 1998). However, the results are consistent with Braakmann (2014), who found that the subjective wellbeing of disabled men in Germany was mitigated against when their female spouse was also disabled. Another consistency with Braakmann (2014) was the lack of evidence of wellbeing adaptation to spousal disability over time. Similarly, Valle *et al.* (2013) finds wellbeing adaptation to spousal health shocks over time. However, the lack of adaptation effects are still unexpected as in the literature, spouses are even found to adapt to widowhood following illness in the spouse, given enough passage of time (Clark *et al.,* 2008; Clark and Georgellis, 2013; Lucas *et al.*, 2003).

Caregiving is found to play no significant part in explaining the negative wellbeing effects of spousal disability, even if it prevent employment opportunities. However, nearly all of the decline in wellbeing is explained by changes in both partners' incomes within the year of onset and in the subsequent two years. From 3 to 7 years after onset, income still plays a part, but the non-disabled spouse's wellbeing continues to decline for reasons which cannot be explained by income and possibly arise from an increasing empathetic response to their spouse's condition. This is supported by the psychology literature which argues that wellbeing between partners becomes more strongly correlated over time. (e.g., Bookwala and Shultz, 1996; Wilson, 2001; Winkelmann, 2005).

The main limitation in the results for this chapter is that there is an unexpected drop in wellbeing two periods before spousal disability onset which remains unexplained. Other limitations are that sample sizes are too small for other dimensions of heterogeneity such as severity and duration of disability to be considered. The results may also be influenced by selection effects as people with disabilities or poor health themselves may be much more likely to marry others in a similar situation. Another issue with the results is that people who experience disability onset fare much better if they live with a spouse, as discovered in the previous chapter. By definition, every disabled person in the study from this chapter already has a spouse and hence their wellbeing is affected less on average by disability onset compared to someone who lives alone, and this limits the extent to which shocks to SWB in a disabled person transfer to their spouse.

In the third empirical chapter, it is investigated whether there are any wellbeing effects of disability onset upon children (aged 10 to 15) of disabled people. As the sample size is much smaller in this chapter, the event-study type models used in

Chapters 3 and 4 cannot be used. The initial set of results suggested no significant effect of parental disability upon children's SWB under the preferred fixed effects model.[138] It is only when the model is extended to include three-way interactions between the child's age, the child's sex and parental disability that negative wellbeing effects are discovered for girls between the ages of 13 to 15. These are later found to be partly explained by changes in the mother's SWB and labour hours. When disabled mothers and fathers are examined separately, the results suggest that younger girls (below 13) may actually experience *positive* wellbeing effects of maternal disability. These results follow a similar pattern to that of Powdthavee and Vernoit (2013) when exploring the effects of parental unemployment on children's SWB.

A possible limitation of these results lies in how well the child is able to observe disability in their parents, especially if the disability is not very visible, or even unknown to the child, which may explain the relatively conservative nature of the results. It may be the case that children are more affected by the more observable aspects of parental disability, for example if it results in the parent becoming unemployed (which may come with a perceived stigma), or if it limits the parent's earning potential and thus the social and leisure opportunities available to the child. Another limitation is the relatively short time-scale, which does not allow the SWB of the child to be observed before, during and after parental disability onset. Moreover, if the parent had been intermittently disabled for a number of years prior to the start of the study, the changes in parental disability status may not result in large within-child differences in SWB if the child is accustomed to living with parental disability.

[138] Although a significant wellbeing effect of -0.109 was found in a Pooled OLS estimation without controls and -0.040 in a Pooled OLS estimation with controls.

Hence, fixed effects models may be limited in this respect as they do not account for between-child differences in SWB.

In terms of policy, the findings from this thesis may be of interest to disability charities, governmental committees, or any other organisations whose interests are focused on raising the wellbeing of disabled people. In particular, such groups may wish to recognise the heterogeneity in the wellbeing responses to disability onset if they wish to prioritize those who are most affected. These include people who live with both a chronic and a severe disability, disabled people who live alone, non-disabled spouses of disabled people and older female children of disabled people. An argument may be made that couples with a single disabled partner should not receive smaller levels of resources from social care services and attention from disability-based charities as couples in which both partners are disabled, regardless of whether the non-disabled partner acts as a carer or not. Special priority could also be given to individuals whose spouses experience disability as a shock, as their SWB levels are shown to fall by similar levels to those who experience a disability themselves. Possible policy recommendations drawn from the findings of the third empirical chapter are limited, although charities and other organisations who are concerned with the wellbeing of children with disabled parents may wish to consider a degree of intervention for older teenage girls.

Policy-makers may wish to pay special attention to the wellbeing effects associated with having both a chronic and a severe disability. The findings from this study would support the implementation of a higher tier of benefit payment (or some extra level of practical support) for severely disabled individuals who are disabled for four years or more. Additionally, whilst employment and income accounts for only around 35-41% of the negative wellbeing effects of disability onset (and part of the negative spousal wellbeing effects), policy should focus on helping individuals to retain the use of their accumulated human capital following disability onset. For example, helping workplaces to better accommodate returning workers to re-start their previous roles on a part-time basis, which is often what the disabled employee would prefer (Jones, 2007). Current UK legislation already forbids employers from dismissing an employee if they become disabled, insisting that they must make 'reasonable adjustments' in the workplace to accommodate the disability. The exception to this is the case where the employee can no longer do their original job, even with reasonable adjustments. Therefore, a recommendation would be to extend the legal definition of reasonable adjustments to include the retraining of newly disabled employees wherever possible so that they can be placed into a different role within the same company, where the only alternative would be redundancy, arising from being unable to retain the same job role. Another possible suggestion would be to expand the scope of the UK Government's *Access to Work* grant, discussed in Chapter 2, so that it can be used to fund re-training of employees returning to work, rather as well as helping them to return to exactly the same role.

Future research should focus on the subjective wellbeing of those individuals (and their family members) whose employment situations are changed by disability onset, such as those who change occupation, industry or weekly working hours. If a larger dataset is available, similar studies should consider differences in spousal SWB response by both own disability status and gender, which was not possible in this study. Future work could also focus on the wellbeing of individuals who lie at the bottom end of the income distribution, whose marginal utility of money is likely to be much higher, to investigate how much additional income (e.g., through transfer payments) would be required to make a significant impact on their wellbeing.

Researchers may also wish to explore the effects of companionship, family and social networks on the magnitude of the negative wellbeing effects in the period of onset and the speed of adaptation afterwards.

The exploration of wellbeing effects on the children of disabled should also extend beyond the age of 15 to ascertain whether their wellbeing continues to decline with age. For the subset of Youth Survey respondents who continue to answer the adult survey from the age of 16, future studies could also explore the impact of parental disability at childhood upon SWB and other variables in adulthood. Alternatively, an event study of the type used in Chapters 3 and 4 may provide clearer answers to the effects of parental disability onset upon children's SWB, although this may require several more years of data collection by Understanding Society to ensure a sufficiently large sample size. The results are expected to be internationally transferable to countries which are culturally similar to the UK such as Ireland, Australia and New Zealand, but are also expected to be applicable in Germany, where much of the SWB literature returns similar to results as those of UK studies (see e.g. Blanchflower and Oswald, 2004a; Clark *et al*, 2001; Clark *et al*. 2008; Lucas *et al*, 2003; Lucas, 2007; Pagán-Rodríguez, 2010 for comparisons of similar event studies across different countries).

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8 Appendices

8.1 Appendix A

A1. Becker's (1957) model of taste-based discrimination.

In Becker's (1957) model of taste-based discrimination, firms maximise a utility function:

$$U = pF(N_b + N_b) - W_a N_a - W_b N_b - dN_b$$

where U represents the firm's utility, p is the price level, F is the production function, N_a is the number of workers from group a, the majority, N_b is the number of workers from group b, the minority who experience the discrimination, W_a and W_b are wages of the majority and minority group respectively and d is the taste parameter of the firm, also known as the coefficient of discrimination. Discriminating firms (d > 0) act as if the wage of b group workers is W_b + d and thus only hire workers in this group if

$$W_a - W_b \geq d$$

The optimal number of workers employed by each firm is determined by the solutions to:

$$pF'(N_a) = W_a$$

$$pF'(N_b) = W_b + d$$

If we treat the price level p as fixed and aggregate across firms, we can determine demand functions for both types of labour: $N_a^d(W_a, W_b, G(d))$, $N_b^d(W_a, W_b, G(d))$, where G(d) is the cumulative distribution function of the taste parameter d in the population of employers. Wages for each type of worker are determined by the following supply functions:

$$N_a^d(W_a, W_b, \mathrm{G(d)}) = N_a^s(W_a)$$

$$N_a^d(W_a, W_b, \mathrm{G(d)}) = N_a^s(W_d)$$

The model draws several conclusions, mainly that if a wage differential $W_b < W_a$ arises, it is only because the fraction of discriminating employers is sufficiently large that the demand for minority workers when $W_b = W_a$ is less than the supply. However, if there are enough non-discriminating employers, then discrimination is competed out of the labour market.

The above conclusions imply that if the fraction of discriminating employers is large enough, minority workers do not work for discriminating employers. Conversely, if this fraction is sufficiently large, some minority group members will work for firms where d > 0 and thus $W_b < W_a$. It should be noted that discrimination on average does not mean discrimination at the margin. Thus, the strength of prejudice at the margin, d, is what determines the size of the wage disparity. In summary, in partial equilibrium, minority workers must 'compensate' their prejudiced employers by either being more productive at a given wage or by accepting a lower wage for the same level of productivity. In a competitive equilibrium however, only the discriminating firms bear the costs of their distaste. This may lead to segregation.

A2. Phelps' (1972) model of statistical discrimination

We can adapt the race discrimination model by Phelps (1972) to show how statistical discrimination affects disabled workers. An employer takes a sample from a population of job applicants and subjects them to some test, y_i, which measure's the applicant's potential or degree of qualification, q_i, plus a normally distributed error term, μ_i.

$$y_i = q_i + \mu_i$$

The employer can use q_i as a least-squares estimator of y_i according to the relation:

$$q_i' = a_1 y_i' + u_i'$$

$$0 < a_1 = \frac{var\ q_i'}{var\ q_i' + var\ u_i'} < 1,\ \mathrm{E}u_i = 0$$

where q_i' and y_i' are deviations from their respective population means.

Now suppose that disability is also observed by the employer so that the model becomes:

$$q_i = \alpha + x_i + \eta_i$$

where x_i the contribution of social factors which are believed to be disability related, according to:

$$x_i = (-\beta + \varepsilon_i)\, c_i, \qquad \beta > 0$$

where c_i=1 if the applicant is disabled and zero otherwise. The error terms ε_i and η_i are normally and independently distributed.

Letting $\lambda_i = \eta_i + c_i\varepsilon_i$ and z_i = -βc_i, we may write

$$q_i = \alpha + z_i + \lambda_i, \qquad y_i = q_i + \mu_i = \alpha + z_i + \lambda_i + \mu_i$$

The test datum q_i can then be used in relation to the disability factor to predict the degree of qualification, net of the disability factor, which is separately calculable:

$$q_i' - z_i' = a_1(q_i' - z_i') + u_i$$

$$0 < a_1 = \frac{var\ \lambda}{var\ \lambda + var\ \mu} < 1$$

Three cases are considered. In case 1, if being disabled is believed by the employer to be disadvantageous ($z_i' < 0$ for disabled applicants), one may expect to find a lower prediction of q_i for disabled people than non-disabled people with the same test scores. However, this is only the case when the error term ε_i is equal to zero for all individuals in the sample. This implies that there is no differential variability in promise between disabled and non-disabled people. Then var λ_i = var η_i, meaning that the coefficients in the model are independent of c_i.

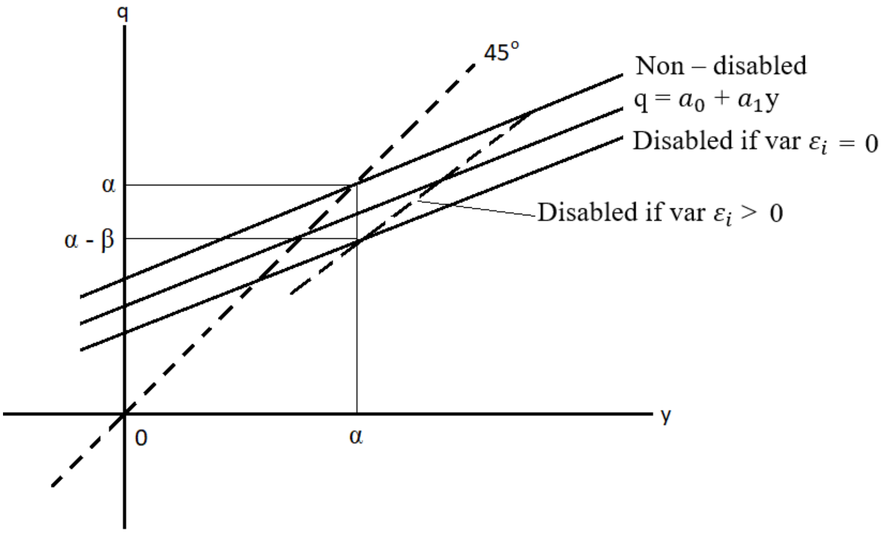


Figure A1. Prediction of qualification by disability status (adapted from Phelps (1972), Figure 1.)

Therefore, the prediction curve which relates q_i to y_i for disabled people lies parallel and below that for non-disabled people, as shown in figure A1. In the second case, we consider that the variance of λ is greater for disabled people and can be postulated as so:

$$\text{var } \lambda_i = \text{var } \eta_i + c_i^2 \text{ var } \varepsilon_i$$

It follows that the coefficient of the test score is *greater* for disabled people in the sample (in the limit, as var $\varepsilon_i \to \infty$, the coefficient of y_i – the slope of the prediction curve for disabled people – approaches one). For any positive value of var ε_i, there will be some high test score, in which those disabled applicants who score this level or above, are predicted to excel over any white applicant with the same or lower score. In the case of matching scores, the employer views an equally good test score by the non-disabled applicant as *less credible*.

In a third case, the disturbance term μ_i becomes conditional on disability:

$$\mu_i = \xi_i + c_i \rho_i$$

Now, disabled people's test scores are regarded by the employer as *more reliable* than the scores of non-disabled people, i.e., they have smaller error terms. In which case, the reliability of non-disabled test scores dominates any tendency for them to be less credible, making the non-disabled prediction curve steeper. There will be a range of low test scores in which non-disabled people are predicted to be less qualified than equally high scoring disabled people.

A3. Tabulations of disability and severity definitions.

Both disability definitions and both severity definitions are tabulated to check for consistency and crossover (see Table A1). There is identical cross-over of non-disabled and disabled individuals between disability definition 2 and severity definition 2, with 94.95% of all observations being of non-disabled individuals. There is also a high level of cross-over between non-disabled and disabled individuals when comparing Disability Definition 1 and Severity Definition 1, with 94.04% of non-disabled individuals in the former group and 94.82% of non-disabled in the latter, so there is reassurance that the composition should not change greatly across disability definitions.

A4. Cross-tabulations of disability and severity definitions.

When different combinations of disability and severity definitions are used (see Table A2), there is not much difference between those who fall into the Non-Disabled group, although there is a significant difference between those who fall into the Non-Severe and Severe Disabled categories. Under the preferred combination of Disability Definition 2 and Severity Definition 2, 2.90% are Non-Severe and 2.04% are Severe.

A similar proportion is found when using Disability Definition 1 with Severity Definition 2, the main problem with this is that it identifies fewer disabled people. When Severity Definition 1 is used, there are proportionally more Non-Severe Disabled people compared to Severe Disabled people, regardless of the definition of disability, so these categorisations potentially over-represent people with Non-Severe disabilities, especially if, as discussed in the main text, it is actually picking up people with health conditions rather than disabilities.

A5. Breusch-Pagan Lagrange Multiplier test for random effects

sclfsato[pidp,t] = Xb + u[pidp] + e[pidp,t]

Estimated results:

	Var	Std. = sq.rt.(Var)
sclfsato	1.928931	1.38886
E	1.270465	1.127149
u	0.574757	0.758127

Test: Var(u)=0
$\bar{\chi}^2(01) = 44451.9$
Prob > $\bar{\chi}^2 = 0$

Key:
sclfsato: Life satisfaction
pidp: Personal identification number
e: Stochastic error
u: Individual error

Var: Variance
Std: Standard Deviation (square root of variance)

A6. Hausman test

	---- *Coefficients* ----			
	(b) FE	(B) RE	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
One-Time*K-3	0.123927	-0.00761	0.131533	0.061346
One-Time*K-2	0.027952	-0.12647	0.154427	0.063306
One-Time*K-1	0.028308	-0.13585	0.164154	0.064642
One-Time*K0	-0.04888	-0.2201	0.171224	0.06486
One-Time*K1	0.054668	-0.11676	0.17143	0.064801
One-Time*K2	0.065246	-0.11347	0.178714	0.064929
One-Time*K3	-0.02092	-0.20492	0.184004	0.064998
One-Time*K4	0.023996	-0.17572	0.199713	0.067277
One-Time*K5	0.085252	-0.12497	0.210225	0.068658
One-Time*K6	0.053351	-0.18044	0.233791	0.069808
One-Time*K7	0.274419	0.050223	0.224196	0.072215
Temporary*K-3	0.14875	-0.10673	0.255485	0.059577
Temporary*K-2	-0.01997	-0.28002	0.260052	0.06163
Temporary*K-1	-0.00267	-0.27031	0.267641	0.063219
Temporary*K0	-0.24345	-0.51815	0.274707	0.063468
Temporary*K1	-0.14591	-0.42082	0.274918	0.063524
Temporary*K2	-0.07539	-0.35751	0.282119	0.063617
Temporary*K3	-0.12971	-0.41518	0.285466	0.063687
Temporary*K4	-0.11071	-0.39288	0.282169	0.065641
Temporary*K5	-0.0867	-0.37374	0.287041	0.066771
Temporary*K6	-0.03887	-0.3322	0.29333	0.067589
Temporary*K7	-0.15857	-0.47639	0.317813	0.068799
Chronic NS*K-3	-0.33015	-0.46896	0.138808	0.164901
Chronic NS*K-2	-0.1622	-0.32128	0.159075	0.170122
Chronic NS*K-1	-0.31184	-0.47502	0.16318	0.172676
Chronic NS*K0	-0.40357	-0.57173	0.168164	0.172811
Chronic NS*K1	-0.45753	-0.63503	0.177499	0.172864
Chronic NS*K2	-0.31819	-0.49137	0.173177	0.172825
Chronic NS*K3	-0.39088	-0.56205	0.171167	0.172793
Chronic NS*K4	-0.45326	-0.62893	0.175665	0.174804
Chronic NS*K5	-0.49529	-0.68655	0.191252	0.176191
Chronic NS*K6	-0.46902	-0.66665	0.19763	0.176842
Chronic NS*K7	-0.54876	-0.72614	0.177379	0.177762
Chronic S*K-3	-0.10412	-0.43672	0.3326	0.134757
Chronic S*K-2	-0.05915	-0.42087	0.361718	0.13858
Chronic S*K-2	-0.16714	-0.54998	0.382846	0.141408
Chronic S*K-1	-0.54014	-0.93074	0.390605	0.141635
Chronic S*K0	-0.72764	-1.11779	0.390155	0.141569
Chronic S*K1	-0.60958	-1.00207	0.392489	0.141525
Chronic S*K2	-0.64258	-1.03249	0.389911	0.141616
Chronic S*K3	-0.68076	-1.06867	0.387915	0.14304

Chronic S*K4	-0.8275	-1.24291	0.415409	0.14468
Chronic S*K5	-0.89766	-1.3251	0.427442	0.14523
Chronic S*K6	-0.65031	-1.06969	0.419381	0.146071
Age	-0.07417	-0.07232	-0.00185	0.004621
Age-Squared	0.000785	0.000862	-7.7E-05	4.73E-05
Living as Couple	0.148883	0.231183	-0.0823	0.013863
Married	0.152914	0.343062	-0.19015	0.018598
Separated	-0.15207	-0.09741	-0.05466	0.02216
Divorced	0.031297	0.035246	-0.00395	0.025024
Widowed	-0.12657	0.039752	-0.16632	0.048275
No. of Children	0.007703	0.007871	-0.00017	0.002761
GCSE	-0.00718	0.048769	-0.05595	0.036062
Higher/AS Level	0.013671	0.102632	-0.08896	0.034763
A Level/Bacc.	-0.01088	0.104239	-0.11512	0.035176
Other Higher	-0.03361	0.097734	-0.13134	0.040043
Degree	-0.00511	0.181993	-0.1871	0.039187
Postgraduate	-0.07499	0.179771	-0.25476	0.045365
Northeast	-0.00221	0.150405	-0.15261	0.106344
Northwest	-0.09467	0.132081	-0.22675	0.070763
Yorks/Humber	-0.10432	0.087101	-0.19142	0.073937
East Midlands	-0.0735	0.110717	-0.18422	0.070667
West Midlands	-0.05511	0.041554	-0.09666	0.072491
East	-0.01644	0.107916	-0.12436	0.057485
Southeast	-0.0277	0.108813	-0.13651	0.048405
Southwest	0.021379	0.121254	-0.09987	0.064323
Wales	-0.07388	0.124411	-0.19829	0.085165
Scotland	-0.04732	0.13974	-0.18706	0.102926
N. Ireland	0.367731	0.256105	0.111627	0.175742
Rural	0.042013	0.077881	-0.03587	0.020795
2010	-0.00897	0.009103	-0.01807	0.007946
2011	-0.09182	-0.08133	-0.01049	0.006702
2012	-0.15358	-0.15248	-0.0011	0.004552
2013	-0.17078	-0.17751	0.006733	0.002926
2014	-0.05771	-0.07126	0.013547	0.003206
2015	0.025643	0.003596	0.022047	0.00514
2016	0.030107	0.003587	0.026521	0.007092
2017	-0.07972	-0.11943	0.039709	0.011034
2018	-0.08202	-0.11841	0.036386	0.010879

b = consistent under H_0 and H_a; obtained from xtreg
B = inconsistent under H_a, efficient under H_0; obtained from xtreg
Test: H_0: difference in coefficients not systematic

χ^2 (78) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 499.08
Prob > χ^2 = 0.0000
(V_b-V_B is not positive definite)

A7. Wooldridge test for serial autocorrelation in panel data

H_0: No first order autocorrelation
F(1, 25405) = 136.759
Prob > F = 0.0000

A8. Modified Wald test for groupwise heteroskedasticity in fixed effects models

H_0: $\sigma_i^2 = \sigma^2$ for all i

χ^2 (27468) = 8.3×10^9
Prob > χ^2 = 0.0000

A9. Mundlak test for fixed effects

Variable	RE	FE	Mundlak
One-Time*K-3	0.006367	0.099629	0.099629
One-Time*K-2	-0.13565	-0.02183	-0.02183
One-Time*K-1	-0.16086	-0.0391	-0.0391
One-Time*K0	-0.25742	-0.12934	-0.12934
One-Time*K1	-0.14601	-0.018	-0.018
One-Time*K2	-0.11307	0.019171	0.019171
One-Time*K3	-0.18953	-0.05339	-0.05339
One-Time*K4	-0.13919	0.008612	0.008612
One-Time*K5	-0.10371	0.05226	0.05226
One-Time*K6	-0.18098	-0.00626	-0.00626
One-Time*K7	-0.00717	0.16128	0.16128
Temporary*K-3	-0.10145	0.116807	0.116807
Temporary*K-2	-0.29137	-0.07069	-0.07069
Temporary*K-1	-0.28772	-0.06181	-0.06181
Temporary*K0	-0.5463	-0.31379	-0.31379
Temporary*K1	-0.454	-0.22162	-0.22162
Temporary*K2	-0.3679	-0.13143	-0.13143
Temporary*K3	-0.40553	-0.16729	-0.16729
Temporary*K4	-0.35382	-0.12156	-0.12156
Temporary*K5	-0.33973	-0.10707	-0.10707
Temporary*K6	-0.32713	-0.09306	-0.09306
Temporary*K7	-0.53155	-0.26842	-0.26842
Chronic NS*K-3	-0.43713	-0.34271	-0.34271
Chronic NS*K-2	-0.30209	-0.19208	-0.19208
Chronic NS*K-1	-0.47565	-0.36517	-0.36517
Chronic NS*K0	-0.59936	-0.48414	-0.48414
Chronic NS*K1	-0.68683	-0.56279	-0.56279
Chronic NS*K2	-0.52286	-0.40478	-0.40478
Chronic NS*K3	-0.54903	-0.43487	-0.43487

Chronic NS*K4	-0.58201	-0.46673	-0.46673
Chronic NS*K5	-0.6465	-0.51943	-0.51943
Chronic NS*K6	-0.65492	-0.52938	-0.52938
Chronic NS*K7	-0.78033	-0.6682	-0.6682
Chronic S*K-3	-0.41258	-0.11612	-0.11612
Chronic S*K-2	-0.41802	-0.09469	-0.09469
Chronic S*K-1	-0.5569	-0.21696	-0.21696
Chronic S*K0	-0.95179	-0.60306	-0.60306
Chronic S*K1	-1.16219	-0.81377	-0.81377
Chronic S*K2	-1.03407	-0.68491	-0.68491
Chronic S*K3	-1.025	-0.68116	-0.68116
Chronic S*K4	-1.02348	-0.68429	-0.68429
Chronic S*K5	-1.19543	-0.83234	-0.83234
Chronic S*K6	-1.30545	-0.93973	-0.93973
Chronic S*K7	-1.12117	-0.7549	-0.7549
Age	-0.07302	-0.06978	-0.06978
Age-Squared	0.00087	0.000832	0.000832
Living as a Couple	0.229504	0.147905	0.147905
Married	0.34234	0.154793	0.154793
Separated	-0.09857	-0.15009	-0.15009
Divorced	0.032427	0.030075	0.030075
Widowed	0.036898	-0.12878	-0.12878
No. of Children	0.033016	0.038682	0.038682
GCSE	0.047761	-0.02412	-0.02412
Higher/AS Level	0.103095	0.000709	0.000709
A Level/Bacc.	0.104636	-0.02486	-0.02486
Other HE	0.098123	-0.04539	-0.04539
Degree	0.184395	-0.01738	-0.01738
Postgraduate	0.181102	-0.096	-0.096
Northeast	0.149875	0.005971	0.005971
Northwest	0.132591	-0.09607	-0.09607
Yorks/Humber	0.087823	-0.10619	-0.10619
East Midlands	0.110263	-0.07777	-0.07777
West Midlands	0.042557	-0.05955	-0.05955
East	0.106949	-0.01817	-0.01817
Southeast	0.108801	-0.02745	-0.02745
Southwest	0.120592	0.022919	0.022919
Wales	0.121505	-0.07707	-0.07707
Scotland	0.138381	-0.03746	-0.03746
N. Ireland	0.256881	0.388387	0.388387
Rural	0.077147	0.042314	0.042314
mOne-Time*K-3			0.565569
mOne-Time*K-2			-0.66351
mOne-Time*K-1			-0.72957
mOne-Time*K0			(omitted)
mOne-Time*K1			0.4324
mOne-Time*K2			-0.13578
mOne-Time*K3			-0.01876
mOne-Time*K4			-0.24732

mOne-Time*K5	-0.11209
mOne-Time*K6	-1.09901
mOne-Time*K7	0.171806
mTemporary*K-3	-0.34276
mTemporary*K-2	-0.29837
mTemporary*K-1	2.434633
mTemporary*K0	-6.56103
mTemporary*K1	1.419969
mTemporary*K2	0.153227
mTemporary*K3	0.311389
mTemporary*K4	0.803972
mTemporary*K5	0.427777
mTemporary*K6	0.616566
mTemporary*K7	-1.83895
mChronic NS*K-3	-0.17384
mChronic NS*K-2	-0.04728
mChronic NS*K-1	-5.86411
mChronic NS*K0	(omitted)
mChronic NS*K1	-4.20727
mChronic NS*K2	3.630079
mChronic NS*K3	4.483916
mChronic NS*K4	1.816607
mChronic NS*K5	-0.59163
mChronic NS*K6	-0.1988
mChronic NS*K7	1.351225
mChronic S*K-3	-0.18134
mChronic S*K-2	-0.18356
mChronic S*K-1	-4.85501
mChronic S*K0	(omitted)
mChronic S*K1	-0.98863
mChronic S*K2	-0.29253
mChronic S*K3	2.893304
mChronic S*K4	2.49783
mChronic S*K5	-1.44028
mChronic S*K6	-0.60111
mChronic S*K7	0.168397
mAge	-0.0062
mAge-Squared	7.09E-05
mLiving as a Couple	0.128127
mMarried	0.291389
mSeparated	0.000971
mDivorced	0.013659
mWidowed	0.30071
mNo. of Children	-0.13918
mGCSE	0.099279
mHigher/AS Level	0.125691
mA Level/Bacc.	0.15911
mOther HE	0.185192
mDegree	0.242574

mPostgraduate			0.326214
mNortheast			0.163333
mNorthwest			0.25256
mYorks/Humber			0.216298
mEast Midlands			0.209953
mWest Midlands			0.112593
mEast			0.144191
mSoutheast			0.156826
mSouthwest			0.109133
mWales			0.224378
mScotland			0.196839
mN. Ireland			-0.11866
mRural			0.040261
Constant	6.273046	6.541551	6.253511

(1)	mOne-Time*K-3=0
(2)	mOne-Time*K-2=0
(3)	mOne-Time*K-1=0
(4)	o.mOne-Time*K0=0
(5)	mOne-Time*K1=0
(6)	mOne-Time*K2=0
(7)	mOne-Time*K3=0
(8)	mOne-Time*K4=0
(9)	mOne-Time*K5=0
(10)	mOne-Time*K6=0
(11)	mOne-Time*K7=0
(12)	mTemporary*K-3=0
(13)	mTemporary*K-2=0
(14)	mTemporary*K-1=0
(15)	mTemporary*K0=0
(16)	mTemporary*K1=0
(17)	mTemporary*K2=0
(18)	mTemporary*K3=0
(19)	mTemporary*K4=0
(20)	mTemporary*K5=0
(21)	mTemporary*K6=0
(22)	mTemporary*K7=0
(23)	mChronic NS*K-3=0
(24)	mChronic NS*K-2=0
(25)	mChronic NS*K-1=0
(26)	o.mChronic NS*K0=0
(27)	mChronic NS*K1=0
(28)	mChronic NS*K2=0
(29)	mChronic NS*K3=0
(30)	mChronic NS*K4=0
(31)	mChronic NS*K5=0
(32)	mChronic NS*K6=0
(33)	mChronic NS*K7=0
(34)	mChronic S*K-3=0
(35)	mChronic S*K-2=0

(36)	mChronic S*K-1=0
(37)	o.mChronic S*K0=0
(38)	mChronic S*K1=0
(39)	mChronic S*K2=0
(40)	mChronic S*K3=0
(41)	mChronic S*K4=0
(42)	mChronic S*K5=0
(43)	mChronic S*K6=0
(44)	mChronic S*K7=0
(45)	mAge=0
(46)	mAge-Squared=0
(47)	mLiving as a Couple=0
(48)	mMarried=0
(49)	mSeparated=0
(50)	mDivorced=0
(51)	mWidowed=0
(52)	mNo. of Children=0
(53)	mGCSE=0
(54)	mHigher/AS Level=0
(55)	mA Level/Bacc.=0
(56)	mOther HE=0
(57)	mDegree=0
(58)	mPostgraduate=0
(59)	mNortheast=0
(60)	mNorthwest=0
(61)	mYorks/Humber=0
(62)	mEast Midlands=0
(63)	mWest Midlands=0
(64)	mEast=0
(65)	mSoutheast=0
(66)	mSouthwest=0
(67)	mWales=0
(68)	mScotland=0
(69)	mN. Ireland=0
(70)	mRural=0
	Constraint 4 dropped
	Constraint 26 dropped
	Constraint 37 dropped
	χ^2(67) = 326.71
	Prob > χ^2 = 0.0000

Note: m[x] = mean of variable x.

A10. Comparing homoscedastic, heteroscedastic (robust) and clustered standard errors.

	Homo.	Hetero.	Clustered
One-Time*K-3	0.028	0.028	0.028
	(0.114)	(0.112)	(0.112)

One-Time*K-2	0.155	0.155	0.155
	(0.107)	(0.115)	(0.115)
One-Time*K-1	0.043	0.043	0.043
	(0.103)	(0.127)	(0.127)
One-Time*K0	-0.063	-0.063	-0.063
	(0.104)	(0.145)	(0.145)
One-Time*K1	0.029	0.029	0.029
	(0.104)	(0.147)	(0.147)
One-Time*K2	0.057	0.057	0.057
	(0.104)	(0.136)	(0.136)
One-Time*K3	-0.030	-0.030	-0.03
	(0.104)	(0.146)	(0.146)
One-Time*K4	-0.089	-0.089	-0.089
	(0.112)	(0.154)	(0.154)
One-Time*K5	-0.018	-0.018	-0.018
	(0.122)	(0.161)	(0.161)
One-Time*K6	0.042	0.042	0.042
	(0.139)	(0.182)	(0.182)
One-Time*K7	0.013	0.013	0.013
	(0.187)	(0.203)	(0.203)
Temporary*K-3	0.069	0.069	0.069
	(0.114)	(0.140)	(0.140)
Temporary*K-2	-0.080	-0.080	-0.08
	(0.106)	(0.146)	(0.146)
Temporary*K-1	-0.012	-0.012	-0.012
	(0.101)	(0.139)	(0.139)
Temporary*K0	-0.269	-0.269	-0.269
	(0.102)	(0.137)	(0.137)
Temporary*K1	-0.103	-0.103	-0.103
	(0.102)	(0.132)	(0.132)
Temporary*K2	-0.083	-0.083	-0.083
	(0.102)	(0.133)	(0.133)
Temporary*K3	-0.069	-0.069	-0.069
	(0.102)	(0.144)	(0.144)
Temporary*K4	-0.148	-0.148	-0.148
	(0.109)	(0.152)	(0.152)
Temporary*K5	-0.125	-0.125	-0.125
	(0.115)	(0.151)	(0.151)
Temporary*K6	-0.075	-0.075	-0.075
	(0.126)	(0.166)	(0.166)
Temporary*K7	-0.189	-0.189	-0.189
	(0.149)	(0.212)	(0.212)
Chronic NS*K-3	-0.150	-0.150	-0.15
	(0.246)	(0.267)	(0.267)
Chronic NS*K-2	-0.067	-0.067	-0.067
	(0.229)	(0.366)	(0.366)
Chronic NS*K-1	-0.276	-0.276	-0.276
	(0.220)	(0.320)	(0.320)

Chronic NS*K0	-0.373	-0.373	-0.373
	(0.221)	(0.369)	(0.369)
Chronic NS*K1	-0.429	-0.429	-0.429
	(0.221)	(0.374)	(0.374)
Chronic NS*K2	-0.351	-0.351	-0.351
	(0.221)	(0.334)	(0.334)
Chronic NS*K3	-0.443	-0.443	-0.443
	(0.221)	(0.372)	(0.372)
Chronic NS*K4	-0.324	-0.324	-0.324
	(0.226)	(0.362)	(0.362)
Chronic NS*K5	-0.355	-0.355	-0.355
	(0.231)	(0.357)	(0.357)
Chronic NS*K6	-0.444	-0.444	-0.444
	(0.240)	(0.373)	(0.373)
Chronic NS*K7	-0.675	-0.675	-0.675
	(0.269)	(0.398)	(0.398)
Chronic S*K-3	-0.265	-0.265	-0.265
	(0.224)	(0.332)	(0.332)
Chronic S*K-2	-0.158	-0.158	-0.158
	(0.205)	(0.331)	(0.331)
Chronic S*K-1	-0.524	-0.524	-0.524
	(0.196)	(0.309)	(0.309)
Chronic S*K0	-0.915	-0.915	-0.915
	(0.196)	(0.293)	(0.293)
Chronic S*K1	-1.104	-1.104	-1.104
	(0.196)	(0.312)	(0.312)
Chronic S*K2	-0.694	-0.694	-0.694
	(0.196)	(0.308)	(0.308)
Chronic S*K3	-1.067	-1.067	-1.067
	(0.196)	(0.291)	(0.291)
Chronic S*K4	-0.936	-0.936	-0.936
	(0.200)	(0.312)	(0.312)
Chronic S*K5	-1.335	-1.335	-1.335
	(0.205)	(0.324)	(0.324)
Chronic S*K6	-1.323	-1.323	-1.323
	(0.211)	(0.334)	(0.334)
Chronic S*K7	-0.880	-0.880	-0.881
	(0.229)	(0.362)	(0.362)
Age	-0.073	-0.073	-0.073
	(0.007)	(0.012)	(0.012)
Age Squared	0.001	0.001	0.001
	(0.000)	(0.000)	(0.000)
Living as a Couple	0.153	0.153	0.153
	(0.027)	(0.044)	(0.044)
Married	0.139	0.139	0.139
	(0.034)	(0.049)	(0.049)
Separated	-0.223	-0.223	-0.223

	(0.058)	(0.081)	(0.081)
Divorced	0.045	0.045	0.045
	(0.055)	(0.068)	(0.068)
Widowed	-0.130	-0.131	-0.132
	(0.113)	(0.161)	(0.161)
No. of Children	0.000	0.001	0.002
	(0.009)	(0.010)	(0.010)
GCSE	-0.090	-0.090	-0.090
	(0.063)	(0.071)	(0.071)
Higher/AS-Level	-0.069	-0.069	-0.069
	(0.066)	(0.075)	(0.075)
A Level/Bacc.	-0.1068	-0.1068	-0.1068
	(0.065)	(0.078)	(0.078)
Other Higher	-0.131	-0.131	-0.131
	(0.074)	(0.090)	(0.090)
Degree	-0.120	-0.120	-0.120
	(0.072)	(0.090)	(0.090)
Postgraduate	-0.189	-0.189	-0.189
	(0.085)	(0.117)	(0.117)
Northeast	0.460	0.460	0.460
	(0.173)	(0.251)	(0.251)
Northwest	0.073	0.073	0.073
	(0.116)	(0.155)	(0.155)
Yorks/Humber	0.180	0.180	0.180
	(0.116)	(0.164)	(0.164)
East Midlands	0.240	0.240	0.240
	(0.113)	(0.155)	(0.155)
West Midlands	0.106	0.106	0.106
	(0.111)	(0.168)	(0.168)
East	0.275	0.275	0.275
	(0.084)	(0.186)	(0.186)
Southeast	0.022	0.022	0.022
	(0.072)	(0.108)	(0.108)
Southwest	0.204	0.204	0.204
	(0.097)	(0.122)	(0.122)
Wales	-0.007	-0.007	-0.007
	(0.142)	(0.152)	(0.152)
Scotland	0.006	0.006	0.006
	(0.156)	(0.251)	(0.251)
N. Ireland	1.127	1.127	1.127
	(0.354)	(0.196)	(0.196)
Rural	-0.008	-0.008	-0.008
	(0.036)	(0.044)	(0.044)
Year			
2010	-0.005	-0.005	-0.005
	(0.020)	(0.024)	(0.024)

2011	-0.068	-0.068	-0.068
	(0.020)	(0.026)	(0.026)
2012	-0.160	-0.161	-0.162
	(0.020)	(0.027)	(0.027)
2013	-0.199	-0.199	-0.199
	(0.020)	(0.026)	(0.026)
2014	-0.116	-0.116	-0.116
	(0.020)	(0.025)	(0.025)
2015	-0.003	-0.003	-0.003
	(0.022)	(0.027)	(0.027)
2016	0.068	0.068	0.068
	(0.024)	(0.026)	(0.026)
2017	-0.054	-0.054	-0.054
	(0.032)	(0.039)	(0.039)
2018	-0.043	-0.043	-0.043
	(0.033)	(0.036)	(0.036)
Constant	6.789	6.789	6.789
	(0.187)	(0.293)	(0.293)

A11. Tests for the significance of wellbeing drops at onset.

One-Time Periods -4 to 0
(1) a1 = 0
(2) a5 = 0

F(2, 10097)	=	0.59
Prob > F	=	0.5546

One-Time Periods -1 to 0
(1) a4 = 0
(2) a5 = 0

F(2, 10097)	=	1.19
Prob > F	=	0.3039

Temporary Periods -4 to 0
(1) a13 = 0
(2) a17 = 0

F(2, 10097)	=	3.39
Prob > F	=	0.0337

Temporary Periods -1 to 0
(1) a16 = 0
(2) a17 = 0

F(2, 10097)	=	5.83

Prob > F	=	0.0029

Chronic Non-Severe Periods -4 to 0
(1) a25 = 0
(2) a29 = 0

F(2, 10097)	=	7.69
Prob > F	=	0.0005

Chronic Non-Severe Periods -1 to 0
(1) a28 = 0
(2) a29 = 0

F(2, 10097)	=	5.24
Prob > F		0.0053

Chronic Severe Periods -4 to 0
(1) a37 = 0
(2) a41 = 0

F(2, 10097)	=	5.77
Prob > F	=	0.0031

Chronic Severe Periods -1 to 0
(1) a40 = 0
(2) a41 = 0

F(2, 10097)	=	8.09
Prob > F	=	0.0003

A12. Tests for significance of adaptation after onset.

Temporary Periods 0 to 1
(1) a17 = 0
(2) a18 = 0

F(2, 10097)	=	3.54
Prob > F	=	0.029

Chronic Severe Periods 0 to 7
(1) a41 = 0
(2) a48 = 0

F(2, 10097)	=	4.52
Prob > F	=	0.0109

Chronic Severe Periods 6 to 7
(1) a47 = 0
(2) a48 = 0

F(2, 10097)	=	6.47
Prob > F	=	0.0016

A13. Investigating Potential Dynamic Bias

Recent literature has highlighted potential problems with using estimates from event-type models in which there are heterogeneous treatment effects, including when the treatment effect occurs at different times. Potentially, "dynamic bias" may be present in the results if there is heterogeneity in the wellbeing response to disability onset between people who become disabled at different times. For example, one possible source of this heterogeneity may arise from the fact that over the time period in which the survey took place (2009 to 2018), entitlement to disability welfare benefits has changed, particularly with the staggered rollout of *Universal Credit* across the UK. As such, someone's response to becoming disabled in 2009 or in 2018 may be different if they perceive that the amount of government assistance they will receive has changed over that time.

The literature on this type of bias largely concentrates on difference-in-differences (DiD) estimations but the arguments also apply to other forms of event-type model. A summary of the literature in this area is provided by Roth, Sant'Anna, Bilinski and Poe (2023), although a useful discussion is also provided by Callaway and Sant'Anna (2021). They explain that the DiD literature typically focuses on settings in which there are two time periods and two groups. In the first time period, no one is treated, but some are treated in the second period (the treated group), whilst some are not (the comparison group). An assumption is made that in the absence of treatment, the average outcomes for both groups should follow parallel paths, for example, they experience the same macroeconomic effects associated with living in the same country (the parallel trends assumption). Based on this, it is possible to estimate the average treatment effect on the treated (ATT) by comparing the average change in outcomes between the two groups, netting out the effects of parallel trends.

However, more complex models which consider more than two time periods and treatments at different points in time have led to multiple authors noting that coefficients from event-type models may not truly represent a weighted average of unit-level treatment effects when the treatment effects are heterogeneous, such as experiencing disability onset at different times (e.g., Callaway and Sant'Anna, 2021; DeChaisemartin and d'Haultfœille, 2022; Goodman-Bacon, 2021). Such regressions are argued to make both "clean" comparisons between treated and not-yet-treated units as well as "forbidden" comparisons between units who are both already-treated (DeChaisemartin and d'Haultfœille, 2022). When the treatment effects occur in different time periods, these "forbidden" comparisons can potentially lead to drawbacks such as "negative weighting problems" which can, in extreme cases, even flip the sign of the estimated coefficient. There is also the problem that the treatment effect does not always simply "turn on" like a switch, as it can have a "dose" or operate with varying intensity (Callaway, Goodman-Bacon and Sant'Anna, 2021).

Several robustness tests are conducted to test whether there is any evidence of dynamic bias present in the main model results. First, some informal tests are conducted to explore whether there is evidence that disability onset affects SWB differently at different times. These tests are listed below.

Pre/Post-year disability model

In this first test, a dummy variable is generated, equal to one if the survey year is 2013 or later. Doing so splits the disabled portion of the sample approximately in half in terms of the onset year, with approximately half becoming disabled in the years 2010 to 2012 and the other half becoming disabled in the years 2013 to 2015. The year 2013 also happens to be the year in which Universal Credit, mentioned previously, was first rolled out. Alongside this dummy, the model also includes a time-variant dummy variable, equal to one if the individual is disabled in a given wave, and an interaction effect between the two dummies. The model is estimated under (i) OLS, (ii) RE, (iii) FE and (iv) FE with a set of controls. In all specifications (see Table A17), both the disability dummy and the post-2013 dummy are negative and statistically significant, but the interaction effects are small and insignificant, suggesting that there is no additional effect of becoming disabled after 2013 relative to before 2013.

This model is repeated using 2011, 2012, 2014 and 2015 as the dividing years (see Table A18). Similar results are found in each specification except for (i) where the dividing year is 2011. This result suggests that people who experienced disability from 2011 onwards reported declines in SWB of around 0.21 points smaller in magnitude compared to those in previous years. A possible explanation for this may be that some people who were disabled prior to 2011 may not have experienced the benefits, or the full benefits, of the 2010 Equality Act.

A similar model is run (see Table A19) but with the inclusion of a pair of dummy variables which denote non-severe and severe disability, each of which are also interacted with the post-2013 dummy. Again, whilst the disability severity and time dummies are all negative and statistically significant (except for Non-Severe disability under FE with controls), all of the interaction effects are non-significant, suggesting no evidence of dynamic bias under this informal model.

In a third model (see Table A20), leads and lags of disability are estimated alongside a set of interactions between these leads and lags and the post-2013 dummy. Only a few of the interaction effects between disability and the post-2013 dummy are significant and these are under OLS and RE, rather than the preferred FE estimation, so evidence of dynamic bias is not strong for this model either.

Overall, the results from these three models suggest that whilst there is a negative effect on SWB arising from disability and a time fixed effect which picks up lower overall levels of SWB from 2013 onwards, there is no apparent interaction between these two factors and thus no evidence of any difference between becoming disabled within different calendar years, with the exception of those who were disabled prior to 2011, whose disability was associated with SWB in this year of around 0.21 points lower than people who experienced disability in subsequent years.

Formal tests of dynamic bias

A number of formal tests are conducted to investigate the presence of dynamic bias arising from the heterogeneous treatment effects (becoming disabled at different times). It is important to note that in each case, due to restrictions that come with each test, as well as the complex nature of the main model used in this chapter, these tests are conducted in relation to adapted versions of the model, rather than the main model specification, so this has to be accounted for when interpreting the results. The first of these is the regression adjustment model of Callaway and Sant'Anna (2021). This model tests whether the parallel trend assumption required when estimating DiD models holds between every pairwise combination of years when there are staggered treatment times. It estimates this using the outcome variable (life satisfaction), the personal identifier, the time variable (the survey year), the onset year, and a variable equal to one to denote that disability onset has already occurred (including the current year). In the context of the main model from this chapter, the year of onset includes the years 2010 to 2015. The results from the model are displayed in Table A21. They suggest that there may be a degree of dynamic bias between the years 2010 and 2012 (-0.240**), 2011 and 2012 (-0.186*), 2012 and 2013 (-0.257**), 2013 and 2014 (-0.250**), implying that the estimated negative effects of disability onset from the main model may be inaccurate when comparing someone who becomes disabled in 2012 compared to 2010, in 2012 compared to 2011, in 2013 compared to 2012, and in 2014 compared to 2013. The first of these results is consistent with the findings from the Pre/Post 2011 model (Table A18, (i)), which suggested that the negative effects of disability upon SWB appeared to be greater by 0.21 points after the year 2011 compared to before.

In a second formal test, a simplified version of the main model is run in which all leads and lags of disability are omitted and replaced with a single dummy variable, set equal to one if disability onset has occurred (including the onset period). This model is run five times, each time to include only individuals who are (i) disabled in any category, (ii) One-Time disabled, (iii) Temporary disabled, (iv) Chronic Non-Severe disabled and (v) Chronic Severe disabled (all estimations include non-disabled people). Once these models have been estimated, they are subject to a *Bacon decomposition* (Goodman-Bacon, 2021). Similar to the paper by Callaway and Sant'Anna (2021), Goodman-Bacon (2021) argues that heterogeneous treatment effects in DiD models means that they return a weighted average of all possible two-group/two-period estimators. He states that a causal interpretation of DiD estimates requires both a parallel trends assumption *and* treatment effects that are constant over time, and proposes a method by which to decompose these effects. Rather than applying an adjustment to the estimated coefficients, as per the method of Callaway and Sant'Anna (2021), Goodman-Bacon (2021) calculates a set of weights to be applied for every pairwise combination of time periods and applies these weights to the explanatory variable(s) in the DiD model, so that any dynamic bias present is controlled for. The variable to be estimated in this case is a dummy which represents the difference between average pre-onset SWB and average post-onset SWB when considering all time periods.

The estimations of five dummy variables discussed above are shown in Table A22 and the results from the Bacon decompositions are then shown in Table A23, although they are mixed. The estimates prior to the decomposition are: -0.195*** for all disabilities, -0.050 for One-Time, -0.135** for Temporary, -0.182 for Chronic Non-Severe and -0.627*** for Chronic Severe disabilities. These estimates represent the average change in SWB post-onset compared to pre-onset SWB and are relatively consistent with the results from this chapter's main estimation.

The Bacon decomposition estimates are: -0.284** for all disabilities, 0.025 for One-Time disabilities, -0.139*** for Temporary disabilities, -0.141* for Chronic Non-Severe disabilities and -0.428*** for Chronic Severe disabilities, most of which are relatively close to the pre-decomposition estimates, suggesting little evidence of dynamic bias. The most noticeable difference in the results is that for the Chronic Severe group; the Bacon decomposition suggests that the decline in wellbeing experienced by this group is overstated by 0.199 points. This is a similar finding to the Regression Adjustment model, discussed above, which also suggested that the negative effects of disability upon SWB may be overstated by around 0.2 points.

In a third test, the effect on SWB of disability in the onset period is estimated using a DiD model by de Chaisemartin and d'Haultfœille (2020), which, as with the Callaway and Sant'Anna (2021) model, applies weights to the estimates. Whilst this model has the disadvantage that it cannot include sample probability weights, controls, or fixed effects an advantage is that it can estimate leads and lags of disability and as such, its results can be more directly compared to those from this chapter's main model. This is done for each of the four disability categories in turn and the results are displayed in Table A24 shown below. The coefficients have to be interpreted carefully because of the way in which they are estimated. All lead coefficients in the model are effectively single-period difference-in-differences between one period and the next, rather than deviations from a baseline level of wellbeing. Therefore, to estimate the total deviation from baseline SWB, all lead coefficients must be summed with their priors. With this in mind, the model starts at 2 periods prior to onset, rather than 3 periods (as was the case in this chapter's main model), because there are no significant effects on SWB at 3 periods prior to onset. Hence, the inclusion of a third period prior to onset would complicate the interpretation of the over results as this would involve summing together both statistically significant and non-significant coefficients. Lags of disability onset, however, are interpreted differently as they represent the long-term estimates of the difference in SWB between the time period in question and SWB in the onset period. In order to accurately compare a pair results which are robust or not robust to dynamic bias, a version of the main model from this chapter is estimated under OLS whilst excluding a set of controls and sample probability weights. These results are shown in Table A25.

Table A26 and Figure A14 show the results when the coefficients are interpreted in such a manner, however comparing these results to those from the main model should also be done with caution as they do not include sample probability weights or controls. As with this chapter's main model, the One-Time category barely deviates from baseline. The model suggests that people with Temporary disabilities experience a decline in SWB at onset by 0.225 points (compared to 0.214 in the main model), but instead of experiencing adaptation in the next period, SWB is still below baseline at 1 year (-0.124) and 3 years (-0.097) after onset (the only statistically significant coefficients), suggesting a small degree of dynamic bias which slightly overstates the speed of adaptation for people with Temporary disabilities in the OLS estimation. Under this model, the Chronic Non-Severe coefficients are mostly insignificant, but the coefficients are smaller in magnitude compared to the main model. However, this may be driven by the fact that the lags of disability onset in this model reflect changes in SWB from onset, rather than from baseline, which under the main model were found to be close to zero for Chronic Non-Severe disabilities when controlling for general level of health. Chronic Severe coefficients are significant in all time periods. As with the main model, the results suggest an anticipation effect prior to onset, a continued decline in SWB at onset and a further decline after onset, reaching a low of -1.372 at 6 periods post-onset. When comparing these results to the OLS estimations,[139] they suggest that dynamic bias causes the OLS model to slightly overstate the wellbeing effects of disability from periods -2 to the onset period, understate the effects in periods 1 to 4 and overstate the effects again in periods 5 to 6 (see Figure A15).

In conclusion, the evidence on whether dynamic bias is present in the results is mixed but not great in magnitude in either direction. The models which look at whether being disabled either side of various years conclude that there may be a slight disadvantage (by around 0.2 points) to being disabled prior to 2011 compared to after this time, possibly explained by changes in legislation. Similarly, the regression adjustment model of Callaway and Sant'Anna (2021) suggests that estimated negative effects of disability upon SWB in later years may be

[139] See Tables A27-A28 for these OLS estimations in full.

overestimated compared to earlier years, again by approximately 0.2 points. In a different approach, single-point estimates of SWB differences from baseline in the onset period are estimated separately for each of the four disability categories. The estimates were subject to a Bacon decomposition (Goodman-Bacon, 2021) and the most noticeable change in the results is found in the Chronic Severe category, in which there is evidence that the negative effects of disability are overstated by approximately 0.2 points. Finally, a set of results is estimated using the 'Difference-in-Differences Multiple GT' model of de Chaisemartin and d'Haultfœille (2020), which estimates a set of coefficients which represent the change in SWB from one period to the next for leads of disability onset, and a separate set of coefficients which represent the long-range change in SWB from the onset period to the period in question. However, the results need to be interpreted with caution for two reasons; first, they must be compared to a version of the chapter's main model which is estimated under OLS and excludes controls and sample probability weights. Second, as the coefficients represent marginal changes in SWB by period, rather than deviations from baseline, they need to be aggregated to interpret the total effect, but this is problematic when the estimations include both statistically significant and non-significant results. As such, the estimation is restricted to as few leads and lags as possible. When the results are interpreted, they suggest that the OLS model overstates the negative effects of disability upon SWB for the first few and last two periods, but the opposite case in the first few periods after onset. If dynamic bias works in opposite directions at different points relative to onset, this may explain the fairly mixed results throughout these robustness tests, however all the results should be treated with caution as the specifications are different each time and none of them is directly comparable with the main model from this chapter. Nevertheless, evidence of dynamic bias is limited to around 0.2 points out of 7 in any case.

A14. Disability by Type (Four Categories Approach)

An assumption of the main model is that disability types affect wellbeing homogeneously. This is not consistent with the existing literature, which emphasizes how mobility and independence issues, for example, can affect wellbeing in specific ways. Therefore, it was deemed useful to explore the heterogeneity of the wellbeing response by disability type. The first attempt to do this involved placing each of the 12 types of disability in the dataset into four broad groups, called 'Physical', 'Sensory', 'Cognitive' and 'Other'. There was little indication from the literature review with regards to how disability should be categorised, although some papers make distinctions between physical and non-physical disabilities. The Office for National Statistics (2019) report lowers levels of life satisfaction amongst people mental, rather than physical disabilities, with life satisfaction for all other disabled people lying between the two groups. For the purpose of this paper, an additional 'Sensory' group was included as hearing- and sight-related disabilities do not fit neatly into either physical or cognitive categories. In the other groups, 'Physical' represented individuals who had a disability which restricted their movement to some extent, including difficulties with mobility, lifting or carrying, manual dexterity, continence, co-ordination or personal care; those who had difficulties with communication or speech, memory or learning, or the ability to recognise danger were placed in the 'Cognitive' group; those who had difficulties in some other area of life were placed in the 'Other' group. The variables which represented the four groups are time-invariant and are not mutually exclusive as it is possible for someone to belong to multiple groups. From the whole sample, 822 (2.99%) of individuals fall into the Physical group, 218 (0.79%) fall into the Sensory group, 346 (1.26%) fall into the Cognitive group and 1,503 (5.47%) fall into the Other group.

Next, the four disability categories from this paper's main model were replaced by the four new disability groups described above. They are interacted with dummy variables which represent the time from onset from 3 periods before disability onset until 7 periods after. The results are shown in Table A37 and Figure A22. Unfortunately, the results are relatively inconclusive, with only the Physical group returning statistically significant coefficients. These are relatively low compared to some of the results from the main model, lying between -0.249 and -0.294 from the onset period. The coefficients in the Cognitive group are slightly smaller in absolute value but are not significant. One possible conclusion is that the different types of disability are too heterogeneous to be easily placed into separate categories with each other, although another explanation for the lack of conclusive results is that chronicity and severity (which are not considered here) are more meaningful categorisations of disability than type; as found when leads and lags of disability were regressed against wellbeing alone, the coefficients are much smaller. Hence, it was concluded that disability by chronicity and severity should be considered first before analysing any heterogeneity, including disability type.

A15. Disability by Type (Separate Regressions Approach).

The second attempt to explore heterogeneity by disability type involved estimating equation (2), outlined in section 3.4.3, the same way that the rest of the heterogeneity analysis was conducted. However, instead of introducing the additional dimension, d, as a pair of dummy variables (e.g., male and female), it would consist of a series of 11 dummy variables, representing the 11 disability types in the data (this included mobility, lifting and carrying, dexterity, hearing, sight, speech/communication, recognising danger, continence, memory and learning, and personal care difficulties, but excluded 'other disability', from which no useful inference could be made). The variables were time-invariant and were set equal to one when the individual had experienced this type of disability (mobility, lifting and carrying, etc.) at least once over the course of the survey. As such, they were non-mutually exclusive as it was possible for an individual to experience more than one disability type across the 9 waves, either simultaneously or at different times. Placing a mutual exclusivity restriction would have lost around 40% of the data. This approach was problematic however, as it required generating quite a large number of dummy variables (484) to deal with each combination of disability category, disability type and time from onset. For some disability types, the cell sizes in the first few periods were too small to form an adequately large reference group. It also caused various collinearity issues, which were picked up by the statistical software and resulted in the omission of several key variables.[140] To get around this, each disability type with enough observations in its reference group was estimated separately. These include all disability groups apart from continence, memory and learning, and personal care difficulties, for which there were not adequate sample sizes. Each equation was estimated with the restriction that an individual must either have a Chronic Severe disability, whilst also having reported the relevant disability type at some point in the survey, or they are non-disabled.

The results are shown in Table A38 and Figure A23. Most of the regressions returned statistically significant coefficients after the onset period. It can be seen that Chronic Severe disabled individuals follow similar life satisfaction paths regardless of their disability type, although some experience lower SWB than others. The most significant sets of coefficients came from speech/communication, mobility,

[140] The results of this model are shown in the Appendix [A37].

lifting/carrying and co-ordination, which all lay below the Chronic Severe coefficients from the main model, so these arguably exhibit the greatest effects upon wellbeing. The coefficient with the greatest magnitude is on speech/communication at 5 periods after onset (-1.896). The coefficients on manual dexterity, hearing, sight and recognising danger mostly lie above the Chronic Severe coefficients from the main model, although very few of these coefficients are significant, with the exception of a handful, i.e., Recognising Danger at 5 periods post-onset, Dexterity and Sight at 1 and 5 periods post-onset. This may possibly be explained by noise in the data, low sample sizes or both.

Table A1. Disability and severity definitions by percentage.

	Disability Definition 1	**Disability Definition 2**
Non-Disabled	94.04%	94.95%
Disabled	5.96%	5.05%
	Severity Definition 1	**Severity Definition 2**
Non-Disabled	94.82%	94.95%
Non-Severe	4.10%	2.97%
Severe	1.08%	2.08%

Table A2. Cross-tabulations of disability and severity definitions by percentage.

	Disability Definition 1	**Disability Definition 2**
Severity Definition 1		
Non-Disabled	94.82%	94.83%
Non-Severe Disabled	4.10%	4.09%
Severe Disabled	1.08%	1.08%
Total	100%	100%
Severity Definition 2		
Non-Disabled	96.75%	95.06%
Non-Severe Disabled	1.49%	2.90%
Severe Disabled	1.76%	2.04%
Total	100%	100%

Table A3. Life satisfaction by disability status.

	Overall Life Satisfaction		Health Satisfaction	
	Non-Dis.	**Disabled**	**Non-Dis.**	**Disabled**
Completely Dissatisfied	1.54%	3.98%	2.69%	8.23%
Mostly Dissatisfied	4.65%	9.23%	7.36%	16.25%
Somewhat Dissatisfied	6.51%	14.59%	9.72%	28.23%
Neither Sat. nor Dis.	8.35%	14.36%	6.91%	11.60%
Somewhat Satisfied	18.16%	20.61%	14.20%	13.46%
Mostly Satisfied	49.24%	32.23%	45.19%	20.05%
Completely Satisfied	11.54%	5.00%	13.93%	2.17%

Table A3 (cont.). Life satisfaction by disability status.

	Income Satisfaction		Amount of Leisure Time Satisfaction	
	Non-Dis.	**Disabled**	**Non-Dis.**	**Disabled**
Completely Dissatisfied	3.97%	10.19%	2.93%	5.97%
Mostly Dissatisfied	8.45%	13.93%	8.10%	10.39%
Somewhat Dissatisfied	14.26%	20.12%	17.15%	19.63%
Neither Sat. nor Dis.	11.93%	15.36%	13.01%	20.36%
Somewhat Satisfied	20.73%	17.09%	22.64%	18.68%
Mostly Satisfied	31.56%	18.51%	26.55%	17.82%
Completely Satisfied	9.09%	4.81%	9.62%	7.14%

Table A4. Leads and lags of disability by severity.

	Non-Severe	**Severe**
4 Periods before Onset	*Reference*	
3 Periods before Onset	0.017	-0.005
	(0.102)	0.152
2 Periods before Onset	0.074	-0.088
	(0.110)	0.156
1 Period before Onset	-0.009	-0.169
	(0.109)	0.151
Onset Period	-0.087	-0.625***
	(0.117)	0.149
1 Period after Onset	-0.017	-0.596***
	(0.117)	0.159
2 Periods after Onset	-0.035	-0.290*
	(0.111)	0.153
3 Periods after Onset	-0.076	-0.492***
	(0.121)	0.15
4 Periods after Onset	-0.135	-0.419**

	(0.123)	0.164
5 Periods after Onset	-0.143	-0.576***
	(0.123)	0.176
6 Periods after Onset	-0.097	-0.617***
	(0.137)	0.184
7 Periods after Onset	-0.220	-0.394*
	(0.151)	0.224
Age	-0.073***	
	(0.012)	
Age Squared	0.001	
	(0.000)	
Single	*Reference*	
Living as a Couple	0.153	
	(0.044)	
Married	0.137	
	(0.049)	
Separated	-0.223	
	(0.081)	
Divorced	0.045	
	(0.068)	
Widowed	-0.138	
	(0.166)	
No. of Children	0.000	
	(0.010)	
No Qualification	*Reference*	
GCSE	-0.092	
	(0.072)	
Higher/AS Level	-0.071	
	(0.075)	
A-Level	-0.104	
	(0.078)	
Other Higher	-0.127	
	(0.090)	
Degree	-0.119	
	(0.090)	
Postgraduate	-0.181	
	(0.117)	
London	*Reference*	
North East	0.468*	
	(0.251)	
North West	0.081	
	(0.154)	
Yorks/Humber	0.188	
	(0.163)	
East Midlands	0.238	
	(0.155)	
West Midlands	0.108	
	(0.166)	
East	0.268	
	(0.186)	
South East	0.031	

	(0.107)
South West	0.212*
	(0.123)
Wales	-0.003
	(0.153)
Scotland	-0.006
	(0.249)
N. Ireland	1.071***
	(0.191)
Urban	*Reference*
Rural	-0.003
	(0.044)
2009	*Reference*
2010	-0.007
	(0.024)
2011	-0.069***
	(0.026)
2012	-0.163***
	(0.027)
2013	-0.202***
	(0.026)
2014	-0.119***
	(0.025)
2015	-0.004
	(0.027)
2016	0.067***
	(0.026)
2017	-0.052
	(0.039)
2018	-0.042
	(0.036)
Constant	6.789***
	(0.294)
R-Squared (within)	0.0129
R-Squared (between)	0.0144
R-Squared (overall)	0.0117

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets.
P-Values: *** 1%, ** 5%, *10%

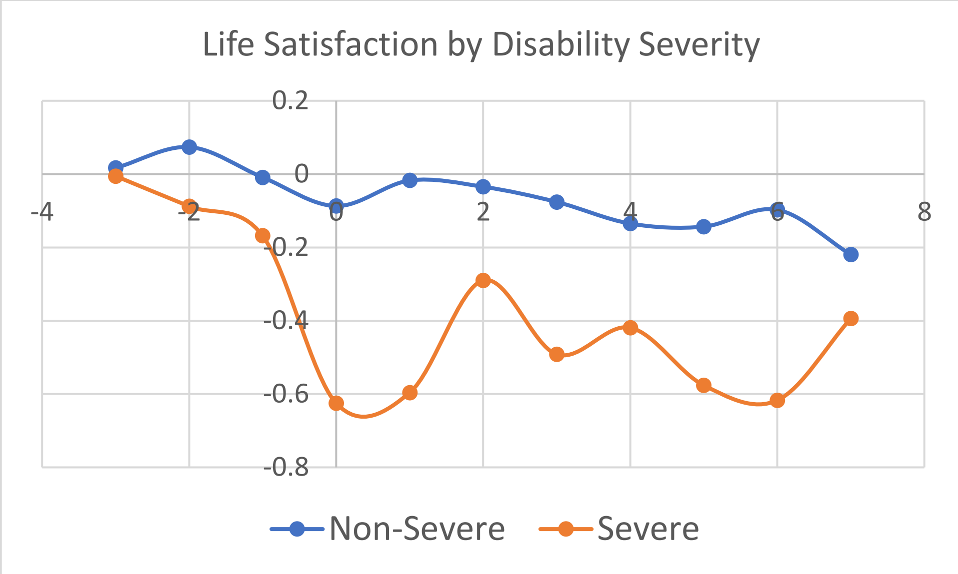


Figure A2. Life satisfaction by disability severity. Only Severe coefficients from the onset period onwards are statistically significant.

Table A5. Leads and lags of disability by chronicity.

	One-Time	Temporary	Chronic
4 Periods before Onset	*Reference*		
3 Periods before Onset	0.028	0.069	-0.228
	(0.112)	(0.140)	(0.217)
2 Periods before Onset	0.156	-0.079	-0.125
	(0.115)	(0.146)	(0.247)
1 Period before Onset	0.044	-0.012	-0.407*
	(0.127)	(0.139)	(0.224)
Onset Period	-0.063	-0.268*	-0.673***
	(0.145)	(0.137)	(0.231)
1 Period after Onset	0.030	-0.102	-0.806***
	(0.147)	(0.132)	(0.241)
2 Periods after Onset	0.057	-0.082	-0.536**
	(0.136)	(0.133)	(0.226)
3 Periods after Onset	-0.030	-0.068	-0.790***
	(0.146)	(0.144)	(0.231)
4 Periods after Onset	-0.088	-0.146	-0.666***
	(0.154)	(0.152)	(0.238)
5 Periods after Onset	-0.018	-0.124	-0.904***
	(0.161)	(0.151)	(0.242)
6 Periods after Onset	0.042	-0.074	-0.944***
	(0.182)	(0.166)	(0.252)
7 Periods after Onset	0.013	-0.189	-0.763***
	(0.203)	(0.212)	(0.272)
Age	-0.072***		

	(0.012)
Age Squared	0.001***
	(0.000)
Single	*Reference*
Living as a Couple	0.155***
	(0.044)
Married	0.140***
	(0.049)
Separated	-0.219***
	(0.082)
Divorced	0.046185
	(0.068)
Widowed	-0.130
	(0.165)
No. of Children	0.000
	(0.010)
No Qualification	*Reference*
GCSE	-0.091
	(0.071)
Higher/AS Level	-0.069
	(0.075)
A-Level	-0.108
	(0.078)
Other Higher	-0.131
	(0.090)
Degree	-0.122
	(0.090)
Postgraduate	-0.192
	(0.117)
London	*Reference*
North East	0.455**
	(0.250)
North West	0.068
	(0.155)
Yorks/Humber	0.178
	(0.164)
East Midlands	0.238
	(0.155)
West Midlands	0.092
	(0.167)
East	0.277
	(0.187)
South East	0.021
	(0.108)
South West	0.210
	(0.123)
Wales	-0.007
	(0.152)
Scotland	0.006
	(0.251)

N. Ireland	1.114***
	(0.199)
Urban	*Reference*
Rural	-0.006
	(0.044)
2009	*Reference*
2010	-0.006
	(0.024)
2011	-0.069***
	(0.026)
2012	-0.160***
	(0.027)
2013	-0.199***
	(0.026)
2014	-0.117***
	(0.025)
2015	-0.004
	(0.027)
2016	0.067***
	(0.026)
2017	-0.054
	(0.039)
2018	-0.043
	(0.036)
Constant	6.779***
	(0.293)
R-Squared (within)	0.0134
R-Squared (between)	0.0189
R-Squared (overall)	0.0150

Observations: 167,093

Sample probability weights applied.

Standard errors (clustered by individual) are displayed in brackets

P-Values: *** 1%, ** 5%, *10%

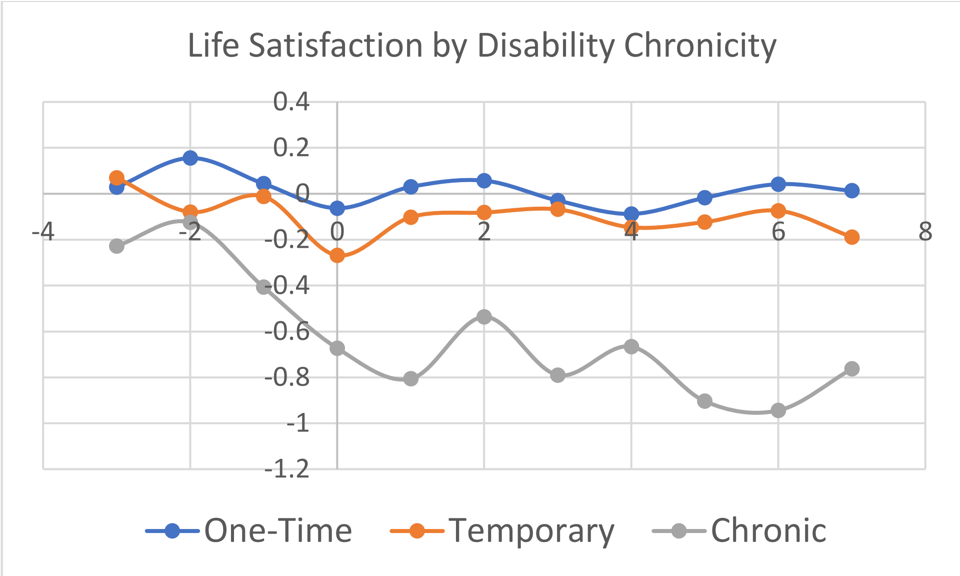


Figure A3. Life satisfaction by disability chronicity. The One-Time coefficients are not statistically significant. Only the coefficient at onset is significant in the Temporary category. The coefficients in the Chronic category are significant from period -1 onwards.

Table A6. Main Model estimated using alternative severity definition.

	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.057	0.069	0.000	-0.640
	(0.113)	(0.143)	(0.245)	(0.461)
2 Periods before Onset	0.162	-0.072	0.050	-0.359
	(0.115)	(0.146)	(0.298)	(0.471)
1 Period before Onset	0.059	-0.027	-0.287	-0.657
	(0.127)	(0.140)	(0.271)	(0.414)
Onset Period	-0.056	-0.254*	-0.484*	-1.075***
	(0.146)	(0.137)	(0.291)	(0.364)
1 Period after Onset	0.018	-0.121	-0.491	-1.226***
	(0.149)	(0.132)	(0.299)	(0.390)
2 Periods after Onset	0.039	-0.064	-0.271	-1.123***
	(0.137)	(0.133)	(0.284)	(0.384)
3 Periods after Onset	-0.037	-0.072	-0.506*	-1.346***
	(0.147)	(0.145)	(0.300)	(0.342)
4 Periods after Onset	-0.102	-0.150	-0.437	-1.317***
	(0.155)	(0.152)	(0.299)	(0.391)
5 Periods after Onset	-0.044	-0.137	-0.641**	-1.642***
	(0.163)	(0.150)	(0.303)	(0.407)
6 Periods after Onset	0.041	-0.138	-0.718**	-1.345***
	(0.184)	(0.169)	(0.310)	(0.457)
7 Periods after Onset	0.035	-0.200	-0.504	-1.348***
	(0.210)	(0.214)	(0.339)	(0.456)
Age	-0.073***			

	(0.012)
Age Squared	0.001***
	(0.000)
Single	*Reference*
Living as a Couple	0.167***
	(0.043)
Married	0.148***
	(0.048)
Separated	-0.232***
	(0.084)
Divorced	0.051
	(0.067)
Widowed	-0.106
	(0.160)
No. of Children	-0.001
	(0.011)
No Qualification	*Reference*
GCSE	-0.093
	(0.072)
Higher/AS Level	-0.072
	(0.075)
A-Level	-0.109
	(0.079)
Other Higher	-0.133
	(0.090)
Degree	-0.130
	(0.090)
Postgraduate	-0.194*
	(0.117)
London	*Reference*
North East	0.457*
	(0.250)
North West	0.096
	(0.154)
Yorks/Humber	0.178
	(0.163)
East Midlands	0.248
	(0.155)
West Midlands	0.133
	(0.168)
East	0.274
	(0.186)
South East	0.031
	(0.106)
South West	0.208*
	(0.122)
Wales	0.011
	(0.152)
Scotland	0.017
	(0.251)

N. Ireland	1.112***
	(0.194)
Urban	*Reference*
Rural	-0.006
	(0.045)
2009	*Reference*
2010	-0.007
	(0.024)
2011	-0.078***
	(0.026)
2012	-0.164***
	(0.027)
2013	-0.202***
	(0.026)
2014	-0.119***
	(0.025)
2015	-0.005
	(0.027)
2016	0.068***
	(0.026)
2017	-0.050
	(0.039)
2018	-0.039
	(0.036)
Constant	6.786***
	(0.293)
R-Squared (within)	0.0136
R-Squared (between)	0.0195
R-Squared (overall)	0.0156

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets.
P-Values: *** 1%, ** 5%, *10%

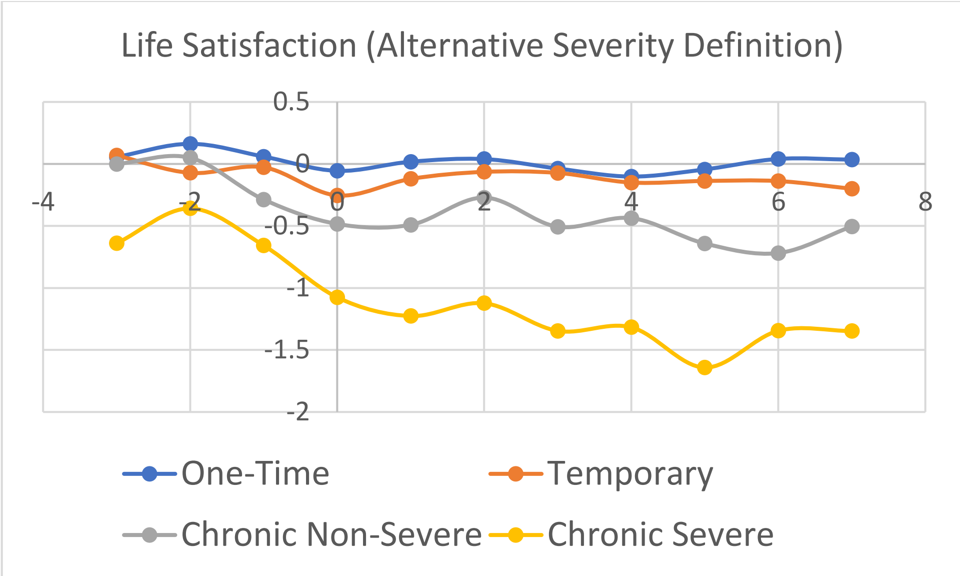


Figure A4. Life satisfaction by disability category. Severe is defined by a response of 'Yes, a Lot' to the question which asks the extent to which their condition affects moderate activities. Non-Severe is defined by a response of 'Yes, a Little'.

Table A7. Main Model estimated using work-limiting severity definition.

	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.040	0.091	-0.114	-1.070
	(0.113)	(0.146)	(0.215)	(0.795)
2 Periods before Onset	0.175	-0.046	0.047	-1.243*
	(0.115)	(0.149)	(0.258)	(0.649)
1 Period before Onset	0.047	0.019	-0.358	-1.158**
	(0.128)	(0.142)	(0.234)	(0.540)
Onset Period	-0.055	-0.253*	-0.566**	-1.692***
	(0.146)	(0.141)	(0.245)	(0.471)
1 Period after Onset	0.041	-0.091	-0.612**	-1.924***
	(0.149)	(0.136)	(0.255)	(0.546)
2 Periods after Onset	0.072	-0.069	-0.411*	-1.418**
	(0.137)	(0.138)	(0.237)	(0.570)
3 Periods after Onset	-0.026	-0.043	-0.623**	-2.258***
	(0.147)	(0.148)	(0.243)	(0.549)
4 Periods after Onset	-0.065	-0.142	-0.580**	-1.623***
	(0.155)	(0.156)	(0.252)	(0.536)
5 Periods after Onset	0.014	-0.097	-0.789***	-1.968***
	(0.161)	(0.154)	(0.257)	(0.571)
6 Periods after Onset	0.113	-0.055	-0.777***	-2.768***
	(0.174)	(0.170)	(0.268)	(0.545)
7 Periods after Onset	0.032	-0.185	-0.579**	-2.448***
	(0.204)	(0.218)	(0.291)	(0.581)
Age	-0.074***			

	(0.012)
Age Squared	0.001***
	(0.000)
Single	*Reference*
Living as a Couple	0.159***
	(0.043)
Married	0.143***
	(0.048)
Separated	-0.214***
	(0.082)
Divorced	0.054
	(0.068)
Widowed	-0.124
	(0.168)
No. of Children	-0.002
	(0.011)
No Qualification	*Reference*
GCSE	-0.094
	(0.072)
Higher/AS Level	-0.068
	(0.075)
A-Level	-0.103
	(0.079)
Other Higher	-0.120
	(0.090)
Degree	-0.120
	(0.090)
Postgraduate	-0.187
	(0.117)
London	*Reference*
North East	0.431*
	(0.246)
North West	0.061
	(0.148)
Yorks/Humber	0.141
	(0.158)
East Midlands	0.210
	(0.150)
West Midlands	0.070
	(0.163)
East	0.219
	(0.154)
South East	0.004
	(0.105)
South West	0.193
	(0.119)
Wales	-0.025
	(0.147)
Scotland	-0.011
	(0.246)
N. Ireland	1.092***

	(0.204)
Urban	*Reference*
Rural	-0.004
	(0.044)
2009	*Reference*
2010	-0.006
	(0.024)
2011	-0.074***
	(0.027)
2012	-0.162***
	(0.027)
2013	-0.202***
	(0.026)
2014	-0.119***
	(0.025)
2015	-0.004
	(0.027)
2016	0.066**
	(0.026)
2017	-0.054
	(0.039)
2018	-0.047
	(0.036)
Constant	6.836***
	(0.281)
R-Squared (within)	0.0140
R-Squared (between)	0.0199
R-Squared (overall)	0.0159

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

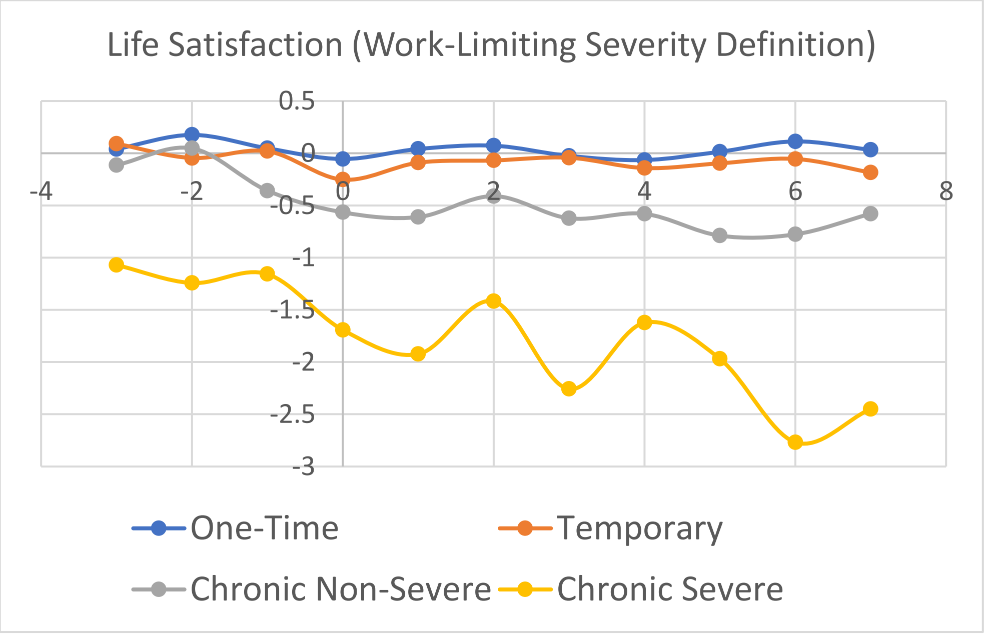


Figure A5. Life satisfaction by disability category. Estimated using work-limiting definition of severity.

Table A8. Main Model with relaxed trajectory restrictions.

	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.026	0.072	-0.150	-0.266
	(0.112)	(0.140)	(0.268)	(0.332)
2 Periods before Onset	0.154	-0.081	-0.065	-0.159
	(0.114)	(0.146)	(0.370)	(0.330)
1 Period before Onset	0.041	-0.010	-0.275	-0.523*
	(0.127)	(0.139)	(0.323)	(0.308)
Onset Period	-0.069	-0.270**	-0.374	-0.913***
	(0.144)	(0.137)	(0.373)	(0.293)
1 Period after Onset	0.023	-0.106	-0.433	-1.110***
	(0.147)	(0.132)	(0.378)	(0.312)
2 Periods after Onset	0.052	-0.084	-0.356	-0.700**
	(0.135)	(0.133)	(0.338)	(0.307)
3 Periods after Onset	-0.029	-0.066	-0.446	-1.068***
	(0.145)	(0.144)	(0.375)	(0.290)
4 Periods after Onset	-0.081	-0.140	-0.322	-0.936***
	(0.153)	(0.152)	(0.366)	(0.312)
5 Periods after Onset	-0.004	-0.111	-0.345	-1.322***
	(0.160)	(0.151)	(0.361)	(0.323)
6 Periods after Onset	0.061	-0.054	-0.426	-1.303***
	(0.182)	(0.165)	(0.377)	(0.334)
7 Periods after Onset	0.038	-0.167	-0.654	-0.855**
	(0.203)	(0.211)	(0.402)	(0.361)
Age	-0.078***			
	(0.012)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.175***			
	(0.044)			
Married	0.191***			
	(0.054)			
Separated	-0.117			
	(0.086)			
Divorced	0.035			
	(0.063)			
Widowed	-0.089			
	(0.148)			
No. of Children	0.001			
	(0.010)			
No Qualification	*Reference*			
GCSE	-0.090			
	(0.070)			

Higher/AS Level	-0.038
	(0.075)
A-Level	-0.093
	(0.076)
Other Higher	-0.162*
	(0.089)
Degree	-0.146*
	(0.088)
Postgraduate	-0.207*
	(0.112)
London	*Reference*
North East	0.416*
	(0.244)
North West	0.056
	(0.154)
Yorks/Humber	0.183
	(0.159)
East Midlands	0.242
	(0.149)
West Midlands	0.124
	(0.166)
East	0.252
	(0.183)
South East	0.023
	(0.105)
South West	0.191
	(0.123)
Wales	-0.076
	(0.151)
Scotland	-0.170
	(0.243)
N. Ireland	1.080***
	(0.195)
Urban	*Reference*
Rural	0.012
	(0.043)
2009	*Reference*
2010	-0.012
	(0.023)
2011	-0.075***
	(0.026)
2012	-0.141***
	(0.026)
2013	-0.189***
	(0.025)
2014	-0.099***
	(0.024)
2015	0.020
	(0.026)
2016	0.064***
	(0.025)

2017	-0.056
	(0.038)
2018	-0.047
	(0.034)
Constant	6.898***
	(0.285)
R-Squared (within)	0.0133
R-Squared (between)	0.0171
R-Squared (overall)	0.0137

Observations: 183,139
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

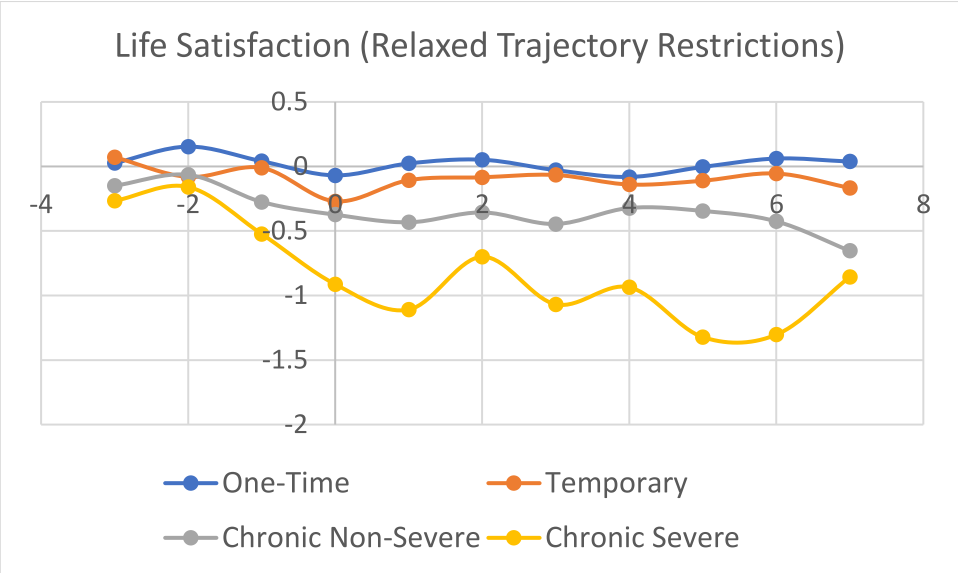


Figure A6. Life satisfaction by disability category, relaxing the restriction that at least 3 periods must be observed after the onset period.

Table A9. Main Model (leads only).

	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
3 Periods before Onset	0.061	0.096	-0.094	-0.203
	(0.109)	(0.132)	(0.268)	(0.345)
2 Periods before Onset	0.151	-0.060	-0.062	-0.187
	(0.104)	(0.148)	(0.351)	(0.354)
1 Period before Onset	0.051	0.043	-0.255	-0.426
	(0.121)	(0.148)	(0.292)	(0.336)
Onset Period	-0.053	-0.213	-0.348	-0.815***
	(0.131)	(0.141)	(0.312)	(0.315)
Age	-0.068***			
	(0.013)			
Age Squared	0.001***			

	(0.000)
Single	*Reference*
Living as a Couple	0.108**
	(0.047)
Married	0.099*
	(0.052)
Separated	-0.160*
	(0.083)
Divorced	0.070
	(0.078)
Widowed	-0.199
	(0.186)
No. of Children	-0.002
	(0.010)
No Qualification	*Reference*
GCSE	-0.118*
	(0.071)
Higher/AS Level	-0.083
	(0.074)
A-Level	-0.148*
	(0.080)
Other Higher	-0.157*
	(0.089)
Degree	-0.161*
	(0.092)
Postgraduate	-0.198
	(0.125)
London	*Reference*
North East	0.495*
	(0.288)
North West	0.147
	(0.158)
Yorks/Humber	0.250
	(0.169)
East Midlands	0.249
	(0.169)
West Midlands	0.079
	(0.161)
East	0.193
	(0.205)
South East	0.048
	(0.118)
South West	0.213
	(0.133)
Wales	0.018
	(0.174)
Scotland	0.047
	(0.267)
N. Ireland	1.074***
	(0.209)
Urban	*Reference*

Rural	-0.013
	(0.048)
2009	*Reference*
2010	-0.008
	(0.024)
2011	-0.079***
	(0.027)
2012	-0.170***
	(0.028)
2013	-0.210***
	(0.028)
2014	-0.125***
	(0.027)
2015	-0.020
	(0.030)
2016	0.073**
	(0.028)
2017	-0.088**
	(0.043)
2018	-0.031
	(0.039)
Constant	6.754***
	(0.312)
R-Squared (within)	0.0118
R-Squared (between)	0.0097
R-Squared (overall)	0.0048

Observations: 152,672
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets.
P-Values: *** 1%, ** 5%, *10%

Table A10. Main Model (lags only).

	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
1 Period after Onset	0.030	-0.127	-0.414	-1.128***
	(0.169)	(0.141)	(0.493)	(0.324)
2 Periods after Onset	0.058	-0.108	-0.337	-0.720**
	(0.156)	(0.143)	(0.464)	(0.319)
3 Periods after Onset	-0.031	-0.097	-0.431	-1.097***
	(0.168)	(0.152)	(0.496)	(0.307)
4 Periods after Onset	-0.107	-0.178	-0.318	-0.975***
	(0.179)	(0.163)	(0.497)	(0.326)
5 Periods after Onset	-0.037	-0.147	-0.368	-1.375***
	(0.186)	(0.164)	(0.497)	(0.339)
6 Periods after Onset	0.022	-0.113	-0.483	-1.367***
	(0.208)	(0.179)	(0.500)	(0.354)
7 Periods after Onset	-0.061	-0.272	-0.656	-0.976**
	(0.224)	(0.217)	(0.538)	(0.382)

Age	-0.075***
	(0.013)
Age Squared	0.001***
	(0.000)
Single	*Reference*
Living as a Couple	0.134***
	(0.046)
Married	0.128**
	(0.051)
Separated	-0.236***
	(0.084)
Divorced	0.056
	(0.072)
Widowed	-0.068
	(0.167)
No. of Children	-0.002
	(0.011)
No Qualification	*Reference*
GCSE	-0.062
	(0.072)
Higher/AS Level	-0.039
	(0.075)
A-Level	-0.115
	(0.080)
Other Higher	-0.096
	(0.090)
Degree	-0.108
	(0.092)
Postgraduate	-0.141
	(0.125)
London	*Reference*
North East	0.518*
	(0.265)
North West	0.114
	(0.158)
Yorks/Humber	0.145
	(0.162)
East Midlands	0.258
	(0.164)
West Midlands	0.150
	(0.173)
East	0.230
	(0.197)
South East	0.007
	(0.115)
South West	0.228*
	(0.128)
Wales	0.032
	(0.160)
Scotland	0.186
	(0.225)

N. Ireland	1.271***
	(0.239)
Urban	*Reference*
Rural	-0.018
	(0.047)
2009	*Reference*
2010	-0.005
	(0.025)
2011	-0.078***
	(0.028)
2012	-0.176***
	(0.029)
2013	-0.206***
	(0.027)
2014	-0.123***
	(0.0260
2015	-0.003
	(0.028)
2016	0.068***
	(0.026)
2017	-0.052
	(0.040)
2018	-0.043
	(0.036)
Constant	6.827***
	(0.305)
R-Squared (within)	0.0117
R-Squared (between)	0.0236
R-Squared (overall)	0.0136

Observations: 157,987
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

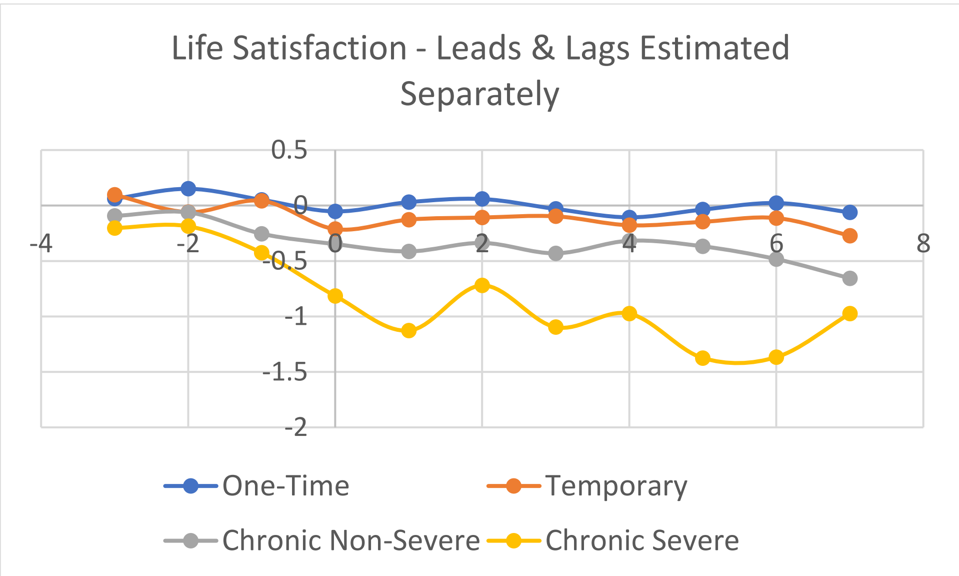


Figure A7. Life satisfaction by disability category (leads and lags estimated separately). Coefficients from both the lead and lag estimations are combined in this figure.

Table A11. Main Model, controlling for interview month.

	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.089	0.092	-0.232	-0.096
	(0.120)	(0.151)	(0.301)	(0.304)
2 Periods before Onset	0.252**	-0.056	-0.140	0.037
	(0.111)	(0.153)	(0.417)	(0.318)
1 Period before Onset	0.111	0.016	-0.333	-0.364
	(0.119)	(0.146)	(0.361)	(0.305)
Onset Period	0.050	-0.246*	-0.462	-0.722**
	(0.116)	(0.144)	(0.421)	(0.292)
1 Period after Onset	0.167	-0.093	-0.552	-0.930***
	(0.116)	(0.138)	(0.431)	(0.310)
2 Periods after Onset	0.130	-0.052	-0.425	-0.543*
	(0.127)	(0.138)	(0.382)	(0.295)
3 Periods after Onset	0.059	-0.085	-0.555	-0.882***
	(0.128)	(0.149)	(0.425)	(0.275)
4 Periods after Onset	0.016	-0.194	-0.414	-0.753**
	(0.146)	(0.156)	(0.413)	(0.306)
5 Periods after Onset	0.066	-0.115	-0.414	-1.205***
	(0.155)	(0.153)	(0.402)	(0.322)
6 Periods after Onset	0.166	-0.116	-0.549	-1.093***
	(0.175)	(0.173)	(0.428)	(0.332)
7 Periods after Onset	0.123	-0.365*	-0.620	-0.633*]
	(0.195)	(0.208)	(0.430)	(0.376)
Age	-0.068***			
	(0.013)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.170***			
	(0.046)			
Married	0.143***			
	(0.052)			
Separated	-0.214**			
	(0.085)			
Divorced	0.063			
	(0.073)			
Widowed	-0.125			
	(0.179)			
No. of Children	-0.002			
	(0.011)			
No Qualification	*Reference*			

GCSE	-0.133*
	(0.074)
Higher/AS Level	-0.081
	(0.078)
A-Level	-0.117
	(0.082)
Other Higher	-0.170*
	(0.093)
Degree	-0.111
	(0.089)
Postgraduate	-0.182
	(0.123)
London	*Reference*
North East	0.550*
	(0.265)
North West	0.114
	(0.161)
Yorks/Humber	0.227
	(0.169)
East Midlands	0.249
	(0.160)
West Midlands	0.158
	(0.166)
East	0.267
	(0.216)
South East	0.054
	(0.115)
South West	0.175
	(0.127)
Wales	-0.032
	(0.159)
Scotland	0.050
	(0.314)
N. Ireland	1.151***
	(0.206)
Urban	*Reference*
Rural	0.010
	(0.047)
Interview Month	
January	*Reference*
February	0.069
	(0.053)
March	0.038
	(0.057)
April	0.021
	(0.040)
May	-0.013
	(0.044)
June	*Omitted*

July	-0.003
	(0.043)
August	-0.077*
	(0.042)
September	*Omitted*
October	0.267***
	(0.096)
November	0.126
	(0.083)
December	0.161*
	(0.084)
2009	*Reference*
2010	-0.011
	(0.025)
2011	-0.079***
	(0.027)
2012	-0.177***
	(0.029)
2013	-0.203***
	(0.028)
2014	-0.121***
	(0.026)
2015	-0.001
	(0.029)
2016	0.063**
	(0.028)
2017	-0.065
	(0.041)
2018	-0.045
	(0.040)
Constant	6.618***
	(0.318)
R-Squared (within)	0.0146
R-Squared (between)	0.0173
R-Squared (overall)	0.0140

Observations: 167,093

Sample probability weights applied.

Standard errors (clustered by individual) are displayed in brackets

P-Values: *** 1%, ** 5%, *10%

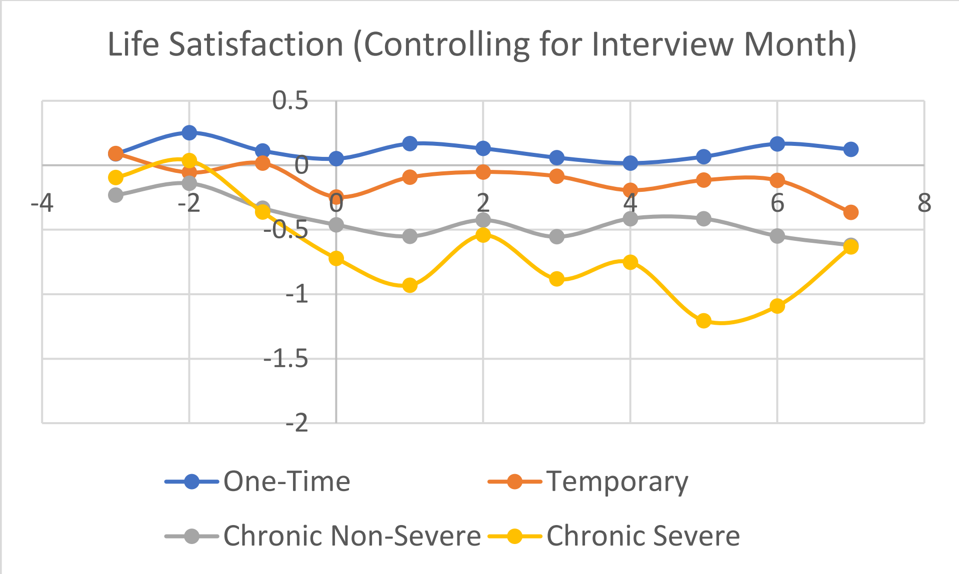


Figure A8. Life satisfaction by disability category, with controls for interview month.

Table A12. Main Model, estimated with balanced data.

	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods from Onset	*Reference*			
3 Periods from Onset	-0.049	0.033	-0.183	-0.260
	(0.105)	(0.150)	(0.282)	(0.349)
2 Periods from Onset	0.046	-0.131	-0.002	-0.214
	(0.116)	(0.156)	(0.391)	(0.350)
1 Period from Onset	-0.012	-0.053	-0.378	-0.530
	(0.126)	(0.149)	(0.329)	(0.324)
Onset Period	-0.120	-0.340	-0.481	-0.917***
	(0.162)	(0.153)	(0.395)	(0.304)
1 Period after Onset	0.003	-0.104	-0.344	-1.143***
	(0.161)	(0.138)	(0.389)	(0.329)
2 Periods after Onset	-0.040	-0.200	-0.383	-0.589*
	(0.140)	(0.144)	(0.354)	(0.322)
3 Periods after Onset	-0.052	-0.117	-0.483	-1.059***
	(0.153)	(0.157)	(0.404)	(0.300)
4 Periods after Onset	0.007	-0.220	-0.235	-0.981***
	(0.152)	(0.168)	(0.384)	(0.325)
5 Periods after Onset	-0.164	-0.192	-0.335	-1.338***
	(0.168)	(0.165)	(0.380)	(0.340)
6 Periods after Onset	-0.013	-0.139	-0.539	-1.372***
	(0.195)	(0.178)	(0.400)	(0.349)
7 Periods after Onset	-0.028	-0.220	-0.687*	-0.875**
	(0.211)	(0.220)	(0.417)	(0.368)
Age	-0.056***			
	(0.016)			
Age Squared	0.001***			

	(0.000)
Single	*Reference*
Living as a Couple	0.183***
	(0.055)
Married	0.167***
	(0.064)
Separated	-0.201**
	(0.100)
Divorced	0.041
	(0.084)
Widowed	-0.340**
	(0.160)
No. of Children	-0.005
	(0.016)
No Qualification	*Reference*
GCSE	0.013
	(0.160)
Higher/AS Level	-0.108
	(0.163)
A-Level	-0.096
	(0.170)
Other Higher	-0.018
	(0.165)
Degree	-0.082
	(0.166)
Postgraduate	-0.222
	(0.187)
London	*Reference*
North East	0.679**
	(0.301)
North West	0.079
	(0.199)
Yorks/Humber	0.309
	(0.215)
East Midlands	0.204
	(0.192)
West Midlands	0.092
	(0.204)
East	0.320
	(0.225)
South East	0.089
	(0.121)
South West	0.211
	(0.151)
Wales	-0.009
	(0.188)
Scotland	-0.190
	(0.284)
N. Ireland	1.221***
	(0.386)

Urban	*Reference*
Rural	-0.026
	(0.057)
2009	*Reference*
2010	0.005
	(0.034)
2011	-0.042
	(0.037)
2012	-0.125***
	(0.037)
2013	-0.171***
	(0.035)
2014	-0.089***
	(0.032)
2015	0.031
	(0.032)
2016	0.067**
	(0.030)
2017	-0.038
	(0.043)
2018	-0.053
	(0.040)
Constant	6.384***
	(0.407)
R-Squared (within)	0.0160
R-Squared (between)	0.0388
R-Squared (overall)	0.0227

Observations: 40,995
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

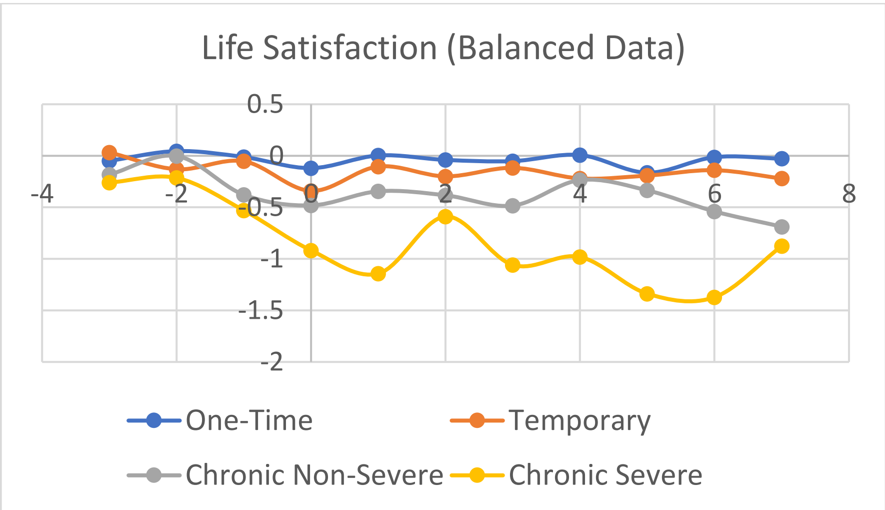


Figure A9. Life satisfaction by disability category, estimated with balanced data.

Table A13. Main Model – prime-age only (35-54).

	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
4 Periods before Onset	*Reference*			
3 Periods before Onset	-0.015	0.243**	-0.316	-0.318
	(0.106)	(0.106)	(0.270)	(0.344)
2 Periods before Onset	-0.116	0.120	-0.259	-0.128
	(0.115)	(0.108)	(0.279)	(0.326)
1 Period before Onset	-0.079	0.042	-0.423*	-0.249
	(0.103)	(0.103)	(0.243)	(0.320)
Onset Period	-0.069	-0.155	-0.557**	-0.654**
	(0.104)	(0.103)	(0.246)	(0.332)
1 Period after Onset	-0.002	-0.083	-0.543**	-0.817**
	(0.111)	(0.106)	(0.240)	(0.331)
2 Periods after Onset	0.039	-0.089	-0.555**	-0.724**
	(0.104)	(0.108)	(0.243)	(0.332)
3 Periods after Onset	-0.099	-0.092	-0.622**	-0.643**
	(0.115)	(0.105)	(0.247)	(0.322)
4 Periods after Onset	0.024	-0.093	-0.541**	-0.759**
	(0.117)	(0.114)	(0.258)	(0.337)
5 Periods after Onset	0.028	-0.104	-0.645**	-0.827**
	(0.131)	(0.121)	(0.259)	(0.339)
6 Periods after Onset	-0.113	0.013	-0.747***	-1.004***
	(0.149)	(0.132)	(0.267)	(0.341)
7 Periods after Onset	0.121	-0.183	-0.853***	-0.778**
	(0.184)	(0.158)	(0.285)	(0.367)
Age	0.001**			
	(0.000)			
Age Squared	0.132***			
	(0.049)			
Single	*Reference*			
Living as a Couple	0.132***			
	(0.049)			
Married	0.082*			
	(0.054)			
Separated	-0.233***			
	(0.069)			
Divorced	-0.003			
	(0.060)			
Widowed	-0.284**			
	(0.145)			
No. of Children	0.003			
	(0.008)			
No Qualification	*Reference*			
GCSE	0.146			
	(0.104)			
Higher/AS Level	0.282			
	(0.186)			

A-Level	0.109
	(0.153)
Other Higher	0.062
	(0.079)
Degree	0.299***
	(0.101)
Postgraduate	0.111
	(0.102)
London	*Reference*
North East	0.172
	(0.242)
North West	-0.087
	(0.157)
Yorks/Humber	-0.129
	(0.199)
East Midlands	-0.094
	(0.188)
West Midlands	0.074
	(0.202)
East	0.052
	(0.137)
South East	0.023
	(0.115)
South West	-0.082
	(0.146)
Wales	0.049
	(0.173)
Scotland	0.103
	(0.249)
N. Ireland	1.234***
	(0.440)
Urban	0.059
Rural	(0.051)
2009	*Reference*
2010	-0.010
	(0.023)
2011	-0.080***
	(0.024)
2012	-0.124***
	(0.023)
2013	-0.167***
	(0.022)
2014	-0.043**
	(0.021)
2015	0.041*
	(0.022)
2016	0.061***
	(0.022)
2017	-0.061**

	(0.029)
2018	-0.074***
	(0.029)
Constant	6.615***
	(0.550)
R-Squared (within)	0.0089
R-Squared (between)	0.0153
R-Squared (overall)	0.0122

Observations: 75,503
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

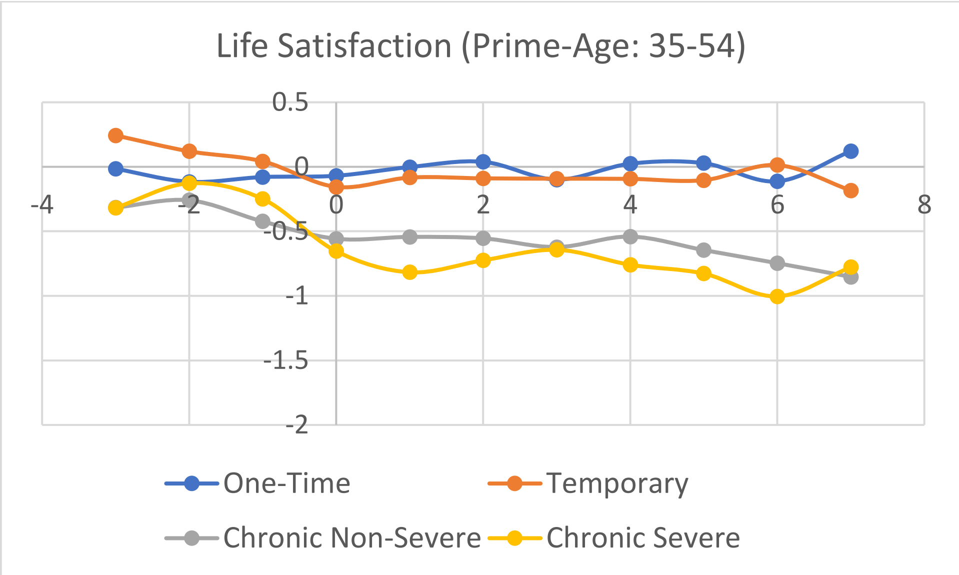


Figure A10. Life satisfaction by disability category, prime-age (35-54) individuals only.

Table A14. Main Model - retirement age only (65+).

	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.159	0.240	-0.338	-0.293
	(0.225)	(0.162)	(0.244)	(0.209)
2 Periods before Onset	0.187	-0.139	-0.003	-0.646***
	(0.220)	(0.192)	(0.268)	(0.187)
1 Period before Onset	0.014	-0.073	-0.115	-0.996***
	(0.230)	(0.194)	(0.324)	(0.256)
Onset Period	-0.195	-0.188	-0.100	-0.872***
	(0.224)	(0.173)	(0.318)	(0.193)
1 Period after Onset	-0.114	-0.068	-0.439	-1.112***
	(0.185)	(0.176)	(0.317)	(0.200)
2 Periods after Onset	-0.015	-0.185	-0.121	-1.142***
	(0.231)	(0.174)	(0.329)	(0.270)

3 Periods after Onset	0.015	-0.153	-0.200	-1.233***
	(0.233)	(0.180)	(0.311)	(0.195)
4 Periods after Onset	-0.001	-0.093	-0.248	-1.548***
	(0.230)	(0.187)	(0.313)	(0.237)
5 Periods after Onset	-0.370	-0.307	-0.467	-1.441***
	(0.292)	(0.220)	(0.315)	(0.238)
6 Periods after Onset	-0.698*	-0.498**	-0.342	-1.503***
	(0.402)	(0.242)	(0.333)	(0.255)
7 Periods after Onset	0.034	-0.507*	-0.274	-1.345***
	(0.259)	(0.274)	(0.336)	(0.287)
Age	-0.117			
	(0.075)			
Age Squared	0.001			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.127			
	(0.248)			
Married	0.123			
	(0.219)			
Separated	-0.218			
	(0.293)			
Divorced	0.105			
	(0.186)			
Widowed	-0.209			
	(0.208)			
No. of Children	-0.021			
	(0.023)			
No Qualification	*Reference*			
GCSE	2.247***			
	(0.401)			
Higher/AS Level	*Omitted*			
A-Level	*Omitted*			
Other Higher	*Omitted*			
Degree	1.771***			
	(0.060)			
Postgraduate	1.128**			
	(0.499)			
London	*Reference*			
North East	-0.738			
	(0.524)			
North West	-0.438			
	(0.577)			
Yorks/Humber	0.761			
	(0.889)			
East Midlands	-0.817*			
	(0.463)			
West Midlands	-0.389			
	(0.265)			

East	-0.601*
	(0.361)
South East	-0.197
	(0.134)
South West	-0.749**
	(0.327)
Wales	-0.045
	(0.393)
Scotland	-1.219*
	(0.634)
N. Ireland	*Omitted*
Urban	*Reference*
Rural	0.034
	(0.193)
2009	*Reference*
2010	-0.145**
	(0.066)
2011	-0.219***
	(0.072)
2012	-0.305***
	(0.071)
2013	-0.346***
	(0.064)
2014	-0.225***
	(0.057)
2015	-0.049
	(0.065)
2016	0.037
	(0.064)
2017	0.003
	(0.086)
2018	0.150*
	(0.079)
Constant	10.707***
	(2.935)
R-Squared (within)	0.024
R-Squared (between)	0.0039
R-Squared (overall)	0.0032

Observations: 31,924
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

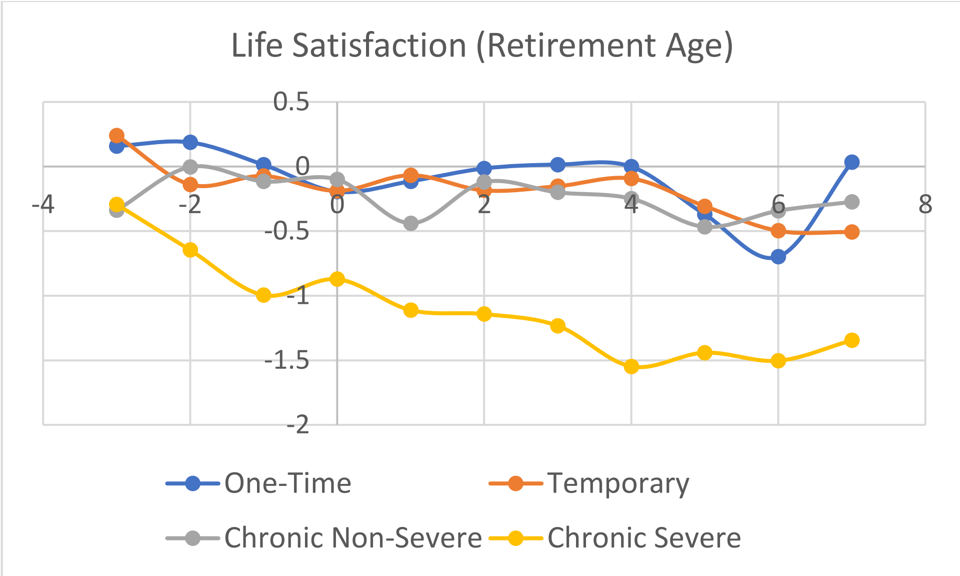


Figure A11. Life satisfaction by disability category, retirement age (65+) individuals only.

Table A15. Main Model estimated without sample weights.

	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.124	0.149*	-0.330*	-0.104
	(0.081)	(0.080)	(0.183)	(0.238)
2 Periods before Onset	0.028	-0.020	-0.162	-0.059
	(0.080)	(0.083)	(0.191)	(0.226)
1 Period before Onset	0.028	-0.003	-0.312*	-0.167
	(0.077)	(0.078)	(0.169)	(0.217)
Onset Period	-0.049	-0.243***	-0.404**	-0.540**
	(0.077)	(0.078)	(0.178)	(0.221)
1 Period after Onset	0.055	-0.146*	-0.458***	-0.728***
	(0.080)	(0.078)	(0.174)	(0.225)
2 Periods after Onset	0.065	-0.075	-0.318*	-0.610***
	(0.077)	(0.079)	(0.173)	(0.225)
3 Periods after Onset	-0.021	-0.130	-0.391**	-0.643***
	(0.081)	(0.079)	(0.181)	(0.218)
4 Periods after Onset	0.024	-0.111	-0.453**	-0.681***
	(0.085)	(0.084)	(0.188)	(0.226)
5 Periods after Onset	0.085	-0.087	-0.495***	-0.827***
	(0.092)	(0.087)	(0.184)	(0.228)
6 Periods after Onset	0.053	-0.039	-0.469**	-0.898***
	(0.108)	(0.097)	(0.193)	(0.233)
7 Periods after Onset	0.274***	-0.159	-0.549***	-0.650***
	(0.141)	(0.120)	(0.210)	(0.247)
Age	-0.074***			
	(0.006)			
Age Squared	0.001***			

	(0.000)
Single	*Reference*
Living as a Couple	0.149***
	(0.022)
Married	0.153***
	(0.026)
Separated	-0.152***
	(0.045)
Divorced	0.031
	(0.040)
Widowed	-0.127
	(0.081)
No. of Children	0.008
	(0.006)
No Qualification	*Reference*
GCSE	-0.007
	(0.041)
Higher/AS Level	0.014
	(0.045)
A-Level	-0.011
	(0.042)
Other Higher	-0.034
	(0.047)
Degree	-0.005
	(0.045)
Postgraduate	-0.075
	(0.051)
London	*Reference*
North East	-0.002
	(0.117)
North West	-0.095
	(0.077)
Yorks/Humber	-0.104
	(0.079)
East Midlands	-0.074
	(0.082)
West Midlands	-0.055
	(0.089)
East	-0.016
	(0.063)
South East	-0.028
	(0.054)
South West	0.021
	(0.066)
Wales	-0.074
	(0.087)
Scotland	-0.047
	(0.119)
N. Ireland	0.368**
	(0.160)
Urban	*Reference*

Rural	0.042*
	(0.025)
2009	*Reference*
2010	-0.009
	(0.015)
2011	-0.092***
	(0.015)
2012	-0.154***
	(0.014)
2013	-0.171***
	(0.014)
2014	-0.058***
	(0.014)
2015	0.026*
	(0.014)
2016	0.030**
	(0.014)
2017	-0.080***
	(0.019)
2018	-0.082***
	(0.019)
Constant	6.849***
	(0.149)
R-Squared (within)	0.0092
R-Squared (between)	0.0288
R-Squared (overall)	0.0200

Observations: 167,093

Sample probability weights applied.

Standard errors (clustered by individual) are displayed in brackets

P-Values: *** 1%, ** 5%, *10%

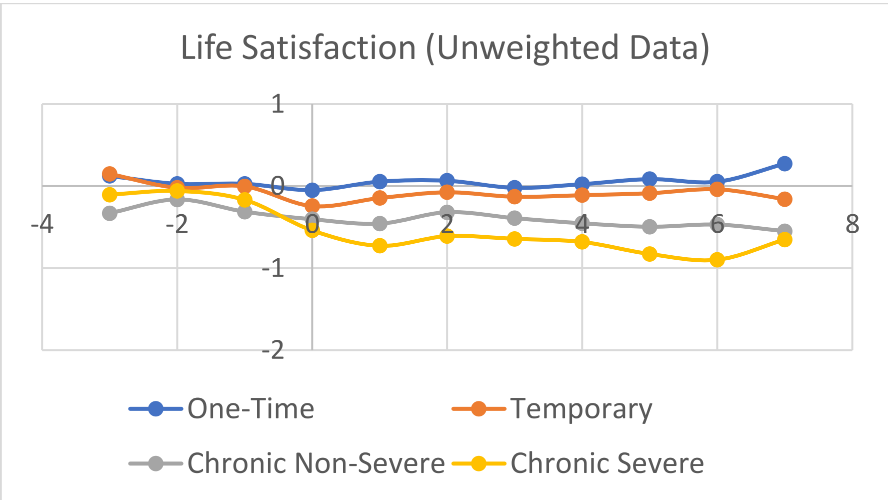


Figure A12. Life satisfaction by disability category, estimated without sample probability weights.

Table A16. Main Model (FE ordered logit estimation).

	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.278	0.281*	-0.684*	-0.098
	(0.178)	(0.156)	(0.374)	(0.392)
2 Periods before Onset	0.053	-0.045	-0.353	-0.028
	(0.170)	(0.158)	(0.394)	(0.371)
1 Period before Onset	0.046	-0.024	-0.681*	-0.220
	(0.164)	(0.148)	(0.351)	(0.353)
Onset Period	-0.097	-0.428***	-0.844**	-0.804**
	(0.164)	(0.146)	(0.367)	(0.359)
1 Period after Onset	0.109	-0.268*	-0.936***	-1.091***
	(0.172)	(0.148)	(0.365)	(0.363)
2 Periods after Onset	0.140	-0.151	-0.679*	-0.920**
	(0.167)	(0.149)	(0.365)	(0.364)
3 Periods after Onset	-0.038	-0.256*	-0.828**	-0.988***
	(0.172)	(0.150)	(0.378)	(0.353)
4 Periods after Onset	0.039	-0.227	-0.955**	-1.075***
	(0.182)	(0.159)	(0.390)	(0.369)
5 Periods after Onset	0.153	-0.183	-1.036***	-1.312***
	(0.195)	(0.165)	(0.381)	(0.370)
6 Periods after Onset	0.097	-0.084	-0.969**	-1.408***
	(0.217)	(0.185)	(0.392)	(0.378)
7 Periods after Onset	0.556*	-0.279	-1.106***	-0.992**
	(0.294)	(0.216)	(0.428)	(0.402)
Age	-0.147***			
	(0.012)			
Age Squared	0.002***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.286***			
	(0.042)			
Married	0.280***			
	(0.051)			
Separated	-0.249***			
	(0.078)			
Divorced	0.060			
	(0.072)			
Widowed	-0.233			
	(0.147)			
No. of Children	0.012			
	(0.012)			
No Qualification	*Reference*			
GCSE	0.004			
	(0.081)			
Higher/AS Level	0.049			
	(0.091)			

A-Level	-0.012
	(0.084)
Other Higher	-0.062
	(0.094)
Degree	-0.017
	(0.092)
Postgraduate	-0.186*
	(0.107)
London	*Reference*
North East	-0.021
	(0.247)
North West	-0.186
	(0.159)
Yorks/Humber	-0.204
	(0.166)
East Midlands	-0.150
	(0.177)
West Midlands	-0.095
	(0.174)
East	-0.015
	(0.135)
South East	-0.051
	(0.111)
South West	0.053
	(0.139)
Wales	-0.150
	(0.186)
Scotland	-0.103
	(0.247)
N. Ireland	0.817*
	(0.425)
Urban	*Reference*
Rural	0.088*
	(0.053)
2009	*Reference*
2010	-0.030
	(0.031)
2011	-0.201***
	(0.031)
2012	-0.319***
	(0.029)
2013	-0.350***
	(0.028)
2014	-0.126***
	(0.028)
2015	0.049*
	(0.030)
2016	0.060**
	(0.030)
2017	-0.165***

	(0.040)
2018	-0.169***
	(0.041)

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

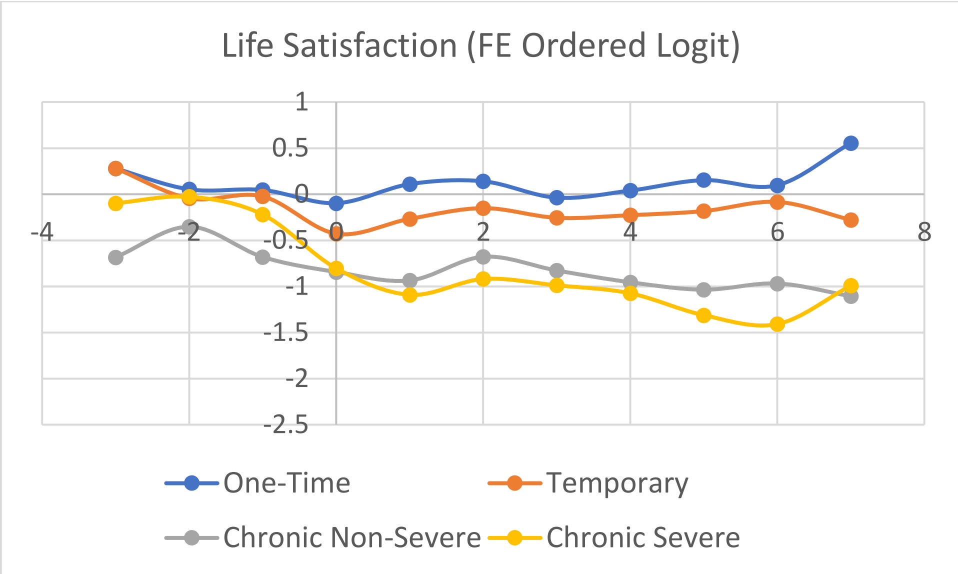


Figure A13. Life satisfaction by disability category, estimated using fixed effects ordered logit.

Table A17. Pre/Post 2013 Disability Model.

	(i) OLS	**(ii) Random Effects**	**(iii) Fixed Effects**	**(iv) FE with Controls**
Disabled	-0.779***	-0.779***	-0.399***	-0.244***
	(0.063)	(0.063)	(0.026)	(0.048)
Post 2013	-0.051***	-0.051***	-0.018***	-0.053***
	(0.013)	(0.013)	(0.006)	(0.017)
Disabled*Post 2013	-0.049	-0.049	-0.021	-0.001
	(0.065)	(0.065)	(0.030)	(0.059)
Age				-0.066***
				(0.012)
Age Squared				0.001***
				(0.000)
Single				*Reference*
Living as a Couple				0.148***
				(0.044)
Married				0.137***
				(0.049)
Separated				-0.214***

				(0.083)
Divorced				0.047
				(0.069)
Widowed				-0.156
				(0.172)
No. of Children				0.041***
				(0.009)
No Qualification				*Reference*
GCSE				-0.109
				(0.071)
Higher/AS Level				-0.079
				(0.075)
A-Level				-0.116
				(0.078)
Other Higher				-0.131
				(0.091)
Degree				-0.124
				(0.090)
Postgraduate				-0.208*
				(0.116)
London				*Reference*
North East				0.491*
				(0.255)
North West				0.090
				(0.157)
Yorks/Humber				0.189
				(0.162)
East Midlands				0.244
				(0.155)
West Midlands				0.122
				(0.169)
East				0.283
				(0.191)
South East				0.046
				(0.108)
South West				0.215*
				(0.124)
Wales				-0.018
				(0.153)
Scotland				0.041
				(0.249)
N. Ireland				1.056***
				(0.226)
Urban				*Reference*
Rural				-0.004
				(0.045)
Constant	5.312***	5.312***	5.302***	6.350***

	(0.013)	(0.013)	(0.007)	(0.275)
R-Squared (within)		0.002	0.003	0.0074
R-Squared (between)		0.036	0.030	0.0190
R-Squared (overall)	0.019	0.014	0.013	0.0108

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A18. All Pre/Post-Year Models.

	(i) Pre/Post 2011	**(ii) Pre/Post 2012**	**(iii) Pre/Post 2013**	**(iv) Pre/Post 2014**	**(v) Pre/Post 2015**
Disabled	-0.424***	-0.302***	-0.244***	-0.231***	-0.220***
	(0.080)	(0.057)	(0.048)	(0.044)	(0.041)
Post [Year]	-0.119***	-0.126***	-0.053***	0.083***	0.158***
	(0.016)	(0.016)	(0.017)	(0.017)	(0.019)
Disabled*Post [Year]	0.211***	0.084	-0.001	-0.029	-0.066
	(0.080)	(0.060)	(0.059)	(0.058)	(0.066)
Age	-0.061***	-0.056***	-0.066***	-0.084***	-0.091***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Age Squared	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Single	*Reference*				
Living as a Couple	0.150***	0.151***	0.148***	0.149***	0.149***
	(0.044)	(0.044)	(0.044)	(0.044)	(0.044)
Married	0.140***	0.139***	0.137***	0.136***	0.137***
	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)
Separated	-0.213***	-0.213***	-0.214***	-0.220***	-0.221***
	(0.083)	(0.082)	(0.083)	(0.082)	(0.082)
Divorced	0.047	0.046	0.047	0.047	0.046
	(0.069)	(0.069)	(0.069)	(0.069)	(0.068)
Widowed	-0.147	-0.149	-0.156	-0.157	-0.152
	(0.172)	(0.172)	(0.172)	(0.173)	(0.173)
No. of Children	0.012	0.028***	0.041***	0.035***	0.027***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
No Qualification	*Reference*				
GCSE	-0.112	-0.101	-0.109	-0.113	-0.107
	(0.071)	(0.071)	(0.071)	(0.072)	(0.071)
Higher/AS Level	-0.081	-0.070	-0.079	-0.079	-0.075
	(0.075)	(0.075)	(0.075)	(0.075)	(0.075)
A-Level	-0.122	-0.113	-0.116	-0.116	-0.110
	(0.078)	(0.078)	(0.078)	(0.078)	(0.078)
Other Higher	-0.137	-0.128	-0.131	-0.135	-0.132
	(0.091)	(0.090)	(0.091)	(0.091)	(0.091)
Degree	-0.129	-0.120	-0.124	-0.126	-0.122

	(0.090)	(0.090)	(0.090)	(0.090)	(0.090)
Postgraduate	-0.208*	-0.198*	-0.208*	-0.213*	-0.205*
	(0.117)	(0.117)	(0.116)	(0.117)	(0.116)
London	*Reference*				
North East	0.476*	0.484*	0.491*	0.493*	0.485*
	(0.255)	(0.254)	(0.255)	(0.255)	(0.251)
North West	0.089	0.085	0.090	0.095	0.084
	(0.156)	(0.157)	(0.157)	(0.157)	(0.157)
Yorks/Humber	0.188	0.184	0.189	0.193	0.185
	(0.163)	(0.162)	(0.162)	(0.163)	(0.163)
East Midlands	0.249	0.248	0.244	0.245	0.244
	(0.156)	(0.155)	(0.155)	(0.156)	(0.155)
West Midlands	0.116	0.113	0.122	0.124	0.121
	(0.169)	(0.169)	(0.169)	(0.169)	(0.167)
East	0.280	0.283	0.283	0.286	0.283
	(0.189)	(0.189)	(0.191)	(0.192)	(0.190)
South East	0.039	0.042	0.046	0.043	0.041
	(0.108)	(0.108)	(0.108)	(0.109)	(0.108)
South West	0.212*	0.210*	0.215*	0.220*	0.220*
	(0.124)	(0.124)	(0.124)	(0.124)	(0.123)
Wales	-0.012	-0.019	-0.018	-0.011	-0.011
	(0.153)	(0.153)	(0.153)	(0.155)	(0.154)
Scotland	0.029	0.031	0.041	0.046	0.036
	(0.250)	(0.250)	(0.249)	(0.249)	(0.249)
N. Ireland	1.055***	1.057***	1.056***	1.069***	1.089***
	(0.226)	(0.227)	(0.226)	(0.225)	(0.228)
Urban	*Reference*				
Rural	-0.002	-0.004	-0.004	-0.005	-0.005
	(0.045)	(0.045)	(0.045)	(0.045)	(0.045)
Constant	6.357***	6.114***	6.350***	7.018***	7.312***
	(0.266)	(0.270)	(0.275)	(0.279)	(0.274)
R-Squared (within)	0.0086	0.0089	0.0074	0.0077	0.0090
R-Squared (between)	0.0178	0.0188	0.0190	0.0064	0.0035
R-Squared (overall)	0.0107	0.0108	0.0108	0.0050	0.0033

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A19. Pre/Post 2013 Disability Model with severity.

Non-Severe Dis.	-0.083
	(0.052)
Severe Dis.	-0.549***
	(0.076)
Non-Sev. Dis*Post 2013	-0.059
	(0.063)

Sev. Dis.*Post 2013	0.100
	(0.101)
Post 2013	-0.053***
	(0.017)
Age	-0.066***
	(0.012)
Age Squared	0.001***
	(0.000)
Single	*Reference*
Living as a Couple	0.149***
	(0.044)
Married	0.139***
	(0.049)
Separated	-0.215***
	(0.083)
Divorced	0.051
	(0.069)
Widowed	-0.147
	(0.167)
No. of Children	0.040***
	(0.009)
No Qualification	*Reference*
GCSE	-0.111
	(0.071)
Higher/AS Level	-0.081
	(0.075)
A-Level	-0.117
	(0.078)
Other Higher	-0.132
	(0.090)
Degree	-0.124
	(0.090)
Postgraduate	-0.207*
	(0.116)
London	*Reference*
North East	0.493*
	(0.254)
North West	0.091
	(0.157)
Yorks/Humber	0.188
	(0.161)
East Midlands	0.242
	(0.155)
West Midlands	0.120
	(0.166)
East	0.281
	(0.190)

South East	0.042
	(0.108)
South West	0.212*
	(0.124)
Wales	-0.020
	(0.153)
Scotland	0.044
	(0.248)
N. Ireland	1.081***
	(0.232)
Urban	*Reference*
Rural	-0.004
	(0.045)
Constant	6.348***
	(0.274)
R-Squared (within)	0.0088
R-Squared (between)	0.0212
R-Squared (overall)	0.0126

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A20. Pre/Post 2013 Disability Model with Leads and Lags of Disability Onset.

2 Periods from Onset	0.092
	(0.068)
1 Period from Onset	0.034
	(0.069)
Onset Period	-0.172**
	(0.076)
1 Period after Onset	-0.159*
	(0.085)
2 Periods after Onset	-0.141
	(0.096)
3 Periods after Onset	-0.003
	(0.156)
4 Periods after Onset	-0.280**
	(0.141)
5 Periods after Onset	-0.233*
	(0.137)
6 Periods after Onset	-0.239*
	(0.135)
Post 2013	-0.050***
	(0.018)

2 Periods from Onset*Post 2013	-0.178
	(0.186)
1 Period from Onset*Post 2013	-0.147
	(0.139)
Onset Period*Post 2013	-0.142
	(0.091)
1 Period after Onset*Post 2013	-0.041
	(0.093)
2 Periods after Onset*Post 2013	0.088
	(0.100)
3 Periods after Onset*Post 2013	-0.139
	(0.158)
4 Periods after Onset*Post 2013	0.206
	(0.140)
5 Periods after Onset*Post 2013	0.114
	(0.139)
6 Periods after Onset*Post 2013	0.122
	(0.149)
Age	-0.065***
	(0.012)
Age Squared	0.001***
	(0.000)
Single	*Reference*
Living as a Couple	0.149***
	(0.044)
Married	0.135***
	(0.049)
Separated	-0.218***
	(0.082)
Divorced	0.046
	(0.069)
Widowed	-0.161
	(0.173)
No. of Children	0.041***
	(0.009)
No Qualification	*Reference*
GCSE	-0.103
	(0.072)
Higher/AS Level	-0.075
	(0.075)
A-Level	-0.110
	(0.078)
Other Higher	-0.126
	(0.090)
Degree	-0.118
	(0.090)
Postgraduate	-0.197*

	(0.116)
London	*Reference*
North East	0.489*
	(0.254)
North West	0.095
	(0.156)
Yorks/Humber	0.194
	(0.163)
East Midlands	0.241
	(0.155)
West Midlands	0.120
	(0.168)
East	0.281
	(0.191)
South East	0.047
	(0.108)
South West	0.219*
	(0.124)
Wales	-0.004
	(0.152)
Scotland	0.038
	(0.249)
N. Ireland	1.024***
	(0.217)
Urban	*Reference*
Rural	-0.002
	(0.045)
Constant	6.296***
	(0.277)
R-Squared (within)	0.0072
R-Squared (between)	0.0187
R-Squared (overall)	0.0103

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A21. Regression Adjustment Model.

Omitted group: 2010	
Comparison years	**Adjustment**
2009-2010	-0.063
	(0.119)
2009-2011	0.084

	(0.123)
2009-2012	*(omitted)*
2009-2013	*(omitted)*
2009-2014	*(omitted)*
2009-2015	*(omitted)*
2009-2016	*(omitted)*
2009-2017	*(omitted)*
2009-2018	*(omitted)*
Omitted group: 2011	
Comparison years	**Adjustment**
2009 - 2010	-0.110
	(0.136)
2010 - 2011	-0.119
	(0.102)
2010 - 2012	-0.240**
	(0.100)
2010 - 2013	*(omitted)*
2010 - 2014	*(omitted)*
2010 - 2015	*(omitted)*
2010 - 2016	*(omitted)*
2010 - 2017	*(omitted)*
2010 - 2018	*(omitted)*
Omitted group: 2012	
Comparison years	**Adjustment**
2009 - 2010	-0.007
	(0.125)
2010 - 2011	0.060
	(0.102)
2011 - 2012	-0.186*
	(0.112)
2011 - 2013	-0.114
	(0.099)
2011 - 2014	*(omitted)*
2011 - 2015	*(omitted)*

2011 - 2016	*(omitted)*
2011 - 2017	*(omitted)*
2011 - 2018	*(omitted)*

Omitted group: 2013

Comparison years	**Adjustment**
2009 - 2010	-0.082
	(0.135)
2010 - 2011	-0.083
	(0.103)
2011 - 2012	-0.069
	(0.124)
2012 - 2013	-0.257**
	(0.128)
2012 - 2014	-0.063
	(0.124)
2012 - 2015	*(omitted)*
2012 - 2016	*(omitted)*
2012 - 2017	*(omitted)*
2012 - 2018	*(omitted)*

Omitted group: 2014

Comparison years	**Adjustment**
2009 - 2010	0.007
	(0.141)
2010 - 2011	0.158
	(0.112)
2011 - 2012	-0.046
	(0.116)
2012 - 2013	0.160
	(0.104)
2013 - 2014	-0.250**
	(0.125)
2013 - 2015	-0.177
	(0.129)
2013 - 2016	*(omitted)*
2013 - 2017	*(omitted)*
2013 - 2018	*(omitted)*

Omitted group: 2015

Comparison years	Adjustment
2009 - 2010	*(omitted)*
2010 - 2011	-0.018
	(0.157)
2011 - 2012	-0.093
	(0.156)
2012 - 2013	-0.146
	(0.176)
2013 - 2014	-0.112
	(0.187)
2014 - 2015	-0.214
	(0.180)
2014 - 2016	0.017
	(0.219)
2014 - 2017	*(omitted)*
2014 - 2018	*(omitted)*

Control group: not yet treated.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A22. Onset period estimations prior to Bacon decompositions.

	(i) All Disabilities	(ii) One-Time	(iii) Temporary	(iv) Chronic Non-Severe	(v) Chronic Severe
Disabled	-0.195***	-0.050	-0.135**	-0.182	-0.627***
	(0.049)	(0.083)	(0.066)	(0.145)	(0.121)
Age	-0.057***	-0.055***	-0.046***	-0.053***	-0.061***
	(0.016)	(0.017)	(0.017)	(0.017)	(0.018)
Age Squared	0.001***	0.001***	0.000**	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Single	*Reference*				
Living as a Couple	0.181***	0.162***	0.161***	0.157***	0.157***
	(0.055)	(0.059)	(0.061)	(0.061)	(0.060)
Married	0.164**	0.147**	0.145**	0.146**	0.155**
	(0.064)	(0.068)	(0.069)	(0.070)	(0.071)
Separated	-0.199**	-0.191*	-0.182*	-0.111	-0.105
	(0.100)	(0.108)	(0.106)	(0.109)	(0.109)
Divorced	0.038	0.033	0.096	0.098	0.075
	(0.084)	(0.096)	(0.095)	(0.099)	(0.099)
Widowed	-0.373**	-0.366**	-0.288	-0.373**	-0.387**
	(0.181)	(0.167)	(0.181)	(0.177)	(0.174)
No. of Children	0.000	0.007	0.003	0.000	-0.009
	(0.015)	(0.017)	(0.016)	(0.018)	(0.018)

No Qualification	*Reference*				
GCSE	0.005	-0.038	-0.098	-0.151	-0.063
	(0.157)	(0.154)	(0.160)	(0.158)	(0.164)
Higher/AS Level	-0.120	-0.108	-0.201	-0.220	-0.126
	(0.160)	(0.162)	(0.162)	(0.165)	(0.167)
A-Level	-0.098	-0.185	-0.239	-0.334**	-0.196
	(0.165)	(0.163)	(0.167)	(0.167)	(0.175)
Other Higher	-0.017	-0.164	-0.148	-0.239	-0.148
	(0.162)	(0.155)	(0.162)	(0.160)	(0.166)
Degree	-0.088	-0.166	-0.190	-0.269	-0.174
	(0.163)	(0.161)	(0.163)	(0.165)	(0.170)
Postgraduate	-0.215	-0.304	-0.334*	-0.405**	-0.299
	(0.185)	(0.186)	(0.193)	(0.196)	(0.199)
London	*Reference*				
North East	0.685**	0.697**	0.724**	0.619*	0.676*
	(0.301)	(0.327)	(0.319)	(0.343)	(0.346)
North West	0.082	0.146	0.167	0.160	0.200
	(0.199)	(0.212)	(0.202)	(0.213)	(0.209)
Yorks/Humber	0.314	0.253	0.364	0.238	0.260
	(0.216)	(0.210)	(0.227)	(0.222)	(0.214)
East Midlands	0.206	0.199	0.271	0.174	0.222
	(0.192)	(0.199)	(0.197)	(0.204)	(0.201)
West Midlands	0.091	0.166	0.197	0.041	0.171
	(0.206)	(0.206)	(0.207)	(0.220)	(0.202)
East	0.318	0.220	0.265	0.296	0.235
	(0.224)	(0.255)	(0.242)	(0.245)	(0.245)
South East	0.094	0.126	0.136	0.068	0.125
	(0.121)	(0.130)	(0.126)	(0.134)	(0.133)
South West	0.224	0.171	0.253	0.178	0.190
	(0.151)	(0.163)	(0.162)	(0.166)	(0.167)
Wales	0.001	0.035	0.137	0.032	0.066
	(0.188)	(0.211)	(0.206)	(0.216)	(0.223)
Scotland	-0.194	0.055	-0.208	-0.075	-0.023
	(0.283)	(0.267)	(0.299)	(0.272)	(0.263)
N. Ireland	1.078***	1.748***	1.787***	1.725***	1.145***
	(0.455)	(0.394)	(0.412)	(0.405)	(0.422)
Urban	-0.019	-0.037	-0.028	-0.014	-0.019
Rural	(0.057)	(0.062)	(0.061)	0.064	(0.064)
Year					
2009	*Reference*				
2010	0.002	-0.005	-0.010	-0.003	-0.019
	(0.034)	(0.036)	(0.036)	(0.038)	(0.038)
2011	-0.046	-0.064	-0.056	-0.069*	-0.080**
	(0.037)	(0.039)	(0.039)	(0.040)	(0.041)
2012	-0.127***	-0.123***	-0.140***	-0.142***	-0.144***
	(0.036)	(0.039)	(0.039)	(0.041)	(0.041)
2013	-0.164***	-0.189***	-0.177***	-0.175***	-0.158***
	(0.034)	(0.037)	(0.037)	(0.038)	(0.038)

2014	-0.084***	-0.102***	-0.095***	-0.096***	-0.085**
	(0.031)	(0.034)	(0.034)	(0.035)	(0.035)
2015	0.038	0.007	0.020	0.015	0.026
	(0.032)	(0.034)	(0.034)	(0.035)	(0.035)
2016	0.069**	0.058*	0.069**	0.076**	0.080**
	(0.031)	(0.032)	(0.032)	(0.034)	(0.033)
2017	-0.034	-0.074	-0.065	-0.056	-0.003
	(0.043)	(0.045)	(0.045)	(0.047)	(0.047)
2018	-0.051	-0.063	-0.050	-0.045	-0.032
	(0.040)	(0.042)	(0.042)	(0.044)	(0.043)
Constant	6.410***	6.418***	6.297***	6.577***	6.698***
	(0.410)	(0.426)	(0.424)	(0.435)	(0.442)
R-Squared (within)	0.0114	0.0099	0.0098	0.0124	0.0124
R-Squared (between)	0.0134	0.0016	0.0029	0.0166	0.0166
R-Squared (overall)	0.0094	0.0020	0.0027	0.0108	0.0108
Observations:	40,995	34,335	35,136	32,697	33,003

Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A23. Onset period estimations after Bacon decompositions.

	(i) All Disabilities	(ii) One-Time	(iii) Temporary	(iv) Chronic Non-Severe	(v) Chronic Severe
Disabled (Bacon decomp.)	-0.284**	0.025	-0.139***	-0.141*	-0.428***
	(0.117)	(0.044)	(0.041)	(0.073)	(0.065)
Observations: 55,578	40,995	34,335	35,136	32,697	33,003

Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%
Note: Decompositions are based on the estimates from Table A22.

Table A24. DiD Multiple GT Model (de Chaisemartin and d'Haultfœille, 2020).

Periods from Onset	One-Time	Temporary	Chronic NS	Chronic S
-2	0.016	-0.062	0.035	-0.136**
	(0.054)	(0.063)	(0.099)	(0.103)
-1	-0.008	0.072	-0.073	-0.318***
	(0.065)	(0.083)	(0.125)	(0.119)
0	-0.059	-0.225***	-0.077	-0.358***
	(0.051)	(0.051)	(0.097)	(0.078)

1	0.033	-0.124***	-0.120	-0.539***
	(0.047)	(0.055)	(0.092)	(0.076)
2	0.063	-0.061	0.001**	-0.387***
	(0.053)	(0.047)	(0.101)	(0.083)
3	-0.008	-0.097***	-0.067	-0.419***
	(0.075)	(0.053)	(0.090)	(0.069)
4	0.015	-0.072	-0.090	-0.443***
	(0.075)	(0.061)	(0.141)	(0.106)
5	-0.007	0.007	-0.194**	-0.457***
	(0.082)	(0.074)	(0.129)	(0.135)
6	0.284***	-0.038	0.004	-0.559***
	(0.131)	(0.126)	(0.214)	(0.174)

Observations: 167,093
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A25. OLS without controls or weights.

	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods from Onset	*Reference*			
3 Periods from Onset	-0.011	-0.220***	-0.551***	-0.502***
	(0.067)	(0.065)	(0.145)	(0.125)
2 Periods from Onset	-0.176***	-0.364***	-0.400***	-0.502***
	(0.054)	(0.052)	(0.103)	(0.092)
1 Period from Onset	-0.183***	-0.342***	-0.541***	-0.642***
	(0.044)	(0.039)	(0.072)	(0.061)
Onset Period	-0.265***	-0.592***	-0.642***	-1.027***
	(0.044)	(0.039)	(0.072)	(0.061)
1 Period after Onset	-0.158***	-0.479***	-0.709***	-1.210***
	(0.045)	(0.040)	(0.073)	(0.062)
2 Periods after Onset	-0.157***	-0.421***	-0.527***	-1.084***
	(0.045)	(0.040)	(0.074)	(0.063)
3 Periods after Onset	-0.239***	-0.475***	-0.585***	-1.094***
	(0.045)	(0.041)	(0.074)	(0.063)
4 Periods after Onset	-0.225***	-0.416***	-0.658***	-1.110***
	(0.053)	(0.047)	(0.078)	(0.067)
5 Periods after Onset	-0.192***	-0.385***	-0.746***	-1.339***
	(0.063)	(0.054)	(0.084)	(0.074)
6 Periods after Onset	-0.286***	-0.328***	-0.725***	-1.425***
	(0.085)	(0.069)	(0.103)	(0.086)
7 Periods after Onset	-0.010	-0.571***	-0.740***	-1.130***
	(0.141)	(0.103)	(0.146)	(0.125)
2009	*Reference*			
2010	-0.012			
	(0.015)			
2011	-0.099***			

	(0.015)
2012	-0.169***
	(0.015)
2013	-0.190***
	(0.015)
2014	-0.073***
	(0.015)
2015	0.007
	(0.015)
2016	0.008
	(0.015)
2017	-0.098***
	(0.018)
2018	-0.120***
	(0.021)
Constant	5.412***
	(0.011)
R-Squared (overall)	0.0245

Observations: 167,093
Sample probability weights assumed.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A26. DiD Multiple GT Model (interpreted coefficients).

Period from Onset	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
-2	0.016	-0.062	0.035	-0.136
-1	0.008	0.011	-0.038	-0.455
0	-0.050	-0.214	-0.115	-0.813
1	-0.017	-0.337	-0.239	-1.352
2	0.013	-0.275	-0.177	-1.200
3	-0.058	-0.311	-0.213	-1.231
4	-0.035	-0.286	-0.188	-1.255
5	-0.057	-0.207	-0.108	-1.270
6	0.234	-0.251	-0.153	-1.372

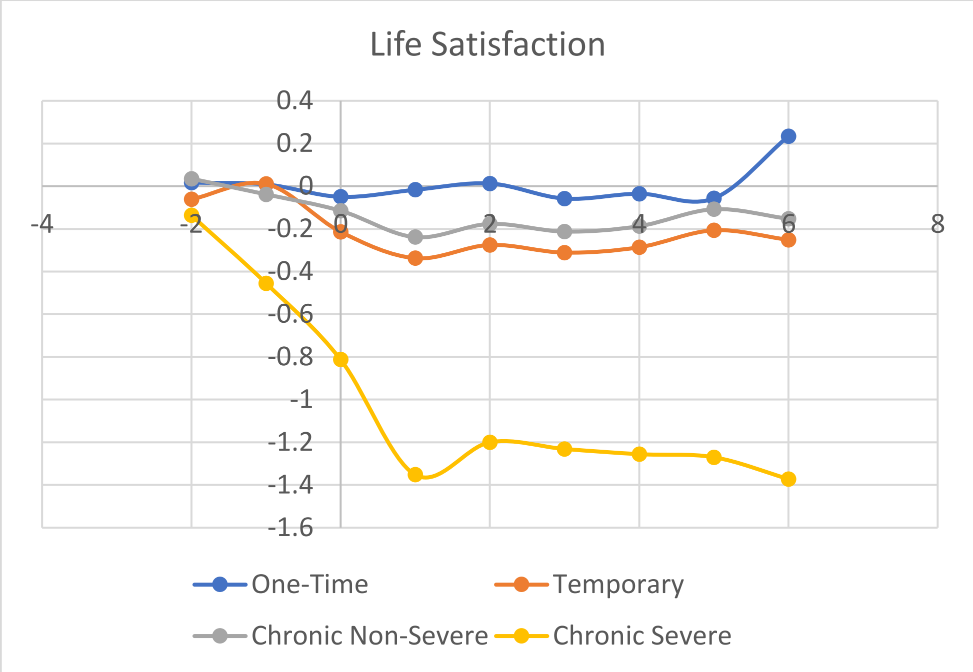


Figure A14. Interpreted coefficients from the DiD Multiple GT model. Leads (periods -2 to 0) are interpreted as their values plus the sum of their priors, whilst lags (periods 1 to 7) are interpreted as long-term DiD estimates of the change in SWB between the current period and onset period.

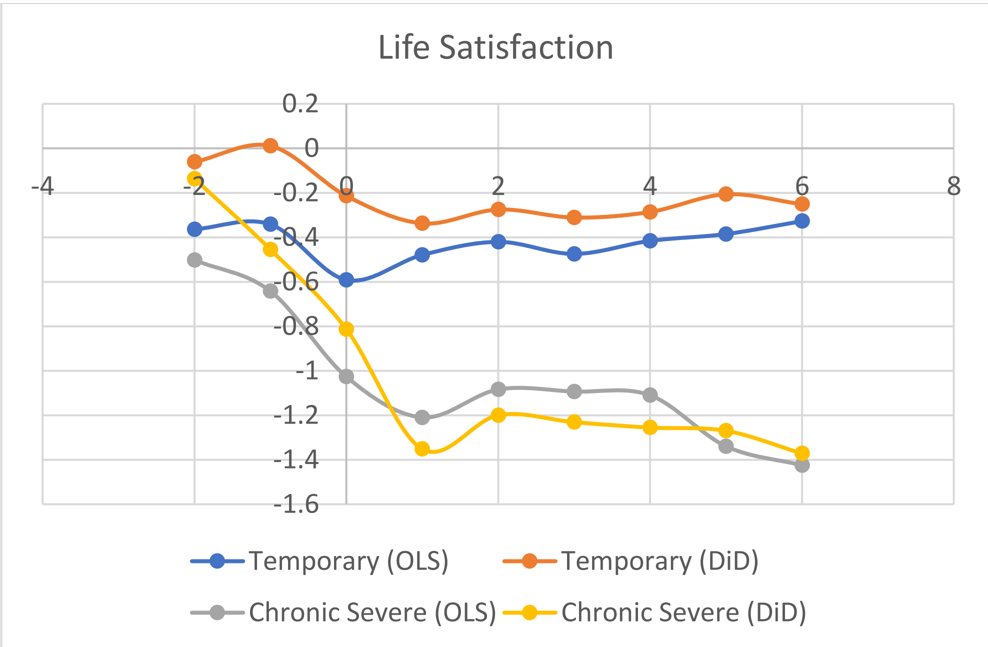


Figure A15. Interpreted coefficients from the DiD Multiple GT model for the Temporary and Chronic Severe categories, alongside the coefficients from the main model for the same disability categories, estimated under OLS without controls or probability sample weights.

Table A27. Main Model without probability sample weights (disability dummy only).

Disabled	-0.215***
	(0.019)
Age	-0.074***
	(0.006)
Age Squared	0.001***
	(0.000)
Single	*Reference*
Living as a Couple	0.148***
	(0.022)
Married	0.155***
	(0.026)
Separated	-0.149***
	(0.045)
Divorced	0.030
	(0.040)
Widowed	-0.126
	(0.082)
No. of Children	0.009
	(0.006)
No Qualification	*Reference*
GCSE	-0.009
	(0.041)
Higher/AS Level	0.014
	(0.045)
A-Level	-0.011
	(0.042)
Other Higher	-0.033
	(0.047)
Degree	-0.005
	(0.045)
Postgraduate	-0.075
	(0.051)
London	*Reference*
North East	0.007
	(0.117)
North West	-0.090
	(0.077)
Yorks/Humber	-0.103
	(0.079)
East Midlands	-0.068
	(0.082)
West Midlands	-0.047
	(0.089)
East	-0.014
	(0.063)
South East	-0.025

	(0.054)
South West	0.023
	(0.066)
Wales	-0.072
	(0.087)
Scotland	-0.045
	(0.119)
N. Ireland	0.355**
	(0.160)
Urban	*Reference*
Rural	0.042*
	(0.025)
Year	
2009	*Reference*
2010	-0.007
	(0.015)
2011	-0.090***
	(0.015)
2012	-0.154***
	(0.014)
2013	-0.171***
	(0.014)
2014	-0.059***
	(0.014)
2015	0.023
	(0.014)
2016	0.029**
	(0.014)
2017	-0.076***
	(0.019)
2018	-0.078***
	(0.019)
Constant	6.878***
	(0.149)
R-Squared (within)	0.0085
R-Squared (between)	0.0171
R-Squared (overall)	0.0122

Observations: 55,578
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A28. Main Model without probability sample weights.

	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
4 Periods from Onset	*Reference*			
3 Periods from Onset	0.124	0.149*	-0.330*	-0.104

	(0.081)	(0.080)	(0.183)	(0.238)
2 Periods from Onset	0.028	-0.020	-0.162	-0.059
	(0.080)	(0.083)	(0.191)	(0.226)
1 Period from Onset	0.028	-0.003	-0.312*	-0.167
	(0.077)	(0.078)	(0.169)	(0.217)
Onset Period	-0.049	-0.243***	-0.404**	-0.540**
	(0.077)	(0.078)	(0.178)	(0.221)
1 Period after Onset	0.055	-0.146*	-0.458***	-0.728***
	(0.080)	(0.078)	(0.174)	(0.225)
2 Periods after Onset	0.065	-0.075	-0.318*	-0.610***
	(0.077)	(0.079)	(0.173)	(0.225)
3 Periods after Onset	-0.021	-0.130	-0.391**	-0.643***
	(0.081)	(0.079)	(0.181)	(0.218)
4 Periods after Onset	0.024	-0.111	-0.453**	-0.681***
	(0.085)	(0.084)	(0.188)	(0.226)
5 Periods after Onset	0.085	-0.087	-0.495***	-0.827***
	(0.092)	(0.087)	(0.184)	(0.228)
6 Periods after Onset	0.053	-0.039	-0.469**	-0.898***
	(0.108)	(0.097)	(0.193)	(0.233)
7 Periods after Onset	0.274*	-0.159	-0.549***	-0.650***
	(0.141)	(0.120)	(0.210)	(0.247)
Age	-0.074***			
	(0.006)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.149***			
	(0.022)			
Married	0.153***			
	(0.026)			
Separated	-0.152***			
	(0.045)			
Divorced	0.031			
	(0.040)			
Widowed	-0.127			
	(0.081)			
No. of Children	0.008			
	(0.006)			
No Qualification	*Reference*			
GCSE	-0.007			
	(0.041)			
Higher/AS Level	0.014			
	(0.045)			
A-Level	-0.011			
	(0.042)			
Other Higher	-0.034			
	(0.047)			
Degree	-0.005			
	(0.045)			
Postgraduate	-0.075			
	(0.051)			

London	*Reference*
North East	-0.002
	(0.117)
North West	-0.095
	(0.077)
Yorks/Humber	-0.104
	(0.079)
East Midlands	-0.074
	(0.082)
West Midlands	-0.055
	(0.089)
East	-0.016
	(0.063)
South East	-0.028
	(0.054)
South West	0.021
	(0.066)
Wales	-0.074
	(0.087)
Scotland	-0.047
	(0.119)
N. Ireland	0.368**
	(0.160)
Urban	*Reference*
Rural	0.042*
	(0.025)
Year	
2009	*Reference*
2010	-0.009
	(0.015)
2011	-0.092***
	(0.015)
2012	-0.154***
	(0.014)
2013	-0.171***
	(0.014)
2014	-0.058***
	(0.014)
2015	0.026*
	(0.014)
2016	0.030**
	(0.014)
2017	-0.080***
	(0.019)
2018	-0.082***
	(0.019)
Constant	6.849***
	(0.149)
R-Squared (within)	0.0092
R-Squared (between)	0.0288
R-Squared (overall)	0.0200

Observations: 55,578
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A29. Randomisation tests.

	T (obs.)	C	N	P=C/N	SE(P)	[95% Conf.	Interval]
Disabled	-0.21468	0	200	0.000	0.000	0.000	0.018
One-Time	-0.04888	49	200	0.245	0.030	0.187	0.311
Temporary	-0.24345	0.000	200	0.000	0.000	0.000	0.018
Chronic Non-Sev	-0.40357	0.000	200	0.000	0.000	0.000	0.018
Chronic Severe	-0.54014	0.000	200	0.000	0.000	0.000	0.018

Observations: 55,578

Note: Confidence interval is with respect to P=C/N.

Note: c = #{|T| >= |T(obs.)|}

Note: Estimated coefficients (T) refer to those generated in Tables A28 and A29.

Table A30. Main Model, controlling for real annual income and employment status.

(i) Controlling for Log Real Annual Income

	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.051	-0.003	-0.253	-0.271
	(0.111)	(0.152)	(0.331)	(0.330)
2 Periods before Onset	0.120	-0.169	-0.254	-0.155
	(0.116)	(0.148)	(0.416)	(0.325)
1 Period before Onset	0.032	-0.134	-0.421	-0.450
	(0.130)	(0.138)	(0.371)	(0.304)
Onset Period	-0.057	-0.344***	-0.503	-0.824***
	(0.149)	(0.134)	(0.429)	(0.291)
1 Period after Onset	0.061	-0.207	-0.614	-1.022***
	(0.148)	(0.131)	(0.429)	(0.309)
2 Periods after Onset	0.059	-0.160	-0.531	-0.593*
	(0.138)	(0.132)	(0.399)	(0.304)
3 Periods after Onset	-0.027	-0.163	-0.607	-0.959***
	(0.149)	(0.143)	(0.424)	(0.290)
4 Periods after Onset	-0.099	-0.226	-0.510	-0.819***
	(0.154)	(0.150)	(0.412)	(0.309)
5 Periods after Onset	-0.013	-0.199	-0.569	-1.242***
	(0.164)	(0.149)	(0.411)	(0.320)
6 Periods after Onset	0.034	-0.170	-0.648	-1.251***

	(0.186)	(0.164)	(0.424)	(0.334)
7 Periods after Onset	0.006	-0.318	-0.845*	-0.805**
	(0.212)	(0.210)	(0.448)	(0.362)
Age	-0.061***			
	(0.012)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.168***			
	(0.044)			
Married	0.122**			
	(0.051)			
Separated	-0.219***			
	(0.081)			
Divorced	0.034			
	(0.068)			
Widowed	-0.157			
	(0.165)			
No. of Children	0.004			
	(0.011)			
No Qualification	*Reference*			
GCSE	-0.080			
	(0.095)			
Higher/AS Level	-0.079			
	(0.092)			
A-Level	-0.107			
	(0.093)			
Other Higher	-0.088			
	(0.103)			
Degree	-0.121			
	(0.106)			
Postgraduate	-0.207*			
	(0.126)			
London	*Reference*			
North East	0.521**			
	(0.253)			
North West	0.087			
	(0.169)			
Yorks/Humber	0.197			
	(0.179)			
East Midlands	0.341**			
	(0.156)			
West Midlands	0.060			
	(0.177)			
East	0.360*			
	(0.212)			
South East	0.024			
	(0.111)			
South West	0.208			

	(0.130)
Wales	0.023
	(0.165)
Scotland	0.001
	(0.266)
N. Ireland	1.209***
	(0.182)
Urban	*Reference*
Rural	-0.003
	(0.046)
Log Real Annual Income	0.007
	(0.008)
Employed	*Reference*
Unemployed	
Not Working	
Family Work/Carer	
Student	
2009	*Reference*
2010	0.010
	(0.025)
2011	-0.046*
	(0.027)
2012	-0.138***
	(0.028)
2013	-0.171***
	(0.027)
2014	-0.098***
	(0.026)
2015	0.009
	(0.028)
2016	0.081***
	(0.027)
2017	-0.028
	(0.040)
2018	-0.027
	(0.036)
Constant	6.449***
	(0.325)
R-Squared (within)	0.0125
R-Squared (between)	0.0181
R-Squared (overall)	0.0158

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A30 (cont.). Main Model, controlling for real annual income and employment status.

(ii) Controlling for Employment Status

	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.043	0.081	-0.137	-0.253
	(0.113)	(0.140)	(0.265)	(0.321)
2 Periods before Onset	0.158	-0.084	-0.065	-0.140
	(0.112)	(0.147)	(0.384)	(0.320)
1 Period before Onset	0.059	-0.004	-0.241	-0.499*
	(0.126)	(0.140)	(0.330)	(0.299)
Onset Period	-0.042	-0.259*	-0.338	-0.846***
	(0.142)	(0.138)	(0.383)	(0.280)
1 Period after Onset	0.051	-0.101	-0.377	-1.030***
	(0.143)	(0.133)	(0.387)	(0.301)
2 Periods after Onset	0.079	-0.073	-0.307	-0.596**
	(0.133)	(0.134)	(0.348)	(0.296)
3 Periods after Onset	-0.010	-0.069	-0.405	-0.978***
	(0.142)	(0.144)	(0.384)	(0.281)
4 Periods after Onset	-0.065	-0.149	-0.286	-0.846***
	(0.152)	(0.152)	(0.375)	(0.301)
5 Periods after Onset	0.002	-0.129	-0.332	-1.246***
	(0.159)	(0.151)	(0.370)	(0.312)
6 Periods after Onset	0.061	-0.087	-0.401	-1.237***
	(0.180)	(0.164)	(0.388)	(0.323)
7 Periods after Onset	0.033	-0.192	-0.638	-0.796**
	(0.201)	(0.206)	(0.407)	(0.353)
Age	-0.065***			
	(0.012)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.150***			
	(0.043)			
Married	0.129***			
	(0.049)			
Separated	-0.226***			
	(0.082)			
Divorced	0.043			
	(0.067)			
Widowed	-0.122			
	(0.157)			
No. of Children	0.001			
	(0.011)			
No Qualification	*Reference*			
GCSE	-0.066			

	(0.070)
Higher/AS Level	-0.034
	(0.074)
A-Level	-0.059
	(0.078)
Other Higher	-0.049
	(0.091)
Degree	0.043
	(0.095)
Postgraduate	-0.011
	(0.122)
London	*Reference*
North East	0.462*
	(0.256)
North West	0.073
	(0.155)
Yorks/Humber	0.164
	(0.162)
East Midlands	0.222
	(0.154)
West Midlands	0.109
	(0.169)
East	0.272
	(0.188)
South East	0.022
	(0.108)
South West	0.194
	(0.122)
Wales	-0.008
	(0.154)
Scotland	-0.006
	(0.250)
N. Ireland	1.165***
	(0.192)
Urban	*Reference*
Rural	-0.002
	(0.044)
Log Real Annual Income	
Employed	*Reference*
Unemployed	-0.208***
	(0.045)
Not Working	-0.433***
	(0.099)
Family Work/Carer	-0.083*
	(0.051)
Student	0.177***
	(0.045)
2009	*Reference*
2010	-0.007
	(0.024)

2011	-0.068***
	(0.026)
2012	-0.160***
	(0.027)
2013	-0.201***
	(0.026)
2014	-0.119***
	(0.025)
2015	-0.007
	(0.027)
2016	0.066**
	(0.026)
2017	-0.051
	(0.039)
2018	-0.040
	(0.036)
Constant	6.584***
	(0.289)
R-Squared (within)	0.0175
R-Squared (between)	0.0270
R-Squared (overall)	0.0216

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

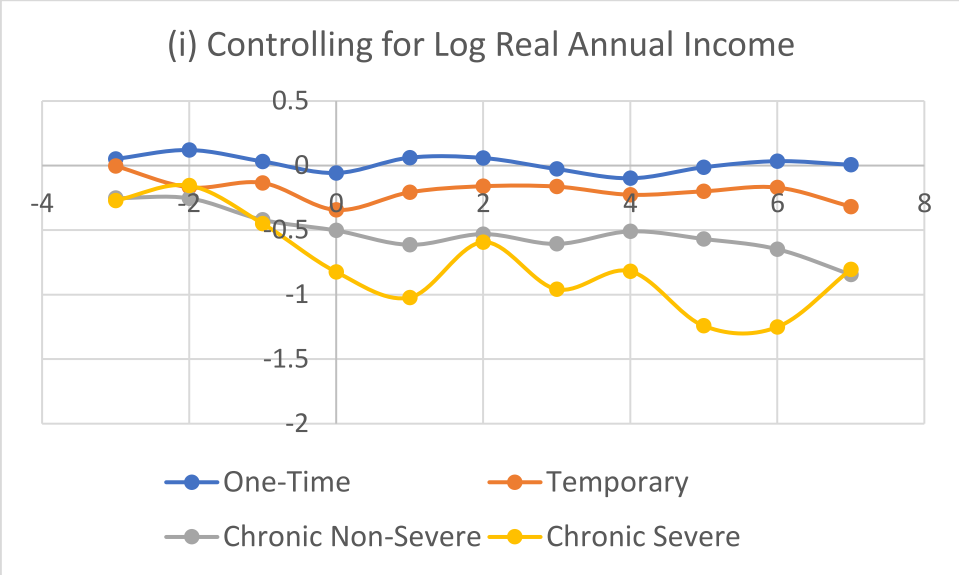
Table A30 (cont.). Main Model, controlling for real annual income and employment status.

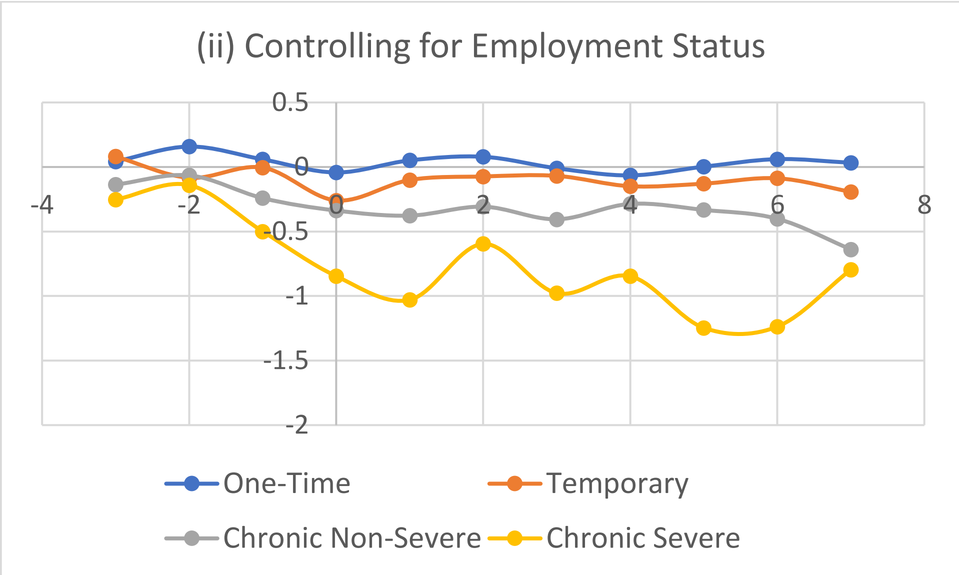
	(iii) Controlling for Income and Employment Status			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.063	0.007	-0.245	-0.245
	(0.113)	(0.151)	(0.328)	(0.318)
2 Periods before Onset	0.126	-0.171	-0.249	-0.133
	(0.114)	(0.148)	(0.417)	(0.313)
1 Period before Onset	0.044	-0.128	-0.402	-0.424
	(0.128)	(0.138)	(0.371)	(0.294)
Onset Period	-0.037	-0.332**	-0.483	-0.753***
	0.145)	(0.134)	(0.430)	(0.279)
1 Period after Onset	0.078	-0.202	-0.583	-0.946***
	(0.144)	(0.132)	(0.427)	(0.298)
2 Periods after Onset	0.078	-0.151	-0.506	-0.497*
	(0.135)	(0.133)	(0.400)	(0.294)
3 Periods after Onset	-0.012	-0.163	-0.589	-0.874***
	(0.145)	(0.143)	(0.423)	(0.281)
4 Periods after Onset	-0.077	-0.229	-0.486	-0.730**

	(0.152)	(0.150)	(0.411)	(0.298)
5 Periods after Onset	0.002	-0.203	-0.558	-1.152***
	(0.162)	(0.149)	(0.411)	(0.309)
6 Periods after Onset	0.051	-0.180	-0.620	-1.163***
	(0.184)	(0.163)	(0.426)	(0.324)
7 Periods after Onset	0.027	-0.327	-0.825*	-0.722**
	(0.208)	(0.206)	(0.446)	(0.354)
Age	-0.058***			
	(0.012)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.163***			
	(0.044)			
Married	0.116**			
	(0.051)			
Separated	-0.218***			
	(0.081)			
Divorced	0.035			
	(0.067)			
Widowed	-0.147			
	(0.162)			
No. of Children	0.005			
	(0.011)			
No Qualification	*Reference*			
GCSE	-0.059			
	(0.094)			
Higher/AS Level	-0.051			
	(0.090)			
A-Level	-0.064			
	(0.091)			
Other Higher	-0.033			
	(0.103)			
Degree	-0.009			
	(0.109)			
Postgraduate	-0.087			
	(0.128)			
London	*Reference*			
North East	0.526**			
	(0.257)			
North West	0.091			
	(0.170)			
Yorks/Humber	0.181			
	(0.178)			
East Midlands	0.328**			
	(0.156)			
West Midlands	0.062			
	(0.177)			
East	0.355*			
	(0.215)			
South East	0.024			

	(0.111)
South West	0.199
	(0.131)
Wales	0.019
	(0.166)
Scotland	-0.005
	(0.267)
N. Ireland	1.242***
	(0.178)
Urban	*Reference*
Rural	0.004
	(0.046)
Log Real Annual Income	-0.005
	(0.009)
Employed	*Reference*
Unemployed	-0.217***
	(0.048)
Not Working	-0.426***
	(0.109)
Family Work/Carer	-0.092*
	(0.056)
Student	0.086*
	(0.048)
2009	*Reference*
2010	0.010
	(0.025)
2011	-0.047*
	(0.027)
2012	-0.137***
	(0.028)
2013	-0.172***
	(0.027)
2014	-0.101***
	(0.026)
2015	0.005
	(0.028)
2016	0.079***
	(0.027)
2017	-0.027
	(0.040)
2018	-0.024
	(0.036)
Constant	6.463***
	(0.326)
R-Squared (within)	0.0147
R-Squared (between)	0.0249
R-Squared (overall)	0.0206

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%


(i) Controlling for Log Real Annual Income
0.5
0
-0.5
-1
-1.5
-2
-4
-2
0
2
4
6
8
One-Time
Temporary
Chronic Non-Severe
Chronic Severe


(ii) Controlling for Employment Status
0.5
0
-0.5
-1
-1.5
-2
-4
-2
0
2
4
6
8
One-Time
Temporary
Chronic Non-Severe
Chronic Severe

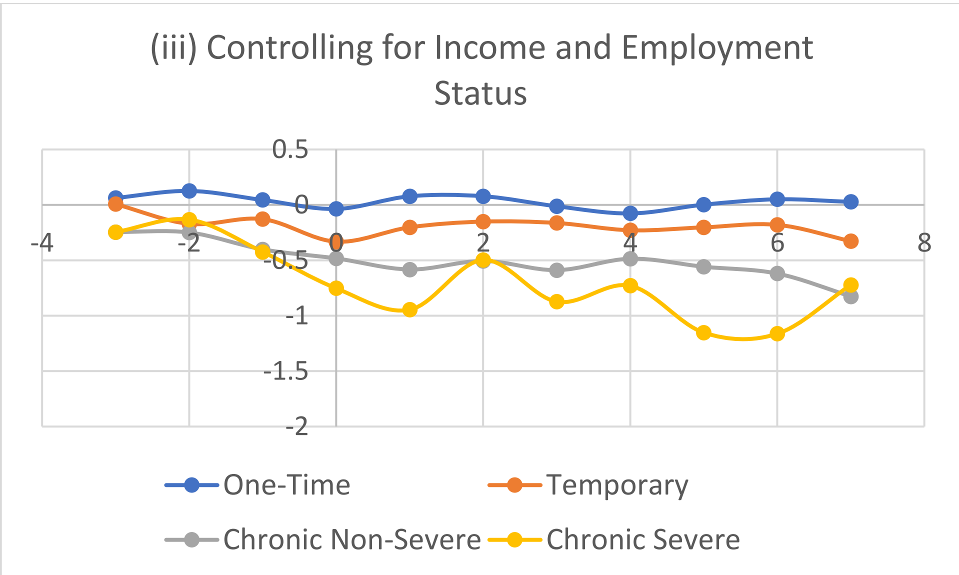

(iii) Controlling for Income and Employment Status
0.5
0
-0.5
-1
-1.5
-2
-4
-2
0
2
4
6
8
One-Time
Temporary
Chronic Non-Severe
Chronic Severe

Figure A16 (i – iii). Life satisfaction by disability category, including controls for (i) log real annual income (June 2015 prices), (ii) employment status, and (iii) both income and employment status).

Table A31. Main Model, controlling for housing and energy costs.

	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.027	0.071	-0.149	-0.266
	(0.112)	(0.140)	(0.266)	(0.332)
2 Periods before Onset	0.155	-0.078	-0.066	-0.160
	(0.115)	(0.146)	(0.366)	(0.331)
1 Period before Onset	0.043	-0.011	-0.274	-0.525*
	(0.127)	(0.139)	(0.319)	(0.309)
Onset Period	-0.064	-0.269**	-0.371	-0.916***
	(0.145)	(0.137)	(0.369)	(0.293)
1 Period after Onset	0.028	-0.102	-0.427	-1.105***
	(0.148)	(0.132)	(0.374)	(0.312)
2 Periods after Onset	0.056	-0.082	-0.349	-0.695**
	(0.136)	(0.133)	(0.334)	(0.307)
3 Periods after Onset	-0.031	-0.068	-0.442	-1.067***
	(0.146)	(0.144)	(0.371)	(0.290)
4 Periods after Onset	-0.089	-0.147	-0.323	-0.937***
	(0.154)	(0.152)	(0.362)	(0.312)
5 Periods after Onset	-0.019	-0.124	-0.354	-1.334***
	(0.161)	(0.151)	(0.356)	(0.324)
6 Periods after Onset	0.041	-0.074	-0.443	-1.324***
	(0.182)	(0.166)	(0.373)	(0.334)
7 Periods after Onset	0.015	-0.188	-0.674*	-0.881**
	(0.204)	(0.212)	(0.398)	(0.362)
Age	-0.073***			
	(0.012)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.153***			
	(0.044)			
Married	0.139***			
	(0.049)			
Separated	-0.222***			
	(0.081)			
Divorced	0.045			
	(0.068)			
Widowed	-0.130			
	(0.161)			
No. of Children	0.000			

	(0.010)
No Qualification	*Reference*
GCSE	-0.089
	(0.071)
Higher/AS Level	-0.069
	(0.075)
A-Level	-0.107
	(0.078)
Other Higher	-0.131
	(0.090)
Degree	-0.120
	(0.090)
Postgraduate	-0.189
	(0.117)
London	*Reference*
North East	0.456*
	(0.251)
North West	0.072
	(0.155)
Yorks/Humber	0.179
	(0.164)
East Midlands	0.239
	(0.155)
West Midlands	0.104
	(0.168)
East	0.275
	(0.187)
South East	0.021
	(0.108)
South West	0.204*
	(0.123)
Wales	-0.009
	(0.152)
Scotland	0.003
	(0.251)
N. Ireland	1.126***
	(0.197)
Urban	*Reference*
Rural	-0.008
	(0.045)
Housing Cost	0.000
	(0.000)
Energy Cost	0.000
	(0.000)
2009	*Reference*
2010	-0.005
	(0.024)
2011	-0.068***
	(0.026)

2012	-0.161***
	(0.027)
2013	-0.200***
	(0.026)
2014	-0.117***
	(0.025)
2015	-0.003
	(0.027)
2016	0.068***
	(0.026)
2017	-0.054
	(0.039)
2018	-0.044
	(0.036)
Constant	6.794***
	(0.293)
R-Squared (within)	0.0142
R-Squared (between)	0.0204
R-Squared (overall)	0.0163

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

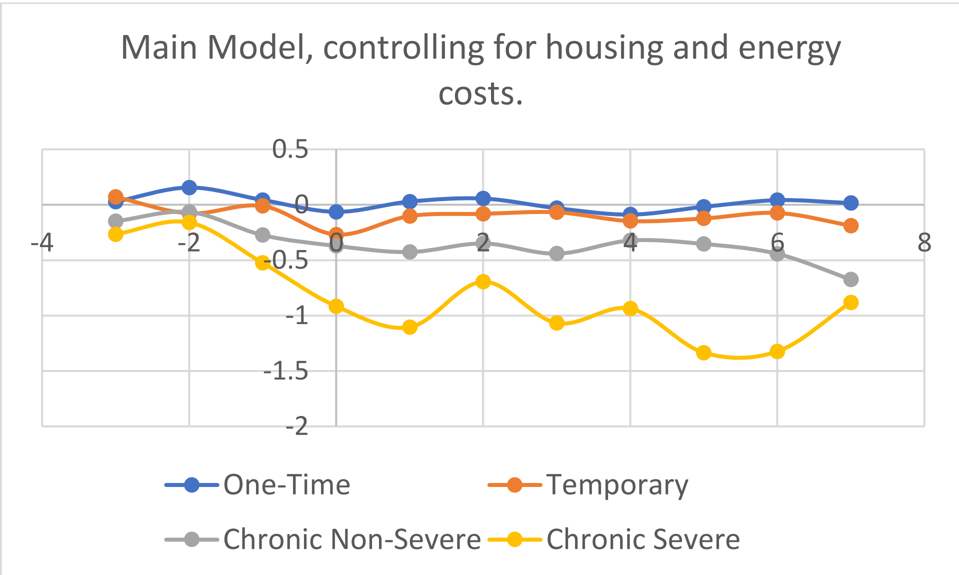


Figure A17. Life satisfaction by disability category, including controls for monthly housing and energy costs. Average monthly housing (rent or mortgage) cost is £495.22 and average monthly energy bill is £514.09.

Table A32. Main Model, controlling for food, alcohol and tobacco expenditure.

	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.039	0.091	-0.274	-0.263
	(0.109)	(0.138)	(0.285)	(0.332)
2 Periods before Onset	0.142	-0.105	-0.196	-0.158
	(0.116)	(0.147)	(0.348)	(0.330)
1 Period before Onset	0.035	-0.035	-0.423	-0.508*
	(0.120)	(0.140)	(0.321)	(0.309)
Onset Period	-0.055	-0.300**	-0.496	-0.932***
	(0.134)	(0.138)	(0.372)	(0.293)
1 Period after Onset	0.045	-0.125	-0.554	-1.097***
	(0.136)	(0.134)	(0.376)	(0.312)
2 Periods after Onset	0.042	-0.091	-0.484	-0.700**
	(0.129)	(0.134)	(0.346)	(0.307)
3 Periods after Onset	-0.029	-0.088	-0.619*	-1.068***
	(0.138)	(0.146)	(0.370)	(0.290)
4 Periods after Onset	-0.085	-0.222	-0.469	-0.909***
	(0.147)	(0.152)	(0.359)	(0.310)
5 Periods after Onset	-0.021	-0.155	-0.465	-1.338***
	(0.156)	(0.155)	(0.357)	(0.325)
6 Periods after Onset	0.052	-0.109	-0.553	-1.312***
	(0.177)	(0.169)	(0.375)	(0.335)
7 Periods after Onset	0.006	-0.205	-0.854**	-0.888**
	(0.199)	(0.220)	(0.402)	(0.361)
Age	-0.075***			
	(0.012)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.152***			
	(0.045)			
Married	0.133***			
	(0.050)			
Separated	-0.211***			
	(0.080)			
Divorced	0.035			
	(0.069)			
Widowed	-0.142			
	(0.164)			
No. of Children	-0.002			
	(0.011)			
No Qualification	*Reference*			
GCSE	-0.097			
	(0.072)			

Higher/AS Level	-0.062
	(0.075)
A-Level	-0.106
	(0.080)
Other Higher	-0.131
	(0.092)
Degree	-0.126
	(0.092)
Postgraduate	-0.222*
	(0.115)
London	*Reference*
North East	0.440**
	(0.224)
North West	0.092
	(0.155)
Yorks/Humber	0.191
	(0.155)
East Midlands	0.268*
	(0.157)
West Midlands	0.166
	(0.168)
East	0.336*
	(0.190)
South East	0.017
	(0.111)
South West	0.187
	(0.127)
Wales	-0.009
	(0.155)
Scotland	0.290
	(0.186)
N. Ireland	1.140***
	(0.185)
Urban	*Reference*
Rural	-0.018
	(0.045)
Food Exp.(Home)	0.000
	(0.000)
Food Exp. (Outside home)	0.000
	(0.000)
Alcohol/Tobacco Exp.	0.000
	(0.000)
2009	*Reference*
2010	-0.015
	(0.024)
2011	-0.079***
	(0.027)
2012	-0.166***
	(0.027)

2013	-0.202***
	(0.026)
2014	-0.122***
	(0.025)
2015	-0.008
	(0.028)
2016	0.069***
	(0.026)
2017	-0.068*
	(0.040)
2018	-0.045
	(0.036)
Constant	6.815***
	(0.294)
R-Squared (within)	0.0147
R-Squared (between)	0.0217
R-Squared (overall)	0.0173

Observations: 163,497

Sample probability weights applied.

Standard errors (clustered by individual) are displayed in brackets

P-Values: *** 1%, ** 5%, *10%

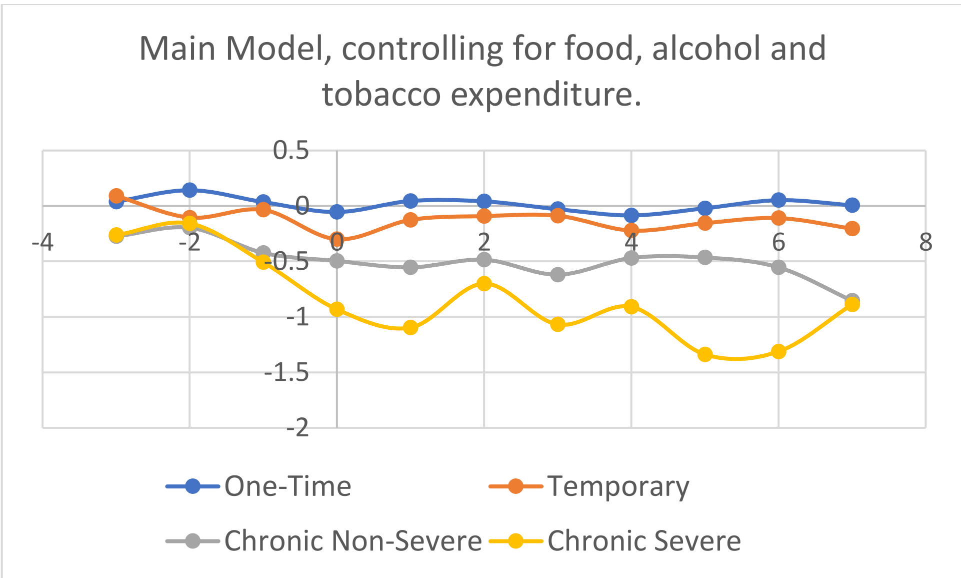


Figure A18. Life satisfaction by disability category, including controls for monthly food, alcohol and tobacco expenditure. Average food and alcohol expenditure is £347.65, average eating out expenditure is £105.94, average tobacco expenditure is £57.95.

Table A33. Main Model, controlling for problems paying for housing, council tax or bills.

	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
4 Periods before Onset	*Reference*			
3 Periods before Onset	-0.098	0.111	-0.059	-0.247
	(0.112)	(0.163)	(0.268)	(0.432)
2 Periods before Onset	0.089	-0.136	-0.105	-0.191
	(0.131)	(0.167)	(0.386)	(0.432)
1 Period before Onset	-0.053	-0.034	-0.288	-0.550
	(0.140)	(0.160)	(0.330)	(0.407)
Onset Period	-0.172	-0.338**	-0.391	-0.835**
	(0.178)	(0.156)	(0.388)	(0.377)
1 Period after Onset	-0.013	-0.182	-0.264	-0.975**
	(0.182)	(0.153)	(0.389)	(0.399)
2 Periods after Onset	0.022	-0.149	-0.309	-0.661**
	(0.157)	(0.156)	(0.353)	(0.405)
3 Periods after Onset	-0.185	-0.125	-0.534	-1.065***
	(0.174)	(0.170)	(0.405)	(0.391)
4 Periods after Onset	-0.204	-0.202	-0.236	-1.021**
	(0.185)	(0.179)	(0.391)	(0.409)
5 Periods after Onset	0.020	-0.231	-0.211	-1.449***
	(0.180)	(0.179)	(0.388)	(0.421)
6 Periods after Onset	-0.035	-0.162	-0.430	-1.319***
	(0.222)	(0.192)	(0.423)	(0.431)
7 Periods after Onset	-0.083	-0.332	-0.463	-0.943**
	(0.246)	(0.260)	(0.440)	(0.475)
Age	-0.078***			
	(0.015)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.180***			
	(0.050)			
Married	0.197***			
	(0.059)			
Separated	-0.174*			
	(0.091)			
Divorced	0.104			
	(0.078)			
Widowed	0.161			
	(0.247)			
No. of Children	0.004			
	(0.012)			
No Qualification	*Reference*			
GCSE	-0.115			
	(0.083)			

Higher/AS Level	-0.071
	(0.088)
A-Level	-0.101
	(0.092)
Other Higher	-0.188*
	(0.100)
Degree	-0.155
	(0.106)
Postgraduate	-0.270*
	(0.138)
London	*Reference*
North East	0.444
	(0.314)
North West	0.109
	(0.189)
Yorks/Humber	0.147
	(0.185)
East Midlands	0.176
	(0.191)
West Midlands	0.177
	(0.207)
East	0.376
	(0.243)
South East	0.006
	(0.135)
South West	0.000
	(0.162)
Wales	-0.112
	(0.194)
Scotland	-0.070
	(0.239)
N. Ireland	*Omitted*
Urban	*Reference*
Rural	0.009
	(0.052)
Problem paying for housing	-0.049
	(0.030)
Problem paying council tax	0.023
	(0.033)
Up to date with all bills	*Reference*
Behind with some bills	-0.176***
	(0.047)
Behind with all bills	-0.224**
	(0.097)
2009	*Reference*
2010	0.007
	(0.028)

2011	-0.063**
	(0.031)
2012	-0.148***
	(0.032)
2013	-0.200***
	(0.031)
2014	-0.099***
	(0.031)
2015	0.012
	(0.032)
2016	0.072**
	(0.031)
2017	-0.040
	(0.046)
2018	-0.014
	(0.043)
Constant	6.934***
	(0.348)
R-Squared (within)	0.0168
R-Squared (between)	0.0317
R-Squared (overall)	0.0256

Observations: 120,072
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%
Note: Control for Northern Ireland missing due to a collinearity problem.

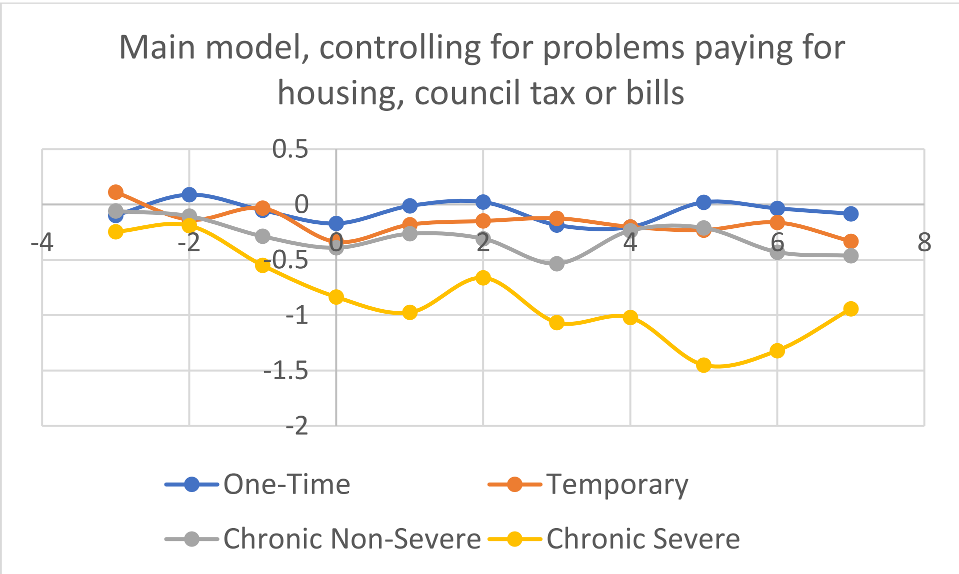


Figure A19. Life satisfaction by disability category, including controls for whether the respondent has problems paying for housing (rent or mortgage), council tax or other bills. 9.68% of the sample have problems paying for housing, 8.06% have problems paying for council tax, 5.47% are behind with some of their bills and 0.58 are behind with all of their bills.

Table A34. Main Model, controlling for subjective financial status.

	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.053	0.104	-0.209	-0.145
	(0.115)	(0.139)	(0.263)	(0.293)
2 Periods before Onset	0.159	-0.046	-0.051	-0.119
	(0.120)	(0.150)	(0.382)	(0.315)
1 Period before Onset	0.043	0.026	-0.195	-0.432
	(0.131)	(0.138)	(0.331)	(0.295)
Onset Period	-0.031	-0.248*	-0.284	-0.790***
	(0.151)	(0.136)	(0.374)	(0.272)
1 Period after Onset	0.058	-0.074	-0.374	-0.998***
	(0.152)	(0.133)	(0.385)	(0.294)
2 Periods after Onset	0.085	-0.047	-0.279	-0.585**
	(0.139)	(0.132)	(0.334)	(0.289)
3 Periods after Onset	-0.021	-0.061	-0.351	-0.971***
	(0.147)	(0.142)	(0.386)	(0.277)
4 Periods after Onset	-0.012	-0.148	-0.255	-0.831***
	(0.155)	(0.151)	(0.374)	(0.295)
5 Periods after Onset	0.001	-0.093	-0.330	-1.284***
	(0.163)	(0.150)	(0.362)	(0.311)
6 Periods after Onset	0.082	-0.070	-0.342	-1.225***
	(0.182)	(0.164)	(0.378)	(0.321)
7 Periods after Onset	0.031	-0.267	-0.605	-0.798**
	(0.219)	(0.184)	(0.400)	(0.339)
Age	-0.079***			
	(0.011)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.135***			
	(0.043)			
Married	0.128***			
	(0.048)			
Separated	-0.135*			
	(0.080)			
Divorced	0.069			
	(0.065)			
Widowed	-0.161			
	(0.154)			
No. of Children	-0.001			
	(0.010)			
No Qualification	*Reference*			
GCSE	-0.048			
	(0.074)			
Higher/AS Level	-0.001			
	(0.076)			
A-Level	-0.061			

	(0.081)
Other Higher	-0.092
	(0.090)
Degree	-0.070
	(0.090)
Postgraduate	-0.163
	(0.117)
London	*Reference*
North East	0.449*
	(0.257)
North West	0.031
	(0.145)
Yorks/Humber	0.152
	(0.154)
East Midlands	0.217
	(0.149)
West Midlands	0.069
	(0.162)
East	0.206
	(0.143)
South East	-0.010
	(0.104)
South West	0.189*
	(0.114)
Wales	-0.069
	(0.144)
Scotland	0.019
	(0.230)
N. Ireland	1.039***
	(0.200)
Urban	*Reference*
Rural	-0.003
	(0.044)
Subjective financial status - current	
Living Comfortably	*Reference*
Doing alright	-0.138***
	(0.018)
Just about getting by	-0.373***
	(0.024)
Finding it quite difficult	-0.652***
	(0.038)
Finding it very difficult	-0.948***
	(0.066)
Subjective financial status – future	
Better off	*Reference*
Worse off than now	-0.118***
	(0.021)
About the same	-0.053***
	(0.016)

2009	*Reference*
2010	-0.012
	(0.024)
2011	-0.059***
	(0.026)
2012	-0.156***
	(0.027)
2013	-0.199***
	(0.026)
2014	-0.131***
	(0.025)
2015	-0.028
	(0.027)
2016	0.055**
	(0.026)
2017	-0.044
	(0.039)
2018	-0.020
	(0.036)
Constant	7.313***
	(0.273)
R-Squared (within)	0.0332
R-Squared (between)	0.0646
R-Squared (overall)	0.0500

Observations: 164,874
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%
Note: Control for Northern Ireland missing due to a collinearity problem.

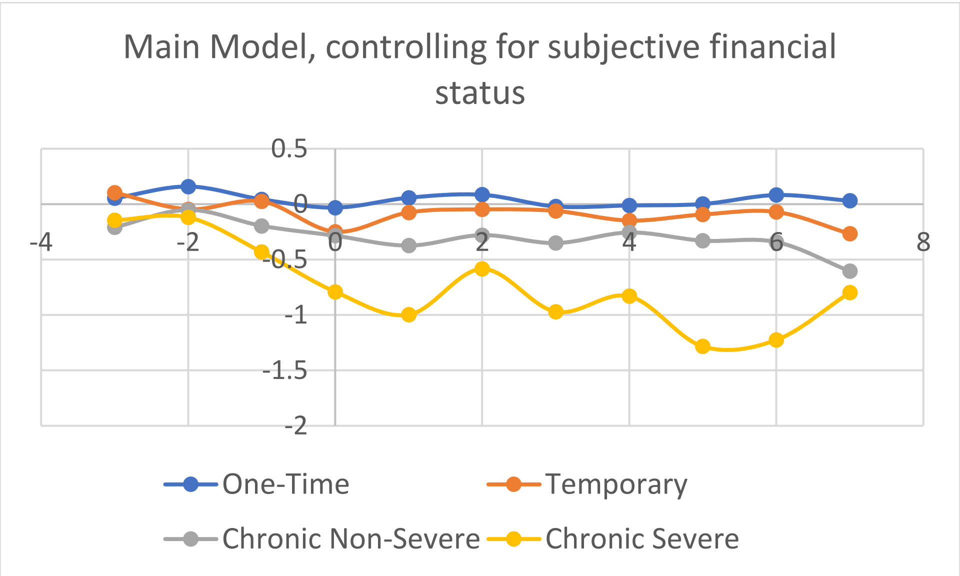


Figure A20. Life satisfaction by disability category, including controls which represent the individual's subjective financial status in the present and in the future. 29.55% of respondents report that they are 'living comfortably'; 39.26% are 'doing alright'; 22.97% are 'just about getting by'; 6.08% are 'finding it quite difficult'; and 2.14% are 'finding it very difficult'. With regards to subjective future financial status, 31.40% of respondents think they will be 'better off'; 12.04% think they will be 'worse off than now'; and 56.56% think they will be 'about the same'.

Table A35. Main Model, controlling for social life.

	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.027	0.068	-0.151	-0.266
	(0.112)	(0.140)	(0.267)	(0.332)
2 Periods before Onset	0.155	-0.080	-0.067	-0.159
	(0.115)	(0.146)	(0.366)	(0.331)
1 Period before Onset	0.043	-0.012	-0.276	-0.525*
	(0.127)	(0.139)	(0.320)	(0.309)
Onset Period	-0.064	-0.270**	-0.373	-0.915***
	(0.145)	(0.137)	(0.369)	(0.293)
1 Period after Onset	0.028	-0.104	-0.430	-1.105***
	(0.147)	(0.132)	(0.374)	(0.312)
2 Periods after Onset	0.056	-0.083	-0.351	-0.693**
	(0.136)	(0.133)	(0.334)	(0.308)
3 Periods after Onset	-0.031	-0.069	-0.443	-1.067***
	(0.146)	(0.144)	(0.372)	(0.291)
4 Periods after Onset	-0.090	-0.149	-0.326	-0.938***
	(0.154)	(0.152)	(0.362)	(0.312)
5 Periods after Onset	-0.018	-0.124	-0.355	-1.334***
	(0.161)	(0.151)	(0.357)	(0.324)
6 Periods after Onset	0.041	-0.075	-0.444	-1.323***
	(0.182)	(0.166)	(0.373)	(0.334)
7 Periods after Onset	0.013	-0.189	-0.676*	-0.880**
	(0.203)	(0.212)	(0.398)	(0.362)
Age	-0.073***			
	(0.012)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.153***			
	(0.044)			
Married	0.139***			
	(0.049)			
Separated	-0.223***			
	(0.081)			
Divorced	0.045			
	(0.068)			

Widowed	-0.130
	(0.161)
No. of Children	0.000
	(0.010)
No Qualification	*Reference*
GCSE	-0.090
	(0.071)
Higher/AS Level	-0.070
	(0.075)
A-Level	-0.107
	(0.078)
Other Higher	-0.132
	(0.090)
Degree	-0.120
	(0.090)
Postgraduate	-0.189
	(0.117)
London	*Reference*
North East	0.460*
	(0.251)
North West	0.073
	(0.155)
Yorks/Humber	0.180
	(0.164)
East Midlands	0.240
	(0.155)
West Midlands	0.106
	(0.168)
East	0.275
	(0.186)
South East	0.022
	(0.108)
South West	0.204*
	(0.122)
Wales	-0.007
	(0.152)
Scotland	0.006
	(0.251)
N. Ireland	1.127***
	(0.196)
Urban	*Reference*
Rural	-0.009
	(0.045)
Goes out socially	0.001
	(0.002)
2009	*Reference*
2010	-0.005
	(0.024)
2011	-0.072***

	(0.028)
2012	-0.164***
	(0.028)
2013	-0.199***
	(0.026)
2014	-0.119***
	(0.027)
2015	-0.006
	(0.028)
2016	0.068***
	(0.026)
2017	-0.061
	(0.042)
2018	-0.050
	(0.038)
Constant	6.796***
	(0.293)
R-Squared (within)	0.0142
R-Squared (between)	0.0204
R-Squared (overall)	0.0163

Observations: 55,578
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

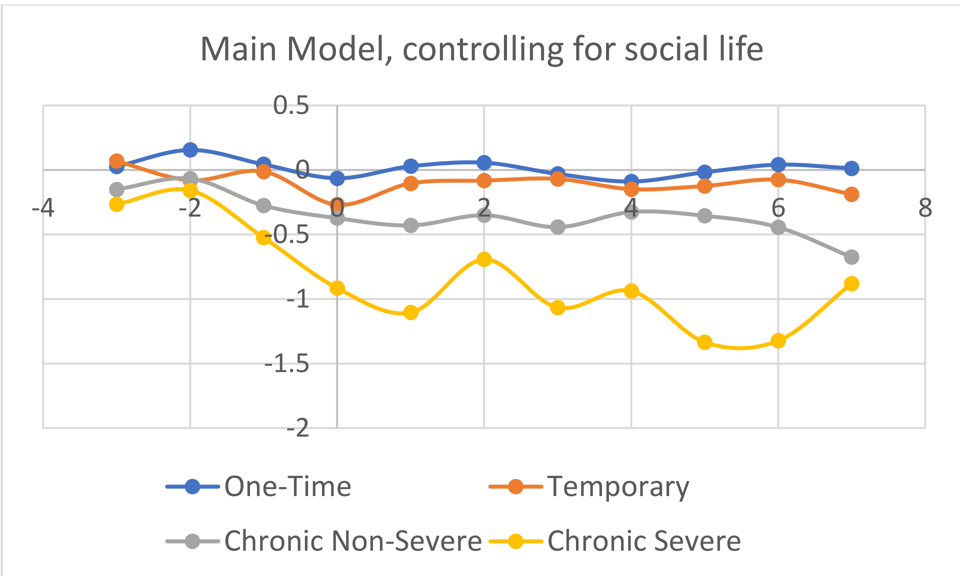


Figure A21. Life satisfaction by disability category, controlling for social life. Main model is estimated including a dummy variable which indicates whether the respondent is able to socialise regularly with friends. Around 90% of non-disabled respondents are able to socialise, compared to around 85% of disabled respondents.

Table A36. Facets of Life Satisfaction.

(i) Health Satisfaction

	One-Time	Temporary	Chronic Non-Severe	Chronic Severe
4 Periods before Onset	*Reference*			
3 Periods before Onset	-0.062	-0.276	-0.096	-0.054
	(0.137)	(0.170)	(0.251)	(0.282)
2 Periods before Onset	-0.059	-0.196	-0.287	-0.136
	(0.151)	(0.140)	(0.294)	(0.351)
1 Period before Onset	-0.104	-0.229*	-0.514*	-0.807**
	(0.149)	(0.138)	(0.269)	(0.333)
Onset Period	-0.324*	-0.632***	-0.868***	-1.519***
	(0.167)	(0.141)	(0.300)	(0.316)
1 Period after Onset	-0.064	-0.456***	-0.909***	-1.302***
	(0.174)	(0.138)	(0.314)	(0.313)
2 Periods after Onset	-0.056	-0.470***	-0.784***	-1.195***
	(0.166)	(0.143)	(0.272)	(0.311)
3 Periods after Onset	0.007	-0.424***	-1.028***	-1.553***
	(0.168)	(0.138)	(0.275)	(0.327)
4 Periods after Onset	-0.075	-0.470***	-0.819***	-1.641***
	(0.182)	(0.158)	(0.279)	(0.325)
5 Periods after Onset	0.013	-0.392**	-0.861***	-1.834***
	(0.192)	(0.157)	(0.283)	(0.340)
6 Periods after Onset	0.263	-0.342**	-1.064***	-1.739***
	(0.190)	(0.173)	(0.313)	(0.357)
7 Periods after Onset	0.006	-0.518**	-1.089***	-1.619***
	(0.235)	(0.219)	(0.325)	(0.348)
Age	-0.030**			
	(0.013)			
Age Squared	0.000**			
	(0.000)			
Single	*Reference*			
Living as a Couple	-0.023			
	(0.054)			
Married	-0.054			
	(0.067)			
Separated	-0.107			
	(0.107)			
Divorced	-0.031			
	(0.090)			
Widowed	-0.009			
	(0.167)			
No. of Children	0.026**			
	(0.012)			
No Qualification	*Reference*			
GCSE	-0.139			
	(0.129)			
Higher/AS Level	-0.207			
	(0.158)			
A-Level	-0.214			

	(0.139)
Other Higher	-0.175
	(0.143)
Degree	-0.041
	(0.147)
Postgraduate	-0.233
	(0.167)
London	*Reference*
North East	0.143
	(0.259)
North West	-0.234
	(0.182)
Yorks/Humber	-0.096
	(0.190)
East Midlands	-0.251
	(0.190)
West Midlands	-0.194
	(0.157)
East	-0.147
	(0.144)
South East	-0.170
	(0.135)
South West	-0.296
	(0.187)
Wales	-0.409*
	(0.231)
Scotland	-0.294
	(0.302)
N. Ireland	-0.507**
	(0.241)
Urban	*Reference*
Rural	-0.022
	(0.059)
2009	*Reference*
2010	0.001
	(0.026)
2011	-0.177***
	(0.030)
2012	-0.419***
	(0.033)
2013	-0.380***
	(0.032)
2014	-0.319***
	(0.031)
2015	-0.096***
	(0.032)
2016	0.005
	(0.030)
2017	-0.141***
	(0.045)
2018	-0.134***

	(0.043)
Constant	6.308***
	(0.326)
R-Squared (within)	0.026
R-Squared (between)	0.061
R-Squared (overall)	0.048

Observations: 164,202
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A36 (cont.). Facets of Life Satisfaction.

	(ii) Income Satisfaction			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.117	0.127	-0.272	-0.080
	(0.155)	(0.153)	(0.218)	(0.288)
2 Periods before Onset	0.207	-0.097	-0.319	-0.258
	(0.154)	(0.137)	(0.270)	(0.324)
1 Period before Onset	-0.009	-0.160	-0.341	-0.571*
	(0.148)	(0.132)	(0.259)	(0.292)
Onset Period	-0.039	-0.315**	-0.498**	-0.749**
	(0.144)	(0.138)	(0.253)	(0.300)
1 Period after Onset	-0.016	-0.121	-0.733***	-0.587*
	(0.144)	(0.137)	(0.250)	(0.303)
2 Periods after Onset	-0.199	-0.138	-0.520**	-0.518*
	(0.142)	(0.144)	(0.247)	(0.299)
3 Periods after Onset	-0.044	-0.183	-0.668***	-0.652**
	(0.144)	(0.138)	(0.245)	(0.311)
4 Periods after Onset	-0.166	-0.200	-0.523**	-0.670**
	(0.156)	(0.147)	(0.258)	(0.304)
5 Periods after Onset	-0.211	-0.254*	-0.518**	-0.839***
	(0.178)	(0.153)	(0.255)	(0.313)
6 Periods after Onset	-0.079	-0.234	-0.606**	-0.636*
	(0.178)	(0.176)	(0.284)	(0.339)
7 Periods after Onset	0.250	-0.293	-0.658**	-0.715*
	(0.260)	(0.231)	(0.306)	(0.406)
Age	0.010			
	(0.013)			
Age Squared	0.000*			
	(0.000)			
Single	*Reference*			
Living as a Couple	-0.013			
	(0.059)			
Married	0.028			
	(0.067)			

Separated	-0.245**
	(0.111)
Divorced	-0.211**
	(0.088)
Widowed	0.078
	(0.167)
No. of Children	-0.008
	(0.011)
No Qualification	*Reference*
GCSE	-0.156
	(0.106)
Higher/AS Level	-0.246*
	(0.128)
A-Level	-0.229*
	(0.118)
Other Higher	-0.078
	(0.124)
Degree	-0.184
	(0.133)
Postgraduate	-0.155
	(0.173)
London	*Reference*
North East	0.049
	(0.285)
North West	-0.135
	(0.245)
Yorks/Humber	0.034
	(0.248)
East Midlands	-0.151
	(0.186)
West Midlands	-0.221
	(0.209)
East	-0.110
	(0.208)
South East	-0.131
	(0.135)
South West	-0.004
	(0.185)
Wales	-0.112
	(0.264)
Scotland	-0.386
	(0.297)
N. Ireland	1.021***
	(0.372)
Urban	*Reference*
Rural	0.054
	(0.057)
2009	*Reference*
2010	-0.077***
	(0.028)

2011	-0.196***
	(0.030)
2012	-0.327***
	(0.031)
2013	-0.330***
	(0.031)
2014	-0.200***
	(0.029)
2015	0.012
	(0.030)
2016	0.048*
	(0.029)
2017	-0.072
	(0.044)
2018	-0.124***
	(0.042)
Constant	4.148***
	(0.338)
R-Squared (within)	0.0202
R-Squared (between)	0.0109
R-Squared (overall)	0.0129

Observations: 164,132
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A36 (cont.). Facets of Life Satisfaction.

(iii) Satisfaction with Amount of Leisure Time

	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	-0.093	0.286	0.166	-0.032
	(0.126)	(0.187)	(0.325)	(0.236)
2 Periods before Onset	-0.141	0.198	0.257	0.173
	(0.133)	(0.205)	(0.389)	(0.287)
1 Period before Onset	-0.127	0.158	-0.136	-0.010
	(0.141)	(0.181)	(0.313)	(0.278)
Onset Period	-0.072	-0.001	-0.381	-0.320
	(0.126)	(0.183)	(0.343)	(0.260)
1 Period after Onset	-0.176	0.210	-0.485	-0.219
	(0.138)	(0.185)	(0.354)	(0.262)
2 Periods after Onset	-0.034	0.057	-0.401	-0.147
	(0.126)	(0.180)	(0.340)	(0.289)
3 Periods after Onset	-0.124	0.095	-0.418	-0.428

	(0.150)	(0.190)	(0.362)	(0.287)
4 Periods after Onset	-0.257*	-0.124	-0.244	-0.265
	(0.154)	(0.200)	(0.327)	(0.278)
5 Periods after Onset	-0.241	-0.063	-0.307	-0.494*
	(0.170)	(0.196)	(0.341)	(0.285)
6 Periods after Onset	-0.040	-0.216	-0.393	-0.112
	(0.172)	(0.214)	(0.352)	(0.305)
7 Periods after Onset	-0.111	-0.144	-0.555	-0.369
	(0.184)	(0.240)	(0.386)	(0.299)
Age	-0.079***			
	(0.015)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	-0.141**			
	(0.056)			
Married	-0.146**			
	(0.062)			
Separated	-0.090			
	(0.091)			
Divorced	-0.049			
	(0.077)			
Widowed	-0.042			
	(0.151)			
No. of Children	-0.013			
	(0.011)			
No Qualification	*Reference*			
GCSE	-0.135			
	(0.093)			
Higher/AS Level	-0.104			
	(0.115)			
A-Level	-0.024			
	(0.109)			
Other Higher	-0.001			
	(0.117)			
Degree	-0.138			
	(0.131)			
Postgraduate	-0.249			
	(0.156)			
London	*Reference*			
North East	0.820**			
	(0.354)			
North West	0.173			
	(0.202)			
Yorks/Humber	0.385*			
	(0.200)			
East Midlands	0.447**			
	(0.205)			
West Midlands	0.172			
	(0.198)			

East	0.057
	(0.198)
South East	0.021
	(0.133)
South West	0.280
	(0.184)
Wales	0.147
	(0.374)
Scotland	-0.043
	(0.335)
N. Ireland	1.531***
	(0.298)
Urban	*Reference*
Rural	0.078
	(0.058)
2009	*Reference*
2010	0.002
	(0.029)
2011	-0.061**
	(0.031)
2012	-0.171***
	(0.031)
2013	-0.199***
	(0.030)
2014	-0.139***
	(0.030)
2015	-0.030
	(0.030)
2016	0.035
	(0.030)
2017	-0.086*
	(0.045)
2018	-0.118***
	(0.045)
Constant	5.698***
	(0.362)
R-Squared (within)	0.0118
R-Squared (between)	0.0474
R-Squared (overall)	0.0240

Observations: 164,214
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A37. Disability by Type (Four categories approach)**.**

	Physical	**Sensory**	**Cognitive**	**Other**
4 Periods before Onset	*Reference*			

3 Periods before Onset	0.036	0.086	-0.030	0.046
	(0.121)	(0.210)	(0.243)	(0.144)
2 Periods before Onset	-0.135	0.108	0.090	0.165
	(0.134)	(0.249)	(0.264)	(0.145)
1 Period before Onset	-0.065	-0.040	-0.004	0.004
	(0.130)	(0.217)	(0.256)	(0.151)
Onset Period	-0.251*	0.001	-0.215	-0.082
	(0.131)	(0.217)	(0.260)	(0.168)
1 Period after Onset	-0.249*	-0.033	-0.254	-0.001
	(0.137)	(0.217)	(0.257)	(0.168)
2 Periods after Onset	-0.141	-0.051	-0.123	0.008
	(0.132)	(0.209)	(0.247)	(0.157)
3 Periods after Onset	-0.254*	-0.041	-0.076	-0.102
	(0.136)	(0.228)	(0.258)	(0.170)
4 Periods after Onset	-0.124	-0.189	-0.145	-0.064
	(0.140)	(0.230)	(0.271)	(0.172)
5 Periods after Onset	-0.229	-0.326	-0.192	-0.050
	(0.145)	(0.251)	(0.273)	(0.176)
6 Periods after Onset	-0.294*	-0.172	-0.218	-0.088
	(0.163)	(0.270)	(0.279)	(0.187)
7 Periods after Onset	-0.142	-0.020	-0.228	-0.206
	(0.208)	(0.276)	(0.332)	(0.218)
Age	-0.072***			
	(0.012)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.151***			
	(0.044)			
Married	0.138***			
	(0.049)			
Separated	-0.222***			
	(0.082)			
Divorced	0.043			
	(0.068)			
Widowed	-0.149			
	(0.168)			
No. of Children	0.000			
	(0.010)			
No Qualification	*Reference*			
GCSE	-0.094			
	(0.071)			
Higher/AS Level	-0.072			
	(0.075)			
A-Level	-0.106			
	(0.078)			
Other Higher	-0.129			
	(0.090)			
Degree	-0.122			
	(0.090)			
Postgraduate	-0.182			

	(0.117)
London	*Reference*
North East	0.448*
	(0.251)
North West	0.073
	(0.155)
Yorks/Humber	0.178
	(0.163)
East Midlands	0.229
	(0.155)
West Midlands	0.087
	(0.168)
East	0.265
	(0.186)
South East	0.026
	(0.108)
South West	0.204*
	(0.123)
Wales	-0.020
	(0.154)
Scotland	0.000
	(0.248)
N. Ireland	1.087***
	(0.204)
Urban	*Reference*
Rural	-0.003
	(0.045)
2009	*Reference*
2010	-0.008
	(0.024)
2011	-0.071***
	(0.026)
2012	-0.164***
	(0.027)
2013	-0.200***
	(0.026)
2014	-0.119***
	(0.025)
2015	-0.006
	(0.027)
2016	0.065**
	(0.026)
2017	-0.053
	(0.039)
2018	-0.043
	(0.035)
Constant	6.780***
	(0.294)
R-Squared (within)	0.0129
R-Squared (between)	0.0140
R-Squared (overall)	0.0113

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

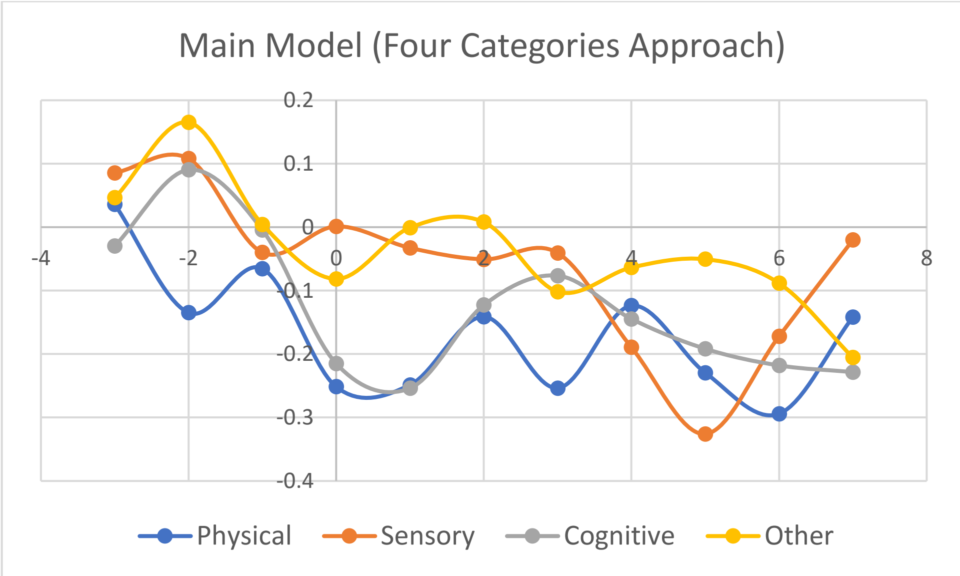


Figure A22. Life satisfaction by disability type (Four categories approach).

Table A38. Main Model by disability type (Chronic Severe only).

	(i) Mobility	(ii) Lifting/ Carrying	(iii) Dexterity	Hearing
4 Periods before Onset	*Reference*			
3 Periods before Onset	-0.540*	-0.228	-0.284	0.289
	(0.320)	(0.354)	(0.310)	(0.804)
2 Periods before Onset	-0.516*	-0.124	-0.085	0.322
	(0.306)	(0.348)	(0.460)	(0.875)
1 Period before Onset	-0.895***	-0.529*	-0.094	-0.496
	(0.288)	(0.325)	(0.452)	(0.725)
Onset Period	-1.201***	-0.926***	-0.585	-0.572
	(0.284)	(0.304)	(0.426)	(0.616)
1 Period after Onset	-1.346***	-1.145***	-0.760*	-0.371
	(0.292)	(0.326)	(0.459)	(0.598)
2 Periods after Onset	-0.958***	-0.735**	-0.477	-0.274
	(0.299)	(0.319)	(0.450)	(0.668)
3 Periods after Onset	-1.360***	-1.126***	-0.612	-0.690
	(0.282)	(0.300)	(0.422)	(0.603)
4 Periods after Onset	-1.236***	-0.957***	-0.454	-0.587

	(0.290)	(0.326)	(0.458)	(0.695)
5 Periods after Onset	-1.563***	-1.377***	-0.810*	-1.121
	(0.308)	(0.339)	(0.464)	(0.738)
6-7 Periods after Onset	-1.485***	-1.193***	-0.688	-1.046
	(0.307)	(0.335)	(0.460)	(0.730)
Age	-0.074***	-0.074*	-0.074***	-0.075***
	(0.013)	(0.013)	(0.013)	(0.013)
Age Squared	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Single	*Reference*			
Living as a Couple	0.117**	0.116**	0.114**	0.115**
	(0.047)	(0.047)	(0.047)	(0.047)
Married	0.114**	0.114**	0.111**	0.113**
	(0.053)	(0.053)	(0.054)	(0.054)
Separated	-0.155*	-0.155*	-0.154*	-0.153*
	(0.083)	(0.084)	(0.084)	(0.084)
Divorced	0.064	0.066	0.058	0.061
	(0.077)	(0.077)	(0.077)	(0.077)
Widowed	-0.129	-0.134	-0.169	-0.178
	(0.174)	(0.174)	(0.194)	(0.195)
No. of Children	-0.007	-0.007	-0.007	-0.004
	(0.011)	(0.011)	(0.011)	(0.011)
No Qualification	*Reference*			
GCSE	-0.097	-0.098	-0.099	-0.101
	(0.073)	(0.072)	(0.072)	(0.072)
Higher/AS Level	-0.072	-0.074	-0.071	-0.070
	(0.076)	(0.075)	(0.075)	(0.075)
A-Level	-0.147*	-0.147*	-0.145*	-0.147*
	(0.083)	(0.082)	(0.082)	(0.082)
Other Higher	-0.149*	-0.149*	-0.145	-0.148
	(0.091)	(0.091)	(0.090)	(0.091)
Degree	-0.144	-0.147	-0.143	-0.146
	(0.093)	(0.093)	(0.093)	(0.093)
Postgraduate	-0.189	-0.191	-0.183	-0.187
	(0.127)	(0.127)	(0.127)	(0.127)
London	*Reference*			
North East	0.537*	0.536*	0.535*	0.532*
	(0.288)	(0.288)	(0.289)	(0.288)
North West	0.173	0.173	0.172	0.168
	(0.157)	(0.157)	(0.157)	(0.157)
Yorks/Humber	0.200	0.199	0.198	0.193
	(0.160)	(0.160)	(0.160)	(0.160)
East Midlands	0.276	0.276	0.277	0.275
	(0.169)	(0.169)	(0.169)	(0.169)
West Midlands	0.185	0.185	0.185	0.172
	(0.165)	(0.165)	(0.164)	(0.164)
East	0.201	0.202	0.200	0.200
	(0.203)	(0.203)	(0.203)	(0.203)

South East	0.040	0.039	0.043	0.046
	(0.119)	(0.119)	(0.119)	(0.119)
South West	0.226*	0.225*	0.226*	0.226*
	(0.132)	(0.132)	(0.132)	(0.133)
Wales	0.039	0.041	0.030	0.032
	(0.172)	(0.172)	(0.173)	(0.173)
Scotland	0.184	0.183	0.177	0.176
	(0.234)	(0.234)	(0.234)	(0.234)
N. Ireland	1.040***	1.043***	1.017***	0.974***
	(0.190)	(0.190)	(0.196)	(0.209)
Urban	*Reference*			
Rural	-0.016	-0.017	-0.015	-0.018
	(0.049)	(0.049)	(0.049)	(0.048)
2009	*Reference*			
2010	-0.013	-0.013	-0.016	-0.015
	(0.026)	(0.026)	(0.026)	(0.026)
2011	-0.087***	-0.086***	-0.091***	-0.092***
	(0.028)	(0.028)	(0.028)	(0.028)
2012	-0.180***	-0.178***	-0.181***	-0.184***
	(0.029)	(0.029)	(0.029)	(0.029)
2013	-0.202***	-0.200***	-0.201***	-0.204***
	(0.028)	(0.028)	(0.028)	(0.028)
2014	-0.122***	-0.120***	-0.123***	-0.125***
	(0.027)	(0.027)	(0.027)	(0.027)
2015	-0.006	-0.005	-0.008	-0.008
	(0.030)	(0.029)	(0.030)	(0.030)
2016	0.077***	0.079***	0.075***	0.074***
	(0.028)	(0.028)	(0.028)	(0.028)
2017	-0.043	-0.043	-0.044	-0.044
	(0.043)	(0.043)	(0.043)	(0.043)
2018	-0.022	-0.022	-0.022	-0.021
	(0.038)	(0.038)	(0.038)	(0.038)
Constant	6.930***	6.901***	6.951***	6.972***
	(0.317)	(0.314)	(0.318)	(0.318)
R-Squared (within)	0.0128	0.0134	0.0111	0.0108
R-Squared (between)	0.0138	0.0119	0.0040	0.0026
R-Squared (overall)	0.0123	0.0111	0.0042	0.0030

Observations: 59,073
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets.
P-Values: *** 1%, ** 5%, *10%

Table A38 (cont.). Main Model by disability type (Chronic Severe only).

	(vi) Sight	(vii) Speech/ Communication	(viii) Recognising Danger	(ix) Co-ordination
4 Periods before Onset	*Reference*			

3 Periods before Onset	-0.244	-0.118	1.358	-0.444
	(0.571)	(0.669)	(0.853)	(0.465)
2 Periods before Onset	0.283	-0.170	0.954	-0.410
	(0.694)	(0.842)	(0.666)	(0.497)
1 Period before Onset	-0.750	-0.639	-0.290	-0.564
	(0.663)	(0.733)	(0.715)	(0.450)
Onset Period	-0.839	-1.237**	-0.242	-1.235***
	(0.660)	(0.576)	(0.601)	(0.394)
1 Period after Onset	-1.173*	-1.449**	-0.824	-1.311***
	(0.686)	(0.641)	(0.637)	(0.434)
2 Periods after Onset	-0.677	-0.773	-0.193	-0.776*
	(0.664)	(0.608)	(0.482)	(0.438)
3 Periods after Onset	-0.964	-1.441***	-0.437	-1.349***
	(0.665)	(0.506)	(0.522)	(0.407)
4 Periods after Onset	-0.947	-1.328**	-0.460	-0.991**
	(0.679)	(0.654)	(0.586)	(0.447)
5 Periods after Onset	-1.493**	-1.896***	-1.474*	-1.303***
	(0.699)	(0.709)	(0.759)	(0.460)
6-7 Periods after Onset	-1.019	-1.453**	-0.922	-1.358***
	(0.680)	(0.624)	(0.878)	(0.457)
Age	-0.074***	-0.072***	-0.072***	-0.073***
	(0.013)	0.013	(0.013)	(0.013)
Age Squared	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Single	*Reference*			
Living as a Couple	0.115**	0.120**	0.115**	0.115**
	(0.047)	(0.047)	(0.047)	(0.047)
Married	0.113**	0.118**	0.115**	0.115**
	(0.053)	(0.053)	(0.053)	(0.053)
Separated	-0.155**	-0.152*	-0.156*	-0.153*
	(0.084)	(0.084)	(0.084)	(0.084)
Divorced	0.052	0.058	0.058	0.057
	(0.078)	(0.077)	(0.078)	(0.077)
Widowed	-0.165	-0.150	-0.162	-0.165
	(0.195)	(0.195)	(0.195)	(0.195)
No. of Children	-0.004	-0.007	-0.004	-0.008
	(0.011)	(0.011)	(0.011)	(0.011)
No Qualification	*Reference*			
GCSE	-0.101	-0.099	-0.101	-0.102
	(0.072)	(0.072)	(0.072)	(0.072)
Higher/AS Level	-0.071	-0.074	-0.072	-0.077
	(0.075)	(0.075)	(0.075)	(0.075)
A-Level	-0.149*	-0.150*	-0.150*	-0.152*
	(0.082)	(0.081)	(0.082)	(0.081)
Other Higher	-0.151*	-0.150*	-0.152*	-0.149*
	(0.090)	(0.090)	(0.091)	(0.090)
Degree	-0.150	-0.145	-0.152	-0.148
	(0.093)	(0.092)	(0.093)	(0.093)
Postgraduate	-0.190	-0.185	-0.194	-0.191
	(0.127)	(0.127)	(0.127)	(0.127)
London	*Reference*			

North East	0.533*	0.533*	0.532*	0.536*
	(0.288)	(0.288)	(0.288)	(0.288)
North West	0.169	0.171	0.169	0.172
	(0.157)	(0.157)	(0.157)	(0.157)
Yorks/Humber	0.194	0.195	0.193	0.197
	(0.160)	(0.160)	(0.160)	(0.160)
East Midlands	0.275	0.274	0.274	0.275
	(0.169)	(0.169)	(0.169)	(0.169)
West Midlands	0.173	0.174	0.173	0.179
	(0.162)	(0.162)	(0.162)	(0.164)
East	0.200	0.200	0.199	0.204
	(0.203)	(0.203)	(0.203)	(0.203)
South East	0.046	0.045	0.046	0.043
	(0.119)	(0.119)	(0.119)	(0.119)
South West	0.226*	0.227*	0.226*	0.233*
	(0.133)	(0.133)	(0.133)	(0.132)
Wales	0.031	0.032	0.031	0.036
	(0.173)	(0.173)	(0.173)	(0.173)
Scotland	0.177	0.177	0.175	0.177
	(0.234)	(0.234)	(0.234)	(0.234)
N. Ireland	0.976***	0.976***	0.975***	0.977***
	(0.209)	(0.209)	(0.209)	(0.209)
Urban	*Reference*			
Rural	-0.017	-0.014	-0.015	-0.016
	(0.048)	(0.049)	(0.049)	(0.049)
2009	*Reference*			
2010	-0.013	-0.018	-0.016	-0.015
	(0.026)	(0.026)	(0.026)	(0.026)
2011	-0.089***	-0.093***	-0.090***	-0.090***
	(0.028)	(0.028)	(0.028)	(0.028)
2012	-0.180***	-0.184***	-0.182***	-0.182***
	(0.029)	(0.029)	(0.029)	(0.029)
2013	-0.201***	-0.204***	-0.202***	-0.201***
	(0.028)	(0.028)	(0.028)	(0.028)
2014	-0.122***	-0.124***	-0.124***	-0.122***
	(0.027)	(0.027)	(0.027)	(0.027)
2015	-0.006	-0.008	-0.008	-0.008
	(0.029)	(0.030)	(0.029)	(0.029)
2016	0.078***	0.076***	0.075***	0.076***
	(0.028)	(0.028)	(0.028)	(0.028)
2017	-0.043	-0.044	-0.043	-0.044
	(0.043)	(0.043)	(0.043)	(0.043)
2018	-0.021	-0.020	-0.021	-0.019
	(0.038)	(0.038)	(0.038)	(0.038)
Constant	6.947***	6.930***	6.923***	6.930***
	(0.316)	(0.316)	(0.317)	(0.318)
R-Squared (within)	0.0113	0.0116	0.0116	0.0126
R-Squared (between)	0.0037	0.0029	0.0021	0.0082
R-Squared (overall)	0.0039	0.0034	0.0025	0.0080

Observations: 59,073
Sample probability weights applied.

Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

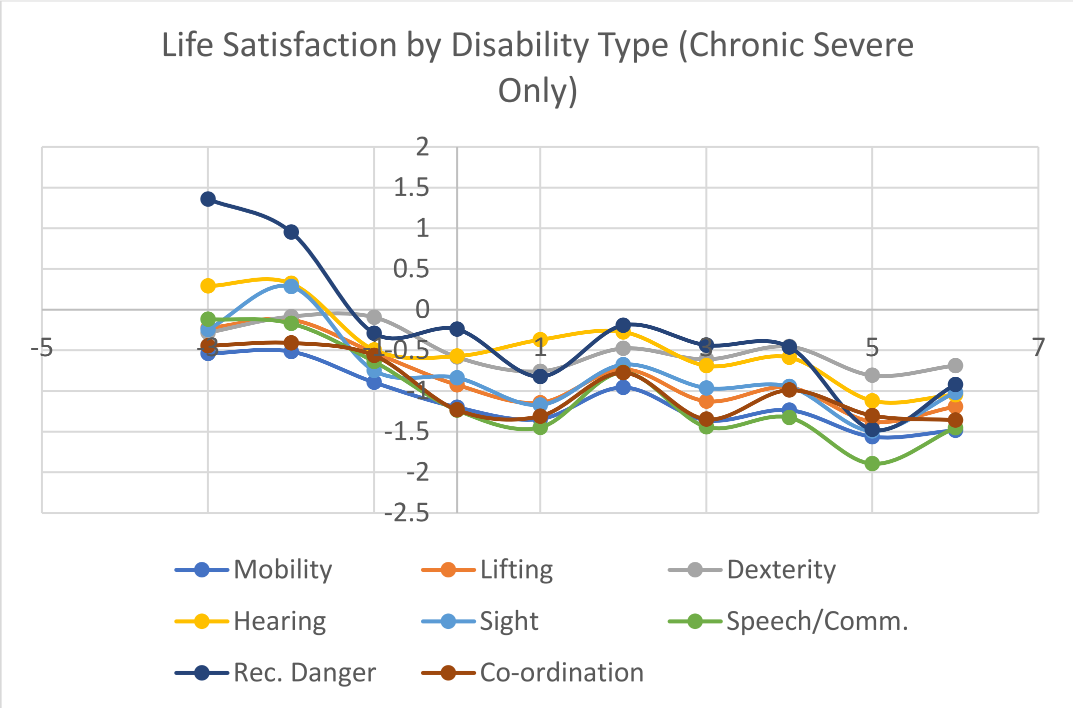


Figure A23. Life Satisfaction by Disability Type (Chronic Severe disability category only). Some disability types are excluded due to insufficient sample size.

Table A39. Main Model by pre-onset education level.

	No Higher Education Prior to Onset			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.004	-0.062	-0.515	0.103
	(0.151)	(0.239)	(0.249)	(0.398)
2 Periods before Onset	0.222	-0.183	-0.350**	-0.058
	(0.139)	(0.245)	(0.177)	(0.550)
1 Period before Onset	0.091	-0.060	-0.537**	-0.533
	(0.139)	(0.241)	(0.214)	(0.529)
Onset Period	0.126	-0.407*	-0.336*	-0.935*
	(0.126)	(0.233)	(0.176)	(0.522)
1 Period after Onset	0.306**	-0.156	-0.409**	-1.213**
	(0.142)	(0.208)	(0.188)	(0.548)
2 Periods after Onset	0.306**	-0.188	-0.244	-0.827*
	(0.126)	(0.225)	(0.194)	(0.506)
3 Periods after Onset	0.077	-0.196	-0.451**	-1.078**
	(0.147)	(0.253)	(0.193)	(0.492)

4 Periods after Onset	0.191	-0.110	-0.605***	-0.889*
	(0.169)	(0.252)	(0.209)	(0.536)
5 Periods after Onset	0.405***	-0.339	-0.336*	-1.387**
	(0.155)	(0.247)	(0.207)	(0.556)
6 Periods after Onset	0.365**	-0.231	-0.692***	-1.333**
	(0.182)	(0.257)	(0.190)	(0.535)
Age	-0.072***			
	(0.012)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.153***			
	(0.044)			
Married	0.138***			
	(0.049)			
Separated	-0.221***			
	(0.081)			
Divorced	0.044			
	(0.068)			
Widowed	-0.132			
	(0.162)			
No. of Children	-0.001			
	(0.010)			
No Qualification	*Reference*			
GCSE	-0.086			
	(0.071)			
Higher/AS Level	-0.063			
	(0.075)			
A-Level	-0.102			
	(0.078)			
Other Higher	-0.121			
	(0.089)			
Degree	-0.111			
	(0.090)			
Postgraduate	-0.178			
	(0.117)			
London	*Reference*			
North East	0.459*			
	(0.251)			
North West	0.082			
	(0.155)			
Yorks/Humber	0.186			
	(0.164)			
East Midlands	0.237			
	(0.155)			
West Midlands	0.110			
	(0.168)			
East	0.273			
	(0.186)			

South East	0.019
	(0.108)
South West	0.200
	(0.123)
Wales	-0.001
	(0.152)
Scotland	0.016
	(0.251)
N. Ireland	1.110***
	(0.176)
Urban	*Reference*
Rural	-0.008
	(0.045)
2009	*Reference*
2010	-0.006
	(0.024)
2011	-0.069***
	(0.026)
2012	-0.160***
	(0.027)
2013	-0.198***
	(0.026)
2014	-0.115***
	(0.025)
2015	-0.001
	(0.027)
2016	0.070***
	(0.026)
2017	-0.052
	(0.039)
2018	-0.039
	(0.036)
Constant	6.789***
	(0.293)
R-Squared (within)	0.0148
R-Squared (between)	0.0193
R-Squared (overall)	0.0157

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A39 (cont.). Main Model by pre-onset education level.

	Higher Education Prior to Onset			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**

4 Periods before Onset	*Reference*			
3 Periods before Onset	0.025	0.155	-0.014	-0.432
	(0.168)	(0.162)	(0.306)	(0.451)
2 Periods before Onset	0.085	-0.013	0.017	-0.188
	(0.179)	(0.173)	(0.463)	(0.411)
1 Period before Onset	-0.028	0.033	-0.187	-0.518
	(0.206)	(0.162)	(0.394)	(0.378)
Onset Period	-0.226	-0.186	-0.406	-0.905**
	(0.241)	(0.161)	(0.467)	(0.354)
1 Period after Onset	-0.191	-0.056	-0.454	-1.065***
	(0.239)	(0.159)	(0.473)	(0.378)
2 Periods after Onset	-0.146	-0.013	-0.413	-0.647*
	(0.223)	(0.155)	(0.414)	(0.379)
3 Periods after Onset	-0.139	0.010	-0.458	-1.059***
	(0.236)	(0.163)	(0.468)	(0.357)
4 Periods after Onset	-0.303	-0.138	-0.221	-0.948**
	(0.241)	(0.180)	(0.453)	(0.382)
5 Periods after Onset	-0.331	-0.003	-0.386	-1.315***
	(0.254)	(0.179)	(0.448)	(0.395)
6 Periods after Onset	-0.214	-0.037	-0.458	-1.123***
	(0.272)	(0.199)	(0.455)	(0.389)

Table A40. Main Model by pre-onset household income level.

	Lower Income Prior to Onset			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.084	-0.157	-0.075	-0.042
	(0.189)	(0.203)	(0.342)	(0.480)
2 Periods before Onset	0.242	-0.358*	0.084	-0.059
	(0.191)	(0.195)	(0.483)	(0.447)
1 Period before Onset	0.041	-0.194	-0.234	-0.364
	(0.232)	(0.178)	(0.397)	(0.416)
Onset Period	-0.170	-0.414**	-0.539	-0.636
	(0.269)	(0.175)	(0.496)	(0.401)
1 Period after Onset	-0.056	-0.346**	-0.458	-0.925**
	(0.266)	(0.173)	(0.491)	(0.426)
2 Periods after Onset	0.133	-0.295*	-0.368	-0.470
	(0.240)	(0.169)	(0.454)	(0.421)
3 Periods after Onset	0.003	-0.244	-0.455	-0.862**
	(0.265)	(0.191)	(0.512)	(0.403)
4 Periods after Onset	-0.120	-0.197	-0.452	-0.756*
	(0.269)	(0.193)	(0.498)	(0.427)
5 Periods after Onset	0.147	-0.253	-0.492	-1.200***
	(0.268)	(0.196)	(0.478)	(0.437)
6 Periods after Onset	0.115	-0.197	-0.625	-0.928**

	(0.312)	(0.216)	(0.484)	(0.430)
Age	-0.073***			
	(0.012)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.154***			
	(0.043)			
Married	0.143***			
	(0.049)			
Separated	-0.222***			
	(0.081)			
Divorced	0.045			
	(0.068)			
Widowed	-0.128			
	(0.163)			
No. of Children	-0.001			
	(0.011)			
No Qualification	*Reference*			
GCSE	-0.090			
	(0.072)			
Higher/AS Level	-0.070			
	(0.075)			
A-Level	-0.109			
	(0.079)			
Other Higher	-0.132			
	(0.090)			
Degree	-0.118			
	(0.090)			
Postgraduate	-0.187			
	(0.117)			
London	*Reference*			
North East	0.465*			
	(0.250)			
North West	0.093			
	(0.154)			
Yorks/Humber	0.192			
	(0.162)			
East Midlands	0.245			
	(0.154)			
West Midlands	0.115			
	(0.165)			
East	0.270			
	(0.186)			
South East	0.025			
	(0.107)			
South West	0.212*			
	(0.122)			
Wales	0.007			

	(0.151)
Scotland	0.017
	(0.249)
N. Ireland	1.124***
	(0.187)
Urban	*Reference*
Rural	-0.011
	(0.044)
2009	*Reference*
2010	-0.005
	(0.024)
2011	-0.068***
	(0.026)
2012	-0.161***
	(0.027)
2013	-0.199***
	(0.026)
2014	-0.115***
	(0.025)
2015	-0.001
	(0.027)
2016	0.068***
	(0.026)
2017	-0.051
	(0.039)
2018	-0.040
	(0.036)
Constant	6.798***
	(0.293)
R-Squared (within)	0.0152
R-Squared (between)	0.0210
R-Squared (overall)	0.0169

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A40 (cont.). Main Model by pre-onset household income level.

	Higher Income Prior to Onset			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	-0.022	0.457***	-0.294	-0.702***
	(0.120)	(0.150)	(0.239)	(0.258)
2 Periods before Onset	0.078	0.375*	-0.252	-0.270
	(0.125)	(0.196)	(0.279)	(0.401)
1 Period before Onset	0.045	0.298	-0.345	-0.800**

	(0.114)	(0.196)	(0.325)	(0.360)
Onset Period	0.038	-0.020	-0.122	-1.513***
	(0.116)	(0.197)	(0.241)	(0.331)
1 Period after Onset	0.111	0.308*	-0.388	-1.432***
	(0.134)	(0.178)	(0.328)	(0.360)
2 Periods after Onset	-0.017	0.278	-0.329**	-1.141***
	(0.132)	(0.191)	(0.161)	(0.351)
3 Periods after Onset	-0.063	0.230	-0.430**	-1.465***
	(0.130)	(0.189)	(0.182)	(0.306)
4 Periods after Onset	-0.060	-0.053	-0.137	-1.266***
	(0.154)	(0.217)	(0.205)	(0.347)
5 Periods after Onset	-0.165	0.104	-0.169	-1.517***
	(0.178)	(0.207)	(0.250)	(0.384)
6 Periods after Onset	-0.054	0.029	-0.359	-1.703***
	(0.160)	(0.220)	(0.255)	(0.387)

Table A41. Main Model by age of onset.

	Early Onset			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.049	-0.257	-0.161	0.175
	(0.166)	(0.231)	(0.321)	(0.456)
2 Periods before Onset	0.226	-0.309	0.075	0.132
	(0.165)	(0.229)	(0.481)	(0.490)
1 Period before Onset	0.017	0.125	-0.336	-0.408
	(0.197)	(0.215)	(0.431)	(0.471)
Onset Period	-0.029	-0.412*	-0.202	-0.903**
	(0.228)	(0.222)	(0.518)	(0.405)
1 Period after Onset	0.044	-0.091	-0.409	-1.105**
	(0.227)	(0.204)	(0.527)	(0.454)
2 Periods after Onset	0.097	0.024	-0.229	-0.453
	(0.204)	(0.205)	(0.460)	(0.432)
3 Periods after Onset	-0.017	0.023	-0.508	-0.940**
	(0.226)	(0.230)	(0.520)	(0.397)
4 Periods after Onset	-0.177	-0.057	-0.314	-0.903**
	(0.231)	(0.241)	(0.494)	(0.454)
5 Periods after Onset	0.059	-0.096	-0.347	-1.181**
	(0.224)	(0.236)	(0.483)	(0.484)
6 Periods after Onset	-0.135	-0.222	-0.604	-1.206***
	(0.257)	(0.260)	(0.486)	(0.451)
Age	-0.073***			
	(0.013)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.154***			

	(0.044)
Married	0.140***
	(0.049)
Separated	-0.226***
	(0.082)
Divorced	0.044
	(0.068)
Widowed	-0.133
	(0.162)
No. of Children	-0.001
	(0.010)
No Qualification	*Reference*
GCSE	-0.091
	(0.071)
Higher/AS Level	-0.069
	(0.075)
A-Level	-0.111
	(0.079)
Other Higher	-0.135
	(0.090)
Degree	-0.125
	(0.090)
Postgraduate	-0.198*
	(0.117)
London	*Reference*
North East	0.462*
	(0.250)
North West	0.071
	(0.155)
Yorks/Humber	0.165
	(0.162)
East Midlands	0.239
	(0.155)
West Midlands	0.106
	(0.168)
East	0.272
	(0.187)
South East	0.015
	(0.108)
South West	0.207*
	(0.123)
Wales	-0.007
	(0.153)
Scotland	0.024
	(0.242)
N. Ireland	1.114***
	(0.192)
Urban	*Reference*
Rural	-0.007
	(0.044)

2009	*Reference*
2010	-0.006
	(0.024)
2011	-0.067**
	(0.026)
2012	-0.159***
	(0.027)
2013	-0.198***
	(0.026)
2014	-0.114***
	(0.025)
2015	-0.001
	(0.027)
2016	0.071***
	(0.026)
2017	-0.051
	(0.039)
2018	-0.037
	(0.036)
Constant	6.804***
	(0.301)
R-Squared (within)	0.0159
R-Squared (between)	0.0201
R-Squared (overall)	0.0165

Observations: 167,093
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A41 (continued). Main Model by age of onset.

	Late Onset			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.000	0.403***	-0.193	-0.658
	(0.136)	(0.137)	(0.389)	(0.431)
2 Periods before Onset	0.060	0.166	-0.328	-0.406
	(0.151)	(0.168)	(0.448)	(0.423)
1 Period before Onset	0.078	-0.146	-0.248	-0.620
	(0.139)	(0.163)	(0.362)	(0.392)
Onset Period	-0.116	-0.118	-0.661*	-0.918**
	(0.144)	(0.146)	(0.360)	(0.403)
1 Period after Onset	0.005	-0.109	-0.511	-1.096***
	(0.161)	(0.155)	(0.349)	(0.413)
2 Periods after Onset	-0.005	-0.185	-0.572*	-0.901**
	(0.161)	(0.158)	(0.329)	(0.417)
3 Periods after Onset	-0.052	-0.156	-0.409	-1.172***

	(0.155)	(0.157)	(0.355)	(0.405)
4 Periods after Onset	0.042	-0.238	-0.392	-0.954**
	(0.176)	(0.167)	(0.386)	(0.411)
5 Periods after Onset	-0.136	-0.143	-0.421	-1.465***
	(0.231)	(0.173)	(0.389)	(0.419)
6 Periods after Onset	0.367*	0.020	-0.454	-1.111***
	(0.188)	(0.182)	(0.396)	(0.431)

Table A42. Main Model by gender.

	Males			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	-0.009	0.043	-0.096	-0.178
	(0.151)	(0.179)	(0.342)	(0.753)
2 Periods before Onset	0.299**	-0.085	-0.220	0.179
	(0.139)	(0.223)	(0.313)	(0.621)
1 Period before Onset	0.223*	0.023	-0.139	-0.241
	(0.128)	(0.211)	(0.275)	(0.541)
Onset Period	0.166	-0.054	-0.029	-0.733
	(0.127)	(0.206)	(0.228)	(0.522)
1 Period after Onset	0.270*	0.004	-0.269	-1.037*
	(0.148)	(0.194)	(0.325)	(0.561)
2 Periods after Onset	0.193	-0.083	-0.235	-0.362
	(0.146)	(0.201)	(0.187)	(0.532)
3 Periods after Onset	0.175	-0.147	-0.156	-0.907*
	(0.148)	(0.201)	(0.172)	(0.513)
4 Periods after Onset	0.001	-0.010	-0.307	-0.792
	(0.186)	(0.232)	(0.251)	(0.552)
5 Periods after Onset	-0.006	-0.101	-0.257	-1.174**
	(0.196)	(0.220)	(0.268)	(0.577)
6 Periods after Onset	0.289	-0.147	-0.228	-1.053*
	(0.197)	(0.234)	(0.279)	(0.554)
Age	-0.072***			
	(0.012)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.154***			
	(0.043)			
Married	0.138***			
	(0.049)			
Separated	-0.221***			
	(0.081)			
Divorced	0.046			
	(0.068)			
Widowed	-0.126			

	(0.161)
No. of Children	0.000
	(0.011)
No Qualification	*Reference*
GCSE	-0.091
	(0.071)
Higher/AS Level	-0.070
	(0.074)
A-Level	-0.108
	(0.078)
Other Higher	-0.132
	(0.089)
Degree	-0.120
	(0.089)
Postgraduate	-0.191
	(0.117)
London	*Reference*
North East	0.464*
	(0.252)
North West	0.079
	(0.154)
Yorks/Humber	0.185
	(0.162)
East Midlands	0.247
	(0.155)
West Midlands	0.116
	(0.167)
East	0.270
	(0.186)
South East	0.023
	(0.107)
South West	0.208*
	(0.122)
Wales	0.006
	(0.152)
Scotland	0.023
	(0.247)
N. Ireland	1.158***
	(0.211)
Urban	*Reference*
Rural	-0.007
	(0.045)
2009	*Reference*
2010	-0.004
	(0.024)
2011	-0.067**
	(0.026)
2012	-0.159***
	(0.027)
2013	-0.198***
	(0.026)

2014	-0.115***
	(0.025)
2015	-0.003
	(0.027)
2016	0.068***
	(0.026)
2017	-0.057
	(0.039)
2018	-0.044
	(0.036)
Constant	6.772***
	(0.293)
R-Squared (within)	0.0150
R-Squared (between)	0.0204
R-Squared (overall)	0.0164

Observations: 167,093
Sample probability weights assumed.
Standard errors (clustered by individual) are displayed in brackets
p-Values: *** 1%, ** 5%, *10%

Table A42 (continued). Main Model by gender.

	Females			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.023	0.082	-0.163	-0.325
	(0.165)	(0.202)	(0.336)	(0.329)
2 Periods before Onset	0.050	-0.081	0.117	-0.329
	(0.170)	(0.194)	(0.467)	(0.367)
1 Period before Onset	-0.089	-0.035	-0.329	-0.690*
	(0.198)	(0.184)	(0.400)	(0.359)
Onset Period	-0.238	-0.415**	-0.583	-1.009***
	(0.228)	(0.182)	(0.492)	(0.342)
1 Period after Onset	-0.155	-0.175	-0.499	-1.116***
	(0.226)	(0.176)	(0.478)	(0.366)
2 Periods after Onset	-0.041	-0.082	-0.389	-0.895**
	(0.206)	(0.175)	(0.440)	(0.366)
3 Periods after Onset	-0.185	-0.015	-0.611	-1.145***
	(0.222)	(0.197)	(0.510)	(0.340)
4 Periods after Onset	-0.142	-0.247	-0.282	-1.001***
	(0.221)	(0.198)	(0.478)	(0.365)
5 Periods after Onset	0.013	-0.138	-0.378	-1.410**
	(0.228)	(0.202)	(0.465)	(0.375)
6 Periods after Onset	-0.192	-0.086	-0.688	-1.211***
	(0.269)	(0.223)	(0.466)	(0.379)

Table A43. Main Model by marital status.

	Has a Spouse Prior to Onset			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	-0.040	0.191	-0.484*	0.062
	(0.113)	(0.175)	(0.291)	(0.389)
2 Periods before Onset	0.149	0.032	-0.664	0.149
	(0.114)	(0.179)	(0.411)	(0.365)
1 Period before Onset	0.155	-0.074	-0.525	-0.229
	(0.104)	(0.171)	(0.365)	(0.348)
Onset Period	0.034	-0.370**	-0.915**	-0.507*
	(0.108)	(0.167)	(0.438)	(0.308)
1 Period after Onset	0.074	-0.183	-0.813*	-0.676**
	(0.112)	(0.166)	(0.452)	(0.326)
2 Periods after Onset	0.083	-0.257	-0.846**	-0.287
	(0.106)	(0.167)	(0.409)	(0.332)
3 Periods after Onset	-0.058	-0.166	-0.964**	-0.741**
	(0.109)	(0.181)	(0.444)	(0.312)
4 Periods after Onset	0.082	-0.359*	-0.804*	-0.656**
	(0.122)	(0.185)	(0.420)	(0.328)
5 Periods after Onset	0.057	-0.261	-0.832*	-0.974***
	(0.134)	(0.184)	(0.428)	(0.347)
6 Periods after Onset	0.083	-0.266	-0.911**	-0.769**
	(0.174)	(0.183)	(0.441)	(0.342)
Age	-0.075***			
	(0.012)			
Age Squared	0.001***			
	(0.000)			
Single	*Reference*			
Living as a Couple	0.147***			
	(0.044)			
Married	0.139***			
	(0.049)			
Separated	-0.221***			
	(0.082)			
Divorced	0.039			
	(0.068)			
Widowed	-0.120			
	(0.159)			
No. of Children	-0.001			
	(0.010)			
No Qualification	*Reference*			
GCSE	-0.097			
	(0.071)			
Higher/AS Level	-0.071			
	(0.074)			
A-Level	-0.116			

	(0.078)
Other Higher	-0.141
	(0.090)
Degree	-0.133
	(0.089)
Postgraduate	-0.187
	(0.116)
London	*Reference*
North East	0.471*
	(0.251)
North West	0.084
	(0.155)
Yorks/Humber	0.191
	(0.161)
East Midlands	0.254
	(0.155)
West Midlands	0.126
	(0.167)
East	0.276
	(0.186)
South East	0.033
	(0.108)
South West	0.207*
	(0.123)
Wales	0.007
	(0.152)
Scotland	0.050
	(0.240)
N. Ireland	1.106***
	(0.173)
Urban	*Reference*
Rural	-0.008
	(0.045)
2009	*Reference*
2010	-0.007
	(0.024)
2011	-0.069***
	(0.026)
2012	-0.160***
	(0.027)
2013	-0.199***
	(0.026)
2014	-0.114***
	(0.025)
2015	-0.002
	(0.027)
2016	0.070***
	(0.026)
2017	-0.052
	(0.039)

2018	-0.039
	(0.036)
Constant	6.832***
	(0.291)
R-Squared (within)	0.0155
R-Squared (between)	0.0185
R-Squared (overall)	0.0150

Observations: 167,093
Sample probability weights assumed.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table A43 (continued). Main Model by marital status.

	No Spouse Prior to Onset			
	One-Time	**Temporary**	**Chronic Non-Severe**	**Chronic Severe**
4 Periods before Onset	*Reference*			
3 Periods before Onset	0.192	-0.149	0.179	-0.525
	(0.233)	(0.208)	(0.390)	(0.478)
2 Periods before Onset	0.162	-0.239	0.476	-0.356
	(0.255)	(0.243)	(0.442)	(0.490)
1 Period before Onset	-0.159	0.114	-0.066	-0.731*
	(0.312)	(0.236)	(0.397)	(0.440)
Onset Period	-0.241	-0.084	0.154	-1.288***
	(0.360)	(0.234)	(0.407)	(0.422)
1 Period after Onset	-0.063	0.050	-0.074	-1.507***
	(0.364)	(0.212)	(0.413)	(0.466)
2 Periods after Onset	-0.005	0.217	0.124	-1.066**
	(0.334)	(0.207)	(0.332)	(0.453)
3 Periods after Onset	-0.002	0.110	0.059	-1.323***
	(0.363)	(0.224)	(0.399)	(0.427)
4 Periods after Onset	-0.396	0.197	0.132	-1.122**
	(0.367)	(0.255)	(0.410)	(0.472)
5 Periods after Onset	-0.176	0.119	0.100	-1.646***
	(0.394)	(0.251)	(0.398)	(0.496)
6 Periods after Onset	-0.067	0.150	-0.183	-1.535***
	(0.384)	(0.305)	(0.389)	(0.478)

8.2 Appendix B

B1. Berger and Fleisher's (1984) theoretical framework of the wife's labour market decision.

Berger and Fleisher (1984) proposed a theoretical framework to model the wife's labour market decision, which is depicted below. The only small change made for the purpose of this paper is that their subscript H, to denote the husband, is changed to D to denote the disabled partner of either sex. The spouse's labour market supply decision, is modelled using the following function:

$$F \equiv W_D(T - H) + WT + I$$

where F is the full family income, W_D is the disabled person's market wage, T is total available weekly labour hours to the spouse, H is the number of hours of caring time the disabled person requires (assumed be exogenous), W is the spouse's market wage (assumed to be independent of the hours they work) and I is the family income from non-labour sources. Then, W*(L, H, F) is the marginal value of the spouse's home time (their home wage) and is an increasing function of the amount of market work. L is the actual number of labour hours the spouse works.

The non-disabled partner will participate in the labour market if their wage exceeds their reservation wage W_0^*, which is the same as their home wage at zero hours of work. Utility maximisation requires that the non-disabled partner works until W = W*, at which point equilibrium labour hours L_0, become proportional to the difference between the market wage and the non-disabled partner's reservation wage (W - W_0^*), i.e., the factor of proportionality is the reciprocal of the slope of W*(L, H, F) (see Heckman, 1974, for the full derivation of this result). This framework allows for the analysis of changes in family circumstances through changes in the reservation wage. An increase in the number of caring hours required H, raises the non-disabled partner's reservation wage W_0^*, which then decreases the term (W - W_0^*) and hence, also decreases the number of hours they apply to the labour market. The full effect of a person's disability or health deterioration on the non-disabled partner's reservation wage can be written as:

$$\mathrm{d}W_0^* = \frac{\delta W^*}{\delta H}\,\mathrm{dH} + \frac{\delta W^*}{\delta F}\frac{\delta W^*}{\delta H}\,\mathrm{dH}$$

$$= \frac{\delta W^*}{\delta H}\,\mathrm{dH} + \frac{\delta W^*}{\delta F}\left(\frac{\delta W_D}{\delta H}(T-H) - W_D\right)\mathrm{dH}$$

Because the first term is positive and the second is negative, the overall effect of the disability upon the reservation wage (and hence the labour supply decision) is ambiguous. As the disabled person's condition worsens, the non-disabled partner's reservation wage increases ($\delta W^*/\delta H > 0$), but at the same time, the decrease in the disabled person's potential earnings tend to lower the non-disabled partner's reservation wage ($(\delta W_D/\delta H)$(T – H) - W_D < 0).

If the disability allows the family to claim welfare benefits, then the change in the non-disabled partner's reservation wage becomes:

$$\mathrm{d}W_0^* = \frac{\delta W^*}{\delta H}\,\mathrm{dH} + \frac{\delta W^*}{\delta F}\left(\frac{\delta W_D}{\delta H}(T-H) - W_D + \frac{\delta I}{\delta H}\right)\mathrm{dH}$$

where I is non-labour income. Because the term $\delta I/\delta H$ is positive, the change in the non-disabled partner's reservation wage $\mathrm{d}W_0^*$ is more positive (or less negative) in the absence of welfare payments. This means that any substitution of hours by the non-disabled partner towards the labour market is dampened by these payments. In fact, as welfare payments increase ($\delta I/\delta H$ becomes larger), it becomes more likely that the non-disabled partner will increase their hours in the labour market, rather than decrease them. The direction of the non-disabled partner's labour supply change only becomes unambiguous at the point where the increase in non-employment income becomes large enough to equal the earnings loss of the disabled partner ($\delta I/\delta H$ = ($\delta W_D/ \delta H$)(T-H) - W_D). At this point, the non-disabled partner only responds to the 'nursing effect' and reduces their labour market activities.

B2. Caregiver burden

From a psychological point of view, caregiver burden is a theoretical construct, whose conceptual framework is based on the *Transactional Model* of stress management (Lazarus and Folkman, 1984). In everyday life, individuals are influenced by their environment by a range of stimuli, which are filtered by the individual and some are perceived by them to be *stressors*.[141] The individual conducts a two-stage process of primary and secondary appraisal. In the first stage, they interpret the stressors as either being positive, dangerous or neutral. If they are perceived as being dangerous, the second stage of appraisal is to decide whether they have sufficient or insufficient resources to deal with the perceived danger. A perception of insufficient sources leads to stress. The next stage is the coping process; overcoming of stress involves either a problem-focused (change the situation itself) or an emotion-focused (change relation to the situation) solution. The final stage is a reappraisal of the problem using any new information picked up during the coping process. A review of the literature with regards to the perceived burden of informal caregivers in the context of the Lazarus and Folkman (1984) model is given by Grässel and Adabbo (2011).

Bastawrous (2013) argues that whilst caregiver burden is commonly investigated in the academic literature, it is "not always well-conceptualized or defined", although

[141] Stress arises when individuals perceive that they cannot adequately cope with the demands being made on them or with threats to their well-being. (Lazarus, 1966).

one commonly quoted description is “the strain or load borne by a person who cares for a chronically ill, disabled, or elderly family member” (Stucki and Mulvey, 2000, p.15). More specifically, it has been described as “the physical, psychological or emotional, social, and financial problems that can be experienced by family members caring for impaired older adults (George and Gwyther, 1986). Braithwaite (1992) argues that the lack of definition for the role arises from the multi-faceted nature of caregiver burden, which she conceptualizes in terms of frustration of needs, arising from five characteristics of care: awareness of degeneration, unpredictability, time constraints, the caregiver-caregiver receiver relationship, and lack of choice. Bastawrous (2013) argues that the multiple definitions of caregiver burden result in vague findings, which are difficult to draw conclusions and implement policy from. She recommends that ‘Role Theory’ and ‘Stress Theory’ are two theoretical frameworks which can guide research into investigating the various domains of caregiver burden. In sociology, a *role* (see Biddle, 1979 for an overview) is defined as a social position or the typical behaviour associated with fulfilling a role in society. These include cultural roles (e.g., a priest or policeman), situation-specific roles (e.g., an eyewitness), and gender roles (e.g., a man, woman, mother or father). With each role comes a set of expectations from society over how someone should normally behave. Two possible problems can arise from finding oneself in a particular role. *Role conflict* may arise when there is a conflict of interest between two or more of life roles (e.g., caregiver, parent and employee), especially when these roles compete for other people’s time or attention (e.g., Biddle, 1986). *Role strain* or *role overload* may arise when someone finds themselves in a role which they feel is (or others deem them to be) beyond their capabilities (e.g., Goode, 1960).

Bastawrous's (2013) argument implies that it is important to identify the caregiver's other roles in life to be able to understand their wellbeing. For example, female caregivers are more likely to provide emotional support such as listening and sharing feelings, whilst male caregivers are more likely to provide instrumental support, such as completing household tasks (Stein, 2009). This translates into poorer wellbeing for female caregivers as the provision of emotional support has a greater psychological impact upon the caregiver compared to completing more practical tasks (Merz, Schuengel and Schulze, 2009; Yamamoto-Mitani and Wallhagen, 2002; Zarit et al., 1986).

B3. Breusch and Pagan Lagrangian Multiplier Test for random effects.

Equation: SWB_{it} = βX + u_i + e_{it}

Estimated results:

	Var	Std. Dev. = $\sqrt{Var}$
SWB_{it}	1.842071	1.357229
e_{it}	1.175402	1.084159
u_i	0.6596325	0.8121776

Test: Var(u_i) = 0

$\bar{\chi}^2$(1) = 24952.29

Prob > $\bar{\chi}^2$ = 0.0000

B4. Hausman Test.

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	FE	RE	Difference	SE

4 Periods Before Onset	0.105179	-0.13407	0.239254	0.096239
3 Periods Before Onset	0.21005	-0.0433	0.25335	0.098825
2 Periods Before Onset	0.146567	-0.12543	0.271993	0.100175
1 Period Before Onset	0.10416	-0.16679	0.270954	0.101116
Onset Period	0.116033	-0.16154	0.277575	0.101622
1 Period After Onset	0.087858	-0.19024	0.2781	0.10187
2 Periods After Onset	0.100832	-0.18501	0.285846	0.102051
3 Periods After Onset	0.093853	-0.1929	0.286754	0.102144
4 Periods After Onset	0.087135	-0.20696	0.294095	0.103479
5 Periods After Onset	0.057934	-0.23991	0.297847	0.103921
6 Periods After Onset	-0.02566	-0.33891	0.313255	0.104505
7 Periods After Onset	0.032457	-0.28871	0.321163	0.105511
Age	-0.06629	-0.0613	-0.00499	0.007543
Age-Squared	0.00067	0.000695	-2.5E-05	7.67E-05
Married	0.009461	0.108832	-0.09937	0.018863
No. of Children	0.01784	0.013888	0.003951	0.003851
GCSE	-0.01557	0.060706	-0.07628	0.095849
Higher/AS Level	0.169295	0.13466	0.034635	0.166202
A Level	0.079256	0.083462	-0.00421	0.106107
Other Higher	-0.03922	0.150505	-0.18973	0.074551
Degree	0.12024	0.272046	-0.15181	0.07949
Postgraduate	0.065322	0.252903	-0.18758	0.08383
North East	0.176708	0.067782	0.108927	0.211102
North West	-0.1133	0.155217	-0.26852	0.12635
York	0.039546	0.132994	-0.09345	0.140148
East Midlands	-0.06706	0.116795	-0.18385	0.121768
West Midlands	-0.06496	0.045605	-0.11056	0.129045
East	-0.00575	0.158693	-0.16444	0.097037
South East	0.12844	0.168058	-0.03962	0.085076
South West	0.033508	0.170433	-0.13692	0.117392
Wales	0.081726	0.12727	-0.04554	0.153243
Scotland	0.115699	0.182486	-0.06679	0.175206
N. Ireland	0.890401	0.204196	0.686205	0.372007
Rural	0.031646	0.066939	-0.03529	0.032054
2010	0.008656	0.02158	-0.01292	0.011775
2011	-0.0938	-0.08687	-0.00693	0.010324
2012	-0.13134	-0.13335	0.002017	0.007195
2013	-0.17562	-0.18323	0.007607	0.004719
2014	-0.04192	-0.05266	0.01074	0.004546
2015	0.025267	0.008937	0.01633	0.006912
2016	0.009557	-0.01102	0.020572	0.009676
2017	-0.11517	-0.14248	0.027307	0.015253
2018	-0.11634	-0.14378	0.027437	0.015139

b = consistent under H_0 and H_a; obtained from xtreg
B = inconsistent under H_a, efficient under H_0; obtained from xtreg

Test: H_0: difference in coefficients not systematic

$\chi^2(42)$ = (b-B)'[(V_b-V_B)^(-1)](b-B) = 108.36

Prob>χ^2 = 0.0000

B5. Modified Wald Test for groupwise heteroskedasticity in fixed effects models.

H_0: $\sigma_i^2 = \sigma^2$ for all i

χ^2 (5305) = 6.8×10^{33}
Prob >χ^2 = 0.00000

Note: Null hypothesis (that there is no heteroskedasticity present) is rejected.

B6. Wooldridge Test for autocorrelation in panel data.

H_0: no first-order autocorrelation
F-Statistic: F(1,17269) = 57.096
Prob > F = 0.0000

Note: Null hypothesis (of no autocorrelation) is rejected.

B7. Comparing homoscedastic, heteroscedastic (robust) and clustered standard errors.

Variable	Hom.	Het.	Clustered
4 Periods Before Onset	0.119359	0.119359	0.119359
	(0.4077)	(0.4869)	(0.4869)
3 Periods Before Onset	0.030284	0.030284	0.030284
	(0.8222)	(0.8809)	(0.8809)
2 Periods Before Onset	-0.10267	-0.10267	-0.10267
	(0.4312)	(0.6718)	(0.6718)
1 Period Before Onset	-0.17221	-0.17221	-0.17221
	(0.1811)	(0.4652)	(0.4652)
Onset Period	-0.1476	-0.1476	-0.1476
	(0.2549)	(0.5399)	(0.5399)
1 Period After Onset	-0.12193	-0.12193	-0.12193
	(0.3513)	(0.6190)	(0.6190)
2 Periods After Onset	-0.07922	-0.07922	-0.07922
	(0.5459)	(0.7296)	(0.7296)
3 Periods After Onset	-0.25114	-0.25114	-0.25114
	(0.0570)	(0.3127)	(0.3127)

4 Periods After Onset	-0.08526	-0.08526	-0.08526
	(0.5302)	(0.7229)	(0.7229)
5 Periods After Onset	-0.27181	-0.27181	-0.27181
	(0.0518)	(0.2692)	(0.2692)
6 Periods After Onset	-0.23543	-0.23543	-0.23543
	(0.1083)	(0.3564)	(0.3564)
7 Period After Onset	-0.2669	-0.2669	-0.2669
	(0.1108)	(0.3179)	(0.3179)
Age	-0.03155	-0.03155	-0.03155
	(0.0104)	(0.1356)	(0.1356)
Age Squared	0.000354	0.000354	0.000354
	(0.0083)	(0.1143)	(0.1143)
Married	0.006808	0.006808	0.006808
	(0.8487)	(0.8853)	(0.8853)
No. of Children	0.018392	0.018392	0.018392
	(0.0937)	(0.1719)	(0.1719)
GCSE	-0.02133	-0.02133	-0.02133
	(0.9188)	(0.9135)	(0.9135)
Higher/AS Level	0.100734	0.100734	0.100734
	(0.6604)	(0.3815)	(0.3815)
A-Level/Bacc.	0.011987	0.011987	0.011987
	(0.9544)	(0.9563)	(0.9563)
Other Higher	-0.00463	-0.00463	-0.00463
	(0.9803)	(0.9791)	(0.9791)
Degree	0.034954	0.034954	0.034954
	(0.8569)	(0.8455)	(0.8455)
Postgraduate	0.041593	0.041593	0.041593
	(0.8302)	(0.8106)	(0.8106)
Northeast	0.855334	0.855334	0.855334
	(0.0015)	(0.0257)	(0.0257)
Northwest	0.327146	0.327146	0.327146
	(0.0975)	(0.2078)	(0.2078)
Yorks/Humber	0.693116	0.693116	0.693116
	(0.0007)	(0.0194)	(0.0194)
East Midlands	0.16818	0.16818	0.16818
	(0.3160)	(0.4871)	(0.4871)
West Midlands	0.060111	0.060111	0.060111
	(0.7479)	(0.7924)	(0.7924)
East	0.519305	0.519305	0.519305
	(0.0001)	(0.1339)	(0.1339)
South East	0.471415	0.471415	0.471415
	(0.0003)	(0.0061)	(0.0061)
South West	0.377735	0.377735	0.377735
	(0.0340)	(0.1033)	(0.1033)
Wales	0.392913	0.392913	0.392913
	(0.0747)	(0.1331)	(0.1331)
Scotland	0.114915	0.114915	0.114915
	(0.6550)	(0.7231)	(0.7231)
N. Ireland	1.696951	1.696951	1.696951
	(0.0570)	(0.0018)	(0.0018)
Rural	0.010045	0.010045	0.010045

	(0.8443)	(0.8733)	(0.8733)
2010	-0.00399	-0.00399	-0.00399
	(0.8839)	(0.8961)	(0.8961)
2011	-0.06253	-0.06253	-0.06253
	(0.0299)	(0.0681)	(0.0681)
2012	-0.12423	-0.12423	-0.12423
	(0.0000)	(0.0002)	(0.0002)
2013	-0.16914	-0.16914	-0.16914
	(0.0000)	(0.0000)	(0.0000)
2014	-0.08654	-0.08654	-0.08654
	(0.0020)	(0.0137)	(0.0137)
2015	-0.03272	-0.03272	-0.03272
	(0.2716)	(0.3368)	(0.3368)
2016	0.006258	0.006258	0.006258
	(0.8460)	(0.8587)	(0.8587)
2017	-0.16606	-0.16606	-0.16606
	(0.0002)	(0.0017)	(0.0017)
2018	-0.09687	-0.09687	-0.09687
	(0.0301)	(0.0424)	(0.0424)
Constant	5.648009	5.648009	5.648009
	(0.0000)	(0.0000)	(0.0000)

Note: Standard errors in brackets.

B8. Heterogeneity Analysis.

Table B6 displays the results from the heterogeneity analysis. The main model was extended using the methodology described by equation (2) in section 4.4.2. Pairs of dummy variables were created (e.g., Non-Severe and Severe) and interacted with the leads and lags from the main model (minus the lag for period -4, which is added to the reference group). In specification (i), the data is split by spousal disability severity but the results are unintuitive, with the coefficients for severely disabled spouses lying above those of non-severely disabled spouses and with mostly only non-severe coefficients being statistically significant. Not only are these results unusual, they also contrast with the results from specification (ii) from Tables 4.6-4.9, in which non-severe disabilities were shown to be less negatively impactful upon own wellbeing than severe disabilities. It is suspected that the results below arise from some unobserved selection effect particular to people in the Non-Chronic

Spousal Disability group which should be controlled for, but has not been identified. The results are more intuitive in specification (ii), which differentiates between Non-Chronic and Chronic spousal disabilities, but the coefficients remain insignificant. In specification (iii), there is a slight indication that people whose spouses do not have a tertiary education experience poorer wellbeing following spousal disability onset than those who do, although the differences are slight. Similarly, in (iv), those whose household income was below the sample mean in the period of onset appear to experience slightly lower SWB in a few of the periods, although there appears to be a lot of noise in the data. In specifications (v) and (vi), males and people whose spouses experience later disability onset appear to experience lower SWB in most periods but again, there appears to be too much noise in the data and too few significant coefficients to make any useful inferences from these results, other than that there is no apparent relationship between spousal disability and SWB. Finally, in (vii), there is slight evidence that people who are caregivers experience marginally lower SWB, although the model relies on very low samples of caregiving data. This time, a time-invariant measure of whether someone is a caregiver is used to account for the fact that people may become caregivers as a direct result of spousal disability, however a time-invariant measure, based on whether the individual was a caregiver in the period prior to onset, was estimated too, but the results were very similar. The only area of the heterogeneity analysis which produced significant results was the model extension which accounted for own disability, which is discussed in full in the main text.

B9. Tests for Dynamic Bias.

A few tests were conducted to test for the presence of dynamic bias, as was carried out in Chapter Three. First, a version of the model which included dummies for own disability, spousal disability and an interaction effect between the two terms (as first run in section 4.5.3 and shown in Table 4.9) is extended to include a dummy which denotes whether spousal disability onset occurred before or after a particular year (from 2011 to 2015, inclusive). There are also interaction effects between this dummy and the two disability dummies. A less complex version of this model was run in Chapter 3, in which the pre/post year dummy was only interacted with a single disability dummy (See Appendix [Table A17]). The intention of the model is to check whether there are any additional effects of experiencing spousal disability onset in specific years.

In the Chapter 3 model, there was limited evidence that own disability affected SWB differently in different years and similar results are found with regards to spousal disability. As shown in Table B11, there is evidence of a small negative effect (-0.060) on SWB of experiencing spousal disability from the year 2015 onwards compared to before this year, significant at the 10% level.

In a more formal test, the regression adjustment model of Callaway and Sant'Anna (2021) is run in the same manner as in Chapter 3. The results, shown in Table B12 suggest that estimates of SWB for people whose spouse becomes disabled in 2010 may be overstated by 0.332 points (significant at the 10% level), although this is not relevant to this estimation is it does not include spouses who experience onset in 2009. However, there is also evidence that estimates for people whose spouse becomes disabled in 2014. A Bacon decomposition (Goodman-Bacon, 2021) is also attempted but is not possible as it requires the panel to be balanced, but doing so reduces some of the cells sizes too much for the test to be able to run. Finally, the 'Difference-in-Differences Multiple GT' model of de Chaisemartin and d'Haultfœille (2022) is run on a version of the Own-Disability Interaction Model by estimating the one-period change in SWB at spousal disability onset in comparison to the previous year. However, this test was slightly problematic for two reasons. First, the model is unable to estimate the change in SWB whilst considering a set of controls or sample probability weights, the latter of which has a notable effect on the results. Second, the largest decline in SWB, as seen in the main results, occurred at two periods before spousal disability onset, so there is no significant decline at the onset period to test. With this in mind, both the coefficients at onset, and at two periods prior to onset, are tested using the DiD Multiple GT model. The results in Table B13 suggest that SWB falls by 0.106 points in the version of the DiD Multiple GT model which is not robust to dynamic bias and by 0.104 points in the version which is robust to dynamic bias. The coefficient on the onset period is 0.075 in both estimations. This suggests that dynamic bias in these periods is very small.

B10. Randomisation tests

As with Chapter 3, randomisation tests are conducted on the main coefficients of interest across different models. In this chapter, three models are run for this purpose, before the key variables from are re-estimated using the Monte Carlo method to generate new standard errors. The first of these models is a version of the main model which includes a single time-variant dummy for spousal disability (Table B14). The second is the Own-disability Interaction Model (Table B15) and the third is the model which was used as a model extension in section 4.5.3, which includes dummies for own disability, spousal disability and an interaction term between the two factors (Table B16). All estimations include a set of controls and are estimated under fixed effects but do not include a set of probability sample weights, as this is not possible under the *ritest* randomisation test, so this unfortunately means that the test is run on unweighted versions of the models (this is far from ideal as omitting sample weights was shown to notably raise the values of the coefficients of the main model from this chapter when estimated under RE). The results of the randomisation tests are shown in Tables B17, B18 and B19 for the three models, respectively. Unfortunately, the result of the test on the Own-disability Interaction Model is inconclusive as the results which were statistically significant previously are no longer significant when the weights are excluded. However, the standard errors and p-values are still reduced under the randomisation test. For the other two models, the robustness tests increase the significance levels on all three coefficients (own disability, spousal disability and both disabled), suggesting that these are robust estimates.

Table B1. Wellbeing distributions by spousal disability status.

(i) Spouse is Not Disabled

	Observations	Percent	Individuals	Percent
Completely Dissatisfied	1,060	1.53	787	6.34
Mostly Dissatisfied	3,173	4.59	2,284	18.41
Somewhat Dissatisfied	4,351	6.29	2,704	21.79
Neither	5,346	7.73	3,236	26.08
Somewhat Satisfied	12,284	17.76	6,384	51.45
Mostly Satisfied	35,784	51.74	10,388	83.73
Completely Satisfied	7,167	10.36	3,478	28.03
Total	**69,165**	**100**	**29,261**	**235.84**

(ii) Spouse is Disabled

	Observations	Percent	Individuals	Percent
Completely Dissatisfied	205	1.69	151	8.30
Mostly Dissatisfied	643	5.30	447	24.56
Somewhat Dissatisfied	1,061	8.74	578	31.76
Neither	1,273	10.48	697	38.30
Somewhat Satisfied	2,344	19.30	1,121	61.59

Mostly Satisfied	5,695	46.90	1,493	82.03
Completely Satisfied	921	7.59	431	23.68
Total	**12,142**	**100**	**4,918**	**270.22**

Table B2. RE estimations with controls.

	(i) Disability Dummy	**(ii) Severity Dummies**	**(iii) Chronicity Dummies**	**(iv) Leads & Lags**
Disabled Spouse	-0.121***			
	(0.024)			
Non-Sev. Dis. Spouse		-0.055**		
		(0.028)		
Sev. Dis. Spouse		-0.248***		
		(0.040)		
Non-Chronic Dis. Spouse			-0.146***	
			(0.027)	
Chronic Dis. Spouse			-0.327***	
			(0.047)	
5 Periods Before Onset	*Reference*			
4 Periods Before Onset				-0.134*
				(0.070)
3 Periods Before Onset				-0.043
				(0.051)
2 Periods Before Onset				-0.125***
				(0.044)
1 Period Before Onset				-0.167***
				(0.036)
Onset Period				-0.162***
				(0.036)
1 Period After				-0.190***
				(0.037)
2 Periods After				-0.185***
				(0.037)
3 Periods After				-0.193***
				(0.036)
4 Periods After				-0.207***
				(0.040)
5 Periods After				-0.240***
				(0.046)
6 Periods After				-0.339***
				(0.058)
7 Periods After				-0.289***
				(0.079)
Age	-0.062***	-0.062***	-0.061***	-0.061
	0.005	0.005	0.005	0.005

Age-Squared	0.001***	0.001***	0.001***	0.001
	0.000	0.000	0.000	0.000
Cohabiting	*Reference*			
Married	0.110***	0.110***	0.109***	0.109***
	0.017	0.017	0.017	0.017
No. of Children	0.015**	0.015**	0.017**	0.014**
	0.007	0.007	0.007	0.007
No Qualifications	*Reference*			
GCSE	0.057**	0.057**	0.060***	0.061***
	0.023	0.023	0.023	0.023
Higher/AS Level	0.130**	0.129**	0.131**	0.135**
	0.06	0.06	0.06	0.06
A-Level/Bacc.	0.081**	0.081**	0.082**	0.083**
	0.035	0.035	0.035	0.035
Other Higher	0.152***	0.152***	0.151***	0.151***
	0.027	0.027	0.027	0.027
Degree	0.274***	0.274***	0.270***	0.272***
	0.023	0.023	0.023	0.023
Postgraduate	0.253***	0.252***	0.250***	0.253***
	0.025	0.025	0.025	0.025
Northeast	0.058	0.058	0.068	0.068
	0.051	0.051	0.051	0.051
Northwest	0.151***	0.152***	0.157***	0.155***
	0.035	0.035	0.034	0.034
Yorks/Humber	0.129***	0.128***	0.133***	0.133***
	0.037	0.037	0.037	0.037
East Midlands	0.109***	0.110***	0.119***	0.117***
	0.037	0.037	0.037	0.037
West Midlands	0.043	0.043	0.047	0.046
	0.038	0.038	0.038	0.038
East	0.156***	0.156***	0.159***	0.159***
	0.035	0.035	0.035	0.035
South East	0.166***	0.165***	0.168***	0.168***
	0.032	0.032	0.031	0.031
South West	0.164***	0.164***	0.171***	0.170***
	0.035	0.035	0.035	0.035
Wales	0.122***	0.122***	0.125***	0.127***
	0.041	0.041	0.041	0.041
Scotland	0.177***	0.177***	0.184***	0.182***
	0.037	0.037	0.037	0.037
N. Ireland	0.201***	0.201***	0.205***	0.204***
	0.042	0.042	0.042	0.042
Rural	0.066***	0.066***	0.067***	0.067***
	0.018	0.018	0.018	0.018
2009	*Reference*			
2010	0.027	0.027	0.029*	0.022
	0.017	0.017	0.017	0.017
2011	-0.079***	-0.080***	-0.080***	-0.087***
	0.018	0.018	0.018	0.019
2012	-0.127***	-0.127***	-0.130***	-0.133***

	0.019	0.019	0.019	0.019
2013	-0.179***	-0.179***	-0.182***	-0.183***
	0.019	0.019	0.019	0.019
2014	-0.050***	-0.050***	-0.053***	-0.053***
	0.019	0.019	0.019	0.019
2015	0.009	0.009	0.007	0.009
	0.018	0.018	0.018	0.018
2016	-0.014	-0.014	-0.017	-0.011
	0.018	0.018	0.018	0.018
2017	-0.151***	-0.152***	-0.154***	-0.142***
	0.023	0.023	0.023	0.023
2018	-0.150***	-0.150***	-0.154***	-0.144***
	0.025	0.025	0.025	0.025
Constant	6.293***	6.297***	6.279***	6.289***
	0.113	0.113	0.113	0.113
Observations:	81,307	81,307	81,307	81,307
R-Squared (Within):	0.0058	0.006	0.0058	0.0059
R-Squared (Between):	0.0296	0.0304	0.0324	0.0321
R-Squared (Overall):	0.0176	0.0181	0.0193	0.0191

Sample probability weights not applied (not possible under RE estimation).
Standard errors (clustered on the individual) are reported in brackets.
P-Values: *10% **5% ***1%

Table B3. FE estimations with controls.

	(i) Disability Dummy	**(ii) Severity Dummies**	**(iii) Chronicity Dummies**	**(iv) Leads & Lags**
Disabled Spouse	-0.068			
	(0.047)			
Non-Sev. Dis. Spouse		-0.064		
		(0.058)		
Sev. Dis. Spouse		-0.076		
		(0.065)		
Non-Chronic Dis. Spouse			*Cannot estimate under FE*	
Chronic Dis. Spouse				
5 Periods Before Onset	*Reference*			
4 Periods Before Onset				0.119
				(0.172)
3 Periods Before Onset				0.030
				(0.202)
2 Periods Before Onset				-0.103
				(0.242)
1 Period Before Onset				-0.172
				(0.236)
Onset Period				-0.148

			(0.241)
1 Period After Onset			-0.122
			(0.245)
2 Periods After Onset			-0.079
			(0.229)
3 Periods After Onset			-0.251
			(0.249)
4 Periods After Onset			-0.085
			(0.240)
5 Periods After Onset			-0.272
			(0.246)
6 Periods After Onset			-0.235
			(0.255)
7 Periods After Onset			-0.267
			(0.267)
Age	-0.032	-0.032	-0.032
	(0.021)	(0.021)	(0.021)
Age-Squared	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Cohabiting	*Reference*		
Married	0.004	0.004	0.007
	(0.048)	(0.048)	(0.047)
No. of Children	0.018	0.018	0.018
	(0.013)	(0.013)	(0.013)
No Qualifications	*Reference*		
GCSE	-0.013	-0.014	-0.021
	(0.196)	(0.195)	(0.196)
Higher/AS Level	0.068	0.068	0.101
	(0.100)	(0.100)	(0.115)
A-Level/Bacc.	0.012	0.012	0.012
	(0.219)	(0.219)	(0.219)
Other Higher	-0.005	-0.005	-0.005
	(0.176)	(0.176)	(0.177)
Degree	0.039	0.039	0.035
	(0.180)	(0.180)	(0.179)
Postgraduate	0.046	0.046	0.042
	(0.174)	(0.173)	(0.174)
Northeast	0.859**	0.859**	0.855***
	(0.383)	(0.383)	(0.383)
Northwest	0.327	0.327	0.327
	(0.261)	(0.261)	(0.260)
Yorks/Humber	0.682**	0.682**	0.693**
	(0.297)	(0.297)	(0.296)
East Midlands	0.182	0.182	0.168
	(0.243)	(0.243)	(0.242)
West Midlands	0.059	0.059	0.060
	(0.230)	(0.230)	(0.228)
East	0.523	0.523	0.519
	(0.346)	(0.346)	(0.346)
South East	0.472***	0.471***	0.471***

	(0.174)	(0.174)	(0.172)
South West	0.376	0.376	0.378
	(0.232)	(0.232)	(0.232)
Wales	0.381	0.381	0.393
	(0.262)	(0.262)	(0.262)
Scotland	0.120	0.119	0.115
	(0.325)	(0.325)	(0.324)
N. Ireland	1.714***	1.713***	1.697***
	(0.543)	(0.543)	(0.544)
Rural	0.010	0.010	0.010
	(0.063)	(0.063)	(0.063)
2009	*Reference*		
2010	-0.005	-0.005	-0.004
	(0.031)	(0.031)	(0.031)
2011	-0.064*	-0.064*	-0.063*
	(0.034)	(0.034)	(0.034)
2012	-0.124***	-0.124***	-0.124***
	(0.034)	(0.034)	(0.033)
2013	-0.169***	-0.169***	-0.169***
	(0.033)	(0.033)	(0.033)
2014	-0.086**	-0.086**	-0.087**
	(0.036)	(0.036)	(0.035)
2015	-0.031	-0.031	-0.033
	(0.034)	(0.034)	(0.034)
2016	0.005	0.005	0.006
	(0.035)	(0.035)	(0.035)
2017	-0.174***	-0.174***	-0.166***
	(0.053)	(0.053)	(0.053)
2018	-0.101**	-0.101**	-0.097**
	(0.048)	(0.048)	(0.048)
Constant	5.694***	5.694***	5.648***
	(0.583)	(0.583)	(0.585)
Observations:	81,307	81,307	81,307
R-Squared (Within):	0.0068	0.0068	0.0078
R-Squared (Between):	0.0020	0.0020	0.0033
R-Squared (Overall):	0.0016	0.0016	0.0024

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
P-Values: *10% **5% ***1%

Table B4. Robustness checks.

	(i) Same Spouse Restriction Relaxed	**(ii) Married Couples Only**	**(iii) Excluding Undefined Disabilities**
5 Periods Before Onset	*Reference*		
4 Periods Before Onset	0.120	0.215	0.106
	(0.171)	(0.235)	(0.208)

3 Periods Before Onset	0.033	0.192	0.041
	(0.201)	(0.274)	(0.246)
2 Periods Before Onset	-0.090	0.006	-0.253
	(0.241)	(0.287)	(0.307)
1 Period Before Onset	-0.169	0.011	-0.263
	(0.234)	(0.327)	(0.300)
Onset Period	-0.146	-0.015	-0.249
	(0.239)	(0.329)	(0.307)
1 Period After Onset	-0.112	0.001	-0.186
	(0.243)	(0.332)	(0.315)
2 Periods After Onset	-0.071	0.063	-0.172
	(0.227)	(0.299)	(0.286)
3 Periods After Onset	-0.230	-0.078	-0.338
	(0.246)	(0.333)	(0.319)
4 Periods After Onset	-0.083	0.041	-0.291
	(0.238)	(0.320)	(0.304)
5 Periods After Onset	-0.256	-0.157	-0.426
	(0.243)	(0.324)	(0.309)
6 Periods After Onset	-0.218	-0.120	-0.319
	(0.253)	(0.336)	(0.322)
7 Periods After Onset	-0.256	-0.121	-0.503
	(0.265)	(0.347)	(0.337)
Age	-0.032	-0.068***	-0.017
	(0.021)	(0.020)	(0.025)
Age-Squared	0.000	0.001***	0.000
	(0.000)	(0.000)	(0.000)
Cohabiting	*Reference*		
Married	0.000		-0.003
	(0.047)		(0.053)
No. of Children	0.019	0.029*	0.019
	(0.013)	(0.015)	(0.016)
No Qualifications	*Reference*		
GCSE	0.022	0.159	-0.203
	(0.193)	(0.259)	(0.235)
Higher/AS Level	0.061	0.629***	0.103
	(0.122)	(0.223)	(0.132)
A-Level/Bacc.	0.050	0.225	-0.095
	(0.214)	(0.252)	(0.269)
Other Higher	0.020	0.106	-0.128
	(0.174)	(0.233)	(0.221)
Degree	0.070	0.128	0.019
	(0.177)	(0.233)	(0.211)
Postgraduate	0.068	0.155	0.076
	(0.171)	(0.235)	(0.197)
London	*Reference*		
Northeast	0.767**	0.428	0.782**
	(0.373)	(0.421)	(0.378)
Northwest	0.327	0.093	0.315
	(0.255)	(0.206)	(0.263)
Yorks/Humber	0.678**	0.502**	0.656**
	(0.294)	(0.250)	(0.309)

East Midlands	0.135	0.110	0.200
	(0.240)	(0.242)	(0.258)
West Midlands	-0.002	0.056	0.091
	(0.225)	(0.194)	(0.248)
East	0.487	0.129	0.581
	(0.344)	(0.143)	(0.367)
South East	0.435***	0.416**	0.525***
	(0.168)	(0.167)	(0.173)
South West	0.374	0.394**	0.369
	(0.229)	(0.194)	(0.236)
Wales	0.299	0.297	0.378
	(0.259)	(0.224)	(0.289)
Scotland	0.064	0.049	0.083
	(0.321)	(0.309)	(0.344)
N. Ireland	1.703***	1.809***	1.660***
	(0.539)	(0.521)	(0.561)
Rural	0.011	0.030	0.005
	(0.061)	(0.069)	(0.069)
2009	*Reference*		
2010	-0.005	0.025	-0.002
	(0.030)	(0.034)	(0.034)
2011	-0.059*	-0.026	-0.037
	(0.034)	(0.039)	(0.039)
2012	-0.122***	-0.072*	-0.167***
	(0.033)	(0.037)	(0.038)
2013	-0.163***	-0.111***	-0.186***
	(0.032)	(0.036)	(0.037)
2014	-0.077**	-0.024	-0.103***
	(0.035)	(0.036)	(0.040)
2015	-0.016	0.013	-0.030
	(0.034)	(0.037)	(0.039)
2016	0.011	0.061*	0.030
	(0.035)	(0.034)	(0.039)
2017	-0.162***	-0.113**	-0.176***
	(0.052)	(0.055)	(0.061)
2018	-0.084*	-0.090*	-0.096*
	(0.047)	(0.050)	(0.055)
Constant	5.698***	6.430***	5.615***
	(0.581)	(0.549)	(0.668)
Observations:	82,421	64,815	61,165
R-Squared (Within):	0.0076	0.0076	0.0114
R-Squared (Between):	0.0029	0.0029	0.0032
R-Squared (Overall):	0.0023	0.0019	0.0035

Sample probability weights applied.

Standard errors (clustered on the individual) are reported in brackets.

P-Values: *10% **5% ***1%

Table B4 (continued). Robustness checks.

	(iv) Excluding Time FE	(v) Excluding Weights
5 Periods Before Onset	*Reference*	
4 Periods Before Onset	0.123	0.105
	(0.172)	(0.127)
3 Periods Before Onset	0.016	0.210*
	(0.204)	(0.126)
2 Periods Before Onset	-0.132	0.147
	(0.244)	(0.125)
1 Period Before Onset	-0.210	0.104
	(0.239)	(0.123)
Onset Period	-0.196	0.116
	(0.243)	(0.123)
1 Period After Onset	-0.186	0.088
	(0.247)	(0.124)
2 Periods After Onset	-0.130	0.101
	(0.230)	(0.125)
3 Periods After Onset	-0.285	0.094
	(0.252)	(0.125)
4 Periods After Onset	-0.083	0.087
	(0.242)	(0.128)
5 Periods After Onset	-0.270	0.058
	(0.248)	(0.130)
6 Periods After Onset	-0.255	-0.026
	(0.257)	(0.135)
7 Periods After Onset	-0.362	0.032
	(0.270)	(0.146)
Age	-0.038*	-0.066***
	(0.021)	(0.010)
Age-Squared	0.000*	0.001***
	(0.000)	(0.000)
Cohabiting	*Reference*	
Married	0.006	0.009
	(0.047)	(0.026)
No. of Children	0.044***	0.018***
	(0.011)	(0.008)
No Qualifications	*Reference*	
GCSE	-0.022	-0.016
	(0.196)	(0.098)
Higher/AS Level	0.150	0.169
	(0.120)	(0.189)
A-Level/Bacc.	-0.004	0.079
	(0.218)	(0.109)
Other Higher	-0.017	-0.039
	(0.176)	(0.083)
Degree	0.014	0.120
	(0.178)	(0.094)
Postgraduate	0.009	0.065
	(0.172)	(0.100)

London	*Reference*	
Northeast	0.873**	0.177
	(0.391)	(0.278)
Northwest	0.329	-0.113
	(0.267)	(0.128)
Yorks/Humber	0.693**	0.040
	(0.299)	(0.157)
East Midlands	0.166	-0.067
	(0.245)	(0.116)
West Midlands	0.045	-0.065
	(0.233)	(0.141)
East	0.541	-0.006
	(0.358)	(0.104)
South East	0.469***	0.128
	(0.174)	(0.088)
South West	0.394*	0.034
	(0.236)	(0.117)
Wales	0.376	0.082
	(0.267)	(0.195)
Scotland	0.115	0.116
	(0.331)	(0.194)
N. Ireland	1.693***	0.890***
	(0.545)	(0.339)
Rural	0.012	0.032
	(0.063)	(0.039)
2009	*Reference*	
2010		0.009
		(0.020)
2011		-0.094***
		(0.021)
2012		-0.131***
		(0.020)
2013		-0.176***
		(0.019)
2014		-0.042**
		(0.019)
2015		0.025
		(0.020)
2016		0.010
		(0.020)
2017		-0.115***
		(0.027)
2018		-0.116***
		(0.028)
Constant	5.731***	6.761***
	(0.558)	(0.263)
Observations:	81,307	81,307
R-Squared (Within):	0.0045	0.0068
R-Squared (Between):	0.0032	0.0025
R-Squared (Overall):	0.0018	0.0026

Sample probability weights applied.

Standard errors (clustered on the individual) are reported in brackets.
P-Values: *10% **5% ***1%

Table B4 (continued). Robustness checks.

	(vi) Severity Dummy	(vii) No. of Disabilities
Severe Disabled	-0.052	
	(0.041)	
No. of Disabilities		-0.036
		(0.023)
5 Periods Before Onset	*Reference*	
4 Periods Before Onset	0.118	0.117
	(0.172)	(0.172)
3 Periods Before Onset	0.030	0.030
	(0.202)	(0.202)
2 Periods Before Onset	-0.104	-0.105
	(0.242)	(0.242)
1 Period Before Onset	-0.175	-0.177
	(0.236)	(0.236)
Onset Period	-0.083	-0.097
	(0.245)	(0.244)
1 Period After Onset	-0.097	-0.099
	(0.245)	(0.246)
2 Periods After Onset	-0.057	-0.058
	(0.228)	(0.230)
3 Periods After Onset	-0.229	-0.228
	(0.248)	(0.249)
4 Periods After Onset	-0.063	-0.063
	(0.240)	(0.241)
5 Periods After Onset	-0.249	-0.247
	(0.246)	(0.247)
6 Periods After Onset	-0.211	-0.208
	(0.256)	(0.257)
7 Periods After Onset	-0.245	-0.241
	(0.267)	(0.267)
Age	-0.032	-0.031
	(0.021)	(0.021)
Age-Squared	0.000	0.000
	(0.000)	(0.000)
Cohabiting	*Reference*	
Married	0.006	0.006
	(0.047)	(0.047)
No. of Children	0.018	0.018
	(0.013)	(0.013)
No Qualifications	*Reference*	
GCSE	-0.017	-0.020
	(0.196)	(0.196)
Higher/AS Level	0.120	0.110

	(0.120)	(0.117)
A-Level/Bacc.	0.017	0.014
	(0.219)	(0.219)
Other Higher	-0.001	-0.003
	(0.176)	(0.176)
Degree	0.040	0.036
	(0.179)	(0.179)
Postgraduate	0.047	0.043
	(0.174)	(0.173)
London	*Reference*	
Northeast	0.860**	0.857**
	(0.385)	(0.384)
Northwest	0.323	0.321
	(0.261)	(0.260)
Yorks/Humber	0.686**	0.685**
	(0.297)	(0.297)
East Midlands	0.164	0.162
	(0.243)	(0.243)
West Midlands	0.054	0.053
	(0.230)	(0.230)
East	0.517	0.516
	(0.347)	(0.347)
South East	0.464***	0.464***
	(0.174)	(0.174)
South West	0.371	0.370
	(0.233)	(0.233)
Wales	0.392	0.390
	(0.263)	(0.262)
Scotland	0.111	0.110
	(0.325)	(0.325)
N. Ireland	1.690***	1.688
	(0.545)	(0.545)
Rural	0.010	0.010
	(0.063)	(0.063)
2009	*Reference*	
2010	-0.004	-0.004
	(0.031)	(0.031)
2011	-0.063*	-0.063*
	(0.034)	(0.034)
2012	-0.124***	-0.124***
	(0.033)	(0.033)
2013	-0.169***	-0.169***
	(0.033)	(0.033)
2014	-0.087**	-0.087**
	(0.035)	(0.035)
2015	-0.033	-0.033
	(0.034)	(0.034)
2016	0.006	0.006
	(0.035)	(0.035)
2017	-0.166***	-0.167***
	(0.053)	(0.053)

2018	-0.096**	-0.096**
	(0.048)	(0.048)
Constant	5.650***	5.647***
	(0.586)	(0.586)
Observations:	81,307	81,307
R-Squared (Within):	0.0079	0.0079
R-Squared (Between):	0.0034	0.0034
R-Squared (Overall):	0.0025	0.0025

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
P-Values: *10% **5% ***1%

Table B5. Main Model, controlling for own disability.

	(i) Own Disability Dummy	**(ii) Own Severity Dummies**	**(iii) Own and Spousal Dis. Interaction**
Spousal Disability			-0.104*
			(0.053)
Own Disability	-0.159***		-0.175***
	(0.034)		(0.035)
Own Non-Severe Disability		-0.084**	
		(0.035)	
Own Severe Disability		-0.316***	
		(0.054)	
Own Dis.*Spousal Dis.			0.187**
			(0.094)
5 Periods Before Onset	*Reference*		
4 Periods Before Onset	0.122	0.125	
	(0.172)	(0.172)	
3 Periods Before Onset	0.028	0.024	
	(0.202)	(0.201)	
2 Periods Before Onset	-0.101	-0.103	
	(0.243)	(0.242)	
1 Period Before Onset	-0.171	-0.172	
	(0.236)	(0.236)	
Onset Period	-0.142	-0.144	
	(0.241)	(0.241)	
1 Period After	-0.120	-0.124	
	(0.246)	(0.245)	
2 Periods After	-0.076	-0.077	
	(0.230)	(0.229)	
3 Periods After	-0.249	-0.249	
	(0.249)	(0.249)	
4 Periods After	-0.081	-0.081	
	(0.241)	(0.240)	
5 Periods After	-0.263	-0.263	
	(0.246)	(0.246)	
6 Periods After	-0.233	-0.239	
	(0.255)	(0.255)	

7 Periods After	-0.261	-0.261	
	(0.268)	(0.266)	
Age	-0.031	-0.031	
	(0.021)	(0.021)	
Age-Squared	0.000	0.000	
	(0.000)	(0.000)	
Cohabiting	*Reference*		
Married	0.008	0.008	0.004
	(0.047)	(0.047)	(0.048)
No. of Children	0.019	0.019	0.019
	(0.013)	(0.013)	(0.013)
No Qualifications	*Reference*		
GCSE	-0.024	-0.010	-0.003
	(0.200)	(0.202)	(0.200)
Higher/AS Level	0.097	0.101	0.092
	(0.118)	(0.117)	(0.107)
A-Level/Bacc.	0.022	0.032	0.035
	(0.226)	(0.232)	(0.227)
Other Higher	-0.010	0.001	-0.001
	(0.180)	(0.183)	(0.180)
Degree	0.028	0.040	0.043
	(0.184)	(0.188)	(0.184)
Postgraduate	0.027	0.041	0.041
	(0.178)	(0.181)	(0.178)
Northeast	0.874**	0.866**	0.875**
	(0.381)	(0.379)	(0.383)
Northwest	0.335	0.330	0.337
	(0.259)	(0.258)	(0.260)
Yorks/Humber	0.691**	0.687**	0.682**
	(0.295)	(0.294)	(0.296)
East Midlands	0.167	0.172	0.183
	(0.241)	(0.240)	(0.242)
West Midlands	0.065	0.062	0.064
	(0.226)	(0.226)	(0.228)
East	0.518	0.521	0.522
	(0.346)	(0.345)	(0.346)
South East	0.474***	0.478***	0.473***
	(0.168)	(0.165)	(0.171)
South West	0.376	0.378*	0.374
	(0.230)	(0.228)	(0.230)
Wales	0.415	0.403	0.401
	(0.259)	(0.258)	(0.260)
Scotland	0.126	0.120	0.131
	(0.323)	(0.322)	(0.324)
N. Ireland	1.690***	1.697***	1.708***
	(0.543)	(0.541)	(0.541)
Rural	0.009	0.009	0.008
	(0.063)	(0.063)	(0.063)
2009	*Reference*		
2010	-0.007	-0.006	-0.007
	(0.030)	(0.030)	(0.031)

2011	-0.067**	-0.066*	-0.068**
	(0.034)	(0.034)	(0.034)
2012	-0.129***	-0.129***	-0.128***
	(0.033)	(0.033)	(0.034)
2013	-0.174***	-0.174***	-0.174***
	(0.033)	(0.033)	(0.033)
2014	-0.091***	-0.090***	-0.091**
	(0.035)	(0.035)	(0.036)
2015	-0.037	-0.036	-0.034
	(0.034)	(0.034)	(0.034)
2016	0.005	0.005	0.004
	(0.035)	(0.035)	(0.035)
2017	-0.163***	-0.164***	-0.170***
	(0.053)	(0.053)	(0.052)
2018	-0.095**	-0.098**	-0.099**
	(0.048)	(0.048)	(0.048)
Constant	5.657***	5.654***	5.692***
	(0.585)	(0.585)	(0.583)
Observations:	81,307	81,307	81,307
R-Squared (Within):	0.0091	0.0102	0.0084
R-Squared (Between):	0.0083	0.0128	0.0062
R-Squared (Overall):	0.0055	0.0081	0.0043

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
P-Values: *10% **5% ***1%

Table B5 (continued). Main Model, controlling for own disability.

	(v) No Own Disability	**Own Disability**
4 Periods Before Onset	*Reference*	
3 Periods Before Onset	-0.121	0.034
	(0.158)	(0.168)
2 Periods Before Onset	-0.416*	0.083
	(0.255)	(0.158)
1 Period Before Onset	-0.422*	-0.056
	(0.242)	(0.151)
Onset Period	-0.433*	0.006
	(0.250)	(0.152)
1 Period After Onset	-0.365	-0.015
	(0.260)	(0.161)
2 Periods After Onset	-0.310	0.014
	(0.219)	(0.164)
3 Periods After Onset	-0.565**	-0.066
	(0.262)	(0.164)
4 Periods After Onset	-0.491**	0.193
	(0.247)	(0.163)
5 Periods After Onset	-0.579**	-0.095
	(0.253)	(0.184)

6 Periods After Onset	-0.544**	-0.056
	(0.277)	(0.197)
7 Periods After Onset	-0.701**	0.046
	(0.305)	(0.215)
Age	-0.029	
	(0.021)	
Age-Squared	0.000	
	(0.000)	
Cohabiting	*Reference*	
Married	0.007	
	(0.047)	
No. of Children	0.018	
	(0.013)	
No Qualifications	*Reference*	
GCSE	0.002	
	(0.198)	
Higher/AS Level	0.154	
	(0.142)	
A-Level/Bacc.	0.023	
	(0.220)	
Other Higher	0.000	
	(0.178)	
Degree	0.047	
	(0.181)	
Postgraduate	0.052	
	(0.176)	
Northeast	0.854**	
	(0.381)	
Northwest	0.315	
	(0.261)	
Yorks/Humber	0.671**	
	(0.300)	
East Midlands	0.144	
	(0.245)	
West Midlands	0.039	
	(0.231)	
East	0.506	
	(0.348)	
South East	0.443**	
	(0.179)	
South West	0.355	
	(0.236)	
Wales	0.367	
	(0.263)	
Scotland	0.086	
	(0.326)	
N. Ireland	1.679***	
	(0.542)	
Rural	0.012	
	(0.063)	
2009	*Reference*	

2010	-0.003
	(0.031)
2011	-0.062*
	(0.034)
2012	-0.123***
	(0.033)
2013	-0.169***
	(0.033)
2014	-0.086**
	(0.035)
2015	-0.032
	(0.034)
2016	0.006
	(0.035)
2017	-0.167***
	(0.053)
2018	-0.096**
	(0.048)
Constant	5.620***
	(0.590)
Observations:	81,307
R-Squared (Within):	0.0086
R-Squared (Between):	0.0017
R-Squared (Overall):	0.0014

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
P-Values: *10% **5% ***1%

Table B6. Heterogeneity Analysis.

	Spousal Disability Severity		Spousal Disability Chronicity	
	(i) Non-Severe	**(ii) Severe**	**(i) Non-Chronic**	**(ii) Chronic**
4 Periods Before Onset	*Reference*		*Reference*	
3 Periods Before Onset	-0.228*	0.359*	0.021	-0.376
	(0.131)	(0.208)	(0.128)	(0.287)
2 Periods Before Onset	-0.373*	0.242	-0.115	-0.465
	(0.213)	(0.160)	(0.134)	(0.596)
1 Period Before Onset	-0.441**	0.167	-0.243	-0.353
	(0.197)	(0.154)	(0.174)	(0.334)
Onset Period	-0.447**	0.242	-0.242	-0.262
	(0.204)	(0.152)	(0.179)	(0.342)
1 Period After Onset	-0.341	0.132	-0.196	-0.300
	(0.213)	(0.164)	(0.183)	(0.370)
2 Periods After Onset	-0.270	0.130	-0.090	-0.424
	(0.181)	(0.169)	(0.146)	(0.401)
3 Periods After Onset	-0.445**	-0.039	-0.294	-0.510
	(0.216)	(0.169)	(0.182)	(0.391)
4 Periods After Onset	-0.303	0.171	-0.019	-0.591

	(0.200)	(0.179)	(0.167)	(0.400)
5 Periods After Onset	-0.514**	0.024	-0.289	-0.566
	(0.208)	(0.195)	(0.182)	(0.397)
6 Periods After Onset	-0.432**	0.007	-0.283	-0.478
	(0.220)	(0.223)	(0.198)	(0.412)
7 Periods After Onset	-0.659***	0.223	-0.143	-0.766*
	(0.253)	(0.233)	(0.200)	(0.444)
Age	-0.031		-0.031	
	(0.021)		(0.021)	
Age-Squared	0.000		0.000	
	(0.000)		(0.000)	
Cohabiting	*Reference*		*Reference*	
Married	0.009		0.009	
	(0.047)		(0.047)	
No. of Children	0.018		0.018	
	(0.013)		(0.013)	
No Qualifications	*Reference*		*Reference*	
GCSE	-0.020		-0.012	
	(0.196)		(0.197)	
Higher/AS Level	0.122		0.107	
	(0.128)		(0.150)	
A-Level/Bacc.	0.017		0.023	
	(0.219)		(0.219)	
Other Higher	-0.005		0.001	
	(0.176)		(0.177)	
Degree	0.043		0.052	
	(0.180)		(0.179)	
Postgraduate	0.047		0.059	
	(0.174)		(0.174)	
London	*Reference*		*Reference*	
Northeast	0.862**		0.853**	
	(0.386)		(0.393)	
Northwest	0.318		0.313	
	(0.261)		(0.262)	
Yorks/Humber	0.683**		0.690**	
	(0.298)		(0.298)	
East Midlands	0.156		0.157	
	(0.244)		(0.244)	
West Midlands	0.051		0.054	
	(0.230)		(0.231)	
East	0.513		0.516	
	(0.348)		(0.347)	
South East	0.447**		0.458***	
	(0.176)		(0.176)	
South West	0.362		0.369	
	(0.234)		(0.234)	
Wales	0.391		0.394	
	(0.264)		(0.266)	
Scotland	0.120		0.107	

	(0.327)	(0.326)
N. Ireland	1.684***	1.690***
	(0.545)	(0.544)
Rural	0.008	0.008
	(0.062)	(0.063)
2009	*Reference*	*Reference*
2010	-0.002	-0.004
	(0.030)	(0.031)
2011	-0.060*	-0.063*
	(0.034)	(0.034)
2012	-0.123***	-0.124***
	(0.033)	(0.033)
2013	-0.167***	-0.167***
	(0.033)	(0.033)
2014	-0.084**	-0.085**
	(0.035)	(0.035)
2015	-0.031	-0.029
	(0.034)	(0.034)
2016	0.007	0.007
	(0.035)	(0.035)
2017	-0.164***	-0.166***
	(0.053)	(0.053)
2018	-0.097**	-0.095**
	(0.048)	(0.048)
Constant	5.653***	5.649***
	(0.588)	(0.587)
Observations:	81,307	81,307
R-Squared (Within):	0.0086	0.0087
R-Squared (Between):	0.0028	0.0044
R-Squared (Overall):	0.0021	0.0034

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
P-Values: *10% **5% ***1%

Table B6 (continued). Heterogeneity Analysis.

	Spousal Education Level		Household Income	
	(i) School Level	**(ii) Higher Education**	**(i) Low Income**	**(ii) High Income**
4 Periods Before Onset	*Reference*		*Reference*	
3 Periods Before Onset	-0.154	-0.031	-0.165	-0.009
	(0.148)	(0.178)	(0.147)	(0.174)
2 Periods Before Onset	-0.329	-0.149	-0.281	-0.202
	(0.247)	(0.190)	(0.242)	(0.189)
1 Period Before Onset	-0.312*	-0.272	-0.298*	-0.290
	(0.165)	(0.266)	(0.161)	(0.272)
Onset Period	-0.275*	-0.234	-0.240	-0.284

	(0.166)	(0.277)	(0.163)	(0.281)
1 Period After Onset	-0.287	-0.212	-0.224	-0.307
	(0.184)	(0.277)	(0.178)	(0.285)
2 Periods After Onset	-0.289	-0.073	-0.244	-0.118
	(0.191)	(0.212)	(0.188)	(0.209)
3 Periods After Onset	-0.362*	-0.371	-0.413**	-0.289
	(0.191)	(0.280)	(0.190)	(0.280)
4 Periods After Onset	-0.227	-0.183	-0.215	-0.197
	(0.190)	(0.256)	(0.188)	(0.253)
5 Periods After Onset	-0.439**	-0.341	-0.476**	-0.254
	(0.203)	(0.266)	(0.200)	(0.260)
6 Periods After Onset	-0.388*	-0.358	-0.424**	-0.265
	(0.212)	(0.299)	(0.214)	(0.282)
7 Periods After Onset	-0.356	-0.479	-0.419**	-0.354
	(0.224)	(0.351)	(0.213)	(0.421)
Age	-0.031		-0.030	
	(0.021)		(0.021)	
Age-Squared	0.000		0.000	
	(0.000)		(0.000)	
Cohabiting	*Reference*			
Married	0.008		0.006	
	(0.047)		(0.047)	
No. of Children	0.018		0.018	
	(0.013)		(0.013)	
No Qualifications	*Reference*			
GCSE	-0.019		-0.019	
	(0.198)		(0.197)	
Higher/AS Level	0.112		0.103	
	(0.120)		(0.117)	
A-Level/Bacc.	0.014		0.005	
	(0.220)		(0.220)	
Other Higher	-0.002		-0.008	
	(0.177)		(0.178)	
Degree	0.037		0.025	
	(0.180)		(0.182)	
Postgraduate	0.046		0.035	
	(0.175)		(0.175)	
London	*Reference*		*Reference*	
Northeast	0.860**		0.867**	
	(0.384)		(0.384)	
Northwest	0.323		0.321	
	(0.260)		(0.260)	
Yorks/Humber	0.691**		0.688**	
	(0.297)		(0.296)	
East Midlands	0.164		0.170	
	(0.242)		(0.242)	
West Midlands	0.056		0.059	
	(0.229)		(0.228)	
East	0.516		0.518	

	(0.347)	(0.346)
South East	0.467***	0.467***
	(0.173)	(0.171)
South West	0.373	0.371
	(0.232)	(0.231)
Wales	0.395	0.388
	(0.263)	(0.263)
Scotland	0.116	0.113
	(0.325)	(0.325)
N. Ireland	1.691***	1.693***
	(0.545)	(0.543)
Rural	0.011	0.010
	(0.063)	(0.063)
2009	*Reference*	*Reference*
2010	-0.003	-0.003
	(0.031)	(0.031)
2011	-0.062*	-0.062*
	(0.034)	(0.034)
2012	-0.123***	-0.123***
	(0.033)	(0.033)
2013	-0.169***	-0.168***
	(0.033)	(0.033)
2014	-0.087**	-0.086**
	(0.035)	(0.035)
2015	-0.034	-0.032
	(0.034)	(0.034)
2016	0.005	0.006
	(0.035)	(0.035)
2017	-0.167***	-0.166***
	(0.053)	(0.053)
2018	-0.098**	-0.098**
	(0.048)	(0.048)
Constant	5.642***	5.643***
	(0.586)	(0.587)
Observations:	81,307	81,307
R-Squared (Within):	0.008	0.0081
R-Squared (Between):	0.0043	0.0041
R-Squared (Overall):	0.0032	0.0030

Sample weights applied.
Standard errors (clustered on the individual) are reported in brackets.
P-Values: *10% **5% ***1%

Table B7. Own-disability Interaction Model with additional controls.

	(i) Own Income		**(ii) Spousal Income**		**(iii) Both Incomes**	
	No Own Dis.	Own Dis.	No Own Dis.	Own Dis.	No Own Dis.	Own Dis.

4 Periods Before Onset	*Reference*					
3 Periods Before Onset	0.013	0.069	-0.012	0.064	0.125	0.112
	(0.159)	(0.171)	(0.142)	(0.174)	(0.144)	(0.177)
2 Periods Before Onset	-0.264	0.053	-0.218	0.146	-0.061	0.117
	(0.256)	(0.156)	(0.166)	(0.159)	(0.143)	(0.157)
1 Period Before Onset	-0.269	-0.066	-0.333	-0.007	-0.185	-0.017
	(0.165)	(0.151)	(0.230)	(0.153)	(0.146)	(0.154)
Onset Period	-0.268	-0.012	-0.312	0.046	-0.151	0.027
	(0.174)	(0.153)	(0.238)	(0.153)	(0.153)	(0.154)
1 Period After Onset	-0.209	-0.004	-0.245	0.011	-0.094	0.017
	(0.184)	(0.161)	(0.241)	(0.163)	(0.152)	(0.163)
2 Periods After Onset	-0.154	-0.009	-0.218	0.063	-0.070	0.038
	(0.187)	(0.164)	(0.186)	(0.164)	(0.143)	(0.164)
3 Periods After Onset	-0.371**	-0.070	-0.418**	-0.042	-0.268*	-0.048
	(0.187)	(0.166)	(0.208)	(0.166)	(0.145)	(0.168)
4 Periods After Onset	-0.337*	0.119	-0.352	0.249	-0.208	0.171
	(0.194)	(0.164)	(0.222)	(0.165)	(0.161)	(0.166)
5 Periods After Onset	-0.445**	-0.129	-0.441*	-0.027	-0.317*	-0.060
	(0.199)	(0.188)	(0.229)	(0.186)	(0.166)	(0.189)
6 Periods After Onset	-0.397*	-0.074	-0.452*	0.077	-0.316	0.056
	(0.228)	(0.199)	(0.255)	(0.197)	(0.200)	(0.200)
7 Periods After Onset	-0.564**	0.009	-0.588**	0.152	-0.463*	0.119
	(0.262)	(0.219)	(0.295)	(0.218)	(0.250)	(0.223)
Age	-0.034		-0.044**		-0.051***	
	(0.022)		(0.018)		(0.018)	
Age-Squared	0.000		0.000**		0.001***	
	(0.000)		(0.000)		(0.000)	
Cohabiting	*Reference*					
Married	-0.011		0.027		0.012	
	(0.048)		(0.045)		(0.045)	
No. of Children	0.019		0.018		0.018	
	(0.013)		(0.014)		(0.013)	
No Qualifications	*Reference*					
GCSE	-0.060		-0.199		-0.275	
	(0.189)		(0.215)		(0.204)	
Higher/AS Level	0.097		-0.542**		-0.604**	
	(0.130)		(0.275)		(0.261)	
A-Level/Bacc.	-0.105		-0.146		-0.290	
	(0.198)		(0.240)		(0.214)	
Other Higher	-0.102		-0.154		-0.266	
	(0.162)		(0.196)		(0.180)	
Degree	-0.060		-0.116		-0.233	
	(0.163)		(0.198)		(0.178)	
Postgraduate	-0.029		-0.095		-0.183	
	(0.160)		(0.189)		(0.171)	
Northeast	0.863**		0.540*		0.517*	
	(0.356)		(0.321)		(0.270)	
Northwest	0.401		0.068		0.143	

	(0.282)	(0.197)	(0.202)
Yorks/Humber	0.755**	0.414	0.475*
	(0.318)	(0.252)	(0.260)
East Midlands	0.342	-0.107	0.063
	(0.245)	(0.176)	(0.155)
West Midlands	0.131	-0.142	-0.071
	(0.249)	(0.183)	(0.189)
East	0.625	0.028	0.096
	(0.401)	(0.109)	(0.108)
South East	0.459**	0.363***	0.368***
	(0.188)	(0.126)	(0.137)
South West	0.443*	0.162	0.216
	(0.250)	(0.178)	(0.182)
Wales	0.456	0.155	0.204
	(0.283)	(0.204)	(0.204)
Scotland	0.216	-0.172	-0.073
	(0.340)	(0.271)	(0.267)
N. Ireland	1.772***	1.486***	1.542***
	(0.535)	(0.536)	(0.526)
Rural	-0.016	0.032	0.008
	(0.063)	(0.062)	(0.061)
2009	*Reference*		
2010	-0.008	-0.005	-0.009
	(0.031)	(0.030)	(0.030)
2011	-0.064*	-0.054	-0.056*
	(0.034)	(0.033)	(0.033)
2012	-0.125***	-0.115***	-0.118***
	(0.034)	(0.034)	(0.034)
2013	-0.166***	-0.170***	-0.166***
	(0.033)	(0.033)	(0.034)
2014	-0.084**	-0.069**	-0.066*
	(0.036)	(0.034)	(0.034)
2015	-0.029	-0.025	-0.023
	(0.035)	(0.033)	(0.034)
2016	0.007	0.008	0.009
	(0.036)	(0.035)	(0.036)
2017	-0.159***	-0.143***	-0.142***
	(0.054)	(0.052)	(0.053)
2018	-0.065	-0.109**	-0.079*
	(0.048)	(0.048)	(0.047)
Log Income	0.023		0.023*
	(0.015)		(0.013)
Log Spousal Income		0.022*	0.022*
		(0.012)	(0.012)
Constant	5.550***	6.108***	6.117
	(0.671)	(0.470)	(0.472)
Observations:	81,307	81,307	81,307
R-Squared (Within):	0.0080	0.0085	0.008
R-Squared (Between):	0.0020	0.0012	0.0012

R-Squared (Overall):	0.0010	0.0010	0.0009

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
P-Values: *10% **5% ***1%

Table B7. (continued) Own-disability Interaction Model with additional controls.

	(iv) Employment Status		**(v) Spousal Employment Status**	
	No Own Dis.	Own Dis.	No Own Dis.	Own Dis.
4 Periods Before Onset	*Reference*			
3 Periods Before Onset	0.038	-0.172	-0.116	0.035
	(0.169)	(0.174)	(0.157)	(0.169)
2 Periods Before Onset	0.063	-0.472*	-0.417*	0.080
	(0.160)	(0.272)	(0.251)	(0.157)
1 Period Before Onset	-0.053	-0.464*	-0.418*	-0.058
	(0.153)	(0.260)	(0.240)	(0.151)
Onset Period	-0.004	-0.479*	-0.430*	0.006
	(0.154)	(0.268)	(0.248)	(0.152)
1 Period After Onset	-0.015	-0.416	-0.360	-0.012
	(0.163)	(0.278)	(0.257)	(0.162)
2 Periods After Onset	0.007	-0.355	-0.305	0.018
	(0.166)	(0.235)	(0.217)	(0.164)
3 Periods After Onset	-0.070	-0.604**	-0.561**	-0.065
	(0.165)	(0.281)	(0.260)	(0.164)
4 Periods After Onset	0.188	-0.536**	-0.486**	0.198
	(0.164)	(0.265)	(0.246)	(0.163)
5 Periods After Onset	-0.097	-0.619**	-0.575**	-0.094
	(0.186)	(0.271)	(0.252)	(0.184)
6 Periods After Onset	-0.054	-0.594**	-0.532*	-0.051
	(0.198)	(0.293)	(0.276)	(0.197)
7 Periods After Onset	0.047	-0.747**	-0.698**	0.052
	(0.215)	(0.320)	(0.304)	(0.214)
Age	-0.026	-0.027		
	(0.021)	(0.022)		
Age-Squared	0.000	0.000		
	(0.000)	(0.000)		
Cohabiting	*Reference*			
Married	0.001	0.004		
	(0.047)	(0.047)		
No. of Children	0.018	0.018		
	(0.013)	(0.013)		
No Qualifications	*Reference*			
GCSE	0.020	-0.005		
	(0.195)	(0.199)		
Higher/AS Level	0.242	0.146		
	(0.169)	(0.136)		

A-Level/Bacc.	0.050	0.015
	(0.212)	(0.220)
Other Higher	0.018	-0.005
	(0.173)	(0.179)
Degree	0.061	0.038
	(0.177)	(0.182)
Postgraduate	0.059	0.046
	(0.176)	(0.176)
Northeast	0.853**	0.838**
	(0.374)	(0.379)
Northwest	0.306	0.315
	(0.259)	(0.263)
Yorks/Humber	0.666**	0.665**
	(0.302)	(0.302)
East Midlands	0.128	0.147
	(0.242)	(0.246)
West Midlands	0.019	0.032
	(0.231)	(0.234)
East	0.499	0.514
	(0.333)	(0.353)
South East	0.431**	0.443**
	(0.177)	(0.179)
South West	0.329	0.358
	(0.232)	(0.237)
Wales	0.300	0.354
	(0.258)	(0.266)
Scotland	0.063	0.085
	(0.321)	(0.327)
N. Ireland	1.659***	1.681***
	(0.541)	(0.543)
Rural	0.006	0.010
	(0.063)	(0.063)
2009	*Reference*	
2010	-0.006	-0.005
	(0.031)	(0.031)
2011	-0.066*	-0.064*
	(0.034)	(0.034)
2012	-0.128***	-0.126***
	(0.033)	(0.033)
2013	-0.174***	-0.172***
	(0.033)	(0.033)
2014	-0.093***	-0.089**
	(0.035)	(0.035)
2015	-0.037	-0.034
	(0.034)	(0.034)
2016	0.001	0.004
	(0.035)	(0.035)
2017	-0.173***	-0.168***
	(0.052)	(0.053)

2018	-0.095**	-0.095**
	(0.047)	(0.048)
Employed	*Reference*	
Unemployed	-0.368***	-0.098
	(0.079)	(0.068)
Not Working	-0.476***	-0.133
	(0.105)	(0.130)
Family Work/Carer	-0.013	0.015
	(0.073)	(0.057)
Student	-0.157	0.049
	(0.167)	(0.178)
Retired	0.186***	0.087
	(0.061)	(0.059)
Constant	5.645***	5.595***
	(0.569)	(0.604)
Observations:	81,307	81,307
R-Squared (Within):	0.0133	0.0090
R-Squared (Between):	0.0096	0.0024
R-Squared (Overall):	0.0063	0.0018

Probability sample weights applied.
Standard errors (clustered on the individual) are reported in brackets.
P-Values: *10% **5% ***1%

Table B7 (continued). Own-disability Interaction Model with additional controls.

	(vi) Own Labour Hours		**(vii) Spousal Labour Hours**	
	No Own Dis.	Own Dis.	No Own Dis.	Own Dis.
4 Periods Before Onset	*Reference*			
3 Periods Before Onset	-0.123	0.033	-0.120	0.033
	(0.161)	(0.168)	(0.159)	0.168
2 Periods Before Onset	-0.419	0.081	-0.416	0.081
	(0.258)	(0.158)	(0.256)	0.158
1 Period Before Onset	-0.426*	-0.053	-0.423*	-0.058
	(0.245)	(0.151)	(0.242)	0.151
Onset Period	-0.436*	0.006	-0.433*	0.005
	(0.254)	(0.152)	(0.250)	0.152
1 Period After Onset	-0.369	-0.016	-0.365	-0.017
	(0.263)	(0.161)	(0.260)	0.161
2 Periods After Onset	-0.315	0.015	-0.310	0.013
	(0.222)	(0.164)	(0.219)	0.164
3 Periods After Onset	-0.570**	-0.065	-0.566**	-0.067
	(0.264)	(0.164)	(0.262)	0.164
4 Periods After Onset	-0.494**	0.195	-0.492**	0.193
	(0.251)	(0.163)	(0.248)	0.163
5 Periods After Onset	-0.581**	-0.092	-0.580**	-0.095
	(0.257)	(0.184)	(0.254)	0.184

6 Periods After Onset	-0.549**	-0.056	-0.544**	-0.057
	(0.280)	(0.197)	(0.277)	0.197
7 Periods After Onset	-0.706**	0.047	-0.702**	0.045
	(0.308)	(0.215)	(0.305)	0.214
Age	-0.031		-0.029	
	(0.021)		(0.021)	
Age-Squared	0.000		0.000	
	(0.000)		(0.000)	
Cohabiting	*Reference*			
Married	0.009		0.007	
	(0.047)		(0.047)	
No. of Children	0.019		0.018	
	(0.013)		(0.013)	
No Qualifications	*Reference*			
GCSE	-0.003		0.001	
	(0.198)		(0.198)	
Higher/AS Level	0.153		0.154	
	(0.145)		(0.142)	
A-Level/Bacc.	0.027		0.020	
	(0.219)		(0.220)	
Other Higher	-0.007		-0.001	
	(0.177)		(0.178)	
Degree	0.041		0.046	
	(0.181)		(0.181)	
Postgraduate	0.042		0.051	
	(0.176)		(0.177)	
Northeast	0.876**		0.848**	
	(0.380)		(0.380)	
Northwest	0.319		0.313	
	(0.262)		(0.261)	
Yorks/Humber	0.677**		0.670**	
	(0.302)		(0.300)	
East Midlands	0.143		0.145	
	(0.246)		(0.245)	
West Midlands	0.045		0.039	
	(0.233)		(0.231)	
East	0.506		0.506	
	(0.348)		(0.347)	
South East	0.443**		0.442**	
	(0.181)		(0.178)	
South West	0.354		0.359	
	(0.238)		(0.235)	
Wales	0.369		0.368	
	(0.263)		(0.263)	
Scotland	0.084		0.086	
	(0.325)		(0.325)	
N. Ireland	1.686***		1.683***	
	(0.549)		(0.547)	
Rural	0.011		0.012	
	(0.063)		(0.063)	
2009	*Reference*			

2010	-0.002	-0.004
	(0.031)	(0.031)
2011	-0.060*	-0.062*
	(0.034)	(0.034)
2012	-0.122***	-0.124***
	(0.033)	(0.033)
2013	-0.168***	-0.169***
	(0.033)	(0.033)
2014	-0.084**	-0.086***
	(0.035)	(0.035)
2015	-0.031	-0.032
	(0.034)	(0.034)
2016	0.007	0.006
	(0.035)	(0.035)
2017	-0.167***	-0.167***
	(0.053)	(0.053)
2018	-0.096**	-0.096**
	(0.048)	(0.048)
Labour Hours	0.004*	
	(0.002)	
Labour Hours Squared	0.000	
	(0.000)	
Spousal Labour Hours		-0.002
		(0.002)
Spousal Labour Hours Squared		0.000
		(0.000)
Constant	5.596***	5.628***
	(0.589)	(0.591)
Observations:	81,307	81,307
R-Squared (Within):	0.0088	0.0086
R-Squared (Between):	0.0022	0.0017
R-Squared (Overall):	0.0016	0.0014

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
P-Values: *10% **5% ***1%

Table B7 (continued). Own-disability Interaction Model with additional controls.

	(viii) Weekly Caregiving Hours		**(ix) Caring Prevents Employment**	
	No Own Dis.	Own Dis.	No Own Dis.	Own Dis.
4 Periods Before Onset	*Reference*			
3 Periods Before Onset	-0.117	0.034	-0.118	0.035
	(0.160)	(0.168)	(0.161)	(0.168)
2 Periods Before Onset	-0.408	0.082	-0.410	0.083
	(0.257)	(0.158)	(0.258)	(0.158)
1 Period Before Onset	-0.415*	-0.058	-0.417*	-0.057
	(0.244)	(0.151)	(0.244)	(0.151)

Onset Period	-0.427*	0.006	-0.428*	0.008
	(0.252)	(0.152)	(0.252)	(0.153)
1 Period After Onset	-0.360	-0.014	-0.362	-0.013
	(0.261)	(0.162)	(0.261)	(0.162)
2 Periods After Onset	-0.305	0.015	-0.307	0.016
	(0.220)	(0.164)	(0.220)	(0.164)
3 Periods After Onset	-0.560**	-0.066	-0.562*	-0.063
	(0.263)	(0.165)	(0.263)	(0.165)
4 Periods After Onset	-0.484*	0.195	-0.485*	0.197
	(0.249)	(0.164)	(0.249)	(0.164)
5 Periods After Onset	-0.570**	-0.105	-0.571**	-0.104
	(0.256)	(0.185)	(0.256)	(0.186)
6 Periods After Onset	-0.534*	-0.055	-0.535*	-0.053
	(0.279)	(0.198)	(0.279)	(0.198)
7 Periods After Onset	-0.688**	0.048	-0.691**	0.051
	(0.309)	(0.215)	(0.307)	(0.215)
Age	-0.029		-0.029	
	(0.021)		(0.021)	
Age-Squared	0.000		0.000	
	(0.000)		(0.000)	
Cohabiting	*Reference*			
Married	0.004		0.004	
	(0.047)		(0.047)	
No. of Children	0.018		0.018	
	(0.013)		(0.013)	
No Qualifications	*Reference*			
GCSE	-0.004		-0.005	
	(0.199)		(0.199)	
Higher/AS Level	0.144		0.147	
	(0.149)		(0.147)	
A-Level/Bacc.	0.021		0.021	
	(0.220)		(0.220)	
Other Higher	-0.002		-0.003	
	(0.178)		(0.178)	
Degree	0.046		0.046	
	(0.181)		(0.181)	
Postgraduate	0.053		0.053	
	(0.177)		(0.177)	
Northeast	0.853**		0.854**	
	(0.381)		(0.381)	
Northwest	0.313		0.313	
	(0.262)		(0.261)	
Yorks/Humber	0.669**		0.670**	
	(0.300)		(0.300)	
East Midlands	0.133		0.134	
	(0.242)		(0.242)	
West Midlands	0.036		0.037	
	(0.231)		(0.231)	
East	0.506		0.506	

	(0.348)	(0.348)
South East	0.451**	0.451**
	(0.179)	(0.179)
South West	0.358	0.359
	(0.236)	(0.236)
Wales	0.365	0.366
	(0.263)	(0.263)
Scotland	0.083	0.084
	(0.326)	(0.326)
N. Ireland	1.683***	1.689***
	(0.544)	(0.543)
Rural	0.011	0.010
	(0.063)	0.063
2009	*Reference*	
2010	-0.004	-0.004
	(0.031)	(0.031)
2011	-0.062**	-0.063*
	(0.034)	(0.034)
2012	-0.122***	-0.123***
	(0.033)	(0.033)
2013	-0.169***	-0.170***
	(0.033)	(0.033)
2014	-0.086**	-0.087**
	(0.035)	(0.035)
2015	-0.032	-0.032
	(0.034)	(0.034)
2016	0.006	0.006
	(0.035)	(0.035)
2017	-0.170***	-0.170***
	(0.053)	(0.053)
2018	-0.103**	-0.103**
	(0.048)	(0.048)
No Labour Hours	*Reference*	
Up to 20 Hours	-0.013	
	(0.030)	
Over 20 Hours	-0.031	
	(0.117)	
Continuous Care	-0.055	
	(0.136)	
Caring Prevents Employment		-0.067
		(0.158)
Constant	5.618***	5.611***
	(0.590)	(0.590)
Observations:	81,307	81,307
R-Squared (Within):	0.0086	0.0086
R-Squared (Between):	0.0018	0.0018
R-Squared (Overall):	0.0015	0.0014

Sample probability weights applied.

Standard errors (clustered on the individual) are reported in brackets.

P-Values: *10% **5% ***1%

Table B8. Own-disability Interaction Model, controlling for changes in spousal health.

	(i) No Own Disability	(ii) Own Disability
4 Periods Before Onset	*Reference*	
3 Periods Before Onset	-0.258	0.014
	(0.205)	(0.246)
2 Periods Before Onset	-0.897**	-0.001
	(0.362)	(0.249)
1 Period Before Onset	-0.836**	-0.097
	(0.334)	(0.232)
Onset Period	-0.811**	0.042
	(0.345)	(0.230)
1 Period After Onset	-0.771**	-0.032
	(0.354)	(0.235)
2 Periods After Onset	-0.707**	-0.036
	(0.314)	(0.244)
3 Periods After Onset	-0.969***	-0.095
	(0.356)	(0.237)
4 Periods After Onset	-0.888***	0.171
	(0.343)	(0.245)
5 Periods After Onset	-1.002***	-0.063
	(0.350)	(0.258)
6 Periods After Onset	-0.996***	-0.079
	(0.369)	(0.277)
7 Periods After Onset	-1.172***	0.073
	(0.396)	(0.290)
Age	0.007	
	(0.048)	
Age-Squared	0.000	
	(0.000)	
Cohabiting	*Reference*	
Married	0.006	
	(0.056)	
No. of Children	0.037	
	(0.036)	
No Qualifications	*Reference*	
GCSE	0.238	
	(0.254)	
Higher/AS Level	0.316	
	(0.251)	
A-Level/Bacc.	0.338	
	(0.277)	
Other Higher	0.243	
	(0.234)	
Degree	0.296	
	(0.241)	

Postgraduate	0.288
	(0.237)
Northeast	0.276
	(0.354)
Northwest	-0.109
	(0.247)
Yorks/Humber	0.466
	(0.296)
East Midlands	0.039
	(0.257)
West Midlands	0.047
	(0.238)
East	0.229
	(0.226)
South East	0.291
	(0.191)
South West	0.219
	(0.247)
Wales	0.376
	(0.273)
Scotland	-0.358
	(0.317)
N. Ireland	1.601***
	(0.605)
Rural	0.047
	(0.072)
2009	*Reference*
2010	0.354
	(0.294)
2011	0.255
	(0.253)
2012	0.125
	(0.211)
2013	0.040
	(0.169)
2014	0.069
	(0.127)
2015	0.076
	(0.089)
2016	0.064
	(0.055)
2017	-0.135**
	(0.055)
2018	-0.142**
	(0.064)
Change in Spousal Physical Health	0.001
	(0.001)
Change in Spousal Mental Health	0.004***
	(0.001)
Constant	3.630*
	(2.021)

Observations:	81,307
R-Squared (Within):	0.0095
R-Squared (Between):	0.0016
R-Squared (Overall):	0.0005

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
P-Values: *10% **5% ***1%

Table B9. Main Model, with own physical and mental health as outcome variables.

	(i) Own Physical Health	**(ii) Own Mental Health**
4 Periods Before Onset	*Reference*	
3 Periods Before Onset	0.090	-0.442
	(0.797)	(0.605)
2 Periods Before Onset	-1.558*	-0.575
	(0.874)	(0.700)
1 Period Before Onset	-1.275*	-1.129*
	(0.703)	(0.659)
Onset Period	-1.568**	-1.172*
	(0.776)	(0.679)
1 Period After Onset	-1.641**	-0.568
	(0.792)	(0.698)
2 Periods After Onset	-1.410**	-0.621
	(0.719)	(0.692)
3 Periods After Onset	-1.251	-1.485**
	(0.774)	(0.726)
4 Periods After Onset	-2.043*	-1.104
	(0.800)	(0.815)
5 Periods After Onset	-1.131	-1.803**
	(0.844)	(0.818)
6 Periods After Onset	-0.977	-1.869*
	(0.932)	(1.076)
7 Periods After Onset	-0.97	-1.364
	(1.163)	(1.191)
Age	0.366***	-0.929***
	(0.097)	(0.121)
Age-Squared	-0.005***	0.008***
	(0.001)	(0.001)
Cohabiting	*Reference*	
Married	-0.519**	0.869**
	(0.262)	(0.341)
No. of Children	0.133	0.171**
	(0.083)	(0.081)
No Qualifications	*Reference*	
GCSE	-1.895	-1.625
	(1.597)	(1.621)

Higher/AS Level	-2.839**	-5.714**
	(1.235)	(2.397)
A-Level/Bacc.	-3.063*	0.287
	(1.731)	(1.735)
Other Higher	-2.212	-1.215
	(1.469)	(1.464)
Degree	-1.416	-1.613
	(1.398)	(1.562)
Postgraduate	-1.617	-0.528
	(1.316)	(1.456)
Northeast	-4.233	-0.819
	(2.690)	(1.680)
Northwest	-4.023**	0.737
	(1.897)	(1.437)
Yorks/Humber	-2.961	2.076
	(1.875)	(1.757)
East Midlands	-3.675*	0.393
	(2.078)	(1.502)
West Midlands	-2.064	-0.813
	(1.868)	(1.495)
East	-4.227	-0.091
	(2.834)	(0.654)
South East	-3.873**	0.088
	(1.563)	(1.427)
South West	-3.614**	0.057
	(1.680)	(1.511)
Wales	-5.371**	2.422
	(2.385)	(1.491)
Scotland	-3.992*	-1.634
	(2.197)	(1.708)
N. Ireland	1.483	-4.638
	(3.489)	(5.407)
Rural	-0.125	0.183
	(0.412)	(0.478)
Year		
2009	*Reference*	
2010	0.594***	-0.078
	(0.176)	(0.206)
2011	0.607***	-0.612***
	(0.202)	(0.216)
2012	0.417**	-0.675***
	(0.186)	(0.215)
2013	0.432**	-0.761***
	(0.173)	(0.214)
2014	0.248	-0.014
	(0.173)	(0.205)
2015	0.250	0.024
	(0.179)	(0.223)
2016	-0.165	-0.025
	(0.191)	(0.251)
2017	-0.706**	0.025

	(0.298)	(0.365)
2018	-0.135	-0.353
	(0.228)	(0.342)
Constant	51.132***	74.425***
	(3.040)	(3.327)
Observations:	81,307	81,307
R-Squared (Within):	0.0125	0.0167
R-Squared (Between):	0.0005	0.0135
R-Squared (Overall):	0.0011	0.0032

Sample weights applied.
Standard errors (clustered on the individual) are reported in brackets.
P-Values: *10% **5% ***1%

Table B10. Main model, with facets of own life satisfaction as outcome variables.

	(i) Spouse's Health Satisfaction	**(ii) Spouse's Income Satisfaction**	**(iii) Spouse's Satisfaction with Amount of Leisure Time**
4 Periods Before Onset	*Reference*		
3 Periods Before Onset	0.008	0.097	0.240**
	(0.111)	(0.124)	(0.113)
2 Periods Before Onset	0.072	0.077	0.212*
	(0.111)	(0.115)	(0.119)
1 Period Before Onset	-0.151	0.134	0.185
	(0.109)	(0.114)	(0.118)
Onset Period	-0.557***	0.067	0.024
	(0.113)	(0.120)	(0.121)
1 Period After Onset	-0.355***	0.138	0.133
	(0.119)	(0.124)	(0.123)
2 Periods After Onset	-0.358***	0.048	0.140
	(0.110)	(0.123)	(0.122)
3 Periods After Onset	-0.359***	-0.040	0.047
	(0.116)	(0.126)	(0.126)
4 Periods After Onset	-0.378***	0.058	-0.091
	(0.127)	(0.128)	(0.134)
5 Periods After Onset	-0.374***	0.105	-0.008
	(0.134)	(0.139)	(0.143)
6 Periods After Onset	-0.383**	0.116	0.025
	(0.150)	(0.154)	(0.157)
7 Periods After Onset	-0.487***	0.095	-0.104
	(0.182)	(0.194)	(0.204)
Age	-0.038*	0.050**	-0.045*
	(0.021)	(0.023)	(0.026)
Age-Squared	0.000*	0.000	0.001***
	(0.000)	(0.000)	(0.000)
Cohabiting	*Reference*		
Married	0.062	0.051	0.004
	(0.060)	(0.062)	(0.062)
No. of Children	0.030**	-0.001	0.000
	(0.015)	(0.014)	(0.014)

No Qualifications	*Reference*		
GCSE	-0.502**	-0.678**	-0.644**
	(0.228)	(0.290)	(0.316)
Higher/AS Level	-1.305***	-1.189**	-1.674***
	(0.346)	(0.509)	(0.479)
A-Level/Bacc.	-0.281	-0.754***	-0.596*
	(0.239)	(0.283)	(0.332)
Other Higher	-0.406**	-0.513**	-0.323
	(0.204)	(0.247)	(0.305)
Degree	-0.448**	-0.483**	-0.368
	(0.216)	(0.262)	(0.313)
Postgraduate	-0.583**	-0.332	-0.199
	(0.229)	(0.284)	(0.325)
Northeast	0.240	0.435	1.003
	(0.313)	(0.304)	(0.650)
Northwest	-0.106	-0.049	0.173
	(0.261)	(0.296)	(0.394)
Yorks/Humber	0.323	0.717*	0.544
	(0.341)	(0.374)	(0.426)
East Midlands	0.018	0.074	0.014
	(0.242)	(0.255)	(0.386)
West Midlands	-0.044	0.040	-0.089
	(0.205)	(0.267)	(0.382)
East	0.218	-0.032	0.334
	(0.192)	(0.313)	(0.567)
South East	0.209	0.214	-0.311
	(0.179)	(0.189)	(0.313)
South West	-0.025	0.087	0.179
	(0.255)	(0.297)	(0.361)
Wales	-0.346	-0.033	-0.162
	(0.261)	(0.277)	(0.464)
Scotland	0.393	0.201	-0.096
	(0.308)	(0.371)	(0.440)
N. Ireland	1.087*	1.500*	1.668***
	(0.623)	(0.906)	(0.548)
Rural	0.015	0.047	0.044
	(0.073)	(0.073)	(0.086)
2009	*Reference*		
2010	0.040	-0.074**	-0.032
	(0.035)	(0.035)	(0.036)
2011	-0.167***	-0.235***	-0.076*
	(0.043)	(0.039)	(0.041)
2012	-0.450***	-0.385***	-0.200***
	(0.042)	(0.040)	(0.040)
2013	-0.365***	-0.401***	-0.233***
	(0.042)	(0.040)	(0.039)
2014	-0.273***	-0.213***	-0.156***
	(0.039)	(0.039)	(0.041)
2015	-0.104***	0.029	-0.048
	(0.040)	(0.040)	(0.042)
2016	0.013	0.043	0.038

	(0.039)	(0.040)	(0.042)
2017	-0.142**	-0.119**	-0.137**
	(0.056)	(0.057)	(0.060)
2018	-0.118**	-0.085	-0.079
	(0.056)	(0.059)	(0.058)
Constant	6.472***	3.660***	5.173***
	(0.522)	(0.570)	(0.808)
Observations:	81,275	81,269	81,286
R-Squared (Within):	0.0126	0.0254	0.0126
R-Squared (Between):	0.0244	0.0085	0.0244
R-Squared (Overall):	0.0121	0.0082	0.0121

Sample probability weights applied.
Standard errors (clustered on the individual) are reported in brackets.
P-Values: *10% **5% ***1%

Table B11. All Pre/Post-Year Models.

	(i) Pre/Post 2011	**(ii) Pre/Post 2012**	**(iii) Pre/Post 2013**	**(iv) Pre/Post 2014**	**(v) Pre/Post 2015**
Disabled	-0.213***	-0.193***	-0.164***	-0.179***	-0.156***
	(0.028)	(0.024)	(0.021)	(0.020)	(0.019)
Spouse Disabled	-0.040	-0.039*	-0.013	-0.025	-0.018
	(0.027)	(0.023)	(0.020)	(0.019)	(0.018)
Both Disabled	0.061	0.053	0.018	0.030	0.030
	(0.057)	(0.049)	(0.031)	(0.039)	(0.037)
Post [Year]	-0.101***	-0.070***	-0.008	0.117***	0.111***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)
Disabled*Post [Year]	0.043	0.022	-0.020	0.011	-0.060**
	(0.030)	(0.027)	(0.023)	(0.026)	(0.028)
Spouse Disabled*Post [Year]	0.005	0.007	-0.034	-0.011	-0.041
	(0.028)	(0.026)	(0.022)	(0.025)	(0.026)
Both Disabled*Post [Year]	-0.055	-0.053	-0.053	-0.026	-0.023
	(0.060)	(0.055)	(0.059)	(0.053)	(0.055)
Age	-0.051***	-0.051***	-0.059***	-0.076***	-0.075***
	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)
Age Squared	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Living as a Couple	*Reference*				
Married	0.000	0.000	0.001	0.000	-0.002
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
No. of Children	0.029***	0.042***	0.047***	0.039***	0.038***
	(0.006)	(0.005)	(0.005)	(0.005)	(0.006)
No Qualification	*Reference*				
GCSE	0.038	0.036	0.028	0.014	0.021

	(0.088)	(0.088)	(0.088)	(0.088)	(0.088)
Higher/AS Level	0.203	0.195	0.193	0.185	0.189
	(0.168)	(0.168)	(0.168)	(0.168)	(0.168)
A-Level	0.204**	0.199**	0.197**	0.186*	0.190*
	(0.098)	(0.098)	(0.098)	(0.098)	(0.098)
Other Higher	-0.027	-0.028	-0.035	-0.045	-0.039
	(0.070)	(0.070)	(0.070)	(0.070)	(0.070)
Degree	0.168**	0.165**	0.159*	0.148*	0.153*
	(0.084)	(0.084)	(0.084)	(0.084)	(0.084)
Postgraduate	0.083	0.077	0.066	0.058	0.065
	(0.093)	(0.093)	(0.093)	(0.093)	(0.093)
London	*Reference*				
North East	0.300	0.306	0.310	0.318	0.320
	(0.239)	(0.239)	(0.239)	(0.236)	(0.238)
North West	-0.117	-0.114	-0.109	-0.109	-0.107
	(0.119)	(0.119)	(0.119)	(0.119)	(0.119)
Yorks/Humber	0.064	0.066	0.070	0.074	0.070
	(0.137)	(0.137)	(0.137)	(0.137)	(0.137)
East Midlands	0.010	0.009	0.007	0.010	0.009
	(0.113)	(0.113)	(0.113)	(0.113)	(0.113)
West Midlands	0.018	0.016	0.016	0.020	0.021
	(0.124)	(0.124)	(0.125)	(0.125)	(0.125)
East	0.041	0.042	0.046	0.051	0.053
	(0.098)	(0.099)	(0.099)	(0.099)	(0.099)
South East	0.112	0.114	0.113	0.116	0.115
	(0.082)	(0.082)	(0.083)	(0.083)	(0.082)
South West	0.035	0.038	0.039	0.045	0.043
	(0.106)	(0.106)	(0.106)	(0.106)	(0.105)
Wales	0.023	0.018	0.020	0.032	0.035
	(0.175)	(0.175)	(0.175)	(0.175)	(0.175)
Scotland	0.130	0.137	0.142	0.146	0.147
	(0.162)	(0.162)	(0.163)	(0.162)	(0.162)
N. Ireland	0.910***	0.917***	0.932***	0.942***	0.919***
	(0.341)	(0.342)	(0.341)	(0.340)	(0.341)
Urban	*Reference*				
Rural	0.011	0.010	0.011	0.013	0.010
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
Constant	6.181***	6.079***	6.321***	7.129***	6.998***
	(0.201)	(0.205)	(0.208)	(0.212)	(0.208)
R-Squared (within)	0.0047	0.0043	0.0038	0.0050	0.0047
R-Squared (between)	0.0162	0.0147	0.0150	0.0093	0.0111
R-Squared (overall)	0.0094	0.0083	0.0087	0.0067	0.0077

Observations: 111,371

Sample probability weights applied.

Standard errors (clustered by individual) are displayed in brackets

P-Values: *** 1%, ** 5%, *10%

Table B12. Regression Adjustment Model.

Comparison years	Adjustment
Omitted group: 2010	
Comparison years	**Adjustment**
2009-2010	0.008
	(0.148)
2009-2011	-0.037
	(0.176)
2009-2012	*(omitted)*
2009-2013	*(omitted)*
2009-2014	*(omitted)*
2009-2015	*(omitted)*
2009-2016	*(omitted)*
2009-2017	*(omitted)*
2009-2018	*(omitted)*
Omitted group: 2011	
Comparison years	**Adjustment**
2009 - 2010	-0.332**
	(0.160)
2010 - 2011	-0.076
	(0.108)
2010 - 2012	-0.021
	(0.869)
2010 - 2013	*(omitted)*
2010 - 2014	*(omitted)*
2010 - 2015	*(omitted)*
2010 - 2016	*(omitted)*
2010 - 2017	*(omitted)*
2010 - 2018	*(omitted)*
Omitted group: 2012	
Comparison years	**Adjustment**
2009 - 2010	0.025
	(0.137)
2010 - 2011	-0.067
	0.148

2011 - 2012	0.107
	(0.132)
2011 - 2013	0.141
	(0.139)
2011 - 2014	*(omitted)*
2011 - 2015	*(omitted)*
2011 - 2016	*(omitted)*
2011 - 2017	*(omitted)*
2011 - 2018	*(omitted)*

Omitted group: 2013

Comparison years	**Adjustment**
2009 - 2010	-0.195
	(0.226)
2010 - 2011	-0.069
	(0.167)
2011 - 2012	-0.038
	(0.178)
2012 - 2013	0.227
	(0.161)
2012 - 2014	0.266*
	(0.151)
2012 - 2015	*(omitted)*
2012 - 2016	*(omitted)*
2012 - 2017	*(omitted)*
2012 - 2018	*(omitted)*

Omitted group: 2014

Comparison years	**Adjustment**
2009 - 2010	0.428**
	(0.185)
2010 - 2011	0.009
	(0.121)
2011 - 2012	-0.084
	(0.169)
2012 - 2013	-0.044
	(0.191)
2013 - 2014	0.053
	(0.158)
2013 - 2015	-0.127
	(0.139)

2013 - 2016	*(omitted)*
2013 - 2017	*(omitted)*
2013 - 2018	*(omitted)*

Omitted group: 2015

Comparison years	**Adjustment**
2009 - 2010	*(omitted)*
2010 - 2011	0.143
	(0.205)
2011 - 2012	0.079
	(0.183)
2012 - 2013	-0.166
	(0.206)
2013 - 2014	-0.297
	(0.200)
2014 - 2015	-0.049
	(0.254)
2014 - 2016	0.000
	(0.246)
2014 - 2017	*(omitted)*
2014 - 2018	*(omitted)*

Control group: not yet treated.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table B13. DiD Multiple GT – Own-disability Interaction Model.

	Estimate	**SE**	**LB CI**	**UB CI**	**N**	**Switchers**
Period -2 (Non-Robust)	-0.10564	0.098313	-0.29833	0.087054	29619	283
Period -2 (Robust)	-0.10426	0.07698	-0.25514	0.046616	29061	283
Onset Period (Non-Robust)	0.075305	0.115874	-0.15181	0.302418	29676	271
Onset Period (Robust)	0.075333	0.073973	-0.06965	0.22032	29196	271

Table B14. Randomisation Test: Single Spousal Disability.

Disabled Spouse	-0.034**
	(0.015)
Age	-0.062***
	(0.009)
Age Squared	0.001***
	(0.000)
Living as a Couple	*Reference*
Married	-0.004
	(0.023)
No. of Children	0.021***
	(0.006)
No Qualification	*Reference*
GCSE	0.033
	(0.088)
Higher/AS Level	0.198
	(0.166)
A-Level	0.201**
	(0.098)
Other Higher	-0.023
	(0.070)
Degree	0.166**
	(0.084)
Postgraduate	0.085
	(0.093)
London	*Reference*
North East	0.291
	(0.237)
North West	-0.120
	(0.118)
Yorks/Humber	0.074
	(0.137)
East Midlands	0.021
	(0.113)
West Midlands	0.030
	(0.125)
East	0.048
	(0.098)
South East	0.122
	(0.082)
South West	0.042
	(0.105)
Wales	0.033
	(0.177)
Scotland	0.145
	(0.162)
N. Ireland	0.928***
	(0.338)

Urban	*Reference*
Rural	0.013
	(0.035)
Year	
2009	*Reference*
2010	0.005
	(0.017)
2011	-0.084***
	(0.018)
2012	-0.117***
	(0.017)
2013	-0.169***
	(0.017)
2014	-0.027
	(0.017)
2015	0.037**
	(0.017)
2016	0.015
	(0.017)
2017	-0.092***
	(0.024)
2018	-0.095***
	(0.024)
Constant	6.626***
	(0.233)
R-Squared (within)	0.0060
R-Squared (between)	0.0039
R-Squared (overall)	0.0035

Observations: 111,371
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table B15. Randomisation test: Own-disability Interaction Model (No Sample Weights).

	Own Disability	**No Own Disability**
4 Periods Before Onset	*Reference*	
3 Periods Before Onset	0.123	0.146
	(0.119)	(0.089)
2 Periods Before Onset	0.143	0.005
	(0.110)	(0.093)
1 Period Before Onset	0.075	-0.014
	(0.108)	(0.093)
Onset Period	0.133	-0.044
	(0.110)	(0.090)
1 Period After Onset	0.051	-0.024

	(0.112)	(0.092)
2 Periods After Onset	0.062	-0.009
	(0.114)	(0.095)
3 Periods After Onset	0.067	-0.027
	(0.111)	(0.094)
4 Periods After Onset	0.097	-0.065
	(0.116)	(0.101)
5 Periods After Onset	0.045	-0.075
	(0.122)	(0.104)
6 Periods After Onset	-0.055	-0.143
	(0.131)	(0.116)
7 Periods After Onset	0.018	-0.099
	(0.155)	(0.138)
Age	-0.066***	
	(0.010)	
Age Squared	0.001***	
	(0.000)	
Living as a Couple	*Reference*	
Married	0.009	
	(0.026)	
No. of Children	0.018**	
	(0.008)	
No Qualification	*Reference*	
GCSE	-0.015	
	(0.098)	
Higher/AS Level	0.170	
	(0.189)	
A-Level	0.079	
	(0.109)	
Other Higher	-0.039	
	(0.083)	
Degree	0.120	
	(0.094)	
Postgraduate	0.066	
	(0.100)	
London	*Reference*	
North East	0.181	
	(0.278)	
North West	-0.115	
	(0.128)	
Yorks/Humber	0.038	
	(0.157)	
East Midlands	-0.068	
	(0.116)	
West Midlands	-0.066	
	(0.141)	
East	-0.007	
	(0.104)	
South East	0.127	
	(0.088)	
South West	0.033	

	(0.117)
Wales	0.081
	(0.195)
Scotland	0.116
	(0.194)
N. Ireland	0.892***
	(0.339)
Urban	*Reference*
Rural	0.031
	(0.039)
Year	
2009	*Reference*
2010	0.010
	(0.020)
2011	-0.093***
	(0.021)
2012	-0.131***
	(0.020)
2013	-0.175***
	(0.019)
2014	-0.041**
	(0.019)
2015	0.026
	(0.020)
2016	0.010
	(0.020)
2017	-0.115***
	(0.027)
2018	-0.116***
	(0.028)
Constant	6.761***
	(0.263)
R-Squared (within)	0.0069
R-Squared (between)	0.0026
R-Squared (overall)	0.0026

Observations: 111,371
Sample probability weights not applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table B16. Randomisation test: Own and spousal disability.

Own Disability	-0.171***
	(0.019)
Spousal Disability	-0.063**
	(0.028)
Both Disabled	0.094*
	(0.056)
Age	-0.066***

	(0.010)
Age Squared	0.001***
	(0.000)
Living as a Couple	*Reference*
Married	0.010
	(0.026)
No. of Children	0.018**
	(0.008)
No Qualification	*Reference*
GCSE	-0.015
	(0.099)
Higher/AS Level	0.167
	(0.192)
A-Level	0.085
	(0.110)
Other Higher	-0.043
	(0.083)
Degree	0.118
	(0.094)
Postgraduate	0.065
	(0.101)
London	*Reference*
North East	0.199
	(0.278)
North West	-0.112
	(0.129)
Yorks/Humber	0.037
	(0.158)
East Midlands	-0.063
	(0.116)
West Midlands	-0.062
	(0.141)
East	-0.003
	(0.103)
South East	0.127
	(0.088)
South West	0.035
	(0.117)
Wales	0.083
	(0.195)
Scotland	0.123
	(0.193)
N. Ireland	0.890***
	(0.342)
Urban	*Reference*
Rural	0.029
	(0.039)
Year	
2009	*Reference*

2010	0.009
	(0.020)
2011	-0.094***
	(0.021)
2012	-0.132***
	(0.020)
2013	-0.177***
	(0.019)
2014	-0.042**
	(0.019)
2015	0.023
	(0.019)
2016	0.009
	(0.020)
2017	-0.114***
	(0.027)
2018	-0.114***
	(0.028)
Constant	6.807***
	(0.262)
R-Squared (within)	0.0081
R-Squared (between)	0.0114
R-Squared (overall)	0.0086

Observations: 111,371
Sample probability weights applied.
Standard errors (clustered by individual) are displayed in brackets
P-Values: *** 1%, ** 5%, *10%

Table B17. Randomisation test: Single spousal disability dummy.

	T (obs.)	C	N	P=C/N	SE(P)	[95% Conf. Interval]	
Disabled Spouse	-0.034	0	200	0.000	0.000	0.000	0.018

Observations: 111,371
P-Values: *** 1%, ** 5%, *10%
Note: Confidence interval is with respect to P=C/N.
Note: c = #{|T| >= |T(obs.)|}
Note: Estimated coefficient (T) refers to that generated in Table B14.

Table B18. Randomisation test: Own-disability Interaction Model (No Own Disability).

	T (obs.)	C	N	P=C/N	SE(P)	[95% Conf. Interval]	
2 Periods Before Onset	0.005	182	200	0.91	0.020	0.861	0.946
Onset Period	-0.044	49	200	0.245	0.030	0.187	0.311

Observations: 111,371
P-Values: *** 1%, ** 5%, *10%

Note: Confidence interval is with respect to P=C/N.
Note: c = #{|T| >= |T(obs.)|}
Note: Estimated coefficient (T) refers to that generated in Table B15.

Table B19. Randomisation test: Own and Spousal Disability Model.

	T (obs.)	C	N	P=C/N	SE(P)	[95% Conf. Interval]	
Own Disability	-0.171	0	200	0.000	0.000	0.000	0.018
Spousal Disability	-0.063	0	200	0.000	0.000	0.000	0.018
Both Disabled	0.094	6	200	0.030	0.012	0.011	0.064

Observations: 111,371
P-Values: *** 1%, ** 5%, *10%
Note: Confidence interval is with respect to P=C/N.
Note: c = #{|T| >= |T(obs.)|}
Note: Estimated coefficient (T) refers to that generated in Table B16.

8.3 Appendix C

C1. Psychological theories of children's wellbeing.

Child wellbeing is argued in some literature to be largely derived from the fulfilment of fundamental needs, which grow more complex with age. Pollard and Lee (2002) state that for very young children, wellbeing is derived from physical,[142] psychological,[143] cognitive,[144] social,[145] and economic[146] domains. Bradford (2012, p.12) argues that children's wellbeing may also be explained through an adaptation of Maslow's (1943) hierarchy of needs; this states that people have five levels of needs (physiological, security, social, esteem and self-actualisation), the lower of these

[142] E.g., health, safety, rate of growth.
[143] The psychological domain encompasses mental health, self-esteem, confidence and emotion.
[144] I.e., intellectual or school-related aspects.
[145] E.g., family and peer relationships, communication skills and the availability of emotional and practical support.
[146] E.g., family income and wealth, economic hardship, access to welfare benefits.

must be fulfilled before they will pay attention to the higher order needs, although the specificity of these needs change with age. In the example of a very young child, they are not likely to want to play or engage in learning if they are hungry, tired or require a nappy change. Bradford (2012) argues that it is difficult for children to draw a reasonable level of wellbeing from life unless the basic needs are met by their parents.

The other common theme in this strand of literature is *Attachment Theory*. Children's wellbeing is said to be heavily influenced by their relationships with different groups of people within their ecology, with whom they make 'attachments' i.e., they are important in building the social and emotional aspects of children's wellbeing (McAuley and Rose, 2010, p.24). These include family members and other important adults such as teachers. It has been shown that very young children need to receive unconditional acceptance from their caregivers so that all of their emotional needs are met. This is to ensure a long-term sense of belonging, security and self-esteem, which is associated with better confidence, social skills and relationships later in life (Bowlby, 1969). A more contemporary discussion of Attachment Theory is provided by Aldgate and Jones (2006), who describe attachment behaviour as important from an evolutionary standpoint; individuals, whether adults or children seek to 'attach' themselves to others whom they view as being stronger or wiser, with the aim of survival from predators. This provides children with a secure base from which they can more confidently explore the outside world, seeking out ways in which to improve their own wellbeing.

The loss of an attachment figure (e.g., through bereavement or divorce) has been shown to be a significant source of decreased wellbeing for the child, which can lead to longer-term developmental problems if not dealt with sensitively or if an alternative attachment figure is not found (Aldgate and Jones, 2006). When separated from adult attachment figures, children go through a process of protest, despair and detachment (Bowlby, 1958), the long-term effects of which depend upon what happens next. Short absences may cause distress and mistrust, but this can be restored if the attachment figure returns quickly and deals with the distress in a sensitive manner. When the loss is more permanent, such as the death of a parent, the child requires sensitive caregiving which allows them to express their grief in an age-appropriate way, but a replacement attachment figure must also be found (Aldgate, 1992). Consistent with this, children who enter the care system are at significant risk of harm. Stevenson (1968) noted that children who experience such an event are likely to have experienced insecure attachment experiences beforehand and further separations caused by the care system are likely to negatively affect many aspects of the child's wellbeing, including their self-esteem, to the extent that they may need to learn social skills from scratch.

C2. Longitudinal studies of children's wellbeing in the UK.

Other studies include the Longitudinal Study of Young People in England 2 (LSYPE2), a database of 13- to 14-year-olds linked to the National Pupil Database, and the Annual Population Survey (APS), collected by the Office for National Statistics. Both these sources are used in the State of the Nation report discussed in section 3.2 because each has its own strengths; Understanding Society has a rich source of data on many aspects of the lives of 11- to 15-year-olds, which is collected through an anonymous self-completion survey. This includes subjective reports of happiness with friends, family, school, schoolwork, appearance and health. LSYPE2 includes wellbeing data on children who receive free school meals (FSM) and those with special educational needs (SEN), as well as psychological data on teenage girls. APS data is used for its statistics on young people's (aged 16-24) wellbeing. If we look at a summary of the results from the 2019 State of the Nation report,[147] they are quite similar to what is found elsewhere in the literature. Most children are happy with their lives (84.9% of 10- to 15-year-olds), but both wellbeing and psychological health decline as people get older and females report lower levels of wellbeing and higher levels of anxiety at every age compared to males. However, gender is a less consistent determinant of children's wellbeing than age. Some evidence exists to indicate that the wellbeing of FSM and SEN children is lower than other children, but FSM and SEN are not consistent indicators of wellbeing during childhood, although they could have consequences later in life. Children derived the greatest levels of wellbeing from their family, friends and health, followed by school and appearance, but low levels of satisfaction with their amount of leisure time. Bullying was most prevalent among white children, those with a long-term illness or disability and those who required extra help at school. Experiences of being bullied, including online bullying was the most significant driver of psychological health, however seeing friends and getting enough sleep acted as protective factors against poor psychological health.

C3. Imputation of Missing Variables

A problem with some of the variables used in the sensitivity analysis is that they are only included in some of the waves, as they are asked in alternating (odd-numbered) years of the survey. Two of these variables are included in the main set of controls (general health and whether others misbehave in class), whilst three of them are

[147] The 2019 report is chosen here as an example as it is the most recent report from a 'normal' year, in which the data cannot have been affected by the Coronavirus pandemic.

included as additional controls to be used in the sensitivity analysis (bullying, whether they talk with parents about personal matters, and caregiving). Where data were missing, they were estimated from other waves for the same individual where possible. This was done by taking the average of the values in adjacent waves, or where there was only an observation in one adjacent wave, this was copied over. In the minority of cases where there was not an observation in either adjacent wave, the observation was dropped if the control was used in the main set of controls, or recorded as missing if the control was only to be used in the sensitivity analysis. This approach is not ideal as the value of missing data cannot automatically be assumed from their leads and lags. However, this is not a great concern for three of the variables, which are only used as part of the sensitivity analysis and not in the main model. For the other two variables, it is still preferable to omitting such important explanatory variables from the main model and also preferable to the alternative method of running the sensitivity analysis using only waves in which available data is present, as doing so distorts the main results too much due to the lower sample size. See Tables C1 to C8 for a list of observations present for each imputed variable before and after imputation.

C4. Breusch Pagan Lagrangian Multiplier Test for random effects.

yphlf[pidp_youth,t] = Xb + u[pidp_youth] + e[pidp_youth,t]

Estimated results:

	Var	**sd = SQRT(Var)**
yphlf	1.672468	1.293239
e	0.847074	0.920366
u	0.708837	0.841924

Test: Var(u) = 0

$\bar{\chi}^2(01) = 4665.58$

Prob > $\bar{\chi}^2$ = 0.000

Key:
yphlf: children's wellbeing
pidp_youth: children's individual identifier
u: individual error term
e: random error term
Var: variance
sd: standard deviation

C5. Hausman Test.

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b V_B))
	FE	RE	Difference	S.E.
Either Parent Disabled	0.031158	-0.00696	0.038116	0.013993
Age 11	-0.04638	-0.04389	-0.00249	0.00947
Age 12	-0.12328	-0.09804	-0.02524	0.015841
Age 13	-0.25238	-0.21147	-0.04091	0.022484
Age 14	-0.37404	-0.31746	-0.05659	0.02943
Age 15	-0.44049	-0.36671	-0.07378	0.03538
Single-parent family	-0.16055	-0.23384	0.073297	0.042005
3 or 4 Siblings	0.037739	0.000119	0.03762	0.042494
More than 4 Siblings	-0.06481	-0.04748	-0.01733	0.094403
Only child	-0.03869	-0.01471	-0.02398	0.023318
Age of oldest parent	0.001631	-0.00045	0.002085	0.004944
School	-0.03005	0.018101	-0.04816	0.058566
Higher Education	-0.03167	-0.03226	0.000596	0.068992
Very good health	-0.17088	-0.2387	0.067823	0.016483
Good health	-0.43484	-0.56104	0.1262	0.02298
Fair health	-0.62215	-0.81614	0.193985	0.035101
Poor health	-1.04726	-1.11538	0.068122	0.078523
6 to 10 close friends	0.086369	0.117226	-0.03086	0.007641
More than 10 close friends	0.08928	0.103613	-0.01433	0.011612
No close friends	-0.40099	-0.45772	0.056724	0.026211
Disruption - most/all of classes	-0.23049	-0.36606	0.13557	0.042938
Disruption - > half of classes	-0.20063	-0.26018	0.05955	0.042071
Disruption - half of classes	-0.15547	-0.19696	0.041487	0.04211
Disruption - now and then	-0.09656	-0.09751	0.000946	0.040309
Exams - important	-0.20048	-0.23681	0.03633	0.009539
Exams - not very important	-0.21861	-0.34246	0.123849	0.031485
Exams - not at all important	-0.41471	-0.45094	0.036237	0.05388
North	0.113527	0.059553	0.053974	0.320671
Midlands	-0.40776	-0.00063	-0.40713	0.271635
Scotland/Wales/N. Ireland	-0.42477	0.101367	-0.52614	0.322409
Urban Area	0.057893	-0.00282	0.06071	0.105063
2010	0.064585	0.085575	-0.02099	0.014353
2011	0.055307	0.055885	-0.00058	0.013568
2012	0.103149	0.088309	0.01484	0.012293

2013	0.070158	0.042539	0.027619	0.012887
2014	0.097631	0.054368	0.043263	0.01502
2015	0.038492	-0.0165	0.054987	0.018382
2016	0.02127	-0.02333	0.0446	0.020784
2017	-0.04876	-0.11742	0.068665	0.035151
2018	-0.12878	-0.1487	0.019919	0.030824

b = consistent under H_0 and H_a; obtained from xtreg
B = inconsistent under H_a, efficient under H_0; obtained from xtreg

Test: H_0: difference in coefficients not systematic

χ^2(40) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 158.78

Prob>χ^2 = 0.0000

C6. Wooldridge test for autocorrelation in panel data.

H_0: no first order autocorrelation
F(1, 4383) = 100.692
Prob > F = 0.0000

C7. Modified Wald test for groupwise heteroscedasticity in fixed effects models.

H_0: σ_i^2 = σ_i^2 for all i

χ^2 (8342) = 3.8×10^{37}
Prob>χ^2 = 0.0000

C8. Comparing homoscedastic, heteroscedastic (robust) and clustered standard errors.

	Homoscedastic	**Heteroscedastic**	**Clustered**
Either Parent Disabled	0.031	0.031	0.031
	-0.023	-0.025	-0.025
Age 11	-0.046	-0.046	-0.046
	-0.023	-0.023	-0.023
Age 12	-0.123	-0.123	-0.123
	-0.027	-0.028	-0.028
Age 13	-0.252	-0.252	-0.252
	-0.032	-0.034	-0.034

Age 14	-0.374	-0.374	-0.374
	-0.038	-0.041	-0.041
Age 15	-0.440	-0.440	-0.440
	-0.044	-0.047	-0.047
Single-parent family	-0.161	-0.161	-0.161
	-0.050	-0.067	-0.067
3 or 4 Siblings	0.038	0.038	0.038
	-0.054	-0.066	-0.066
More than 4 Siblings	-0.065	-0.065	-0.065
	-0.122	-0.194	-0.194
Only child	-0.039	-0.039	-0.039
	-0.032	-0.036	-0.036
Age of oldest parent	0.002	0.002	0.002
	-0.005	-0.006	-0.006
School	-0.030	-0.030	-0.030
	-0.063	-0.094	-0.094
Higher Education	-0.032	-0.032	-0.032
	-0.075	-0.109	-0.109
Very Good Health	-0.171	-0.171	-0.171
	-0.026	-0.027	-0.027
Good Health	-0.435	-0.435	-0.435
	-0.033	-0.037	-0.037
Fair Health	-0.622	-0.622	-0.622
	-0.053	-0.068	-0.068
Poor Health	-1.047	-1.047	-1.047
	-0.121	-0.167	-0.167
6 to 10 close friends	0.086	0.086	0.086
	-0.017	-0.018	-0.018
More than 10 close friends	0.089	0.089	0.089
	-0.025	-0.025	-0.025
No close friends	-0.401	-0.401	-0.401
	-0.059	-0.081	-0.081
Disruption - most/all of classes	-0.230	-0.231	-0.232
	-0.064	-0.065	-0.065
Disruption - more than half of classes	-0.201	-0.201	-0.201
	-0.063	-0.063	-0.063
Disruption - about half of classes	-0.155	-0.155	-0.155
	-0.064	-0.064	-0.064
Disruption - now and then	-0.097	-0.097	-0.097
	-0.061	-0.059	-0.059
Exams - Important	-0.200	-0.200	-0.200
	-0.020	-0.022	-0.022
Exams - Not very important	-0.219	-0.219	-0.219
	-0.069	-0.084	-0.084
Exams - Not at all important	-0.415	-0.415	-0.415
	-0.107	-0.128	-0.128
North	0.114	0.114	0.114
	-0.322	-0.295	-0.295

Midlands	-0.408	-0.408	-0.408
	-0.273	-0.376	-0.376
Scotland/Wales/N. Ireland	-0.425	-0.425	-0.425
	-0.324	-0.298	-0.298
Urban Area	0.058	0.058	0.058
	-0.108	-0.135	-0.135
2010	0.065	0.065	0.065
	-0.031	-0.034	-0.034
2011	0.055	0.055	0.055
	-0.031	-0.033	-0.033
2012	0.103	0.103	0.103
	-0.031	-0.034	-0.034
2013	0.070	0.070	0.070
	-0.032	-0.034	-0.034
2014	0.098	0.098	0.098
	-0.033	-0.035	-0.035
2015	0.038	0.038	0.038
	-0.035	-0.036	-0.036
2016	0.021	0.021	0.021
	-0.036	-0.037	-0.037
2017	-0.049	-0.049	-0.049
	-0.051	-0.055	-0.055
2018	-0.129	-0.129	-0.129
	-0.051	-0.047	-0.047
Constant	6.430	6.430	6.430
	-0.309	-0.338	-0.338

Note: Standard errors in brackets.

C9. Tests for Dynamic Bias.

As in the previous two chapters, tests are carried out to investigate whether there is evidence of dynamic bias present in the results. The first way this is done in this chapter is to run a version of the benchmark model with the inclusion of a dummy which denotes whether each observation occurs before or after a particular year. It also includes an interaction variable between this dummy and parental disability. A statistically significant coefficient on this interaction term would imply that children respond to parental disability differently in different years, *ceteris paribus*. However, there is no such significant effect (see Appendix [Table C11]). In a more formal test, a version of the 'Difference-in-Differences Multiple GT' test (de Chaisemartin and d'Haultfœille, 2022) is estimated to detect any presence of dynamic bias in the results. This re-estimates the main model in the form of a difference-in-differences model which measures the change in children's SWB at the time of parental disability in comparison to its lag. As discussed in previous chapters, the results have to be interpreted with caution as they estimate a specification which is different to that of the main model. The DiD Multiple GT model is estimated in such a way that it is conditional on the parent exhibiting no disability in the previous period. As such, it only estimates changes in children's SWB when transitioning from a period of parental non-disability to a period of parental disability. This reduces the sample size by around 16% to 22,278, however not taking this step would mean that the estimation of the effect of parental disability upon single-period changes in children's SWB would include cases in which the parent has two consecutive periods of disability. The model is estimated twice (see Appendix [Table C12]), where the second estimation is robust to dynamic bias. The difference between the coefficient of interest under both estimations is very slight (by 0.007 points), suggesting no evidence of dynamic bias. However, this test has to be interpreted with caution due to its different specification relative to the main model.[148]

Table C1. Frequency of bullying variables before and after imputing missing values from other waves.

"How often do you get physically bullied at school?"

	Before		After	
	Obs.	**%**	**Obs.**	**%**
Missing	15,228	45.56%		
Never	15,065	45.08%	25,841	82.23%
1-3 times in last 6 months	2,372	7.10%	4,227	13.45%

[148] Unfortunately, neither the regression adjustment model of Callaway and Sant'Anna (2021) nor the Bacon Decomposition model of Goodman-Bacon (2021) can be implemented in this chapter as they require both a balanced panel (balancing the panel reduces the observations to zero) and an identifiable disability onset period.

4+ times in last 6 months	478	1.43%	868	2.76%
A few times a week	279	0.83%	490	1.56%
Total	**33,422**	**100**	**31,426**	**100**

"How often do you get physically bulled in other ways?"

	Before		After	
	Obs.	**%**	**Obs.**	**%**
Missing	15,220	45.54%		
Never	12,549	37.55%	21,504	68.41%
1-3 times in last 6 months	3,880	11.61%	6,806	21.65%
4+ times in last 6 months	1,104	3.30%	1,974	6.28%
A few times a week	669	2.00%	1,151	3.66%
Total	**33,422**	**100**	**31,435**	**100**

Table C2. Frequency of bullying variables before and after imputing missing values from other waves, by wave.

"How often do you get physically bullied at school?" (Before)

Wave	**Missing**	**Never**	**Not much**	**Quite a lot**	**A lot**	**Total**
1	32	3,709	705	129	88	4,663
2	4,797	0	0	0	0	4,797
3	28	3,475	524	116	67	4,210
4	3,843	0	0	0	0	3,843
5	119	2,810	413	77	48	3,467
6	3,250	0	0	0	0	3,250
7	18	2,873	418	89	45	3,443
8	3,110	0	0	0	0	3,110
9	31	2,198	312	67	31	2,639
Total	**15,228**	**15,065**	**2,372**	**478**	**279**	**33,422**

"How often do you get physically bullied at school?" (After)

Wave	**Never**	**Not much**	**Quite a lot**	**A lot**	**Total**
1	3,709	705	129	88	4,631
2	3,255	578	115	69	4,017
3	3,475	524	116	67	4,182
4	2,849	510	114	55	3,528
5	2,810	413	77	48	3,348
6	2,428	406	77	50	2,961
7	2,873	418	89	45	3,425

8	2,244	361	84	37	2,726
9	2,198	312	67	31	2,608
Total	25,841	4,227	868	490	31,426

Table C3. Frequency of 'talks with parents' variables before and after imputing missing values from other waves.

"How often do you talk to your mother about things that matter to you?"

	Before		After	
	Obs.	**%**	**Obs.**	**%**
Missing	15,229	45.57%		
Most days	7,317	21.89%	12,782	40.68
More than once a week	4,425	13.24%	7,638	24.31
Less than once a week	3,280	9.81%	5,637	17.94
Hardly ever	3,099	9.27%	5,236	16.66
Don't have a mother	72	0.22%	129	0.41
Total	33,422	100	31,422	100

"How often do you talk to your father about things that matter to you?"

	Before		After	
	Obs.	**%**	**Obs.**	**%**
Missing	15,339	45.89%		
Most days	3,564	10.66%	6,263	20.03
More than once a week	3,622	10.84%	6,278	20.08
Less than once a week	3,866	11.57%	6,734	21.54
Hardly ever	5,989	17.92%	10,233	32.73
Don't have a father	1,042	3.12%	1,754	5.61
Total	33,422	100	31,262	100

Table C4. Frequency of 'talks with parents' variables before and after imputing missing values from other waves, by wave.

"How often do you talk to your mother about things that matter to you?" (Before)

Wave	Missing	Most days	More than once a week	Less than once a week	Hardly ever	Don't have a mother	Total
1	36	1,798	1,121	789	894	25	4,663
2	4,797	0	0	0	0	0	4,797
3	26	1,639	1,017	793	722	13	4,210
4	3,843	0	0	0	0	0	3,843
5	120	1,337	781	628	584	17	3,467
6	3,250	0	0	0	0	0	3,250
7	25	1,466	806	628	509	9	3,443
8	3,110	0	0	0	0	0	3,110
9	22	1,077	700	442	390	8	2,639
Total	**15,229**	**7,317**	**4,425**	**3,280**	**3,099**	**72**	**33,422**

"How often do you talk to your mother about things that matter to you?" (After)

Wave	Most days	More than once a week	Less than once a week	Hardly ever	Don't have a mother	Total
1	1,798	1,121	789	894	25	4,627
2	1,551	1,009	714	720	19	4,013
3	1,639	1,017	793	722	13	4,184
4	1,468	851	643	548	17	3,527
5	1,337	781	628	584	17	3,347
6	1,283	699	510	463	11	2,966
7	1,466	806	628	509	9	3,418
8	1,163	654	490	406	10	2,723
9	1,077	700	442	390	8	2,617
Total	**12,782**	**7,638**	**5,637**	**5,236**	**129**	**31,422**

"How often do you talk to your father about things that matter to you?"

Wave	Missing	Most days	More than once a week	Less than once a week	Hardly ever	Don't have a mother	Total
1	75	856	812	903	1,729	288	4,663
2	4,797	0	0	0	0	0	4,797
3	58	762	798	924	1,428	240	4,210
4	3,843	0	0	0	0	0	3,843
5	131	650	685	709	1,102	190	3,467
6	3,250	0	0	0	0	0	3,250
7	42	732	751	712	1,014	192	3,443
8	3,110	0	0	0	0	0	3,110
9	33	564	576	618	716	132	2,639

Total	**15,339**	**3,564**	**3,622**	**3,866**	**5,989**	**1,042**	**33,422**

Wave	Most days	More than once a week	Less than once a week	Hardly ever	Don't have a mother	Total
1	856	812	903	1,729	288	4,588
2	736	725	853	1,445	226	3,985
3	762	798	924	1,428	240	4,152
4	691	709	774	1,145	200	3,519
5	650	685	709	1,102	190	3,336
6	658	621	652	869	157	2,957
7	732	751	712	1,014	192	3,401
8	614	601	589	785	129	2,718
9	564	576	618	716	132	2,606
Total	**6,263**	**6,278**	**6,734**	**10,233**	**1,754**	**31,262**

Table C5. Frequency of 'others misbehave in class' variable before and after imputing missing values from other waves.

"How often do other pupils at school misbehave or cause trouble in your classes?"

	Before Obs.	%	After Obs.	%
Missing	12,588	42.53%		
In most or all classes	4,101	13.86%	7,110	24.15%
More than half of classes	3,728	12.60%	6,421	21.81%
About half your classes	3,036	10.26%	5,245	17.82%
Now and then	5,527	18.67%	9,597	32.60%
This is not a problem	618	2.09%	1,063	3.61%
Total	**29,598**	**100%**	**29,436**	**100%**

Table C6. Frequency of 'others misbehave in class' variable before and after imputing missing values from other waves, by wave.

"How often do other pupils at school misbehave or cause trouble in your classes?" (Before)

Wave	Missing	In most or all classes	More than half of classes	About half your classes	Now and then	This is not a problem	Total
1	19	1,130	879	731	1,391	174	4,324
2	3,771	0	0	0	0	0	3,771
3	16	892	922	728	1,275	102	3,935
4	3,314	0	0	0	0	0	3,314
5	23	709	702	554	1,058	105	3,151
6	2,802	0	0	0	0	0	2,802
7	31	740	662	592	1,059	141	3,225

8	2,588	0	0	0	0	0	2,588
9	24	630	563	431	744	96	2,488
Total	**12,588**	**4,101**	**3,728**	**3,036**	**5,527**	**618**	**29,598**

"How often do other pupils at school misbehave or cause trouble in your classes?" (After)

Wave	**In most or all classes**	**More than half of classes**	**About half your classes**	**Now and then**	**This is not a problem**	**Total**
1	1,130	879	731	1,391	174	4,305
2	980	801	638	1,205	134	3,758
3	892	922	728	1,275	102	3,919
4	755	753	608	1,094	99	3,309
5	709	702	554	1,058	105	3,128
6	663	578	497	944	106	2,788
7	740	662	592	1,059	141	3,194
8	611	561	466	827	106	2,571
9	630	563	431	744	96	2,464
Total	**7,110**	**6,421**	**5,245**	**9,597**	**1,063**	**29,436**

Table C7. Frequency of general health variable
before and after imputing missing values from other waves.

"In general, would you say your health is…"

	Before Obs.	**%**	**After Obs.**	**%**
Missing	14,779	49.93		
Excellent	3,489	11.79	5,529	20.83
Excellent/Very good			803	3.02
Very good	6,439	21.75	11,020	41.51
Very good/Good			870	3.28
Good	3,932	13.28	6,581	24.79
Good/Fair			207	0.78
Fair	827	2.79	1,319	4.97
Fair/Poor			16	0.06
Poor	132	0.45	204	0.77
Total	**29,598**	**100**	**26,549**	**100**

Table C8. Frequency of general health variable before and and after imputing missing values from other waves, by wave.

"In general, would you say your health is…" (before)

Wave	Missing	Excellent	Very good	Good	Fair	Poor	Total
1	4,324	0	0	0	0	0	4,324
2	30	819	1,626	1,052	220	24	3,771
3	3,935	0	0	0	0	0	3,935
4	42	703	1,474	886	173	36	3,314
5	3,151	0	0	0	0	0	3,151
6	24	657	1,237	711	145	28	2,802
7	3,225	0	0	0	0	0	3,225
8	19	626	1,091	687	141	24	2,588
9	29	684	1,011	596	148	20	2,488
Total	14,779	3,489	6,439	3,932	827	132	29,598

"In general, would you say your health is…" (after)

Wave	Excellent	Excellent/Very good	Very good	Very good/good	Good
1	487	0	1,066	0	747
2	819	0	1,626	0	1,052
3	556	318	1,344	335	695
4	703	0	1,474	0	886
5	477	236	1,112	264	603
6	657	0	1,237	0	711
7	520	249	1,059	271	604
8	626	0	1,091	0	687
9	684	0	1,011	0	596
Total	5,529	803	11,020	870	6,581

"In general, would you say your health is…" (after) (continued)

Wave	Good/Fair	Fair	Fair/Poor	Poor
1	0	158	0	22
2	0	220	0	24
3	89	126	7	17
4	0	173	0	36
5	62	101	6	16
6	0	145	0	28
7	56	107	3	17
8	0	141	0	24
9	0	148	0	20
Total	207	1,319	16	204

Table C9. Main Model, with additional controls.

	(i) Single Parent Family	(ii) Own Health	(iii) HH Income	(iv) Child talks to Parents
Either Parent Disabled	0.034	0.035	0.034	0.036
	(0.026)	(0.026)	0.026	(0.026)
Age 10	*Reference*			
Age 11	-0.027	-0.035	-0.034	-0.030
	(0.024)	(0.024)	(0.024)	(0.024)
Age 12	-0.115***	-0.111***	-0.125***	-0.114***
	(0.029)	(0.028)	(0.029)	(0.029)
Age 13	-0.265***	-0.248***	-0.280***	-0.263***
	(0.034)	(0.034)	(0.035)	(0.035)
Age 14	-0.389***	-0.366***	-0.407***	-0.385***
	(0.041)	(0.041)	(0.042)	(0.041)
Age 15	-0.482***	-0.442***	-0.505***	-0.481***
	(0.048)	(0.047)	(0.048)	(0.048)
No. of siblings				
1 or 2	*Reference*			
3 or 4	0.028	0.042	0.037	0.034
	(0.067)	(0.067)	(0.068)	(0.068)
More than 4	-0.065	-0.058	-0.052	-0.054
	(0.196)	(0.198)	(0.198)	(0.197)
Only Child	-0.039	-0.046	-0.041	-0.041
	(0.037)	(0.036)	(0.037)	(0.037)
Age of oldest parent	0.002	0.005	0.006	0.005
	(0.006)	(0.006)	(0.006)	(0.006)
Highest parental education level				
No qualifications	*Reference*			
School	-0.039	-0.023	-0.035	-0.033
	(0.094)	(0.094)	(0.094)	(0.094)
Higher Education	-0.029	-0.033	-0.028	-0.035
	(0.109)	(0.111)	(0.111)	(0.111)
UK area				
London/South	*Reference*			
North	0.210	0.186	0.167	0.125
	(0.306)	(0.278)	(0.301)	(0.308)
Midlands	-0.381	-0.410	-0.416	-0.436
	(0.407)	(0.371)	(0.404)	(0.415)
Scotland/Wales/NI	-0.443	-0.421	-0.463	-0.466
	(0.351)	(0.301)	(0.348)	(0.344)
Urban area	0.042	0.060	0.037	0.046
	(0.138)	(0.134)	(0.137)	(0.139)
Single parent	-0.186***			
	(0.068)			
Own Health				
Excellent		*Reference*		
Very good		-0.180***		
		(0.027)		

Good		-0.461***		
		(0.037)		
Fair		-0.667***		
		(0.069)		
Poor		-1.146***		
		(0.167)		
Household Income			-0.002	
			(0.023)	
Child Talks to Parents				-0.088***
				(0.012)
Class Misbehaviour				
Not at all				
Most/all of classes				
More than half of classes				
About half of classes				
Now and then				
Importance of Exams				
Very Important				
Important				
Not very important				
Not at all important				
Bullied				
No. of close friends				
1 to 5				
6 to 10				
More than 10				
No friends				
Year				
2009	*Reference*			
2010	0.073**	0.062*	0.070**	0.071**
	(0.034)	(0.034)	(0.034)	(0.034)
2011	0.092***	0.060*	0.089***	0.088***
	(0.034)	(0.033)	(0.034)	(0.033)
2012	0.139***	0.114***	0.139***	0.134***
	(0.034)	(0.034)	(0.034)	(0.034)
2013	0.108***	0.081**	0.108***	0.105***
	(0.035)	(0.034)	(0.035)	(0.035)
2014	0.123***	0.100***	0.121***	0.121***
	(0.036)	(0.035)	(0.036)	(0.036)
2015	0.067*	0.041	0.066*	0.068*
	(0.037)	(0.036)	(0.037)	(0.037)
2016	0.032	0.016	0.030	0.032
	(0.037)	(0.037)	(0.037)	(0.037)
2017	-0.053	-0.054	-0.054	-0.049

	(0.056)	(0.055)	(0.056)	(0.056)
2018	-0.126***	-0.133***	-0.128***	-0.119***
	(0.048)	(0.047)	(0.048)	(0.048)
Constant	6.001***	6.079***	5.834***	6.088***
	(0.350)	(0.331)	0.416	(0.353)
Observations:	25,941	25,941	25,941	25,941
R-Squared (within):	0.0377	0.0519	0.0368	0.0406
R-Squared (between):	0.0033	0.0338	0.0010	0.0087
R-Squared (overall):	0.0073	0.0377	0.0043	0.0132

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C9 (cont.). Main Model, with additional controls.

	(v) Class Misbehaviour	**(viii) Importance of Exams**	**(ix) Bullied**	**(x) No. of Close Friends**
Either Parent Disabled	0.032	0.033	0.036	0.037
	(0.026)	(0.026)	(0.026)	(0.026)
Age 10	*Reference*			
Age 11	-0.032	-0.039*	-0.034	-0.038
	(0.024)	(0.024)	(0.024)	(0.024)
Age 12	-0.116***	-0.136***	-0.135***	-0.133***
	(0.029)	(0.029)	(0.029)	(0.029)
Age 13	-0.266***	-0.291***	-0.292***	-0.285***
	(0.035)	(0.035)	(0.035)	(0.035)
Age 14	-0.398***	-0.420***	-0.424***	-0.413***
	(0.042)	(0.041)	(0.041)	(0.041)
Age 15	-0.503***	-0.506***	-0.528***	-0.505***
	(0.049)	(0.048)	(0.048)	(0.048)
No. of siblings				
1 or 2	*Reference*			
3 or 4	0.041	0.033	0.030	0.025
	(0.068)	(0.068)	(0.067)	(0.068)
More than 4	-0.036	-0.066	-0.065	-0.061
	(0.198)	(0.195)	(0.197)	(0.199)
Only Child	-0.040	-0.037	-0.036	-0.040
	(0.037)	(0.037)	(0.037)	(0.037)
Age of oldest parent	0.006	0.005	0.006	0.006
	(0.006)	(0.006)	(0.006)	(0.006)
Highest parental education level				
No qualifications	*Reference*			
School	-0.040	-0.034	-0.041	-0.037
	(0.095)	(0.094)	(0.094)	(0.095)
Higher Education	-0.025	-0.026	-0.027	-0.030
	(0.111)	(0.110)	(0.111)	(0.110)
UK area				
London/South	*Reference*			
North	0.078	0.176	0.126	0.146
	(0.297)	(0.300)	(0.296)	(0.318)

Midlands	-0.442	-0.421	-0.414	-0.426
	(0.411)	(0.398)	(0.403)	(0.406)
Scotland/Wales/NI	-0.507	-0.452	-0.400	-0.452
	(0.344)	(0.342)	(0.368)	(0.350)
Urban area	0.042	0.026	0.014	0.039
	(0.137)	(0.137)	(0.137)	(0.137)
Single parent				
Own Health				
Excellent				
Very good				
Good				
Fair				
Poor				
Household Income				
Child Talks to Parents				
Class Misbehaviour				
Not at all	*Reference*			
Most/all of classes	-0.259***			
	(0.068)			
More than half of classes	-0.216***			
	(0.065)			
About half of classes	-0.165**			
	(0.066)			
Now and then	-0.104*			
	(0.062)			
Importance of Exams				
Very Important	*Reference*			
Important		-0.214***		
		(0.022)		
Not very important		-0.246***		
		(0.085)		
Not at all important		-0.461***		
		(0.133)		
Bullied			-0.190***	
			(0.019)	
No. of close friends				
1 to 5	*Reference*			
6 to 10				0.093***
				(0.018)
More than 10				0.105***
				(0.025)
No friends				-0.417***
				(0.082)
Year				
2009	*Reference*			
2010	0.074**	0.066*	0.076**	0.076**

	(0.034)	(0.034)	(0.034)	(0.034)
2011	0.093***	0.079**	0.094***	0.089***
	(0.034)	(0.033)	(0.033)	(0.033)
2012	0.140***	0.123***	0.138***	0.135***
	(0.035)	(0.034)	(0.034)	(0.034)
2013	0.106***	0.095***	0.106***	0.106***
	(0.035)	(0.035)	(0.034)	(0.034)
2014	0.125***	0.113***	0.120***	0.121***
	(0.036)	(0.036)	(0.036)	(0.036)
2015	0.070*	0.055	0.065*	0.066*
	(0.037)	(0.037)	(0.037)	(0.037)
2016	0.038	0.025	0.028	0.029
	(0.037)	(0.037)	(0.037)	(0.037)
2017	-0.040	-0.057	-0.053	-0.061
	(0.056)	(0.056)	(0.056)	(0.055)
2018	-0.125***	-0.126***	-0.137***	-0.134***
	(0.048)	(0.048)	(0.048)	(0.048)
Constant	6.009***	5.954***	6.163***	5.824***
	(0.355)	(0.349)	(0.351)	(0.352)
Observations:	25,941	25,941	25,941	25,914
R-Squared (within):	0.0392	0.0438	0.0452	0.0419
R-Squared (between):	0.0045	0.0048	0.0245	0.0033
R-Squared (overall):	0.0089	0.0097	0.0281	0.0082

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C10. Composite measure of children's SWB.

	(i) No Controls	**(ii) Pre-Determined Controls**	**(iii) Additional Controls**
Either Parent Disabled	0.036*	0.036*	0.057***
	(0.019)	(0.019)	(0.021)
Age 10		*Reference*	
Age 11		-0.052***	-0.174***
		(0.017)	(0.035)
Age 12		-0.206***	-0.411***
		(0.022)	(0.063)
Age 13		-0.382***	-0.664***
		(0.026)	(0.092)
Age 14		-0.502***	-0.886***
		(0.032)	(0.123)
Age 15		-0.617***	-1.093***
		(0.037)	(0.152)
No. of siblings			
1 or 2		*Reference*	
3 or 4		0.097*	0.084
		(0.057)	(0.058)
More than 4		0.076	-0.003
		(0.179)	(0.193)

Only Child	0.000	-0.008
	(0.027)	(0.031)
Age of oldest parent	0.012**	0.119***
	(0.005)	(0.031)
Highest parental education level		
No qualifications	*Reference*	
School	-0.034	-0.110
	(0.086)	(0.177)
Higher Education	-0.039	-0.104
	(0.098)	(0.165)
UK area		
London/South	*Reference*	
North	0.120	0.373
	(0.215)	(0.370)
Midlands	-0.297	-0.201
	(0.263)	(0.240)
Scotland/Wales/NI	-0.430*	-0.322
	(0.233)	(0.237)
Urban area	0.100	0.048
	(0.086)	(0.092)
Single Parent		-1.435***
		(0.243)
Own Health		
Excellent		*Reference*
Very good		-0.121***
		(0.025)
Good		-0.288***
		(0.031)
Fair		-0.544***
		(0.058)
Poor		-0.539***
		(0.160)
Household Income		0.006
		(0.019)
Talks to Parents		-0.061***
		(0.010)
Class Misbehaviour		
Not at all		*Reference*
Most/all of classes		-0.242***
		(0.063)
More than half of classes		-0.176***
		(0.060)
About half of classes		-0.152**
		(0.062)
Now and then		-0.076
		(0.058)
Importance of Exams		
Very Important		*Reference*
Important		-0.186***
		(0.019)
Not very important		-0.251***

			(0.070)
Not at all important			-0.246**
			(0.116)
Bullied			-0.140***
			(0.016)
No. of close friends			
1 to 5			*Reference*
6 to 10			0.062***
			(0.015)
More than 10			0.081***
			(0.022)
No friends			-0.365***
			(0.062)
Cares for Parent			0.010
			(0.046)
Year			
2009	*Reference*		
2010	0.229***	0.052**	0.051
	(0.025)	(0.025)	(0.034)
2011	0.187***	0.087***	0.081***
	(0.025)	(0.025)	(0.031)
2012	0.111***	0.100***	0.082***
	(0.027)	(0.025)	(0.031)
2013	0.027	0.103***	0.085***
	(0.027)	(0.025)	(0.031)
2014	-0.052*	0.107***	0.108***
	(0.027)	(0.026)	(0.031)
2015	-0.140***	0.099***	0.084***
	(0.028)	(0.027)	(0.032)
2016	-0.224***	0.079***	0.074**
	(0.027)	(0.026)	(0.032)
2017	-0.426***	0.043	0.038
	(0.038)	(0.041)	(0.049)
2018	-0.416***	-0.052	-0.042
	(0.033)	(0.035)	(0.040)
Constant	5.755***	5.441***	1.483
	(0.021)	(0.270)	(1.363)
Observations:	25,941	25,941	25,941
R-Squared (within):	0.0373	0.0721	0.1328
R-Squared (between):	0.0052	0.0055	0.0656
R-Squared (overall):	0.0004	0.0127	0.0647

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C11. Pre/Post [Year] Main Models.

	(i) Pre/ Post 2011	(ii) Pre/ Post 2012	(iii) Pre/ Post 2013	(iv) Pre/ Post 2014	(v) Pre/ Post 2015
Either Parent Disabled	-0.048	-0.048	-0.026	-0.038	-0.044*

	(0.033)	(0.033)	(0.029)	(0.026)	(0.024)
Post [Year]	-0.133***	-0.133***	-0.184***	-0.220***	-0.274***
	(0.020)	(0.020)	(0.019)	(0.020)	(0.020)
Either Par. Dis.*Post [Year]	0.006	0.006	-0.028	-0.018	-0.010
	(0.038)	(0.038)	(0.036)	(0.036)	(0.037)
Age 10	*Reference*				
Age 11	-0.034	-0.034	-0.030	-0.024	-0.021
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
Age 12	-0.118***	-0.118***	-0.109***	-0.103***	-0.097***
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Age 13	-0.265***	-0.265***	-0.250***	-0.240***	-0.234***
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Age 14	-0.377***	-0.377***	-0.357***	-0.344***	-0.336***
	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)
Age 15	-0.454***	-0.454***	-0.430***	-0.416***	-0.407***
	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)
No. of siblings					
1 or 2	*Reference*				
3 or 4	-0.005	-0.005	-0.010	-0.010	-0.011
	(0.037)	(0.037)	(0.037)	(0.037)	(0.036)
More than 4	-0.049	-0.049	-0.059	-0.074	-0.092
	(0.101)	(0.101)	(0.101)	(0.101)	(0.099)
Only Child	-0.050**	-0.050**	-0.047*	-0.044*	-0.034
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)
Age of oldest parent	0.004**	0.004**	0.003*	0.002	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Highest parental education level					
No qualifications	*Reference*				
School	-0.016	-0.016	-0.018	-0.019	-0.021
	(0.028)	(0.028)	(0.028)	(0.028)	(0.027)
Higher Education	-0.015	-0.015	-0.017	-0.018	-0.022
	(0.034)	(0.034)	(0.034)	(0.034)	(0.033)
UK area					
London/South	*Reference*				
North	0.080**	0.080**	0.080**	0.079**	0.076**
	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)
Midlands	0.002	0.002	0.000	-0.001	-0.003
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Scotland/Wales/NI	0.144***	0.144***	0.140***	0.138***	0.135***
	(0.034)	(0.034)	(0.033)	(0.033)	(0.033)
Urban area	0.006	0.006	0.005	0.006	0.007
	(0.029)	(0.029)	(0.029)	(0.028)	(0.028)
Constant	5.883***	5.883***	5.935***	5.977***	6.053***
	(0.093)	(0.093)	(0.093)	(0.093)	(0.094)
Observations: 25,941					
R-Squared (within):	0.0328	0.0328	0.0347	0.0359	0.0391
R-Squared (between):	0.0171	0.0171	0.0230	0.0277	0.0323
R-Squared (overall):	0.0221	0.0221	0.0261	0.0294	0.0336

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C12. Main Model estimated with DiD Multiple GT.

	Estimate	SE	LB CI	UB CI	N	Switchers
Parent Disabled (Non-Robust)	-0.155	0.053	-0.258	-0.051	5495	454
Parent Disabled (Robust)	-0.148	0.059	-0.263	-0.033	5421	439

Table C13. Randomisation test: Main Model.

T	T(obs.)	C	N	P=C/N	SE(P)	[95% Conf.	Interval]
Either Par. Disabled	0.035	9	200	0.045	0.015	0.021	0.084

Note: Confidence interval is with respect to P=C/N.
Note: c = #{|T| >= |T(obs.)|}

Table C14. Model Extension: Parental disability severity.

	(i) No Controls	(ii) Pre-Determined Controls	(iii) Additional Controls
Parent Non-Severe Dis.	-0.108	-0.097	-0.048
	(0.072)	(0.071)	(0.626)
Parent Severe Dis.	0.753***	0.730***	2.708***
	(0.192)	(0.199)	(0.655)
Age 10		*Reference*	
Age 11		-0.026	-0.130***
		(0.024)	(0.049)
Age 12		-0.109***	-0.284***
		(0.029)	(0.090)
Age 13		-0.256***	-0.490***
		(0.035)	(0.131)
Age 14		-0.377***	-0.682***
		(0.042)	(0.174)
Age 15		-0.465***	-0.853***
		(0.049)	(0.217)
No. of siblings			
1 or 2		*Reference*	
3 or 4		0.038	0.000
		(0.068)	(0.067)
More than 4		-0.029	-0.255
		(0.197)	(0.191)
Only Child		-0.039	-0.038
		(0.037)	(0.042)
Age of oldest parent		-0.001	0.086*
		(0.006)	(0.044)

Highest parental education level		
No qualifications	*Reference*	
School	-0.020	-0.026
	(0.093)	(0.172)
Higher Education	-0.014	-0.172
	(0.111)	(0.173)
UK area		
London/South	*Reference*	
North	0.136	0.273
	(0.292)	(0.404)
Midlands	-0.404	-0.447
	(0.400)	(0.342)
Scotland/Wales/NI	-0.471	-0.463
	(0.347)	(0.375)
Urban area	0.037	0.010
	(0.135)	(0.139)
Single Parent		-1.458***
		(0.271)
Own Health		
Excellent		*Reference*
Very good		-0.171***
		(0.031)
Good		-0.412***
		(0.042)
Fair		-0.596***
		(0.078)
Poor		-0.864***
		(0.205)
Household Income		0.006
		(0.026)
Talks to Parents		-0.076***
		(0.013)
Class Misbehaviour		
Not at all		*Reference*
Most/all of classes		-0.143*
		(0.077)
More than half of classes		-0.134*
		(0.074)
About half of classes		-0.116
		(0.076)
Now and then		-0.073
		(0.071)
Importance of Exams		
Very Important		*Reference*
Important		-0.186***
		(0.026)
Not very important		-0.091
		(0.107)
Not at all important		-0.300*
		(0.154)
Bullied		-0.165***

			(0.022)
No. of close friends			
1 to 5			*Reference*
6 to 10			0.067***
			(0.020)
More than 10			0.064**
			(0.029)
No friends			-0.333***
			(0.094)
Cares for Parent			
Year			
2009	*Reference*		
2010	0.229***	0.072**	0.084*
	(0.033)	(0.034)	(0.043)
2011	0.177***	0.090***	0.086**
	(0.034)	(0.033)	(0.041)
2012	0.146***	0.138***	0.108***
	(0.035)	(0.034)	(0.041)
2013	0.037	0.105***	0.073*
	(0.036)	(0.035)	(0.041)
2014	-0.019	0.119***	0.117***
	(0.036)	(0.036)	(0.041)
2015	-0.143***	0.065*	0.052
	(0.036)	(0.037)	(0.043)
2016	-0.232***	0.030	0.017
	(0.035)	(0.037)	(0.043)
2017	-0.447***	-0.046	-0.023
	(0.050)	(0.056)	(0.065)
2018	-0.433***	-0.122**	-0.114**
	(0.045)	(0.048)	(0.056)
Constant	5.644***	5.977***	2.470
	(0.058)	(0.350)	(2.027)
Observations:	25,941	25,941	25,941
R-Squared (within):	0.0251	0.0396	0.0921
R-Squared (between):	0.0025	0.0005	0.0118
R-Squared (overall):	0.0002	0.0002	0.0115

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C15. Model extension: New or recurring disability severity.

	(i) No Controls	**(ii) Pre-Determined Controls**	**(iii) Additional Controls**
New Parental Disability	0.005	0.050	0.046
	(0.031)	(0.031)	(0.033)
Recurring Parental Disability	-0.067**	-0.003	-0.026
	(0.032)	(0.032)	(0.035)

Age 10	*Reference*	
Age 11	-0.034	-0.157***
	(0.024)	(0.046)
Age 12	-0.126***	-0.339***
	(0.029)	(0.083)
Age 13	-0.281***	-0.570***
	(0.035)	(0.120)
Age 14	-0.409***	-0.790***
	(0.042)	(0.159)
Age 15	-0.507***	-0.988***
	(0.049)	(0.198)
No. of siblings		
1 or 2	*Reference*	
3 or 4	0.035	0.013
	(0.068)	(0.067)
More than 4	-0.056	-0.301
	(0.198)	(0.199)
Only Child	-0.041	-0.039
	(0.037)	(0.042)
Age of oldest parent	0.006	0.115***
	(0.006)	(0.040)
Highest parental education level		
No qualifications	*Reference*	
School	-0.035	-0.097
	(0.094)	(0.181)
Higher Education	-0.029	-0.150
	(0.111)	(0.182)
UK area		
London/South	*Reference*	
North	0.178	0.537
	(0.302)	(0.456)
Midlands	-0.410	-0.560
	(0.406)	(0.369)
Scotland/Wales/NI	-0.456	-0.438
	(0.350)	(0.386)
Urban area	0.038	0.022
	(0.137)	(0.140)
Single Parent		-1.526***
		(0.281)
Own Health		
Excellent		*Reference*
Very good		-0.171***
		(0.031)
Good		-0.412***
		(0.042)
Fair		-0.608***
		(0.079)
Poor		-0.851***
		(0.208)

Household Income			-0.002
			(0.026)
Talks to Parents			-0.075***
			(0.013)
Class Misbehaviour			
Not at all			*Reference*
Most/all of classes			-0.145*
			(0.077)
More than half of classes			-0.132*
			(0.074)
About half of classes			-0.119
			(0.076)
Now and then			-0.070
			(0.071)
Importance of Exams			
Very Important			*Reference*
Important			-0.187***
			(0.026)
Not very important			-0.088
			(0.107)
Not at all important			-0.302*
			(0.155)
Bullied			-0.167***
			(0.022)
No. of close friends			
1 to 5			*Reference*
6 to 10			0.067***
			(0.021)
More than 10			0.067**
			(0.029)
No friends			-0.339***
			(0.093)
Cares for Parent			-0.003
			(0.060)
Year			
2009	*Reference*		
2010	0.228***	0.070**	0.087**
	(0.033)	(0.034)	(0.044)
2011	0.181***	0.087***	0.088**
	(0.034)	(0.033)	(0.042)
2012	0.148***	0.135***	0.108***
	(0.035)	(0.034)	(0.042)
2013	0.043	0.105***	0.073*
	(0.036)	(0.035)	(0.041)
2014	-0.013	0.121***	0.117***
	(0.036)	(0.036)	(0.042)
2015	-0.140***	0.065*	0.049
	(0.036)	(0.037)	(0.043)
2016	-0.228***	0.029	0.012

	(0.035)	(0.037)	(0.044)
2017	-0.449***	-0.053	-0.041
	(0.050)	(0.056)	(0.065)
2018	-0.430***	-0.128***	-0.123**
	(0.045)	(0.048)	(0.056)
Constant	5.813***	5.848***	1.986
	(0.026)	(0.351)	(1.795)
Observations:	25,941	25,941	25.941
R-Squared (within):	0.0223	0.0370	0.0811
R-Squared (between):	0.0001	0.0012	0.0591
R-Squared (overall):	0.0026	0.0045	0.0534

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C16. Model extension: Two-parent families only.

	(i) No Controls	**(ii) Non-Mediating Controls**	**(iii) Additional Controls**
Parent Disabled	0.016	0.017	0.019
	(0.027)	(0.027)	(0.026)
Age 10			
Age 11		0.011	-0.018
		(0.031)	(0.032)
Age 12		-0.049	-0.073
		(0.048)	(0.050)
Age 13		-0.166**	-0.168**
		(0.066)	(0.070)
Age 14		-0.269***	-0.268***
		(0.086)	(0.091)
Age 15		-0.335***	-0.304***
		(0.107)	(0.113)
No. of siblings			
1 or 2			
3 or 4		-0.012	0.002
		(0.066)	(0.063)
More than 4		-0.314**	-0.311**
		(0.131)	(0.125)
Only Child		-0.026	-0.014
		(0.041)	(0.039)
Age of oldest parent		-0.032	-0.034
		(0.020)	(0.022)
Highest parental education level			
No qualifications			
School		-0.030	-0.012
		(0.103)	(0.096)
Higher Education		-0.107	-0.109
		(0.101)	(0.099)
UK area			

London/South		
North	0.484	0.266
	(0.470)	(0.420)
Midlands	-0.295	-0.387
	(0.440)	(0.345)
Scotland/Wales/NI	-0.554	-0.438
	(0.434)	(0.378)
Urban area	-0.031	-0.023
	(0.135)	(0.138)
Single Parent		-0.107
		(0.311)
Own Health		
Excellent		
Very good		-0.180***
		(0.029)
Good		-0.445***
		(0.040)
Fair		-0.662***
		(0.077)
Poor		-1.007***
		(0.209)
Household Income		-0.005
		(0.025)
Talks to Parents		-0.072***
		(0.012)
Class Misbehaviour		
Not at all		
Most/all of classes		-0.175**
		(0.069)
More than half of classes		-0.145**
		(0.067)
About half of classes		-0.129*
		(0.067)
Now and then		-0.085
		(0.063)
Importance of Exams		
Very Important		
Important		-0.186***
		(0.024)
Not very important		-0.092
		(0.102)
Not at all important		-0.317**
		(0.149)
Bullied		-0.178***
		(0.021)
No. of close friends		
1 to 5		
6 to 10		0.082***
		(0.019)
More than 10		0.098***
		(0.026)

No friends			-0.389***
			(0.092)
Cares for Parent			0.015
			(0.055)
Year			
2009			
2010	0.260***	0.068*	0.052
	(0.037)	(0.038)	(0.038)
2011	0.205***	0.085**	0.039
	(0.039)	(0.038)	(0.038)
2012	0.167***	0.128***	0.085**
	(0.041)	(0.039)	(0.039)
2013	0.057	0.098**	0.054
	(0.041)	(0.040)	(0.039)
2014	0.004	0.122***	0.085**
	(0.041)	(0.041)	(0.040)
2015	-0.104**	0.086**	0.052
	(0.041)	(0.042)	(0.041)
2016	-0.206***	0.043	0.029
	(0.040)	(0.042)	(0.042)
2017	-0.353***	0.036	0.045
	(0.054)	(0.061)	(0.059)
2018	-0.382***	-0.078	-0.078
	(0.050)	(0.055)	(0.054)
Constant	5.921***	7.612***	8.625***
	(0.032)	(0.946)	(1.020)
Observations:	18,501	18,501	18,501
R-Squared (within):	0.0232	0.0417	0.0868
R-Squared (between):	0.0005	0.0004	0.1115
R-Squared (overall):	0.0023	0.0017	0.0975

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C17. Model extension: Fathers only.

	(i) No Controls	**(ii) Non-Mediating Controls**	**(iii) Additional Controls**
Father disabled	0.018	0.011	0.012
	(0.037)	(0.036)	(0.036)
Age 10		*Reference*	
Age 11		-0.153***	-0.157***
		(0.046)	(0.046)
Age 12		-0.362***	-0.339***
		(0.083)	(0.083)
Age 13		-0.635***	-0.571***
		(0.121)	(0.120)
Age 14		-0.879***	-0.791***
		(0.160)	(0.159)
Age 15		-1.128***	-0.989***
		(0.200)	(0.198)

No. of siblings		
1 or 2	*Reference*	
3 or 4	0.032	0.011
	(0.073)	(0.067)
More than 4	-0.227	-0.302
	(0.219)	(0.199)
Only Child	-0.063	-0.040
	(0.045)	(0.042)
Age of oldest parent	0.137***	0.115***
	(0.040)	(0.040)
Highest parental education level		
No qualifications	*Reference*	
School	-0.130	-0.097
	(0.189)	(0.181)
Higher Education	-0.162	-0.151
	(0.203)	(0.182)
UK area		
London/South	*Reference*	
North	0.689	0.518
	(0.479)	(0.453)
Midlands	-0.446	-0.573
	(0.441)	(0.364)
Scotland/Wales/NI	-0.552	-0.452
	(0.430)	(0.381)
Urban area	0.016	0.020
	(0.137)	(0.140)
Single Parent		-1.529***
		(0.281)
Own Health		
Excellent		*Reference*
Very good		-0.171***
		(0.031)
Good		-0.413***
		(0.042)
Fair		-0.609***
		(0.079)
Poor		-0.851***
		(0.208)
Household Income		-0.002
		(0.026)
Talks to Parents		-0.075***
		(0.013)
Class Misbehaviour		
Not at all		*Reference*
Most/all of classes		-0.143*
		(0.077)
More than half of classes		-0.130*
		(0.074)
About half of classes		-0.118
		(0.076)
Now and then		-0.069

			(0.071)
Importance of Exams			
Very Important			*Reference*
Important			-0.188***
			(0.026)
Not very important			-0.088
			(0.108)
Not at all important			-0.301*
			(0.155)
Bullied			-0.167***
			(0.022)
No. of close friends			
1 to 5			*Reference*
6 to 10			0.067***
			(0.021)
More than 10			0.067**
			(0.029)
No friends			-0.338***
			(0.093)
Child cares for parent			-0.007
			(0.060)
Year			
2009	*Reference*		
2010	0.258***	0.100**	0.087**
	(0.041)	(0.044)	(0.044)
2011	0.224***	0.130***	0.088**
	(0.042)	(0.042)	(0.042)
2012	0.171***	0.147***	0.108***
	(0.044)	(0.043)	(0.042)
2013	0.066	0.113***	0.073*
	(0.043)	(0.042)	(0.041)
2014	0.032	0.146***	0.117***
	(0.043)	(0.042)	(0.042)
2015	-0.094**	0.078*	0.049
	(0.043)	(0.043)	(0.043)
2016	-0.200***	0.027	0.013
	(0.042)	(0.044)	(0.044)
2017	-0.408***	-0.050	-0.041
	(0.060)	(0.066)	(0.065)
2018	-0.399***	-0.126	-0.123**
	(0.052)	(0.058)	(0.056)
Constant	5.777***	0.157	1.979
	(0.033)	(1.776)	(1.795)
Observations:	19,222	19,222	19,222
R-Squared (within):	0.0213	0.0396	0.0809
R-Squared (between):	0.0002	0.0020	0.0587
R-Squared (overall):	0.0015	0.0020	0.0530

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C18. Model extension: Mothers only.

	(i) No Controls	(ii) Pre-Determined Controls	(iii) Additional Controls
Either Parent Disabled	0.002	0.017	0.042
	(0.030)	(0.029)	(0.033)
Age 10		*Reference*	
Age 11		-0.020	-0.018
		(0.023)	(0.032)
Age 12		-0.114***	-0.073
		(0.027)	(0.050)
Age 13		-0.266***	-0.168**
		(0.033)	(0.070)
Age 14		-0.403***	-0.269***
		(0.039)	(0.091)
Age 15		-0.475***	-0.304***
		(0.046)	(0.113)
No. of siblings			
1 or 2		*Reference*	
3 or 4		-0.008	0.003
		(0.064)	(0.063)
More than 4		-0.102	-0.311**
		(0.162)	(0.125)
Only Child		-0.019	-0.014
		(0.035)	(0.039)
Age of oldest parent		-0.002	-0.034
		(0.005)	(0.021)
Highest parental education level			
No qualifications		*Reference*	
School		0.008	-0.013
		(0.062)	(0.096)
Higher Education		0.002	-0.110
		(0.069)	(0.100)
UK area			
London/South		*Reference*	
North		0.073	0.258
		(0.284)	(0.422)
Midlands		-0.355	-0.394
		(0.403)	(0.346)
Scotland/Wales/NI		-0.466	-0.441
		(0.348)	(0.378)
Urban area		0.019	-0.022
		(0.138)	(0.138)
Single Parent			-0.101
			(0.311)
Own Health			
Excellent			*Reference*
Very good			-0.179***

				(0.029)
Good				-0.445***
				(0.040)
Fair				-0.662***
				(0.077)
Poor				-1.008***
				(0.208)
Household Income				-0.005
				(0.025)
Talks to Parents				-0.072***
				(0.012)
Class Misbehaviour				
Not at all				*Reference*
Most/all of classes				-0.174**
				(0.069)
More than half of classes				-0.145**
				(0.067)
About half of classes				-0.128*
				(0.067)
Now and then				-0.085
				(0.063)
Importance of Exams				
Very Important				*Reference*
Important				-0.185***
				(0.024)
Not very important				-0.092
				(0.102)
Not at all important				-0.317**
				(0.149)
Bullied				-0.178***
				(0.021)
No. of close friends				
1 to 5				*Reference*
6 to 10				0.082***
				(0.019)
More than 10				0.098***
				(0.026)
No friends				-0.390***
				(0.092)
Child cares for parent				0.016
				(0.055)
Year				
2009	*Reference*			
2010	0.229***	0.064**		0.051
	(0.031)	(0.031)		(0.038)
2011	0.165***	0.070**		0.039
	(0.032)	(0.031)		(0.038)
2012	0.142***	0.130***		0.086**

	(0.033)	(0.032)	(0.038)
2013	0.033	0.099***	0.054
	(0.034)	(0.033)	(0.039)
2014	-0.039	0.100***	0.085**
	(0.035)	(0.035)	(0.040)
2015	-0.152***	0.059*	0.053
	(0.035)	(0.036)	(0.041)
2016	-0.240***	0.028	0.030
	(0.034)	(0.036)	(0.042)
2017	-0.423***	-0.010	0.047
	(0.046)	(0.052)	(0.059)
2018	-0.423***	-0.106**	-0.077
	(0.043)	(0.047)	(0.054)
Constant	5.917***	6.300***	8.632***
	(0.026)	(0.328)	(1.016)
Observations:	25,220	25,220	25,220
R-Squared (within):	0.0237	0.0413	0.0869
R-Squared (between):	0.0003	0.0007	0.1103
R-Squared (overall):	0.0029	0.0045	0.0967

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C19. Model extension: Both parents.

	(i) No Controls	**(ii) Pre-Determined Controls**	**(iii) Additional Controls**
Father Disabled	0.014	0.002	-0.002
	(0.037)	(0.036)	(0.036)
Mother Disabled	0.010	0.021	0.028
	(0.036)	(0.036)	(0.035)
Both Parents Dis.	0.049	0.068	0.068
	(0.074)	(0.073)	(0.072)
Age 10		*Reference*	
Age 11		0.012	-0.018
		(0.031)	(0.032)
Age 12		-0.048	-0.072
		(0.048)	(0.050)
Age 13		-0.164**	-0.167**
		(0.066)	(0.070)
Age 14		-0.268***	-0.267***
		(0.086)	(0.091)
Age 15		-0.332***	-0.302***
		(0.107)	(0.113)
No. of siblings			
1 or 2		*Reference*	
3 or 4		-0.010	0.004

	(0.066)	(0.063)
More than 4	-0.317**	-0.313**
	(0.131)	(0.125)
Only Child	-0.026	-0.013
	(0.041)	(0.039)
Age of oldest parent	-0.033	-0.035
	(0.020)	(0.021)
Highest parental education level		
No qualifications	*Reference*	
School	-0.031	-0.013
	(0.103)	(0.097)
Higher Education	-0.109	-0.110
	(0.101)	(0.100)
UK area		
London/South	*Reference*	
North	0.471	0.250
	(0.475)	(0.425)
Midlands	-0.303	-0.396
	(0.442)	(0.347)
Scotland/Wales/NI	-0.560	-0.444
	(0.434)	(0.379)
Urban area	-0.030	-0.023
	(0.135)	(0.138)
Single Parent		-0.104
		(0.311)
Own Health		
Excellent		*Reference*
Very good		-0.179***
		(0.029)
Good		-0.445***
		(0.040)
Fair		-0.662***
		(0.077)
Poor		-1.008***
		(0.209)
Household Income		-0.005
		(0.025)
Talks to Parents		-0.072***
		(0.012)
Class Misbehaviour		
Not at all		*Reference*
Most/all of classes		-0.174**
		(0.070)
More than half of classes		-0.144**
		(0.067)
About half of classes		-0.128*
		(0.067)
Now and then		-0.085
		(0.063)

Importance of Exams			
Very Important			*Reference*
Important			-0.186***
			(0.024)
Not very important			-0.094
			(0.102)
Not at all important			-0.317**
			(0.149)
Bullied			-0.178***
			(0.021)
No. of close friends			
1 to 5			
6 to 10			0.082***
			(0.019)
More than 10			0.098***
			(0.026)
No friends			-0.388***
			(0.092)
Child cares for parent			0.014
			(0.055)
Year			
2009	*Reference*		
2010	0.261***	0.068*	0.052
	(0.037)	(0.038)	(0.038)
2011	0.205***	0.086**	0.039
	(0.039)	(0.038)	(0.038)
2012	0.168***	0.129***	0.086**
	(0.041)	(0.039)	(0.038)
2013	0.057	0.098**	0.054
	(0.041)	(0.040)	(0.039)
2014	0.004	0.123***	0.086**
	(0.041)	(0.041)	(0.040)
2015	-0.103**	0.088**	0.055
	(0.041)	(0.042)	(0.041)
2016	-0.206***	0.044	0.030
	(0.040)	(0.042)	(0.042)
2017	-0.353***	0.038	0.048
	(0.054)	(0.061)	(0.059)
2018	-0.384***	-0.079	-0.078
	(0.050)	(0.055)	(0.054)
Constant	5.919***	7.652***	8.662***
	(0.032)	(0.943)	(1.014)
Observations:	18,501	18,501	18,501
R-Squared (within):	0.0233	0.0419	0.087
R-Squared (between):	0.0007	0.0003	0.1094
R-Squared (overall):	0.0021	0.0016	0.0963

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C20. Model extension: Child's sex interaction.

	(i) No Controls	(ii) Pre-Determined Controls	(iii) Additional Controls
Either Parent Disabled	0.099**	0.064*	0.084**
	(0.041)	(0.036)	(0.040)
Either Parent Disabled*Girl	-0.092	-0.056	-0.075
	(0.059)	(0.052)	(0.057)
Age 10	*Reference*		
Age 11	-0.150***	-0.031	-0.157***
	(0.046)	(0.024)	(0.046)
Age 12	-0.358***	-0.122***	-0.338***
	(0.083)	(0.029)	(0.083)
Age 13	-0.628***	-0.276***	-0.570***
	(0.121)	(0.035)	(0.120)
Age 14	-0.870***	-0.403***	-0.789***
	(0.160)	(0.041)	(0.159)
Age 15	-1.116***	-0.501***	-0.987***
	(0.200)	(0.048)	(0.198)
No. of siblings			
1 or 2	*Reference*		
3 or 4	0.033	0.033	0.011
	(0.073)	(0.068)	(0.067)
More than 4	-0.224	-0.057	-0.305
	(0.219)	(0.198)	(0.199)
Only Child	-0.063	-0.041	-0.040
	(0.045)	(0.037)	(0.042)
Age of oldest parent	0.135***	0.006	0.115***
	(0.040)	(0.006)	(0.040)
Highest parental education level			
No qualifications	*Reference*		
School	-0.125	-0.035	-0.097
	(0.188)	(0.094)	(0.181)
Higher Education	-0.154	-0.026	-0.148
	(0.203)	(0.111)	(0.182)
UK area			
London/South	*Reference*		
North	0.640	0.161	0.485
	(0.492)	(0.301)	(0.461)
Midlands	-0.466	-0.419	-0.594
	(0.453)	(0.405)	(0.367)
Scotland/Wales/NI	-0.570	-0.467	-0.472
	(0.435)	(0.347)	(0.380)
Urban area	0.019	0.037	0.022
	(0.138)	(0.137)	(0.140)
Single Parent			-1.520***
			(0.281)

Own Health				
Excellent				*Reference*
Very good				-0.172***
				(0.031)
Good				-0.413***
				(0.042)
Fair				-0.610***
				(0.079)
Poor				-0.848***
				(0.208)
Household Income				-0.001
				(0.026)
Talks to Parents				-0.075***
				(0.013)
Class Misbehaviour				
Not at all				*Reference*
Most/all of classes				-0.140*
				(0.077)
More than half of classes				-0.128*
				(0.074)
About half of classes				-0.116
				(0.076)
Now and then				-0.068
				(0.071)
Importance of Exams				
Very Important				*Reference*
Important				-0.187***
				(0.026)
Not very important				-0.086
				(0.108)
Not at all important				-0.299*
				(0.155)
Bullied				-0.167***
				(0.022)
No. of close friends				
1 to 5				*Reference*
6 to 10				0.068***
				(0.021)
More than 10				0.067**
				(0.029)
No friends				-0.339***
				(0.093)
Cares for parent				-0.006
				(0.060)
Year				
2009	*Reference*			
2010	0.102**	0.072**		0.089**
	(0.044)	(0.034)		(0.044)
2011	0.132***	0.091***		0.090**

	(0.042)	(0.034)	(0.042)
2012	0.152***	0.138***	0.111***
	(0.043)	(0.034)	(0.042)
2013	0.114***	0.107***	0.075*
	(0.042)	(0.035)	(0.041)
2014	0.149***	0.122***	0.119***
	(0.042)	(0.036)	(0.042)
2015	0.078*	0.066*	0.051
	(0.044)	(0.037)	(0.043)
2016	0.026	0.029	0.013
	(0.044)	(0.037)	(0.043)
2017	-0.052	-0.054	-0.042
	(0.066)	(0.056)	(0.065)
2018	-0.131**	-0.130***	-0.127**
	(0.058)	(0.048)	(0.056)
Constant	0.166	5.849***	1.987
	(1.783)	(0.351)	(1.798)
Observations:	19,222	19,222	19,222
R-Squared (within):	0.0406	0.0370	0.0812
R-Squared (between):	0.0021	0.0011	0.0584
R-Squared (overall):	0.0021	0.0044	0.0529

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C21. Model extension: Child's age interactions.

	(i) No Controls	**(ii) Pre-Determined Controls**	**(iii) Additional Controls**
Either Parent Disabled	0.183***	0.108***	0.139**
	(0.050)	(0.053)	(0.059)
Either Parent Dis*Age11	-0.030	-0.073	-0.095
	(0.052)	(0.059)	(0.067)
Either Parent Dis*Age12	-0.043	-0.038	-0.055
	(0.055)	(0.061)	(0.069)
Either Parent Dis*Age13	-0.171***	-0.069	-0.072
	(0.058)	(0.064)	(0.071)
Either Parent Dis*Age14	-0.290***	-0.134**	-0.179**
	(0.060)	(0.065)	(0.071)
Either Parent Dis*Age15	-0.329***	-0.110	-0.143*
	(0.066)	(0.070)	(0.078)
Age 10		*Reference*	
Age 11		-0.015	-0.134***
		(0.027)	(0.049)
Age 12		-0.115***	-0.325***
		(0.031)	(0.084)
Age 13		-0.262***	-0.553***

	(0.037)	(0.121)
Age 14	-0.373***	-0.743***
	(0.043)	(0.160)
Age 15	-0.477***	-0.950***
	(0.050)	(0.199)
No. of siblings		
1 or 2	*Reference*	
3 or 4	0.035	0.015
	(0.068)	(0.067)
More than 4	-0.051	-0.297
	(0.198)	(0.198)
Only Child	-0.041	-0.039
	(0.037)	(0.042)
Age of oldest parent	0.006	0.114***
	(0.006)	(0.040)
Highest parental education level		
No qualifications	*Reference*	
School	-0.036	-0.100
	(0.094)	(0.181)
Higher Education	-0.026	-0.142
	(0.111)	(0.182)
UK area		
London/South	*Reference*	
North	0.168	0.510
	(0.300)	(0.448)
Midlands	-0.414	-0.574
	(0.401)	(0.359)
Scotland/Wales/NI	-0.459	-0.448
	(0.351)	(0.385)
Urban area	0.037	0.023
	(0.137)	(0.141)
Single Parent		-1.520***
		(0.282)
Own Health		
Excellent		*Reference*
Very good		-0.174***
		(0.031)
Good		-0.415***
		(0.043)
Fair		-0.611***
		(0.079)
Poor		-0.849***
		(0.207)
Household Income		-0.002
		(0.026)
Talks to Parents		-0.076***
		(0.013)
Class Misbehaviour		

Not at all			*Reference*
Most/all of classes			-0.143*
			(0.077)
More than half of classes			-0.130*
			(0.074)
About half of classes			-0.119
			(0.076)
Now and then			-0.069
			(0.071)
Importance of Exams			
Very Important			*Reference*
Important			-0.186***
			(0.026)
Not very important			-0.086
			(0.107)
Not at all important			-0.301*
			(0.155)
Bullied			-0.167***
			(0.022)
No. of close friends			
1 to 5			*Reference*
6 to 10			0.067***
			(0.021)
More than 10			0.066**
			(0.029)
No friends			-0.338***
			(0.093)
Cares for parent			-0.002
			(0.060)
Year			
2009	*Reference*		
2010	0.203***	0.072**	0.089**
	(0.033)	(0.034)	(0.044)
2011	0.163***	0.090***	0.090**
	(0.034)	(0.034)	(0.042)
2012	0.146***	0.138***	0.112***
	(0.035)	(0.034)	(0.042)
2013	0.049	0.107***	0.076*
	(0.035)	(0.035)	(0.041)
2014	0.003	0.121***	0.119***
	(0.036)	(0.036)	(0.042)
2015	-0.112***	0.065*	0.051
	(0.036)	(0.037)	(0.043)
2016	-0.193***	0.030	0.013
	(0.035)	(0.037)	(0.043)
2017	-0.396***	-0.054	-0.042
	(0.050)	(0.056)	(0.065)
2018	-0.386***	-0.127***	-0.121**

	(0.045)	(0.048)	(0.056)
Constant	5.791***	5.823***	1.975
	(0.027)	(0.350)	(1.802)
Observations:	19,222	19,222	19,222
R-Squared (within):	0.0253	0.0410	0.0817
R-Squared (between):	0.0000	0.0021	0.0587
R-Squared (overall):	0.0038	0.0021	0.0532

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C22. Model extension: Child's age and sex interactions.

	(i) No Controls	**(ii) Pre-Determined Controls**	**(iii) Additional Controls**
Either Parent Disabled	0.095	0.019	0.088
	(0.068)	(0.071)	(0.076)
Either Parent Dis.*Girl	0.182*	0.185**	0.116
	(0.097)	(0.097)	(0.109)
Either Parent Dis.*Age 11	-0.036	-0.079	-0.109
	(0.075)	(0.080)	(0.087)
Either Parent Dis.*Age 12	0.005	0.007	-0.033
	(0.076)	(0.081)	(0.088)
Either Parent Dis.*Age 13	0.008	0.112	0.089
	(0.081)	(0.084)	(0.089)
Either Parent Dis.*Age 14	-0.084	0.072	-0.016
	(0.080)	(0.084)	(0.089)
Either Parent Dis.*Age 15	-0.079	0.141	0.034
	(0.091)	(0.094)	(0.102)
Either Parent Dis.*Age 11*Girl	0.015	0.014	0.029
	(0.103)	(0.103)	(0.117)
Either Parent Dis.*Age 12*Girl	-0.097	-0.091	-0.050
	(0.108)	(0.108)	(0.121)
Either Parent Dis.*Age 13*Girl	-0.359***	-0.361***	-0.331***
	(0.114)	(0.114)	(0.125)
Either Parent Dis.*Age 14*Girl	-0.416***	-0.417***	-0.341***
	(0.116)	(0.116)	(0.127)
Either Parent Dis.*Age 15*Girl	-0.498***	-0.501***	-0.366***
	(0.127)	(0.127)	(0.139)
Age 10		*Reference*	
Age 11		-0.015	-0.133***
		(0.027)	(0.049)
Age 12		-0.114	-0.324***
		(0.031)	(0.084)
Age 13		-0.262	-0.553***
		(0.037)	(0.122)
Age 14		-0.373	-0.743***

	(0.043)	(0.161)
Age 15	-0.477	-0.950***
	(0.050)	(0.200)
No. of siblings		
1 or 2	*Reference*	
3 or 4	0.036	0.013
	(0.068)	(0.068)
More than 4	-0.049	-0.301
	(0.197)	(0.198)
Only Child	-0.041	-0.037
	(0.037)	(0.042)
Age of oldest parent	0.006	0.114***
	(0.006)	(0.040)
Highest parental education level		
No qualifications	*Reference*	
School	-0.026	-0.096
	(0.094)	(0.181)
Higher Education	-0.024	-0.143
	(0.110)	(0.181)
UK area		
London/South	*Reference*	
North	0.123	0.439
	(0.301)	(0.458)
Midlands	-0.430	-0.598
	(0.404)	(0.369)
Scotland/Wales/NI	-0.506	-0.501
	(0.344)	(0.375)
Urban area	0.043	0.029
	(0.136)	(0.138)
Single Parent		-1.511***
		(0.282)
Own Health		
Excellent		*Reference*
Very good		-0.172***
		(0.031)
Good		-0.410***
		(0.043)
Fair		-0.599***
		(0.079)
Poor		-0.850***
		(0.210)
Household Income		0.000
		(0.026)
Talks to Parents		-0.076***
		(0.013)
Class Misbehaviour		
Not at all		*Reference*
Most/all of classes		-0.129*

			(0.076)
More than half of classes			-0.114
			(0.073)
About half of classes			-0.108
			(0.075)
Now and then			-0.058
			(0.070)
Importance of Exams			
Very Important			*Reference*
Important			-0.186***
			(0.026)
Not very important			-0.089
			(0.108)
Not at all important			-0.296*
			(0.153)
Bullied			-0.163***
			(0.022)
No. of close friends			
1 to 5			*Reference*
6 to 10			0.065***
			(0.021)
More than 10			0.065**
			(0.029)
No friends			-0.333***
			(0.093)
Cares for parent			-0.006
			(0.061)
Year			
2009	*Reference*		
2010	0.202***	0.071	0.089**
	(0.033)	(0.034)	(0.044)
2011	0.164***	0.091	0.093**
	(0.034)	(0.033)	(0.042)
2012	0.146***	0.138	0.113***
	(0.035)	(0.034)	(0.042)
2013	0.051	0.109	0.078*
	(0.035)	(0.035)	(0.041)
2014	0.005	0.123	0.120***
	(0.036)	(0.036)	(0.041)
2015	-0.112***	0.065	0.050
	(0.036)	(0.037)	(0.043)
2016	-0.192***	0.031	0.015
	(0.035)	(0.037)	(0.043)
2017	-0.398***	-0.056	-0.040
	(0.050)	(0.056)	(0.065)
2018	-0.388***	-0.128	-0.122**
	(0.045)	(0.048)	(0.056)
Constant	5.790***	5.837	1.958

	(0.027)	(0.350)	(1.812)
Observations:	25,941	25,941	25,941
R-Squared (within):	0.0277	0.0396	0.0836
R-Squared (between):	0.0000	0.0010	0.0581
R-Squared (overall):	0.0048	0.0046	0.0531

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C23. Model extension: Child's age and sex interactions, severe parental disability only**.**

	(i) No Controls	**(ii) Non-Mediating Controls**	**(iii) Mediating Controls**
Either Parent Disabled	0.194***	0.116	0.027
	(0.100)	(0.102)	(0.072)
Either Parent Dis.*Girl	0.161	0.163	0.185*
	(0.142)	(0.142)	(0.103)
Either Parent Dis.*Age 11	-0.087	-0.135	-0.078
	(0.098)	(0.101)	(0.083)
Either Parent Dis.*Age 12	-0.084	-0.083	0.015
	(0.102)	(0.106)	(0.084)
Either Parent Dis.*Age 13	-0.078	0.024	0.130
	(0.106)	(0.109)	(0.086)
Either Parent Dis.*Age 14	-0.169	-0.024	0.025
	(0.106)	(0.109)	(0.087)
Either Parent Dis.*Age 15	-0.127	0.079	0.011
	(0.119)	(0.121)	(0.096)
Either Parent Dis.*Age 11*Girl	0.050	0.060	-0.031
	(0.134)	(0.135)	(0.114)
Either Parent Dis.*Age 12*Girl	-0.087	-0.068	-0.144
	(0.143)	(0.143)	(0.117)
Either Parent Dis.*Age 13*Girl	-0.302*	-0.295*	-0.397***
	(0.154)	(0.154)	(0.120)
Either Parent Dis.*Age 14*Girl	-0.363**	-0.359**	-0.385***
	(0.156)	(0.156)	(0.124)
Either Parent Dis.*Age 15*Girl	-0.490***	-0.486***	-0.395***
	(0.170)	(0.170)	(0.133)
Age 10		*Reference*	
Age 11		-0.011	0.003
		(0.027)	(0.035)
Age 12		-0.108***	-0.062
		(0.032)	(0.052)
Age 13		-0.254***	-0.156**
		(0.038)	(0.071)
Age 14		-0.352***	-0.231**
		(0.045)	(0.092)

Age 15	-0.455***	-0.263**
	(0.052)	(0.115)
No. of siblings		
1 or 2	*Reference*	
3 or 4	0.068	0.002
	(0.071)	(0.063)
More than 4	0.007	-0.304**
	(0.204)	(0.126)
Only Child	-0.043	-0.010
	(0.039)	(0.039)
Age of oldest parent	0.002	-0.033
	(0.006)	(0.022)
Highest parental education level		
No qualifications	*Reference*	
School	-0.034	-0.002
	(0.101)	(0.095)
Higher Education	-0.016	-0.098
	(0.120)	(0.097)
UK area		
London/South	*Reference*	
North	0.093	0.215
	(0.297)	(0.425)
Midlands	-0.555	-0.396
	(0.424)	(0.351)
Scotland/Wales/NI	-0.541	-0.469
	(0.349)	(0.373)
Urban area	0.003	-0.015
	(0.144)	(0.136)
Single Parent		-0.090
		(0.311)
Own Health		
Excellent		*Reference*
Very good		-0.180***
		(0.029)
Good		-0.442***
		(0.040)
Fair		-0.652***
		(0.077)
Poor		-1.009***
		(0.210)
Household Income		-0.004
		(0.025)
Talks to Parents		-0.073***
		(0.012)
Class Misbehaviour		
Not at all		*Reference*
Most/all of classes		-0.162**

			(0.068)
More than half of classes			-0.132**
			(0.066)
About half of classes			-0.123*
			(0.066)
Now and then			-0.076
			(0.062)
Importance of Exams			
Very Important			*Reference*
Important			-0.184***
			(0.024)
Not very important			-0.095
			(0.103)
Not at all important			-0.312**
			(0.148)
Bullied			-0.174***
			(0.021)
No. of close friends			
1 to 5			
6 to 10			0.080***
			(0.019)
More than 10			0.096***
			(0.026)
No friends			-0.384***
			(0.093)
Cares for parent			0.017
			(0.055)
Year			
2009	*Reference*		
2010	0.205***	0.072**	0.053
	(0.035)	(0.036)	(0.038)
2011	0.169***	0.096***	0.042
	(0.036)	(0.036)	(0.038)
2012	0.140***	0.134***	0.087**
	(0.037)	(0.036)	(0.038)
2013	0.033	0.097***	0.056
	(0.037)	(0.037)	(0.039)
2014	-0.023	0.103***	0.085**
	(0.038)	(0.038)	(0.040)
2015	-0.137***	0.051	0.051
	(0.038)	(0.039)	(0.041)
2016	-0.219***	0.017	0.030
	(0.037)	(0.040)	(0.042)
2017	-0.431***	-0.073	0.044
	(0.055)	(0.060)	(0.059)
2018	-0.407***	-0.129**	-0.075
	(0.048)	(0.052)	(0.054)
Constant	5.800***	6.070***	8.535***

	(0.029)	(0.361)	(1.023)
Observations:	25,941	25,941	25,941
R-Squared (within):	0.0270	0.0392	0.0899
R-Squared (between):	0.0000	0.0008	0.1134
R-Squared (overall):	0.0036	0.0039	0.1002

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C24. Model Extension: Child's age and sex interactions, father's disability only.

	(i) No Controls	**(ii) Pre-Determined Controls**	**(iii) Additional Controls**
Father Disabled	0.087	0.003	-0.002
	(0.108)	(0.107)	(0.103)
Father Dis.*Girl	0.088	0.103	0.069
	(0.164)	(0.161)	(0.158)
Father Dis.*Age 11	-0.016	-0.044	-0.016
	(0.122)	(0.124)	(0.125)
Father Dis.*Age 12	0.046	0.040	0.054
	(0.122)	(0.124)	(0.121)
Father Dis.*Age 13	0.059	0.164	0.176
	(0.129)	(0.130)	(0.123)
Father Dis.*Age 14	-0.160	-0.022	-0.025
	(0.121)	(0.122)	(0.116)
Father Dis.*Age 15	-0.077	0.168	0.168
	(0.147)	(0.147)	(0.139)
Father Dis.*Age 11*Girl	0.056	0.048	0.020
	(0.177)	(0.175)	(0.175)
Father Dis.*Age 12*Girl	-0.063	-0.075	-0.052
	(0.185)	(0.182)	(0.180)
Father Dis.*Age 13*Girl	-0.299	-0.328**	-0.297
	(0.190)	(0.187)	(0.182)
Father Dis.*Age 14*Girl	-0.292	-0.297	-0.224
	(0.191)	(0.186)	(0.182)
Father Dis.*Age 15*Girl	-0.392*	-0.414**	-0.347*
	(0.204)	(0.201)	(0.195)
Age 10		*Reference*	
Age 11		-0.150***	-0.156***
		(0.048)	(0.047)
Age 12		-0.364***	-0.343***
		(0.084)	(0.083)
Age 13		-0.637***	-0.577***
		(0.121)	(0.120)
Age 14		-0.858***	-0.775***
		(0.160)	(0.159)
Age 15		-1.124***	-0.990***

	(0.200)	(0.198)
No. of siblings		
1 or 2	*Reference*	
3 or 4	0.035	0.013
	(0.073)	(0.067)
More than 4	-0.223	-0.299
	(0.218)	(0.198)
Only Child	-0.060	-0.038
	(0.045)	(0.042)
Age of oldest parent	0.136***	0.115***
	(0.040)	(0.040)
Highest parental education level		
No qualifications	*Reference*	
School	-0.127	-0.093
	(0.188)	(0.181)
Higher Education	-0.159	-0.148
	(0.203)	(0.182)
UK area		
London/South	*Reference*	
North	0.677	0.514
	(0.476)	(0.451)
Midlands	-0.457	-0.579
	(0.440)	(0.362)
Scotland/Wales/NI	-0.566	-0.460
	(0.430)	(0.383)
Urban area	0.022	0.026
	(0.136)	(0.138)
Single Parent		-1.531***
		(0.282)
Own Health		
Excellent		*Reference*
Very good		-0.172***
		(0.031)
Good		-0.412***
		(0.042)
Fair		-0.605***
		(0.079)
Poor		-0.835***
		(0.209)
Household Income		0.001
		(0.027)
Talks to Parents		-0.075***
		(0.013)
Class Misbehaviour		
Not at all		*Reference*
Most/all of classes		-0.135*
		(0.076)
More than half of classes		-0.122*

			(0.074)
About half of classes			-0.112
			(0.075)
Now and then			-0.062
			(0.070)
Importance of Exams			
Very Important			*Reference*
Important			-0.188***
			(0.026)
Not very important			-0.092
			(0.108)
Not at all important			-0.297*
			(0.154)
Bullied			-0.166***
			(0.022)
No. of close friends			
1 to 5			*Reference*
6 to 10			0.067***
			(0.021)
More than 10			0.066**
			(0.029)
No friends			-0.335***
			(0.094)
Cares for parent			-0.010
			(0.060)
Year			
2009	*Reference*		
2010	0.244***	0.102**	0.089**
	(0.041)	(0.044)	(0.044)
2011	0.218***	0.133***	0.090**
	(0.042)	(0.042)	(0.042)
2012	0.169***	0.148***	0.109***
	(0.043)	(0.043)	(0.042)
2013	0.072*	0.116***	0.076**
	(0.043)	(0.042)	(0.041)
2014	0.042	0.147***	0.118***
	(0.043)	(0.042)	(0.042)
2015	-0.076*	0.080**	0.052
	(0.043)	(0.043)	(0.043)
2016	-0.175***	0.031	0.016
	(0.042)	(0.044)	(0.043)
2017	-0.371***	-0.045	-0.036
	(0.060)	(0.066)	(0.065)
2018	-0.375***	-0.125**	-0.122**
	(0.052)	(0.058)	(0.056)
Constant	5.770***	0.155	1.930
	(0.033)	(1.777)	(1.794)
Observations:	19,222	19,222	19,222

R-Squared (within):	0.0245	0.0245	0.0821
R-Squared (between):	0.0001	0.0001	0.0584
R-Squared (overall):	0.0024	0.0024	0.0529

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C25. Model Extension: Child's age and sex interactions, mother's disability only.

	(i) No Controls	**(ii) Pre-Determined Controls**	**(iii) Additional Controls**
Mother Disabled	0.073	0.023	0.142
	(0.080)	(0.083)	0.093
Mother Dis.*Girl	0.289**	0.279**	0.209
	(0.115)	(0.115)	0.134
Mother Dis.*Age 11	-0.058	-0.118	-0.187*
	(0.088)	(0.092)	0.103
Mother Dis.*Age 12	-0.027	-0.036	-0.094
	(0.091)	(0.095)	0.109
Mother Dis.*Age 13	-0.033	0.053	0.007
	(0.094)	(0.098)	0.109
Mother Dis.*Age 14	-0.076	0.086	-0.038
	(0.097)	(0.100)	0.111
Mother Dis.*Age 15	-0.119	0.068	-0.136
	(0.105)	(0.107)	0.122
Mother Dis.*Age 11*Girl	-0.044	-0.040	-0.018
	(0.121)	(0.121)	0.144
Mother Dis.*Age 12*Girl	-0.175	-0.165	-0.141
	(0.128)	(0.128)	0.152
Mother Dis.*Age 13*Girl	-0.460***	-0.455***	-0.450***
	(0.135)	(0.135)	0.156
Mother Dis.*Age 14*Girl	-0.521***	-0.519***	-0.444***
	(0.137)	(0.137)	0.158
Mother Dis.*Age 15*Girl	-0.590***	-0.585***	-0.414**
	(0.152)	(0.151)	0.173
Age 10		*Reference*	
Age 11		0.001	0.010
		(0.024)	0.033
Age 12		-0.096***	-0.051
		(0.029)	0.051
Age 13		-0.238***	-0.139**
		(0.034)	0.07
Age 14		-0.375***	-0.232**
		(0.040)	0.091
Age 15		-0.438***	-0.256**
		(0.047)	0.114

No. of siblings		
1 or 2	*Reference*	
3 or 4	-0.006	0.002
	(0.064)	0.063
More than 4	-0.092	-0.306**
	(0.162)	0.127
Only Child	-0.018	-0.010
	(0.035)	0.039
Age of oldest parent	-0.002	-0.033
	(0.005)	0.022
Highest parental education level		
No qualifications	*Reference*	
School	0.019	-0.004
	(0.062)	0.096
Higher Education	0.008	-0.093
	(0.069)	0.097
UK area		
London/South	*Reference*	
North	0.033	0.225
	(0.290)	0.429
Midlands	-0.363	-0.388
	(0.404)	0.354
Scotland/Wales/NI	-0.491	-0.450
	(0.349)	0.38
Urban area	0.026	-0.014
	(0.137)	0.136
Single Parent		-0.066
		0.311
Own Health		
Excellent		*Reference*
Very good		-0.180***
		0.029
Good		-0.445***
		0.04
Fair		-0.654***
		0.077
Poor		-1.027***
		0.211
Household Income		-0.006
		0.025
Talks to Parents		-0.072***
		0.012
Class Misbehaviour		
Not at all		*Reference*
Most/all of classes		-0.168**
		0.068
More than half of classes		-0.136**
		0.065
About half of classes		-0.126*

			0.066
Now and then			-0.080
			0.062
Importance of Exams			
Very Important			*Reference*
Important			-0.184***
			0.024
Not very important			-0.095
			0.103
Not at all important			-0.302**
			0.147
Bullied			-0.175***
			0.021
No. of close friends			
1 to 5			*Reference*
6 to 10			0.080***
			0.019
More than 10			0.097***
			0.026
No friends			-0.386***
			0.092
Cares for parent			0.023
			0.055
Year			
2009	*Reference*		
2010	0.206***	0.063**	0.052
	(0.031)	(0.031)	0.038
2011	0.152***	0.071**	0.040
	(0.032)	(0.031)	0.038
2012	0.143***	0.132***	0.088**
	(0.033)	(0.032)	0.038
2013	0.042	0.100***	0.054
	(0.034)	(0.033)	0.039
2014	-0.020	0.101***	0.086**
	(0.035)	(0.035)	0.04
2015	-0.128***	0.057	0.051
	(0.034)	(0.036)	0.041
2016	-0.206***	0.027	0.030
	(0.034)	(0.036)	0.042
2017	-0.375***	-0.016	0.042
	(0.046)	(0.052)	0.059
2018	-0.375***	-0.102**	-0.071
	(0.043)	(0.047)	0.054
Constant	5.907***	6.265***	8.541***
	(0.025)	(0.329)	1.018
Observations:	25,220	25,220	25,220
R-Squared (within):	0.0295	0.0444	0.0903
R-Squared (between):	0.0000	0.0008	0.113
R-Squared (overall):	0.0062	0.0051	0.1005

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C26. Model extension: Child's age and sex interactions, father's disability only, controlling for father's SWB and weekly labour hours.

	(i) Father's SWB	(ii) Father's Labour Hours
Father Disabled	-0.002	-0.002
	(0.103)	(0.103)
Father Dis.*Girl	0.069	0.070
	(0.158)	(0.158)
Father Dis.*Age 11	-0.016	-0.014
	(0.125)	(0.125)
Father Dis.*Age 12	0.054	0.055
	(0.121)	(0.121)
Father Dis.*Age 13	0.176	0.181
	(0.123)	(0.123)
Father Dis.*Age 14	-0.025	-0.021
	(0.116)	(0.116)
Father Dis.*Age 15	0.168	0.173
	(0.139)	(0.138)
Father Dis.*Age 11*Girl	0.020	0.017
	(0.175)	(0.175)
Father Dis.*Age 12*Girl	-0.052	-0.056
	(0.180)	(0.180)
Father Dis.*Age 13*Girl	-0.297	-0.305*
	(0.182)	(0.182)
Father Dis.*Age 14*Girl	-0.223	-0.229
	(0.182)	(0.182)
Father Dis.*Age 15*Girl	-0.347*	-0.359*
	(0.195)	(0.195)
Age 10	*Reference*	
Age 11	-0.156***	-0.154***
	(0.047)	(0.047)
Age 12	-0.343***	-0.339***
	(0.083)	(0.083)
Age 13	-0.576***	-0.570***
	(0.120)	(0.120)
Age 14	-0.775***	-0.768***
	(0.159)	(0.159)
Age 15	-0.990***	-0.981***
	(0.198)	(0.198)
No. of siblings		
1 or 2	*Reference*	
3 or 4	0.012	0.014
	(0.067)	(0.067)
More than 4	-0.300	-0.293

	(0.198)	(0.199)
Only Child	-0.038	-0.037
	(0.042)	(0.042)
Age of oldest parent	0.115***	0.114***
	(0.040)	(0.040)
Highest parental education level		
No qualifications	*Reference*	
School	-0.093	-0.090
	(0.181)	(0.181)
Higher Education	-0.148	-0.146
	(0.182)	(0.182)
UK area		
London/South	*Reference*	
North	0.513	0.515
	(0.450)	(0.454)
Midlands	-0.579	-0.573
	(0.362)	(0.367)
Scotland/Wales/NI	-0.460	-0.450
	(0.382)	(0.383)
Urban area	0.027	0.027
	(0.138)	(0.138)
Single Parent	-1.530***	-1.528***
	(0.282)	(0.282)
Own Health		
Excellent	*Reference*	
Very good	-0.172***	-0.172***
	(0.031)	(0.031)
Good	-0.412***	-0.412***
	(0.042)	(0.042)
Fair	-0.605***	-0.606***
	(0.079)	(0.079)
Poor	-0.835***	-0.836***
	(0.209)	(0.209)
Household Income	0.001	-0.011
	(0.027)	(0.027)
Talks to Parents	-0.075***	-0.075***
	(0.013)	(0.013)
Class Misbehaviour		
Not at all	*Reference*	
Most/all of classes	-0.135*	-0.135*
	(0.076)	(0.076)
More than half of classes	-0.122*	-0.122*
	(0.074)	(0.073)
About half of classes	-0.112	-0.112
	(0.075)	(0.075)
Now and then	-0.062	-0.061
	(0.070)	(0.070)
Importance of Exams		
Very Important	*Reference*	
Important	-0.188***	-0.188***

	(0.026)	(0.026)
Not very important	-0.092	-0.093
	(0.108)	(0.108)
Not at all important	-0.297*	-0.298*
	(0.154)	(0.155)
Bullied	-0.166***	-0.165***
	(0.022)	(0.022)
No. of close friends		
1 to 5	*Reference*	
6 to 10	0.067***	0.068***
	(0.021)	(0.021)
More than 10	0.066**	0.066**
	(0.029)	(0.029)
No friends	-0.335***	-0.331***
	(0.094)	(0.094)
Cares for parent	-0.009	-0.009
	(0.060)	(0.060)
Father's SWB	0.001	
	(0.003)	
Father's Labour Hours		0.005**
		(0.002)
Father's Lbr Hrs Squared		0.000**
		(0.000)
Year		
2009	*Reference*	
2010	0.089**	0.088**
	(0.044)	(0.044)
2011	0.091**	0.089**
	(0.042)	(0.042)
2012	0.110***	0.109***
	(0.042)	(0.042)
2013	0.076*	0.073*
	(0.041)	(0.041)
2014	0.118***	0.118***
	(0.042)	(0.042)
2015	0.052	0.050
	(0.043)	(0.043)
2016	0.016	0.015
	(0.044)	(0.044)
2017	-0.036	-0.037
	(0.065)	(0.065)
2018	-0.122**	-0.123***
	(0.056)	(0.056)
Constant	1.928	2.034
	(1.794)	(1.795)
Observations:	19,097	19,097
R-Squared (within):	0.0821	0.0821
R-Squared (between):	0.0583	0.0583
R-Squared (overall):	0.0529	0.0529

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C27. Model extension: Child's age and sex interactions, mother's disability only, controlling for mother's SWB and weekly labour hours.

	(i) Mother's SWB	**(ii) Mother's Labour Hours**
Mother Disabled	0.143	0.143
	(0.094)	(0.094)
Mother Dis.*Girl	0.208	0.210
	(0.134)	(0.134)
Mother Dis.*Age 11	-0.186*	-0.187*
	(0.103)	(0.103)
Mother Dis.*Age 12	-0.095	-0.094
	(0.109)	(0.110)
Mother Dis.*Age 13	0.006	0.003
	(0.109)	(0.109)
Mother Dis.*Age 14	-0.038	-0.043
	(0.111)	(0.111)
Mother Dis.*Age 15	-0.137	-0.141
	(0.122)	(0.123)
Mother Dis.*Age 11*Girl	-0.017	-0.018
	(0.144)	(0.144)
Mother Dis.*Age 12*Girl	-0.141	-0.141
	(0.152)	(0.152)
Mother Dis.*Age 13*Girl	-0.446***	-0.448***
	(0.156)	(0.156)
Mother Dis.*Age 14*Girl	-0.442***	-0.442***
	(0.158)	(0.158)
Mother Dis.*Age 15*Girl	-0.414**	-0.413**
	(0.173)	(0.173)
Age 10	*Reference*	
Age 11	0.010	0.011
	(0.033)	(0.033)
Age 12	-0.050	-0.049
	(0.051)	(0.051)
Age 13	-0.137*	-0.136*
	(0.070)	(0.070)
Age 14	-0.231**	-0.229**
	(0.092)	(0.092)
Age 15	-0.254**	-0.252**
	(0.114)	(0.114)
No. of siblings		
1 or 2	*Reference*	
3 or 4	0.003	0.001
	(0.063)	(0.063)
More than 4	-0.304**	-0.305**
	(0.127)	(0.127)
Only Child	-0.009	-0.010
	(0.039)	(0.039)
Age of oldest parent	-0.033	-0.033

	(0.022)	(0.022)
Highest parental education level		
No qualifications	*Reference*	
School	-0.004	-0.013
	(0.096)	(0.096)
Higher Education	-0.092	-0.090
	(0.097)	(0.097)
UK area		
London/South	*Reference*	
North	0.226	0.228
	(0.431)	(0.430)
Midlands	-0.382	-0.392
	(0.360)	(0.354)
Scotland/Wales/NI	-0.451	-0.457
	(0.382)	(0.380)
Urban area	-0.011	-0.014
	(0.136)	(0.136)
Single Parent	-0.069	-0.069
	(0.311)	(0.310)
Own Health		
Excellent	*Reference*	
Very good	-0.181***	-0.181***
	(0.029)	(0.029)
Good	-0.445***	-0.445***
	(0.040)	(0.040)
Fair	-0.656***	-0.653***
	(0.077)	(0.077)
Poor	-1.029***	-1.026***
	(0.211)	(0.212)
Household Income	-0.006	0.000
	(0.025)	(0.025)
Talks to Parents	-0.072***	-0.072***
	(0.012)	(0.012)
Class Misbehaviour		
Not at all	*Reference*	
Most/all of classes	-0.169**	-0.171**
	(0.068)	(0.068)
More than half of classes	-0.138**	-0.139**
	(0.065)	(0.065)
About half of classes	-0.127*	-0.129**
	(0.066)	(0.066)
Now and then	-0.082	-0.084
	(0.062)	(0.062)
Importance of Exams		
Very Important	*Reference*	
Important	-0.184***	-0.183***
	(0.024)	(0.024)
Not very important	-0.095	-0.095
	(0.103)	(0.103)
Not at all important	-0.298**	-0.295**
	(0.147)	(0.147)

Bullied	-0.175***	-0.175***
	(0.021)	(0.021)
No. of close friends		
1 to 5	*Reference*	
6 to 10	0.080***	0.080***
	(0.019)	(0.019)
More than 10	0.097***	0.097***
	(0.026)	(0.026)
No friends	-0.386***	-0.385***
	(0.092)	(0.092)
Cares for parent	0.024	0.024
	(0.055)	(0.055)
Mother's SWB	0.004	
	(0.003)	
Mother's Labour Hours		0.000
		(0.003)
Mother's Labour Hrs Squared		0.000
		(0.000)
Year		
2009	*Reference*	
2010	0.053	0.051
	(0.038)	(0.038)
2011	0.042	0.040
	(0.038)	(0.038)
2012	0.090**	0.087**
	(0.038)	(0.038)
2013	0.056	0.054
	(0.039)	(0.039)
2014	0.085**	0.085**
	(0.040)	(0.040)
2015	0.050	0.052
	(0.041)	(0.041)
2016	0.028	0.030
	(0.042)	(0.042)
2017	0.041	0.043
	(0.059)	(0.059)
2018	-0.073	-0.072
	(0.054)	(0.054)
Constant	8.527***	8.504***
	(1.019)	(1.018)
Observations:	18,381	
R-Squared (within):	0.0905	0.0906
R-Squared (between):	0.1143	0.1112
R-Squared (overall):	0.1016	0.0994

Standard errors (clustered on the individual) are displayed in brackets.
P-Values: ***1%, **5%, *10%.

Table C28. Pre/Post [Year]: Model extension: Child's age and sex interactions.

	(i) Pre-2011	**(ii) Post-2011**	**(iii) Pre-2012**	**(iv) Post-2012**
Either Parent Disabled	0.324	-0.080	0.042	-0.015
	(0.270)	(0.085)	(0.152)	(0.098)
Either Parent Dis.*Girl	0.152	0.165	0.141	0.064
	(0.391)	(0.119)	(0.206)	(0.140)
Either Parent Dis.*Age 11	-0.470	0.069	-0.194	-0.035
	(0.269)	(0.088)	(0.158)	(0.101)
Either Parent Dis.*Age 12	-0.249	0.165*	-0.035	0.090
	(0.300)	(0.092)	(0.170)	(0.107)
Either Parent Dis.*Age 13	-0.201	0.181*	0.049	0.116
	(0.326)	(0.098)	(0.178)	(0.116)
Either Parent Dis.*Age 14	-0.279	0.128	-0.046	0.067
	(0.348)	(0.099)	(0.192)	(0.114)
Either Parent Dis.*Age 15	-0.044	0.185*	0.220	0.089
	(0.417)	(0.112)	(0.230)	(0.129)
Either Parent Dis.*Age 11*Girl	0.282	0.011	0.166	0.168
	(0.368)	(0.122)	(0.207)	(0.141)
Either Parent Dis.*Age 12*Girl	0.133	-0.047	-0.087	0.078
	(0.440)	(0.130)	(0.232)	(0.152)
Either Parent Dis.*Age 13*Girl	-0.043	-0.292**	-0.275	-0.229
	(0.486)	(0.137)	(0.246)	(0.161)
Either Parent Dis.*Age 14*Girl	-0.033	-0.350**	-0.284	-0.235
	(0.530)	(0.138)	(0.263)	(0.161)
Either Parent Dis.*Age 15*Girl	-0.085	-0.481***	-0.466	-0.420
	(0.633)	(0.152)	(0.315)	(0.177)
Year				
2009	*Reference*			
2010	-0.022		-0.030	
	(0.043)		(0.038)	
2011			-0.102**	
			(0.042)	
2012		-0.049**		
		(0.024)		
2013		-0.176***		-0.112***
		(0.028)		(0.026)
2014		-0.261***		-0.205***
		(0.032)		(0.030)
2015		-0.424***		-0.368***
		(0.037)		(0.034)
2016		-0.554***		-0.495***
		(0.042)		(0.039)
2017		-0.737***		-0.677***

		(0.053)		(0.052)
2018		-0.881***		-0.819***
		(0.066)		(0.065)
Constant	5.783***	6.085***	5.880***	6.081***
	(0.042)	(0.024)	(0.033)	(0.024)
Observations:	5,599	20,342	9,182	16,759
R-Squared (within):	0.0328	0.0424	0.0061	0.0462
R-Squared (between):	0.0171	0.0001	0.0003	0.0000
R-Squared (overall):	0.0221	0.0033	0.0004	0.0039

P-Values: *** 1%, ** 5%, *10%

Standard errors (clustered on the individual) are displayed in brackets.

Table C28 (cont.). Pre/Post [Year]: Models extension: Child's age and sex interactions.

	(v) Pre-2013	(vi) Post-2013	(vii) Pre-2014	(viii) Post-2014
Either Parent Disabled	0.101	-0.072	0.096	-0.108
	(0.105)	(0.112)	(0.092)	(0.130)
Either Parent Dis.*Girl	0.188	0.088	0.233*	0.070
	(0.154)	(0.161)	(0.130)	(0.194)
Either Parent Dis.*Age 11	-0.090	0.095	-0.086	0.250*
	(0.120)	(0.109)	(0.105)	(0.131)
Either Parent Dis.*Age 12	-0.069	0.145	-0.005	0.233
	(0.119)	(0.119)	(0.104)	(0.145)
Either Parent Dis.*Age 13	-0.023	0.197	0.036	0.263*
	(0.129)	(0.126)	(0.112)	(0.147)
Either Parent Dis.*Age 14	-0.081	0.129	-0.053	0.238
	(0.134)	(0.129)	(0.112)	(0.154)
Either Parent Dis.*Age 15	-0.003	0.162	-0.051	0.257
	(0.158)	(0.148)	(0.131)	(0.173)
Either Parent Dis.*Age 11*Girl	-0.016	0.048	0.000	-0.102
	(0.163)	(0.160)	(0.138)	(0.191)
Either Parent Dis.*Age 12*Girl	-0.109	0.047	-0.128	0.020
	(0.174)	(0.174)	(0.145)	(0.213)
Either Parent Dis.*Age 13*Girl	-0.301	-0.290	-0.389**	-0.284
	(0.184)	(0.181)	(0.154)	(0.216)
Either Parent Dis.*Age 14*Girl	-0.350*	-0.289	-0.507***	-0.266
	(0.193)	(0.187)	(0.162)	(0.226)
Either Parent Dis.*Age 15*Girl	-0.359	-0.447**	-0.488***	-0.375
	(0.219)	(0.207)	(0.178)	(0.245)
Year				
2009	*Reference*			
2010	0.009		0.066*	

	(0.037)		(0.036)	
2011	-0.061		0.003	
	(0.040)		(0.038)	
2012	-0.077*		-0.022	
	(0.044)		(0.041)	
2013			-0.138***	
			(0.043)	
2014		-0.112***		
		(0.026)		
2015		-0.275***		-0.155***
		(0.031)		(0.027)
2016		-0.401***		-0.285***
		(0.036)		(0.033)
2017		-0.588***		-0.477***
		(0.049)		(0.048)
2018		-0.726***		-0.622***
		(0.063)		(0.061)
Constant	5.867***	6.034***	5.845***	5.972***
	(0.033)	(0.024)	(0.033)	(0.024)
Observations:	12,407	13,534	15,430	10,511
R-Squared (within):	0.0051	0.0478	0.0127	0.0432
R-Squared (between):	0.0000	0.0004	0.0001	0.0004
R-Squared (overall):	0.0005	0.0035	0.0019	0.0025

P-Values: *** 1%, ** 5%, *10%
Standard errors (clustered on the individual) are displayed in brackets.

Table C28 (cont.). Pre/Post [Year]: Model extension: Child's age and sex interactions.

	(ix) Pre-2015	**(x) Post-2015**
Either Parent Disabled	0.090	-0.076
	(0.082)	(0.181)
Either Parent Dis.*Girl	0.260**	0.071
	(0.115)	(0.262)
Either Parent Dis.*Age 11	-0.132	0.311*
	(0.094)	(0.165)
Either Parent Dis.*Age 12	-0.025	0.166
	(0.091)	(0.198)
Either Parent Dis.*Age 13	0.004	0.246
	(0.100)	(0.202)
Either Parent Dis.*Age 14	-0.078	0.136
	(0.099)	(0.201)
Either Parent Dis.*Age 15	-0.108	0.283
	(0.119)	(0.226)
Either Parent Dis.*Age 11*Girl	0.027	-0.177
	(0.125)	(0.244)

Either Parent Dis.*Age 12*Girl	-0.143	0.119
	(0.128)	(0.279)
Either Parent Dis.*Age 13*Girl	-0.426***	-0.304
	(0.137)	(0.282)
Either Parent Dis.*Age 14*Girl	-0.499***	-0.229
	(0.143)	(0.291)
Either Parent Dis.*Age 15*Girl	-0.522***	-0.530*
	(0.162)	(0.311)
Year		
2009	*Reference*	
2010	0.108***	
	(0.036)	
2011	0.056	
	(0.037)	
2012	0.029	
	(0.040)	
2013	-0.076*	
	(0.041)	
2014	-0.127***	
	(0.043)	
2015		
2016		-0.125***
		(0.029)
2017		-0.319***
		(0.045)
2018		-0.450***
		(0.061)
Constant	5.827***	5.874***
	(0.032)	(0.025)
Observations:	18,234	7,707
R-Squared (within):	0.0152	0.0389
R-Squared (between):	0.0001	0.0002
R-Squared (overall):	0.0028	0.0028

P-Values: *** 1%, ** 5%, *10%

Standard errors (clustered on the individual) are displayed in brackets.

Table C29. Randomisation test: Model extension: Child's age and sex interactions.

	C	N	P=C/N	SE(P)	[95% Conf. Interval]	
Parent Disabled	0.095	200	0	0	0.000	0.018
Parent. Dis.*Girl	0.182	200	0	0	0.000	0.018275
Par. Dis.*Girl*Age13	-0.359	200	0	0	0.000	0.018275
Par. Dis.*Girl*Age14	-0.416	200	0	0	0.000	0.018275
Par. Dis.*Girl*Age15	-0.498	200	0	0	0.000	0.018275