IARIW 2025

IARIW 2025

Monday, March 24 & Tuesday, March 25

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Paper prepared for the IARIW-Hitotsubashi University Conference "Population Ageing: Implications for Economic Measurement and Economic Performance"
March 24-25, 2025
Session 6: Inter- and Intra-generational Inequality (Plenary)
Time: Tuesday, March 25, 2025 [10:00-12:00 JST]

The Old Folks at Home: Parental Retirement and Adult Children's Well-being

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Abstract

We here use UK data and exploit the State Pension eligibility age to establish the causal effect of parental retirement on adult children's well-being in a Fuzzy Regression Discontinuity Design analysis. Maternal retirement increases adult children's life and income satisfaction by 0.20 standard deviations in the short run. In Difference-in-Differences regressions based on a reform to the eligibility age, fathers' retirement reduces adult sons' life and income satisfaction by 0.14 and 0.12 standard deviations. These impacts are stronger for adult children with lower incomes, with young children of their own, and who live close to their retired parents. We emphasise the critical role of intergenerational time transfers from retired mothers in enhancing their adult children's well-being.

Key words: Retirement; Well-being; Adult children; Inter-generational transfers.

JEL classification: J08; J26; I31; H23.

[1] We would like to thank three anonymous referees for very helpful comments,and seminar participants at the University of Exeter, the LABOR workshop (CCA), LISER, and the University of Luxembourg. We gratefully acknowledge financial support from the Luxembourg National Research Fund under the PRIDE program (PRIDE17/12252781-DTU-DRIVEN) and from the Luxembourg Ministry of Higher Education and Research. Andrew Clark acknowledges financial support from the EUR grant ANR-17-EURE-0001.

1 Introduction

Population aging is a major challenge faced by many OECD countries, including the United Kingdom. With life expectancy on the rise, UK projections suggest that 24% of the population will be 65 and over by 2043 (Lewis, 2021). While greater longevity is one of the benefits of development, it puts significant pressure on modern welfare states, and in particular on pension systems that rely on current contributions to fund the pension benefits of those who are currently retired (see Lewis et al., 2021). In response, governments worldwide have implemented reforms to raise the State Pension Age (SPA) to improve the fiscal sustainability of pension systems.

The postponement of statutory retirement is an effective tool to improve the sustainability of pension systems amidst population aging. However, this intervention raises a number of concerns about the effect of later retirement both on the individuals concerned (Zhu and He, 2015, and Clark and Zhu, 2024) and their family members (Atalay and Zhu, 2018). We here examine potential inter-generational retirement spillover effects between older parents and their adult children, as parental retirement will likely affect the transfer of both resources and non-pecuniary support between parents and children. In this spirit, we here ask whether parental retirement affects the well-being of adult children and, if so, why?

We will appeal to two causal identification strategies applied to panel data from the United Kingdom: the British Household Panel Survey (BHPS) and its successor, Understanding Society (UKHLS). We construct child-parent dyads, linking socio-economic information on adult children to their older parents' retirement transition.

The first identification strategy exploits the discontinuous increase in the probability of retiring at the State Pension Age in a Fuzzy Regression Discontinuity Design (RDD) to identify the direct and integenerational effects of retirement on parents' and adult children's well-being. In the second identification strategy, we leverage two UK Pension Acts, from 1995 and 2011, in a difference-in-differences design (DiD) to estimate the effect of an unexpected increase in the parental State Pension Age on their children's well-being. Here, the treatment and control groups consist of adult children whose parents share similar characteristics but enter retirement at different times due to these reforms.

The Fuzzy RDD estimates reveal a positive and significant impact of maternal retirement on adult children's life and income satisfaction but no effect on mental health. There is no effect of paternal retirement. Heterogeneity analyses help shed light on potential mechanisms. It also identifies the adult children and

father sub-groups where the causal impact of paternal retirement turns statistically significant.

We consider moderation by first the presence of grandchildren at the time of retirement, and then the age of the grandchildren. For maternal retirement, the well-being benefits for adult children are highest when the grandchildren are in the 5-11 age range. Further stratification reveals larger rises in satisfaction for adult children with lower incomes and who lived near their mothers in the latter's pre-retirement years. On the contrary, paternal retirement affects low-income adult children more negatively. Last, we consider the retired mother's and father's marital status and health. Retirement-positive spillovers are larger for elder mothers who are not married (i.e. separated, divorced or widowed) and had not been hospitalised in the pre-retirement years. On the contrary, we observe larger negative retirement spillovers on adult children's well-being in the sub-group of not-married elder fathers.

This battery of moderation results is consistent with maternal retirement causally affecting their adult children's well-being via time transfers, with grandmothers having more time available to provide child care to their grandchildren, reducing their adult children's child-care costs and increasing their well-being. It also reveals opposing retirement spillover effects between elder mothers and elder fathers on their adult child well-being.

While these findings underline important gender differences, we do not interpret them as providing support for gender-specific retirement rules. Such policies could raise concerns about equity and fairness, potentially creating distortions in the allocation of benefits across different groups. Instead, the results suggest that a more effective policy response could be to expand access to affordable high-quality childcare facilities. By doing so, policymakers could help mitigate the caregiving burden that is often borne by grandmothers, and offset some of the inter-generational effects of retirement age reforms. In general, our suggested policy implications emphasise the importance of considering family ties when evaluating retirement policies.

Regarding the second identification strategy, the reform delayed the retirement of the directly-affected older parents. There was no reform effect from mothers on their adult children's well-being, but significant positive effects from fathers on their sons' life and income satisfaction. The heterogeneity analyses again show that the effect is concentrated among adult children with lower incomes and (to a lesser extent) adult sons still living with their fathers in the years around retirement. This second set of results suggests that infra-family financial transfers play a role, with later paternal retirement increasing adult children's financial resources. The entire set of result tables and figures from this second identification strategy are presented in Appendix F.

Our research contributes to a number of strands of the existing literature. We first add to the literature on the

inter-generational effects of parental retirement. Prior work has primarily focused on adult children's fertility and labour-market outcomes. For instance, Eibich and Siedler (2020) show that parental retirement increases adult daughters' fertility in Germany, while Ilciukas (2023) find similar results in the Netherlands. At the same time, Kaufmann et al. (2023) highlight that an exogenous rise in grandmothers' working hours in the Netherlands reduces adult daughters' labour supply, particularly when young children are involved. On the contrary, in Wu and Gao (2020) parental retirement in China reduces adult children's labour supply.

While these analyses have advanced our understanding of how parental retirement affects children's fertility and work decisions, the impact on their subjective well-being— a broader and multi-dimensional measure of quality of life — has been largely overlooked. This paper fills this critical gap by examining the outcomes of life satisfaction, income satisfaction, and mental health (GHQ scores).

Second, we contribute to the literature on informal exchanges between parents and adult children, and particularly time and financial transfers (OECD, 2012, Cox, 1987, Coe and Zamarro, 2011). Parental retirement can change the nature of these exchanges, increasing time availability (e.g., for childcare) while potentially reducing financial transfers. We provide evidence that these mechanisms operate differently for mothers and fathers, resulting in gendered effects on adult children's well-being.

Third, we build on the broader literature on the effects of retirement on individual well-being (Zhu and He, 2015, Clark and Zhu, 2024, Filomena and Picchio, 2023, Spearing, 2024). While prior research has focused on retirees themselves, we extend this analysis to explore the spillover effects of retirement on the next generation, highlighting the role of inter-generational dynamics.

The remainder of this article is organised as follows. Section 2 describes the institutional setting and the potential relationships between parental retirement and adult child well-being. Section 3 then presents the data and the key variables of interest. Section 4 outlines the empirical models, and Section 5 describes the estimation results. Last, the results are discussed in Section 6 and Section 7 concludes.

2 Background

2.1 The UK Pensions System and Pension Reform

The UK State Pension Age (SPA) is the earliest age at which workers can claim the public pension. In 1948, this was set at 60 for women and 65 for men (having previously been 65 for both sexes), figures which remained

unchanged until April 2010.[1] Faced with an ageing population and increased life expectancy, concerns were raised about the sustainability of the pension system. As a result, the UK government implemented significant pension reforms in 1995, including introducing a single-tier flat-rate state pension and a programmed rise in the SPA to be started in 2010.

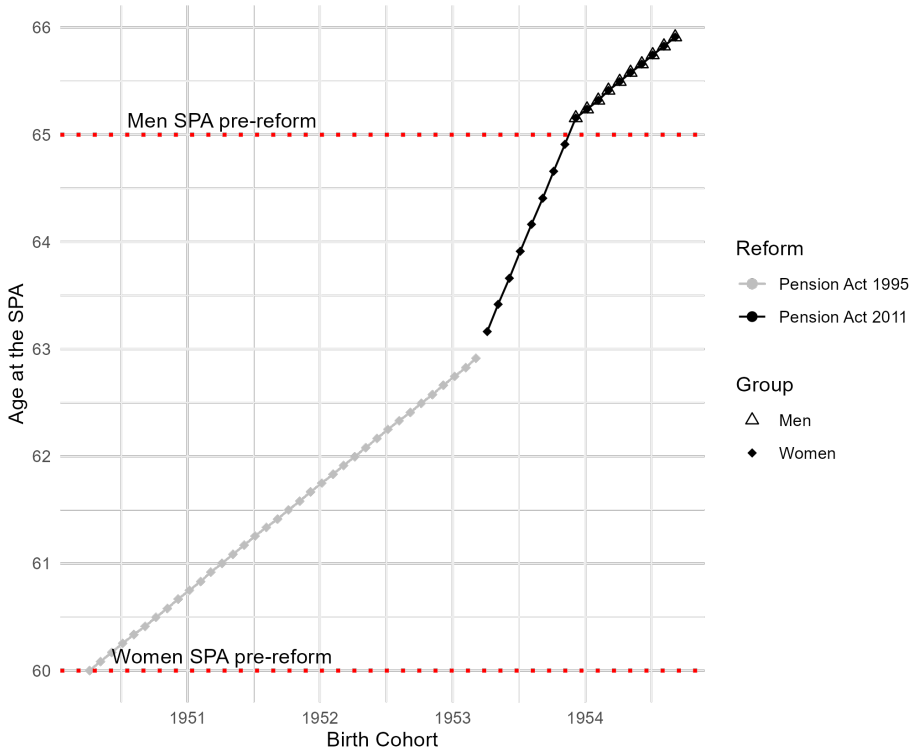
The central point of this 1995 reform was the phased introduction over ten years of equal State Pension Ages for men and women. The SPA for women born after March 1950 increased gradually starting from April 2010. The 2011 Pensions Act then modified this initial timetable, legislating a more rapid increase in women's State Pension age to 65 between April 2016 and November 2018 instead of the initially planned April 2020. The same act also established that from December 2018, the State Pension age for men and women born after November 1953 would be increased to 66 by October 2020. Figure 1 illustrates the planned date of reaching the State Pension Age for male and female birth cohorts under these two pension Acts.

In addition to the State Pension, many UK workers have occupational and private pension funds, which provide additional income after retirement. However, the State Pension remains a significant source of income for many retirees, particularly those without other pension arrangements. To receive the full basic State Pension, individuals must have 30 qualifying years of National Insurance contributions or credits. The level of the basic State Pension depends on the contributions that the individual made throughout their working life, with a minimum level of £141.85 per week for those who meet the eligibility criteria.

Deferring receipt of the State Pension allows individuals to receive an increased entitlement, which depends on the number of weeks deferred. For every five weeks of deferral, the level of the State Pension rises by 1% up to a maximum of 10.4% after one year of deferral (Cribb et al., 2016). These higher entitlements are designed to encourage deferred receipt and continued employment, thereby contributing to the economy and reducing the burden on the State Pension system. Even though the deferral rate seems generous, in practice only relatively few individuals put off their State Pension receipt: in 2010 English Longitudinal Study of Ageing data, only 5% of those aged between the SPA and 75 in 2008-09 had chosen to defer their State Pension (Crawford and Tetlow, 2010 and Cribb et al., 2016).

[1] The basic State Pension was designed to provide a minimum level of income for all retirees, while the earnings-related state pension, known as the State Second Pension (SERPS), provided additional income for those with moderate to high earnings.

FIGURE 1: Women's and Men State Pension Age under the 1995 and 2011 Pension Acts



Notes. The Y-axis lists the State Pension Ages as legislated by the 1995 and 2011 Pension Acts. The X-axis shows the birth cohorts of women and men affected by the reforms. The men's and women's lines overlap after the State Pension Age of 65, as the 2011 Pension Act affected both sexes equally. The horizontal dotted lines indicate the pre-reform SPA for women and men. *Source*: Data from Gov.UK State Pension Age timetable.

2.2 Theoretical Mechanisms

The impact of parental retirement on adult children's well-being is theoretically ambiguous. On the one hand, parental retirement can benefit adult children, as it relaxes time constraints and can increase both leisure time and hours of work. On the other hand, it may also come with adverse effects via an increased demand for informal care and lower net financial transfers from working parents. This section illustrates four potential channels between parental retirement and adult children's well-being.

First, retirement may well directly affect the intensive margin of time transfers between parents and adult children. Based on the literature on retirement's physical- and mental-health consequences (see for example Dave et al., 2008, and Spearing, 2024), the first kind of time transfer may run from adult children to their parents via informal care. Evidence in this field is somewhat mixed, with some UK results finding adverse effects of retirement on the retiree's health and positive effects on their mental well-being (Carrino et al., 2020 and Fé and Hollingsworth, 2016). Any rise in informal care and support from adult children following parental

retirement may reduce the satisfaction of the former (see Lacey et al., 2019).

Time transfers may also flow in the opposite direction, with grandparents' retirement increasing their availability to provide childcare for their grandchildren, as discussed in Eibich and Siedler (2020). This grand-parental childcare will likely have a positive impact on adult children's well-being, especially for adult daughters who often face a "child penalty" regarding their career prospects and earnings. There is recent evidence in Kaufmann et al. (2023) that greater childcare by grandmothers reduces this child penalty and increases the labour supply of adult daughters, and in addition produces better educational outcomes for the grandchildren. The availability and quality of grandparental childcare may well vary, however, according to the geographical distance between the households, grandparents' health, and family structure.

The third channel is direct financial transfers. Retirement almost certainly has financial consequences (Cribb et al., 2022) and may lead to greater financial support from adult children to their parents or less support from newly-retired parents to their adult children, as pension income is typically lower than labour income. In both cases the effect on direct financial transfers should reduce adult children's well-being.

Last, financial transfers may also be indirect. Adult children who are parents may save money on childcare costs by receiving grandparental care, with a positive effect on their well-being.

The net effect of these four channels on adult children's well-being is ambiguous, and likely varies across different types of adult children. From a policy perspective, it seems important to understand how the changes in the State Pension system will feed through to the outcomes of not only retirees, but also their families.

3 Data

Our analysis uses panel data from the British Household Panel Survey (BHPS waves 6-18) and the UK Household Longitudinal Study (UKHLS, also known as Understanding Society, waves 1-12), covering the period from 1996 to 2022 (University of Essex, Institute for Social and Economic Research, 2023). The BHPS began in 1991 with a sample of 5,000 households, and was later expanded to include additional households from Scotland, Wales, and Northern Ireland. The ongoing Understanding Society survey started in 2009 with approximately 40,000 households. These two surveys include many of the same questions, allowing harmonised samples to be constructed.

Both surveys interview all adult members (16+) in participating households. Survey respondents who leave the initial household, for instance children who move out of their parents' home or parents who separate, are

followed, and their new household becomes part of the panel. This survey design allows us to link data on adult children and their parents over time, even when they live in different households.

Our sample is constructed by linking each child in a household to their biological mother and father. If the child lives with a stepfather/mother or a father/mother-in-law, we include them in the sample. When adult children in the original sample start to cohabit with a partner, the new partner inherits this information regarding the biological mother and father. This produces an unbalanced panel dataset. Appendix B contains more information on the initial sample composition and the attrition analysis.

This sample-selection procedure may result in co-residence bias if the characteristics of the adult children in the sample (who are observed to live with their parents at some point) differ significantly from those who we never observe living with their parents. To assess the extent of this potential bias, we carry out a simple descriptive analysis to see whether the estimation samples (from the BHPS for the RDD analysis and from the UKHLS for the Difference-in-Differences analysis) are different from the full sample of respondents in the same age range: the results of this comparison appear in Appendix C. The two samples of adult children are statistically different from the full sample of respondents with respect to some demographic characteristics. However, as discussed in Section 5.1, we note that the estimated effects of retirement on a battery of parental outcomes using the data from our estimation sample do match in sign and size those found in other research that exploits similar identification strategies, and are also comparable to the results obtained when analysing the unrestricted samples of older parents in both the BHPS and the UKHLS (see the results in Appendix C).

We use different samples for the two separate causal identification approaches. The first uses the State Pension Age as an exogenous cutoff point in a Fuzzy Regression Discontinuity Design. Here, we analyse data from the BHPS, as the method requires that the SPA discontinuity be fixed. [2] The second exploits two pension reforms that took place in April 2010 and December 2018. These gradually raised the SPA from 60 to 66 over ten years for women born after April 1950, and starting in 2018 raised the SPA for men born after 1953. In this second approach we will carry out a Difference-in-Differences analysis on UKHLS data to evaluate the impact of delayed parental retirement on the well-being of adult children.

[2] If we include the years after the reform that increased the SPA (from 2010 onwards), parental age at the cutoff would differ systematically in the treatment and control groups. This age difference could confound the estimation, as parental age may independently influence both the parents' own outcomes and the well-being of their adult children. This age effect makes it more difficult to interpret the results cleanly as the effect of reaching the SPA.

3.1 Adult children's outcomes

Our research question is how parental retirement affects adult children's well-being. Well-being is a multi-dimensional concept, and we here consider three different types of outcome.

The first is a measure of psychological distress. This is derived from the 12 questions in the General Health Questionnaire (GHQ), to which respondents indicate the extent of their agreement on a four-point scale (the full set of questions are listed in Appendix A). Some of the questions are negatively couched while others are positively so. After reversing the coding for the negative questions, we add up the individual's 12 responses to produce a 0-36 scale, where higher numbers indicate better outcomes. The GHQ appears in all BHPS and UKHLS waves. However, we will only use BHPS Waves 6-10 and 12-18, as these also include the two satisfaction measures described below.

The second and third well-being variables refer to self-reported satisfaction and appear in BHPS Wave 6 (1996) onwards, except for Wave 11 (2001). All satisfaction questions are answered on a 1-7 Likert scale, where one means completely dissatisfied, four is neutral, and seven is completely satisfied.

The first variable is overall life satisfaction, which has been very-widely analysed across the Social Sciences. The second is satisfaction with income. This variable is particularly relevant here, as parental retirement may affect the financial situation of adult children in two opposing ways. While children may increase financial transfers to support their retired parents (or equally receive smaller transfers from them), they may also benefit from reduced childcare costs due to grandparental childcare.

3.2 Parents' outcomes

To consider how parental retirement influences the well-being of adult children, it is first useful to see how it affects the older parents themselves. The two primary channels between parental retirement and the well-being of adult children are time transfers and financial transfers. We capture these via the following parental outcomes: weekly working hours, leisure-time satisfaction, subjective financial satisfaction, subjective physical and mental health, and life satisfaction.

Weekly working hours cover both regular and overtime hours, and range from zero (for non-working parents) to positive values. This measure appears in all BHPS and UKHLS waves, and will capture the drop in hours of work and the rise in free time following retirement. We will also use hours of work as an alternative treatment variable, replacing self-reported retirement status with weekly working hours as a robustness test in Tables

D–9 and D–10 in Appendix D.3.

Leisure-time satisfaction is reported on a scale of 1 (not satisfied) to 7 (completely satisfied) and appears in BHPS Wave 6 (1996) onwards, except for Wave 11. This will also reflect the greater free time of retired parents.

Subjective financial satisfaction is recorded in all BHPS and UKHLS waves, and picks up the link between retirement and parents' subjective financial situation. It is originally measured on a scale from 1 (finding it difficult to manage financially) to 5 (living comfortably). We reverse this coding so that higher values correspond to better financial well-being.

Subjective physical health refers to self-reported health over the past 12 months, on a scale from 1 (excellent) to 5 (very poor). We reverse this coding so that higher values indicate better health. This question appears in all waves of both surveys.

Last, the life satisfaction variable is the same as that for adult children above. This variable then allows us to compare the impact of retirement on both generations' subjective well-being.

3.3 Retirement and pension eligibility

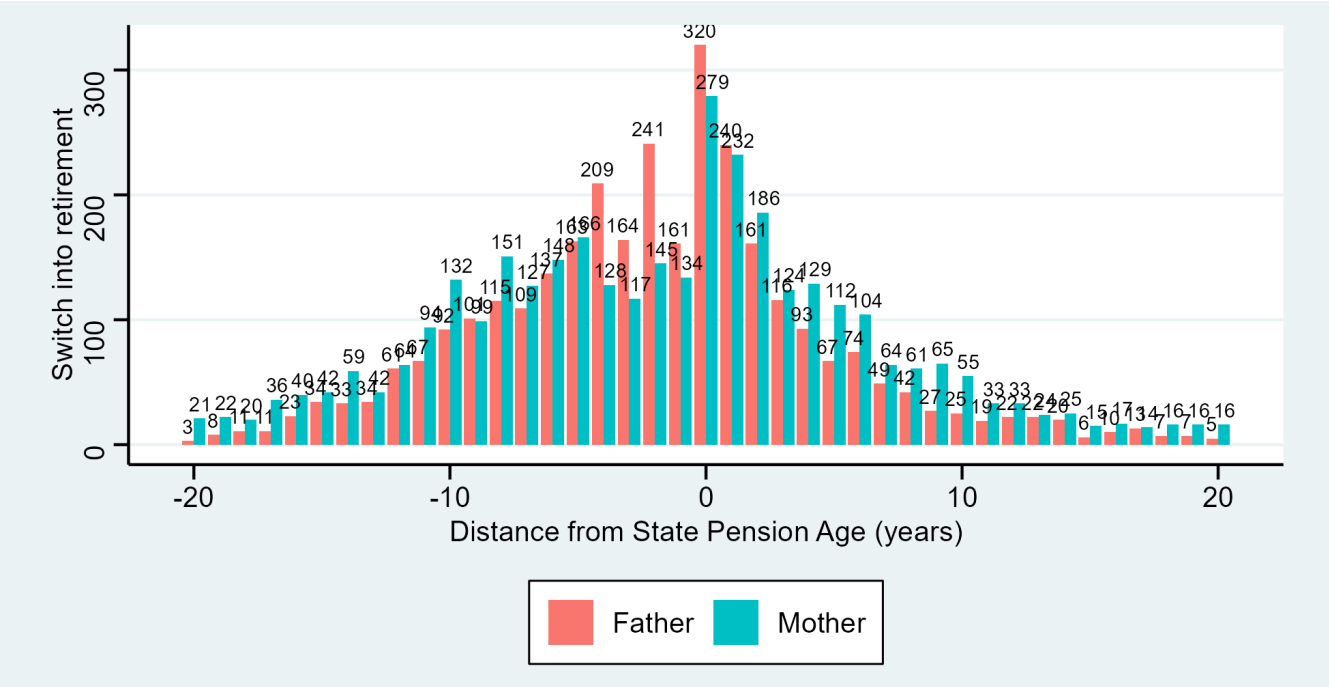
The treatment variable in this analysis is parental retirement. In the main results, we consider older parents who self-reported being retired at the date of the interview as being in the treatment group. We assume that retirement is an absorbing state, so that once individuals retire they will remain so.[3] In the robustness analysis, we will consider two alternative definitions of retirement. First, we also consider parents as retired if they do not self-report retirement but were unemployed and not actively looking for work in the month prior to the interview. Second, we consider as retired those who receive pension income. The results of these analyses appear in Appendix D.2.

Figure 2 plots the number of parents who retire according to the distance from their State Pension Age. Over the entire analysis period, from 1996 to 2020, we have information on 1812 mothers and 1190 fathers who enter retirement. For both sexes, there is a notable spike around the mandatory SPA. However, a non-negligible proportion of parents retire before the SPA.

The UK State Pension eligibility Age changed significantly in the period covered by our data. Up to April 2010, the SPA for men was 65 and 60 for women. These figures then rose for women born after April 1950, starting in April 2010, and for men born after December 1953, starting in December 2018. The effect of this reform on retirement can be seen in Figure 3. Compared to the untreated cohort (with SPA at 65 and 60 for men and

[3] To check that this is the case, we have calculated the percentage of parents who return to paid work after declaring being retired: this is 0.3% for mothers and 0.7% for fathers.

FIGURE 2: Number of parents self-declaring switching into retirement by years to the SPA

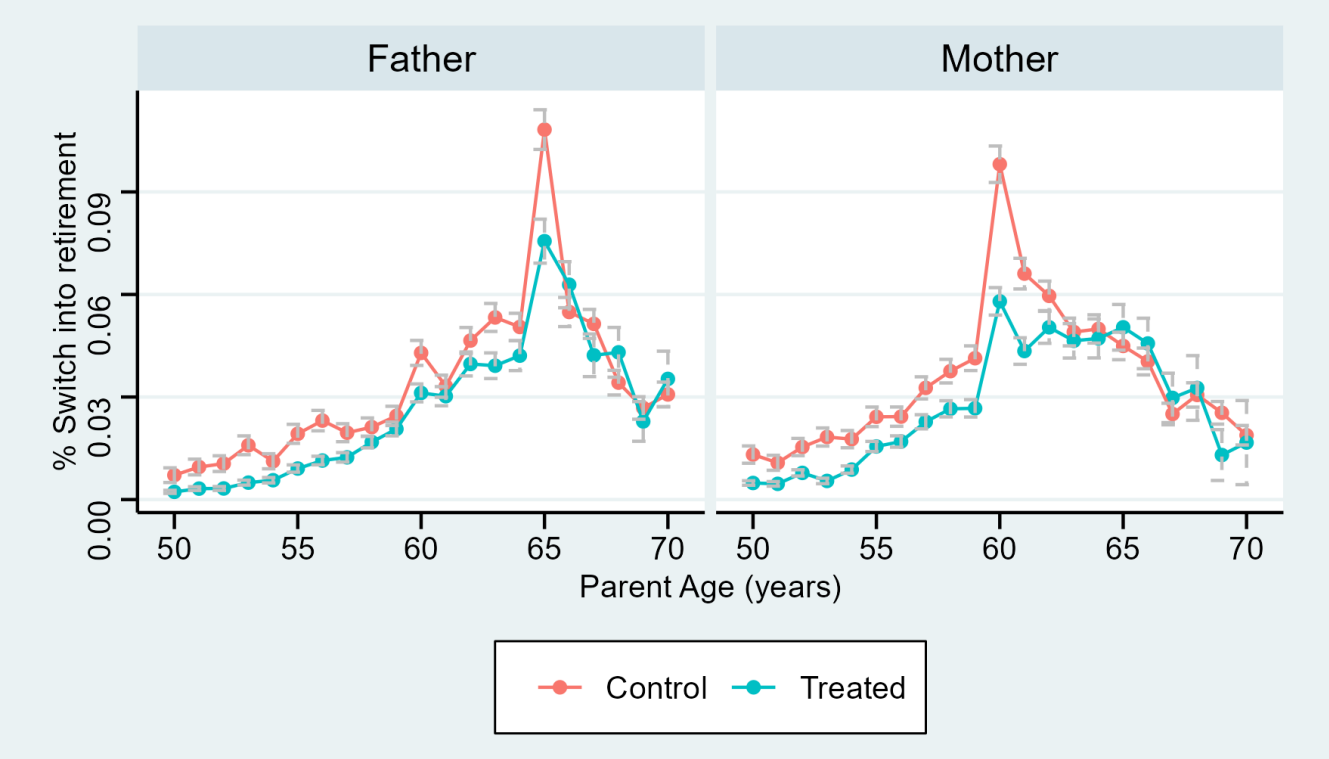


Source: Pooled BHPS and UKHLS sample (1996-2019).

women), the treated cohorts (with higher SPAs) have a significantly lower probability of retirement at the ages of 65 and 60.

Finally, Figure 4 shows the shares of fathers and mothers who are above the SPA thresholds by their adult children's ages. As was found by Eibich and Siedler (2020) in German data, under 20% of parents hit the State Pension Age threshold before their child's 25^{th} birthday, while almost all parents have reached this threshold by the time their adult child turns 45. We therefore apply the same sample restriction as in Eibich and Siedler (2020), and only consider adult children aged 20-45 (as parental retirement is only rare outside of this range). We test whether our results are sensitive to this restriction: the results and associated discussion appear in Appendix D.3.

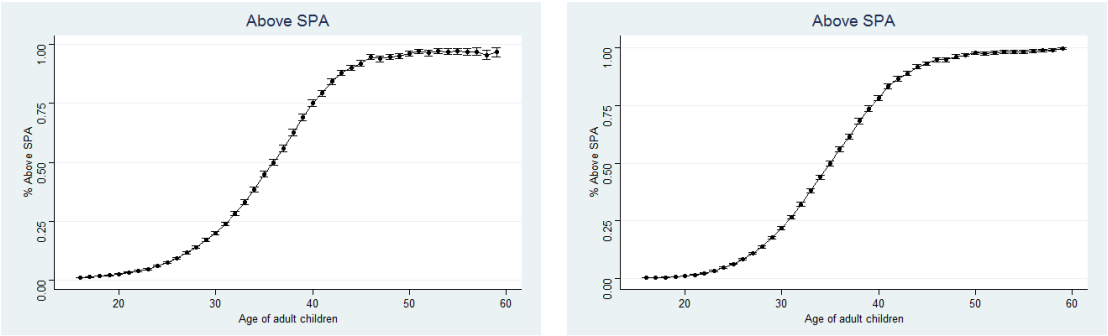
FIGURE 3: Percentage of Parents Retiring by Age in the Control and Treatment Cohorts



Source: Pooled BHPS and UKHLS sample (1996-2019).

FIGURE 4: The proportion of fathers (panel A) and mothers (panel B) above the State Pension Age as a function of their adult child's age

(A) (B)



Source: Pooled BHPS and UKHLS sample (1996-2019).

4 Empirical Approach

Parental retirement is a choice, and is likely related to both parental and adult-child characteristics, including their well-being. Older parents may choose to retire in order to help their children if the latter are unwell, help with childcare and household chores, and provide support in general. We tackle this endogeneity via two

different identification approaches. Both of these rely on the individual's eligibility for the State Pension, which in the UK is likely to represent a major component of their retirement income (see Cribb et al., 2022).

As in other contributions (see for example Coe and Zamarro, 2011, Gorry et al., 2018, and Eibich and Siedler, 2020), the first of these exploits the age threshold for pension eligibility (which, up to 2010, was constant at age 60 for mothers and 65 for fathers) as an exogenous cutoff in a fuzzy regression discontinuity design. Using the Special License version of the data, we have information on the running variable — parental age — at the monthly level. With both the month of birth and the interview month we have an accurate measure of whether parents are above or below the SPA threshold when interviewed. For parents whose birth and interview months coincide, we assume that they have reached retirement age. While this assumption introduces some error around the threshold, we believe that this will only be minimal due to the monthly granularity of the data (Dong, 2015). This approach follows that in the literature (e.g., Della Giusta and Longhi, 2021 and Cribb et al., 2022) on imprecision around such cutoffs. As State Pension eligibility is conditional on attaining these ages, moving from being under to over the age threshold should be associated with a considerable discontinuity in the probability of retirement.

The second identification strategy exploits the 1995 and 2011 UK Pension Acts that, starting in April 2010, gradually increased the State Pension Age from 60 to 66 over a ten-year period, initially only for women and then, starting in 2018, for both sexes. These reforms affected women born after March 1950 and men born after March 1953. We here carry out a difference-in-differences analysis to compare the well-being of adult children of parents who are subject to different State Pension Ages.

4.1 The Fuzzy Regression Discontinuity Design

There are two main requirements for the causal interpretation of the coefficients in a fuzzy RD design. First, being above or below the State Pension age should not directly affect the well-being of adult children. While parental age, in general, may well be related to adult children's well-being, it does not seem likely that there would be a discontinuity in this relationship at exactly the SPA. This first assumption is then likely to hold conditional on a continuous trend in parental age. The second requirement is that parents cannot manipulate whether they are above or below the threshold: with age in months being the running variable for the threshold, this assumption should hold by construction. We test these assumptions via a number of validity checks. We first carry out the McCrary test for manipulation of the running variable (see Appendix D Figure D–3), which returned a high p-value for fathers and mothers, providing no evidence of manipulation of the

running variable at the cutoff. Second, we visually inspected the continuity of the pre-determined covariates of both the adult child and the older parent at the latter's SPA threshold, as shown in Figures D–6, D–4 and D–5. These reveal little evidence of any sharp discontinuities at this age.

In addition to the two fuzzy regression discontinuity requirements above, there are three additional conditions for the identification of the local average treatment effect (LATE) in a 2SLS framework: instrument relevance, the exclusion restriction, and monotonicity. Instrument relevance requires that crossing the SPA threshold significantly increase the probability of parental retirement. The exclusion restriction imposes that the SPA threshold affects the well-being of adult children only through its impact on parental retirement eligibility, without any other direct effects. Last, under monotonicity there are no defiers — older parents who behave in the opposite way to the treatment assignment rules, such as being more likely to retire before reaching the SPA and more likely to work after becoming eligible for retirement. The results of these validity assessments appear in Section D in the Appendix. Overall, the results of the validity tests provide support for the interpretation of the results as causal estimates.

Assuming that all requirements are met, we can estimate the causal effect of parental retirement on the three adult child well-being outcomes via the following regression:

$$r_{it} = \alpha + f_1(\text{age}_{it}) + g_1(\text{page}_{it}) + \pi D_{it} + \omega_i + \kappa_t + \nu_{it} \quad \text{First stage} \tag{4.1}$$

$$WB_{it} = \beta + f_2(\text{age}_{it}) + g_2(\text{page}_{it}) + \lambda r_{it} + \xi_i + \tau_t + \epsilon_{it} \quad \text{Second stage} \tag{4.2}$$

The variables in the equation refer to adult child i at interview date t. The main variables of interest are the child's well-being (WB_{it}), their age in months (age_{it}), the age of their parent centered at the SPA threshold (page_{it}), and their parent's retirement status (r_{it}). The ω_i and ξ_i terms are individual fixed effects for adult child i, and τ_t and κ_t are year and month dummy variables to capture any secular and seasonal trends. Last, ν_{it} and ϵ_{it} are the idiosyncratic errors in the first and second stages. The parametric functions $f(.)$ and $g(.)$ refer to the child's (age_{it}) and parent's (page_{it}) ages respectively, and are both measured in months. D_{it} is a dummy for the parent of adult child i being above the state pension age at time t. In the first stage, the parameter π measures the effect of crossing the pension age threshold on the parent's retirement probability; in the second stage, λ is the local average treatment effect (LATE) of parental retirement on child well-being. The regressions are estimated using two-stage least squares (2SLS). We apply a bandwidth of 10 years around

the SPA for both mothers and fathers (*i.e.* we only include observations with mothers aged 50 to 70 and fathers aged 55 to 75) and consider a quadratic trend for the $f(.)$ and $g(.)$ adult-child and parental age functions in our main specification. Heteroskedastic robust standard errors are clustered at the adult-child level. This choice of a 10-year bandwidth balances concerns about sample size, robustness, and the wish to carry out heterogeneity analyses. Narrower age bandwidths produce smaller sample sizes, with potential effects on statistical power, especially for the heterogeneity analyses (e.g., by the presence of grandchildren or income deciles). Robustness checks with alternative bandwidths and functional-form specifications for the age variables (in Appendix D.3) confirm that the second-stage results are stable, making the 10-year bandwidth an appropriate compromise between precision and the ability to consider heterogeneity in the treatment estimates.

4.1.1 Descriptive Statistics: Fuzzy RDD

The main Fuzzy RDD analysis is carried out on the sample of adult children and their spouses who are aged 20–45 years matched to their parents who are within a band of ±10 years around the State Pension age. The sample here comes from the period before the UK pension reform, so that the SPA is fixed. We drop children whose parents never worked (385 mothers and 203 fathers) or died within the age bandwidth around the State Pension cutoff (58 mothers and 96 fathers).

The final RDD sample consists of 16984 observations in the mother sample and 13450 observations in the father sample. These cover 3518 adult children, 1622 of their mothers and 1232 of their fathers. Table 1 presents the descriptive statistics separately for the adult-child-father and adult-child-mother samples. The difference between the two samples with respect to the adult-child outcomes reflects observations on adult children who are observed with their mothers only but not their fathers (or vice versa). The majority of adult children appear in both samples (2088 out of 3518), but 883 only matched to their mother (and so appear in the first panel of Table 1 but not the second) and 547 only to their father (and are in the second panel but not the first).

TABLE 1: BHPS: RDD Sample Descriptive Statistics

	Mother sample				Father sample			
Variable	N	Individuals	Mean or %	SD	N	Individuals	Mean or %	SD
A. Adult child outcomes								
GHQ (0-36)	16984	3518	25.4	5.2	13325	2580	25.3	5.3
Life Satisfaction (1-7)	16984	3518	5.3	1.1	13755	2635	5.2	1.1
Income satisfaction (1-7)	16984	3518	4.6	1.4	13755	2635	4.5	1.4
A. Adult child characteristics								
Age	16984	3518	29.0	5.6	13450	2635	30.3	5.6
Year of birth	16984	3518	1974.2	6.0	13450	2635	1973.2	5.9
Married	16984	3518	32		13450	2635	39	
Age left school	16984	3212	17.3	2.2	13372	2468	17.2	2.2
Female	16984	3518	49		13450	2635	49	
Number of children	16984	3518	0.6	0.9	13450	2635	0.7	0.9
Real monthly individual income	16984	3518	1384.0	1116.7	13113	2588	1496.5	1170.8
Lives with father	16984	3518	23		13450	2635	22	
Lives with mother	16984	3518	30		13450	2635	23	
White	16984	3518	83		13367	2598	84	
B. Older Parent								
Retired	16984	1622	26		13450	1232	27	
Above SPA	16984	1622	29		13450	1232	24	
Age	16984	1622	56.8	4.9	13450	1232	61.2	4.9
Weekly work hours	15598	1444	16.58	16.77	13450	1232	22.73	22.29

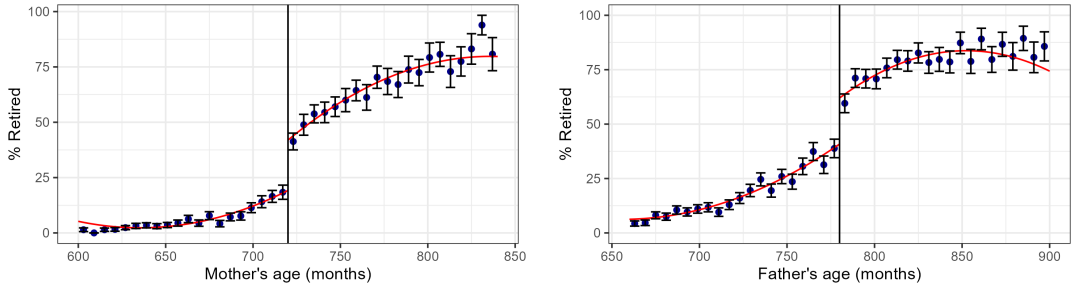
Notes: The data refers to BHPS Waves 6-10 and 12-18 (years 1996-2000 and 2002-2008). Real income is derived by deflating nominal gross incomes to 2015 GBP using values of the CPI All Items (D7BT).

4.1.2 Graphical evidence

The legislated State Pension Age provides an exogenous cutoff for retirement decisions. In Figure 5 there is a sharp jump in the retirement probability around the cutoff, in line with individuals reacting to their State Pension eligibility. As such, our reduced form estimates can be interpreted as valid intent-to-treat effects of attaining the State Pension Age on adult children's well-being, as long as none of the other factors affecting parental retirement change discontinuously around this cut-off.

FIGURE 5: The Percentage of Parents Retired by Age: BHPS

(A) Mother (B) Father



Notes: These figures plot the retirement rate in the sample of parents in the window of ten years before to ten years after the State Pension Age. The points refer to fuzzy regression discontinuity estimates from a flexible quadratic specification using a 10-year bandwidth. Standard errors are clustered at the parent level. The sample consists of parents whose adult children or in-laws are in the main RDD sample.

5 Results

The following sections first investigate the effect of reaching the State Pension Age and its legislated postponement on the well-being and labour-market outcomes of the directly-affected parents. This will help us to identify the proposed theoretical mechanisms for the spillovers to adult children. Retirement is arguably unlikely to affect adult children if it has no effect on their parents' outcomes: those that we explore here are weekly working hours, leisure-time satisfaction, subjective financial situation, subjective physical and mental health, and life satisfaction.

We then estimate the inter-generational effect of parental retirement on adult children's well-being. We stratify the sample in four ways to investigate the underlying mechanisms: i) whether the adult child is responsible for one or more children under the age of 12; ii) the door-to-door travel distance between the adult child and their parents; iii) the adult child's income; and iv) the older parents' marital status. All of the variables used for this stratification are measured prior to the parents reaching their State Pension Age.

5.1 Retirement and Parental Labour Supply and Well-Being: BHPS Data

This section estimates the effect of reaching the State Pension Age on the labour supply and well-being of elderly parents. The first-stage results in Tables 2 and 3 confirm that reaching the State Pension Age predicts the probability of retirement at age 60 (for mothers) and age 65 (for fathers), with an increase of around 29 percentage points and 23 percentage points for mothers and fathers, respectively. Eligibility is a strong instrument for parental retirement status, with F-statistics that are far above the rule-of-thumb F-statistic of

10–12 (Staiger and Stock, 1997).

The first parental outcome is weekly hours of work. We expect these to fall after retirement, and this is indeed the case for both mothers and fathers: see column (1) of Tables 2 and 3. Retirement is estimated to reduce weekly working hours by 1.1 and 1.2 standard deviations for the mother and father, corresponding to drops of 19 and 26 work hours, respectively. As a consequence, leisure satisfaction is expected to rise: in column (2) this does indeed increase significantly by 0.81 and 0.76 standard deviations for retired mothers and fathers. The third outcome is the subjective financial situation. Pensions in the UK are relatively low compared to labour income, so that financial satisfaction is expected to drop post-retirement. Column (3) shows that this is the case, with falls of -0.34 and -0.52 standard deviations. Last, columns (4), (5), and (6) refer to the estimated effect of retirement on retirees' mental health, subjective health, and overall life satisfaction. Mental health rises significantly post-retirement (by 0.30 and 0.27 standard deviations for mothers and fathers). The analogous figures for subjective health are both insignificant. Last, life satisfaction rises, but only significantly so for fathers' retirement, by 0.47 standard deviations. Almost all of the estimated coefficients are of the same sign for mothers and fathers.

The reduced-form estimates for mother's and father's SPA eligibility are shown in the third panel of Tables 2 and 3, respectively. These consistently agree in sign, size and significance with those from the second stage of the RDD estimation (in the first panel of the same tables). This consistency between the reduced-form and second-stage results underscores the strength of the instrument —- eligibility for the State Pension Age (SPA) —- as a driver of parental retirement behavior.

The comparison of the second-stage IV results and the OLS results (in the first and fourth columns of Tables 2 and 3) sheds light on the magnitude and direction of potential reverse causality. Apart from financial satisfaction (column 3), all of the coefficients are of the same sign, but the OLS coefficients are smaller (as is often the case). However, despite being insignificant, the OLS coefficient on retirement in the financial-satisfaction regression is oppositely-signed. This may reflect reverse causality, whereby financially-satisfied older parents retire earlier, irrespective of the State Pension Age, than do those who are more financially-pressed and thus continue to work longer.

These estimated retirement effects on parental outcomes do not provide support for one of the theoretical mechanisms in Section 2.2: the potential rise in informal care from adult children to their parents. This channel is at odds with the mainly positive effect of retirement on parental well-being in the last three columns. However, the positive effects on leisure satisfaction and negative effects on financial situation are

consistent with the other proposed channels.

Last, these estimates on retirees' outcomes are comparable to those found in other contributions that have exploited similar identification strategies in the UK and other European and non-European countries. As such, the sample selection that we apply in order to be able to look at the outcomes of the retirees' adult children does not seem to introduce excessive co-residence bias. For example, in the UK, Calasanti et al. (2021) find a similar gendered pattern in life satisfaction after retirement, whereby only men experience statistically-significantly higher life satisfaction. In an international sample from sixteen countries, Horner (2014) estimates a positive effect on life satisfaction of around 0.4 standard deviations, in line with our estimated figure for fathers. Gorry et al. (2018) estimates a positive effect on mental health in the US. Coe and Zamarro (2011) use a European sample and country-specific SPAs as instruments for retirement, and find a positive effect of retirement on subjective health; in our results, this effect is not statistically significant but is of the same sign.

TABLE 2: The Effect of Mother's Retirement on her Labour Supply and Well-being

Dependent Variables:	Weekly working hours	Leisure Satisfaction	Financial Satisfaction	GHQ	Subjective health	Life Satisfaction
	(1)	(2)	(3)	(4)	(5)	(6)
Second-stage IV results						
Mother retired	-1.10***	0.81***	-0.34**	0.30*	0.14	0.19
	(0.13)	(0.15)	(0.15)	(0.17)	(0.12)	(0.15)
R^2	0.80	0.60	0.65	0.59	0.68	0.63
First-stage IV results						
Mother above SPA	0.29***	0.29***	0.29***	0.28***	0.29***	0.29***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
F-test	1586.0	1487.5	1510.5	1429.8	1534.2	1497.6
Reduced Form						
Mother above SPA	-0.32***	0.24***	-0.11***	0.09*	0.04	0.06
	(0.05)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)
R^2	0.79	0.61	0.66	0.59	0.68	0.64
OLS						
Mother retired	-0.80***	0.31***	0.008	0.10**	0.06*	0.05
	(0.06)	(0.06)	(0.04)	(0.04)	(0.04)	(0.04)
R^2	0.81	0.61	0.66	0.59	0.68	0.64
Individuals	1,610	1,586	1,594	1,564	1,605	1,585
Observations	16,897	16,370	16,560	16,090	16,677	16,368

Clustered (mother) standard-errors in parentheses
*Significance: *** = 1%; ** = 5%; * = 10%*

Notes: The data refers to BHPS Waves 6-10 and 12-18 (years 1996-2000 and 2002-2008). All models include individual, year and month of interview-fixed effects. The models include a quadratic term for mother's age. Bandwidth of 10 years. The second-stage coefficients are standardised.

TABLE 3: The Effect of Father's Retirement on his Labour Supply and Well-being

Dependent Variables:	Weekly working hours (1)	Leisure Satisfaction (2)	Financial Satisfaction (3)	GHQ (4)	Subjective health (5)	Life Satisfaction (6)
Second-stage IV results						
Father retired	-1.22***	0.76***	-0.52***	0.27**	-0.04	0.47**
	(0.14)	(0.20)	(0.17)	(0.14)	(0.15)	(0.23)
R^2	0.82	0.64	0.62	0.60	0.67	0.68
First-stage IV results						
Father above SPA	0.22***	0.23***	0.23***	0.23***	0.23***	0.23***
	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
F-test	426.9	398.3	405.9	393.9	425.2	401.1
Reduced form						
Father above SPA	-0.35***	0.22***	-0.16***	0.08*	-0.01	0.11**
	(0.05)	(0.06)	(0.05)	(0.04)	(0.05)	(0.05)
R^2	0.77	0.61	0.64	0.58	0.67	0.68
OLS						
Father retired	-1.03***	0.55***	0.06	0.11**	-0.003	0.12***
	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)	(0.04)
R^2	0.82	0.65	0.64	0.60	0.67	0.68
Individuals	1,013	908	910	895	940	907
Observations	10,517	9,506	9,604	9,314	9,885	9,500

Clustered (father) standard-errors in parentheses
*Significance: *** = 1%; ** = 5%; * = 10%*

Notes: see Table 2

5.2 The Inter-generational Effects of Parental Retirement on Adult Children's Well-Being

The estimated effects of mother's and father's retirement on their adult children's well-being appear in Tables 4 and 5. These regressions cover the period from ten years before to ten years after the pension-eligibility cutoff, and include quadratic age trends for both the parent and adult child. The results in the first column of each panel refer to all adult children, and the second and third columns to daughters and sons separately.

In Table 4, mothers' retirement significantly increases their adult children's life and income satisfaction by about 0.2 standard deviations. In the third panel, the estimated coefficient for adult-child GHQ is also positive, but insignificant. The corresponding paternal-retirement estimates in Table 5 (including those from the reduced-form regression) are all smaller, insignificant and less-precisely estimated than those for maternal retirement. [4]

[4] It is possible that these estimates are attenuated by parents who self-report as retired but continue to work and defer their state pension. To investigate, we added parental income as a control variable in both Equations 4.1 and 4.2, allowing us to compare parents above the SPA who report being retired to those who report not being retired but have the same level of income. The results are similar to those in the main analysis, suggesting that this potential income effect does not significantly affect our findings.

TABLE 4: Mother's Retirement and Adult Child Well-being

Dependent Variables:	Life Satisfaction			Income Satisfaction			GHQ		
	All	Daughters	Sons	All	Daughters	Sons	All	Daughters	Sons
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Second-stage IV results									
Mother retirement	0.20**	0.24*	0.18	0.21**	0.18	0.24*	0.11	0.18	0.06
	(0.10)	(0.14)	(0.14)	(0.10)	(0.14)	(0.13)	(0.11)	(0.16)	(0.14)
F-test	1577.8	705.2	871.6	1577.8	705.2	871.6	1840.1	920.2	912.3
R^2	0.57	0.56	0.58	0.57	0.57	0.57	0.50	0.48	0.52
Reduced form									
Mother above SPA	0.06**	0.07*	0.05	0.06**	0.05	0.07*	0.03	0.04	0.02
	(0.03)	(0.04)	(0.04)	(0.03)	(0.04)	(0.04)	(0.03)	(0.05)	(0.04)
R^2	0.58	0.56	0.59	0.57	0.57	0.58	0.50	0.49	0.52
OLS									
Mother retired	0.02	0.001	0.03	0.01	-0.003	0.03	-0.02	-0.02	-0.01
	(0.03)	(0.04)	(0.04)	(0.03)	(0.04)	(0.0)	(0.03)	(0.04)	(0.04)
R^2	0.58	0.56	0.59	0.57	0.57	0.58	0.50	0.49	0.52
Individuals	3,513	1,721	1,797	3,513	1,721	1,797	3,513	1,721	1,797
Observations	16,984	8,292	8,692	16,984	8,292	8,692	16,984	8,292	8,692

Clustered (individual) standard-errors in parentheses
*Significance: *** = 1%; ** = 5%; * = 10%*

Notes: The data refers to BHPS Waves 6-10 and 12-18 (years 1996-2000 and 2002-2008). The regressions include a quadratic term for the adult child's and mother's ages, and individual, month and year-fixed effects but no other control variables. The age bandwidth is ten years. The second-stage coefficients are standardised. The F-test variable refers to the Cragg-Donald F-statistic from the first stage.

TABLE 5: Father's Retirement and Adult Child Well-being

Dependent Variables:	Life Satisfaction			Income Satisfaction			GHQ		
	All	Daughter	Son	All	Daughter	Son	All	Daughter	Son
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Second-stage IV results									
Father retired	0.07	0.04	0.09	-0.10	-0.29	0.07	-0.24	-0.20	-0.28
	(0.21)	(0.31)	(0.29)	(0.22)	(0.34)	(0.29)	(0.23)	(0.37)	(0.29)
F-test	345.8	151.1	198.8	345.8	151.1	198.84	345.83	151.12	198.84
R^2	0.57	0.57	0.58	0.58	0.58	0.58	0.50	0.48	0.52
Reduced form									
Father above SPA	0.01	0.02	0.004	-0.03	-0.06	0.006	-0.04	-0.03	-0.05
	(0.03)	(0.04)	(0.05)	(0.03)	(0.05)	(0.05)	(0.04)	(0.06)	(0.05)
R^2	0.57	0.57	0.58	0.58	0.58	0.58	0.50	0.48	0.52
OLS									
Father retired	0.04	-0.07	-0.03	0.04	0.02	0.06	0.006	0.03	-0.010
	(0.04)	(0.05)	(0.05)	(0.04)	(0.06)	(0.05)	(0.04)	(0.06)	(0.05)
R^2	0.58	0.57	0.58	0.58	0.58	0.58	0.50	0.48	0.52
Individuals	2,635	1,299	1,336	2,635	1,299	1,336	2,635	1,299	1,336
Observations	13,457	6,632	6,825	13,457	6,632	6,825	13,457	6,632	6,825

Clustered (individual) standard-errors in parentheses
*Significance: *** = 1%; ** = 5%; * = 10%*

Notes: see Table 4.

5.3 Heterogeneity

This sub-section asks whether the effect of parental retirement on adult child well-being varies according to family characteristics. The first of these is whether the adult children are themselves parents, and if so the ages of the grandchildren. If the positive effect of maternal retirement works via the time transfers related to grandchild care, it should only be found for adult children who are parents. In addition, in Kaufmann et al. (2023), the effect of maternal retirement on daughters' labour supply depends on the age of the grandchildren, with adult daughters' working hours rising only for grandchildren aged between 4 and 7.

The various heterogeneity results for mothers appear in Table 6. First, adult children are split by parenthood and their children's ages in columns (1)-(5) (an adult child who has children of different ages may well appear in more than one of these columns). The results are consistent with grandparental childcare: maternal retirement does not significantly affect the well-being of childless adult children, but has positive significant effects for adult children who are parents. Regarding grandchild age, the smallest effects are found for grandchildren under the age of three, although all of the three estimated coefficients here are statistically equal

to each other.

These findings are consistent with grand-maternal childcare for younger children. This is an important transfer, with private childcare in the UK being expensive. [5]

Second, inter-generational transfers may well vary by the geographical distance between adult children and their retired mothers. In Chan and Ermisch (2011), exchanges between households in the UK fall with the distance between them. A similar result across 10 European countries with respect to grand-parental childcare provision appears in Zanasi et al. (2023). Last, Eibich and Siedler (2020) find a significant effect of paternal retirement on adult children's fertility, but only when the travel distance between the two households is under one hour. It should, however, be borne in mind that the well-being of adult children could itself influence their parents' location and retirement choices: as such, the distance heterogeneity results should be interpreted with some caution.

Columns (6)-(8) do reveal heterogeneity by travel time. When retired mothers live less than one hour from their adult children, the estimated effect of their retirement on adult-child well-being is substantial (at 0.41, 0.24 and 0.31 standard deviations). The estimates for longer travel times are all smaller and insignificant.

Third, given that retired grandparents can provide free childcare to their grandchildren, maternal retirement may matter more for poorer adult children (for whom childcare is less affordable). Columns (9) and (10) list the separate results for adult children whose gross monthly income (in the years before their mothers reached the State Pension Age) was in the bottom quartile or top quartile in that year. For both life and income satisfaction, the positive effect of maternal retirement is driven by adult children in the bottom income quartile.

Considering the marital status of the retired mother, non-partnered mothers — whether widowed, divorced or separated — may be better placed to support their adult children, including via childcare, due to their greater availability. This is what is found in columns (11) and (12), with larger well-being effects for adult children whose mother is not married after retirement.

Last, we stratify the sample by the elderly mothers' pre-retirement health, as their ability to provide childcare and support their adult children likely depends on their health. This latter is measured in all BHPS waves via the question: "In the last 12 months, have you been in a hospital or clinic as an in-patient overnight or longer?". We divide our sample according to whether the elderly mothers were hospitalised at least once in the pre-retirement period. In columns (13) and (14), there is a positive significant effect on adult children's life and income satisfaction only when the retired mother was in good health before retirement; the corresponding

[5] An alternative approach to the extensive margin of retired or not is to consider the intensive margin of older mothers' work hours: the results remain statistically significant and in the same direction (see Appendix D.3).

coefficients for adult children with hospitalised mothers are negative and insignificant.

Overall, these results suggest that a substantial part of the main estimates in Table 4 reflects the time that retired mothers transfer to their adult children. It also sheds light on the gendered nature of childcare responsibilities and the significant role that retired mothers can play in supporting their adult children and grandchildren. Ultimately, these findings may have important implications for policymakers and households, emphasising the value of inter-generational support and the importance of recognising the challenges faced by women in the workforce.

Table 7 then presents the analogous heterogeneity analysis for paternal retirement. In general, there is little consistent evidence of heterogeneity here with respect to adult-child or parent characteristics.

One key consideration in this heterogeneity analysis is the time at which the stratification variables are measured. In the results above, these variables are measured when the parents are aged 58–59 (mothers) or 63–64 (fathers), so that they reflect the parents' situation before State Pension Age (SPA) eligibility. However, these variables could still have changed in anticipation of retirement, potentially influencing our estimates. To see how sensitive the results are to measurement timing, we replaced these variables by their counterparts three years earlier (at age 57 for mothers and 62 for fathers). The point estimates are similar but with higher standard errors, sometimes leading to a loss of statistical significance. The rising standard errors likely reflect both the smaller sample size when moving further from the SPA threshold, and greater noise in the measurement of family structure, particularly regarding the presence of young grandchildren. Evaluating the presence of grandchildren "too early" will miss out on adult children who have very young children when their parents retire, potentially reducing the precision of the estimates. Given these considerations, our main results refer to stratification variables that are measured just before parental pension eligibility.

TABLE 6: Mother's Retirement and Adult-Child Well-being: Heterogeneity Results

Strata:	No child	Child	Age 0-2	Age 3-4	Age 5-11	Live together	≤ 1 hrs	> 1 hrs	$\leq 25^{th}$ pct	$\geq 75^{th}$	Married	Not married	No hospital	Hospital
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Dependent Variable														
Life Satisfaction	0.17	0.28**	0.23*	0.35**	0.38**	-0.03	0.41***	0.35	0.57***	0.17	0.12	0.44**	0.27**	-0.31
	(0.17)	(0.13)	(0.14)	(0.15)	(0.16)	(0.25)	(0.14)	(0.30)	(0.20)	(0.18)	(0.13)	(0.21)	(0.11)	(0.55)
R^2	0.62	0.53	0.52	0.51	0.52	0.63	0.53	0.48	0.68	0.58	0.58	0.61	0.58	0.79
Income Satisfaction	0.0002	0.39***	0.36***	0.49***	0.41***	0.19	0.24*	0.11	0.54***	0.11	0.21*	0.47**	0.26**	-0.16
	(0.16)	(0.13)	(0.14)	(0.15)	(0.15)	(0.24)	(0.14)	(0.27)	(0.19)	(0.16)	(0.12)	(0.21)	(0.11)	(0.38)
R^2	0.61	0.53	0.52	0.51	0.51	0.62	0.55	0.53	0.66	0.55	0.57	0.60	0.58	0.84
GHQ	0.20	0.11	0.20	0.31**	0.35**	0.28*	0.04	-0.20	0.31	0.38*	0.07	0.09	0.12	0.47
	(0.19)	(0.14)	(0.15)	(0.16)	(0.17)	(0.26)	(0.15)	(0.36)	(0.21)	(0.20)	(0.14)	(0.20)	(0.12)	(0.66)
R^2	0.53	0.47	0.46	0.46	0.46	0.56	0.47	0.39	0.61	0.54	0.52	0.51	0.51	0.76
Individuals	2,219	1,299	1,022	844	778	1,654	784	299	1,331	1,914	2,755	914	3,447	846
Observations	8,693	8,291	7,096	6,191	5,419	6,149	5,444	1,900	3,805	7,597	12,871	3,885	15,605	1,379

Clustered (pidp) standard-errors in parentheses
*Significance: *** = 1%; ** = 5%; * = 10%*

Notes: The data refers to BHPS Waves 6-10 and 12-18 (years 1996-2000 and 2002-2008). *Not married* includes divorced, separated and widowed older mothers. *Hospital* refers to older mothers who have spent at least one night in hospital in the 12 months before the interview date. For all stratification levels, the coefficients refer to the second-stage IV estimates of the regression of adult child well-being on the residual of the first stage in Equation 4.1. All models include a quadratic term for adult child and parental age and individual, year and month fixed effects. There are no other control variables.

TABLE 7: Father's Retirement and Adult-Child Well-being: Heterogeneity Results

Strata:	No child	Child	Age 0-2	Age 3-4	Age 5-11	Live together	≤ 1 hrs	> 1 hrs	$\leq 25^{th}$ pct	$\geq 75^{th}$	Married	Not married	No hospital	Hospital
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Dependent Variable														
Life Satisfaction	-0.21	0.33	0.53	0.22	0.16	0.10	0.55	-1.31	-0.24	-0.22	0.07	-0.41	0.18	-1.28
	(0.29)	(0.32)	(0.34)	(0.36)	(0.36)	(0.36)	(0.55)	(1.1)	(0.46)	(0.27)	(0.23)	(0.37)	(0.24)	(0.97)
R^2	0.62	0.52	0.50	0.53	0.53	0.59	0.48	0.53	0.68	0.59	0.59	0.59	0.58	0.80
Income Satisfaction	-0.18	-0.04	0.00	-0.02	-0.23	-0.18	0.25	-0.36	-0.24	-0.28	-0.10	-0.29	-0.01	-1.36*
	(0.31)	(0.31)	(0.31)	(0.36)	(0.37)	(0.37)	(0.52)	(0.95)	(0.45)	(0.30)	(0.24)	(0.40)	(0.25)	(0.74)
R^2	0.61	0.53	0.51	0.52	0.51	0.62	0.55	0.53	0.66	0.55	0.57	0.60	0.59	0.82
GHQ	-0.46	-0.06	-0.13	-0.45	-0.11	0.04	-0.59	0.85	-1.06**	-0.34	0.03	-1.22***	-0.27	0.69
	(0.34)	(0.33)	(0.34)	(0.39)	(0.41)	(0.37)	(0.76)	(0.99)	(0.50)	(0.31)	(0.25)	(0.46)	(0.27)	(0.68)
R^2	0.53	0.47	0.46	0.46	0.46	0.56	0.47	0.39	0.61	0.54	0.52	0.51	0.51	0.82
Individuals	1,484	1,151	875	745	709	972	136	81	1,027	1,487	2,194	209	2,606	546
Observations	6,016	7,441	6,139	5,528	5,010	4,735	987	501	3,098	6,181	10,276	864	12,616	841

Clustered (pidp) standard-errors in parentheses
*Significance: *** = 1%; ** = 5%; * = 10%*

Note: See Table 6.

6 Discussion

While our analysis provides insights into the effects of parental retirement on adult children's well-being, it is important to underline potential limitations that may affect the interpretation and external validity of these findings.

A first limitation comes from the co-residence bias inherent in the sample selection. Our analysis sample is restricted to adult children who were observed living with their parents at some point, so that it probably over-represents families with closer inter-generational ties or a greater propensity to co-reside later in life. As discussed in Appendix B2, the estimation sample of adult children does differ statistically from the full sample of adult children in the same age range over a number of dimensions, such as socioeconomic characteristics. This selection bias may limit the external validity of our estimates, as they are based on adult children who are more likely to live with their parents around the time that the latter retires. However, the estimated effects of retirement on various parental outcomes in our estimation sample are similar to those found in both other research that uses the full sample of older parents and the full sample of older parents in the BHPS, suggesting that any sample-selection bias is limited.

A second limitation refers to the asymmetry in the data on married adult children. While we observe the biological parents of the adult children who lived with their parents, we have no information on the biological parents of their spouses. We thus estimate the effects of their own parents reaching the State Pension Age (SPA) for married adult children in the sample, but cannot evaluate the analogous effect of their parents-in-law attaining the SPA. In parallel, for spouses who married these adult children, the analysis reveals the effects of their parents-in-law reaching the SPA but we do not know about their own biological parents' eligibility or retirement. This may well introduce some asymmetry into the results, and should be borne in mind when interpreting the findings for married adult children.

Last, there are notable differences between the Regression Discontinuity Design (RDD) and the Difference-in-Differences (DiD) results. While the RDD estimates the immediate effects of parents crossing the SPA eligibility threshold, the DiD framework captures the average effects of SPA eligibility (and potential retirement) over a more-extended period. The more-positive effects identified by RDD analysis may therefore not be long-lasting. Along the same lines, contextual factors, such as changes in childcare policies or economic conditions that occurred over the analysis period, may disproportionately affect the DiD estimates (that are estimated over a longer time frame). While the differences between the results are not unexpected,

they do highlight the need for reflection when comparing results across these two empirical techniques.

7 Conclusion

We have here used linked parent-child information in UK household panel data to establish the spillover effects of parental retirement on the well-being of their adult children. This effect was identified first in a Regression Discontinuity Design analysis using the threshold of the eligibility age for the State Pension (over the period when this age was fixed). There were no effects of father's retirement on the well-being of their adult children, while mothers' retirement increased their adult children's life satisfaction and income satisfaction. These latter effects were larger for adult children who lived close to their parents, had children themselves, and had lower incomes. These findings are consistent with inter-generational time transfers from retired mothers to their adult children, highlighting the importance of childcare provisions and affordability. Delayed retirement will then have a potentially large spillover effect on adult children's well-being and labour-market outcomes, especially those from lower-income households.

The second analysis considered the rise in the UK's State Pension Age for women and men. The difference-in-difference analysis here shows that fathers' retirement reduces their adult children's life and income satisfaction, with the results being driven by adult sons; there was no significant effect of mothers' retirement on adult-child well-being. This is consistent with inter-generational financial transfers from fathers to adult children.

Our most general finding is that public policies can have inter-generational spillover effects with significant distributional consequences, underlining the importance of both financial and time transfers. These spillovers should be considered when evaluating policies that change retirement eligibility rules.

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Online supplement

(not for printed publication)

Appendix A General Health Questionnaire

TABLE A–1: GHQ questions/responses

GHQ questions / responses	1	2	3	4
1. Been able to concentrate on whatever you are doing?	Better than usual	Same as usual	Less than usual	Much less than usual
2. Lost much sleep over worry?	Not at all	No more than usual	Rather more than usual	Much more than usual
3. Felt that you are playing a useful part in things?	More so than usual	Same as usual	Less so than usual	Much less capable
4. Felt capable of making decisions about things?	More so than usual	Same as usual	Less so than usual	Much less capable
5. Felt constantly under strain?	Not at all	No more than usual	Rather more than usual	Much more than usual
6. Felt you could not overcome your difficulties?	Not at all	No more than usual	Rather more than usual	Much more than usual
7. Been able to enjoy your normal day-to-day activities?	Much more than usual	Same as usual	Less so than usual	Much less than usual
8. Been able to face up to your problems?	More so than usual	Same as usual	Less able than usual	Much less able
9. Been feeling unhappy and depressed?	Not at all	No more than usual	Rather more than usual	Much more than usual
10. Been losing confidence in yourself?	Not at all	No more than usual	Rather more than usual	Much more than usual
11. Been thinking of yourself as a worthless person?	Not at all	No more than usual	Rather more than usual	Much more than usual
12. Been feeling reasonably happy all things considered?	More so than usual	About same as usual	Less so than usual	Much less than usual

Appendix B Attrition bias

The bar chart in Figure B–1 shows the sample composition of adult children in the British Household Panel Survey (BHPS) from Wave 1 in 1991-92 to Wave 18 in 2008-09. Each bar is colour-coded to indicate the wave in which respondents first participated. This illustrates both the new respondents who are added over time and how participants are retained.

The initial wave (1991-92), represented by the dark purple segment at the base of each bar, has the highest number of adult-children respondents. Over time, additional cohorts of adult children and their spouses or partners entered the survey, as can be seen in the different colours that appear in subsequent waves. The introduction of new households from Scotland and Wales in Wave 9 (1999-2000) and Northern Ireland in Wave

11 (2001-02) also increased the number of adult children in these respective waves.

The chart also reveals the extent of attrition: the diminishing height of the coloured segments corresponding to the first wave reflects the falling participation of the original cohort. This is consistent with the reported attrition rates, with 52% of the initial adult-child participants remaining after 18 years, and a more pronounced participation decline among older mothers and fathers. The varying height of the bars also reflects the survey's dynamic nature, with different numbers of respondents in each wave due to attrition and the addition of new households.

FIGURE B–1: Composition of BHPS Adult Children across 18 Waves

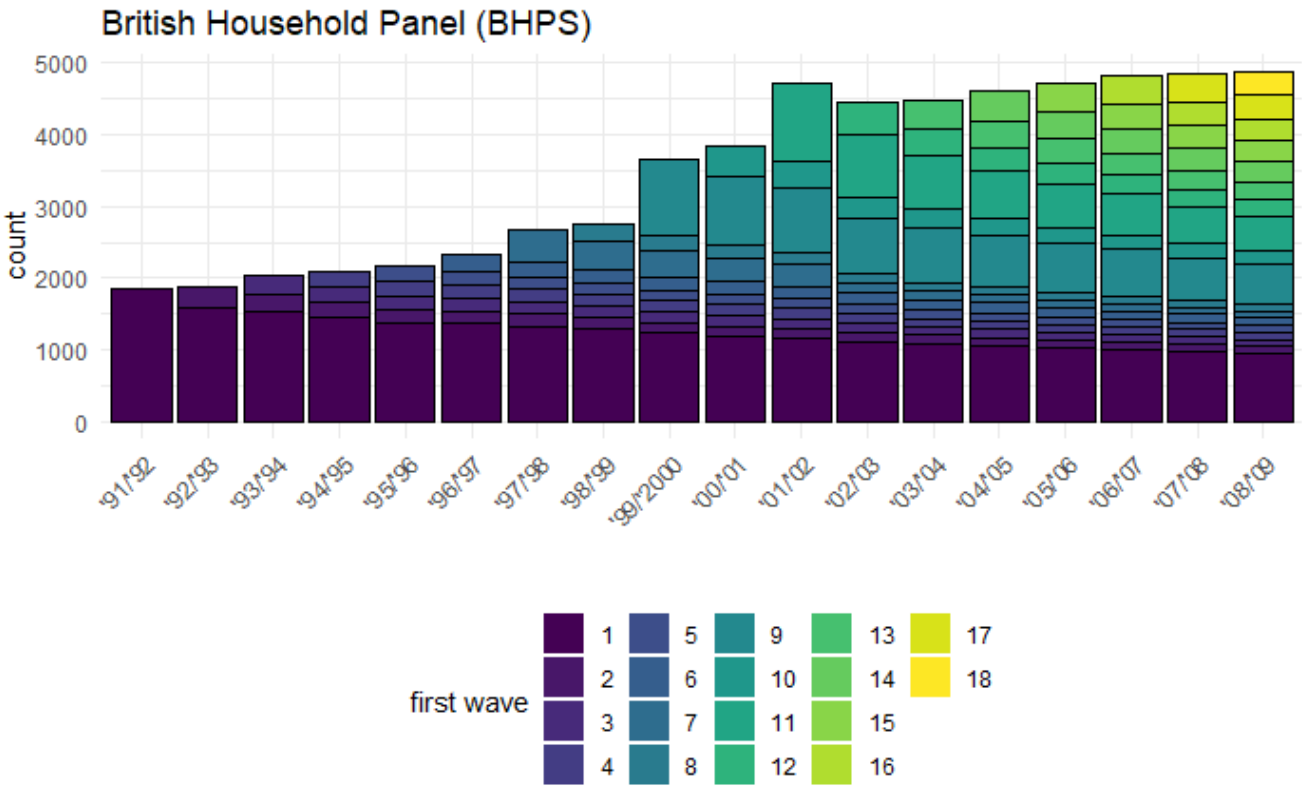


Table B–2 lists the results from a regression of individual attrition in the BHPS on a set of demographic and outcome variables. The main demographic predictors of attrition in our estimation sample are male, White and older adult children. Retirement is associated with a higher probability of attrition for fathers, which may provide a potential explanation for the insignificant estimate we found in this sample.

TABLE B–2: Characteristics of Attritors in the BHPS sample

Dependent Variables:	Attritors Adult Children	Attritors Elder mothers	Attritors Elder Fathers
Covariates			
Life Satisfaction	-0.006**	0.006	-3.7×10^{-5}
	(0.003)	(0.005)	(0.006)
Income satisfaction	-0.009***	-0.01***	-0.01**
	(0.002)	(0.004)	(0.005)
GHQ	0.001	0.0002	-0.003*
	(0.0006)	(0.001)	(0.002)
White	0.05***	0.10***	0.08***
	(0.009)	(0.01)	(0.02)
Age	-0.005***	-0.0002	-0.001
	(0.0004)	(0.0008)	(0.001)
Female	-0.02**		
	(0.009)		
Active	0.002		
	(0.007)		
Retired		0.02	0.08***
		(0.02)	(0.02)
Fit statistics			
Observations	45,998	19,763	14,365
Pseudo R^2	0.01983	0.00983	0.01073
BIC	47,220.6	22,688.0	16,853.5

*Significance: *** = 1%; ** = 5%; * = 10%*

The degree of attrition from the UKHLS survey is also high: of the initial sample of adult children, 33% continue to participate 12 years later: see Figure B–2. Table B–3 shows the results from a regression of individual attrition on demographic and outcome variables in the UKHLS. Compared to the BHPS, the same predictors are statistically significant in the UKHLS sample, but being white now decreases the probability of dropout. In addition, retirement predicts drop out for both fathers and mothers in UKHLS data.

FIGURE B–2: UKHLS waves composition

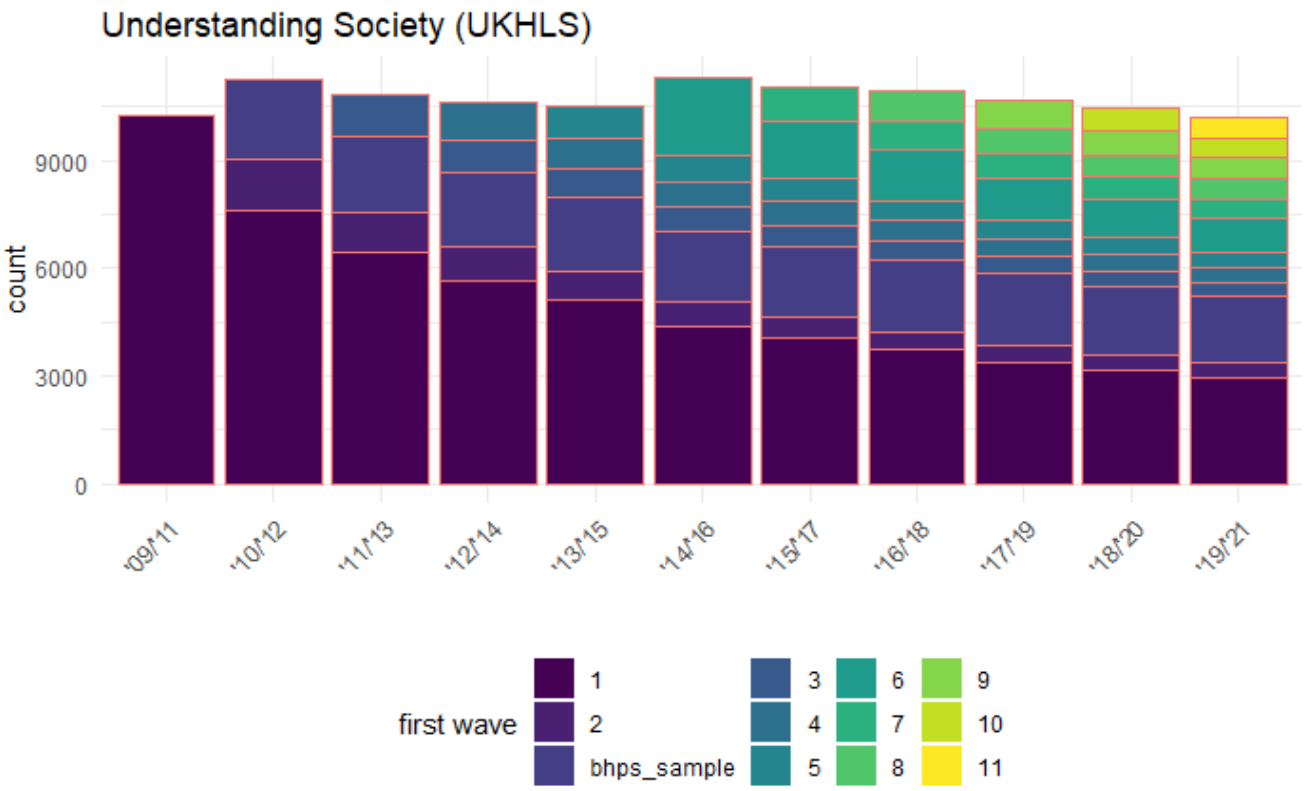


TABLE B–3: Characteristics of Attritors in UKHLS sample

Dependent Variables:	Attritors Adult Children	Attritors Elder mothers	Attritors Elder Fathers
Covariates			
Life Satisfaction	0.006***	0.005**	0.006**
	(0.002)	(0.002)	(0.003)
Income Satisfaction	-0.02***	-0.02***	-0.02***
	(0.002)	(0.002)	(0.003)
GHQ	0.004***	-0.0002	-0.002**
	(0.0004)	(0.0006)	(0.0009)
White	-0.08***	-0.08***	-0.14***
	(0.006)	(0.009)	(0.01)
Age	-0.005***	-0.004***	-0.004***
	(0.0003)	(0.0006)	(0.0007)
Female	-0.02***		
	(0.007)		
Active	-0.03***		
	(0.005)		
Retired		0.05***	0.06***
		(0.01)	(0.02)
Fit statistics			
Observations	111,136	58,764	38,275
Pseudo R^2	0.03350	0.01416	0.02445
BIC	143,868.7	81,235.3	51,659.2

*Significance: ***: 1%, **: 5%, *: 10%*

Appendix C Co-residence Bias

Torche (2019) notes that: “If older co-resident children are included in the analysis, this induces the risk of bias insofar as children who continue to live with parents after late adolescence might not be a representative sample of their cohort. Selection bias induced by selecting co-resident children beyond their late adolescence is a concern, even if the sample is restricted to children who are young adults."

Co-residence bias in our sample of adult children is assessed in two ways: a descriptive analysis comparing the means and standard deviations of the adult-child demographic variables in our main sample to those in the full sample of BHPS respondents, and analysing parents’ outcomes using the unrestricted sample that includes all parents regardless of whether the adult child was observed living with them. Tables C–4 and C–5 show that the sample means for adult children demographics are statistically different in the two samples in all

dimensions considered. This is a significant potential source of bias that needs to be borne in mind when considering the validity of our main causal estimates.

TABLE C–4: Co-residence bias in the BHPS sample - Adult Chlildren

Sample:	Adult Children	Full Sample	Significance
GHQ	25.15	24.64	***
	(5.33)	(5.60)	
Income satisfaction	4.50	4.42	***
	(1.44)	(1.52)	
Life satisfaction	5.20	5.10	***
	(1.14)	(1.23)	
Active	0.87	0.84	***
	(0.34)	(0.37)	
Age	31.46	35.58	***
	(4.94)	(5.79)	
Female	0.46	0.54	***
	(0.50)	(0.50)	
Labour income	1548.48	1495.68	***
	(1176.82)	(1343.01)	
Married	0.39	0.58	***
	(0.49)	(0.49)	
Number children	0.71	1.14	***
	(0.98)	(1.14)	
Year of birth	1972	1966	***
	(5.35)	(6.51)	
Years of education	16.99	16.42	***
	(2.00)	(1.03)	
Number of Observations	18333	57686	

*Significance: ***: 1%, **: 5%, *: 10%*

The figures refer to the Means and Standard Deviations (in parentheses) of the outcome and demographic variables in the Adult Children and Full samples, and the significance level for the test of the equality of the means.

TABLE C–5: Co-residence bias in the UKHLS sample.

Sample:	Adult Children	Full Sample	Significance
GHQ	24.46	24.54	
	(5.75)	(5.76)	
Income satisfaction	4.38	4.16	***
	(1.99)	(2.57)	
Life satisfaction	4.95	4.80	***
	(1.90)	(2.52)	
Active	0.88	0.84	***
	(0.33)	(0.37)	
Age	31.37	(35.76	***
	(5.13)	(5.95)	
Female	0.50	0.57	***
	(0.50)	(0.49)	
Labour income	1933.79	2139.41	***
	(1857.12)	(5409.37)	
Married	0.31	0.55	***
	(0.46)	(0.50)	
Number children	0.55	1.14	***
	(0.89)	(1.14)	
Year of birth	1984.06	1978.18	***
	(5.70)	(6.86)	
Years of education	16.65	16.62	***
	(1.10)	(1.19)	
Number of Observations			

*Significance: ***: 1%, **: 5%, *: 10%*

Means and Standard Deviations (in parentheses) of the outcome and demographic variables in the UKHLS Adult Children sample and the Full sample, and the associated p-value from the t-test for the difference in means.

Tables C–6 and C–7 report the second stage and reduced form estimates of parental retirement on parents' outcome in the full unrestricted sample of older parents. We highlight two main insights. First, the second stage and reduced form estimates are highly comparable to the ones we obtained in the main sample. The only difference is the estimate of retirement on subjective health, which is now positive and statistically significant for both mothers and fathers. Also, compared to our main estimate, potentially due to a bigger sample size, the positive effect on life satisfaction for mothers gains statistical significance.

TABLE C–6: Co-residence bias in the BHPS sample - 2SLS Results for the full sample of older mothers

Dependent Variables:	Weekly working hours	Leisure Satisfaction	Financial Satisfaction	GHQ	Subjective health	Life Satisfaction
	(1)	(2)	(3)	(4)	(5)	(6)
Second-stage IV results						
Maternal retired	-0.98***	0.58***	-0.27***	0.16**	0.20***	0.20***
	(0.07)	(0.08)	(0.07)	(0.08)	(0.06)	(0.07)
R^2	0.78	0.60	0.63	0.53	0.66	0.64
First-stage IV results						
Mother above SPA	0.30***	0.30***	0.30***	0.30***	0.29***	0.31***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
F-Stat	1977.038	1600.216	1946.880	1980.151	1818.285	1598.620
Reduced Form						
Mother above the SPA	-0.29***	0.18***	-0.08***	0.05**	0.06***	0.06***
	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
R^2	0.76	0.60	0.64	0.53	0.66	0.64
OLS						
Mother retired	-0.68***	0.27***	0.04**	0.06***	0.005	0.03
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
R^2	0.79	0.61	0.64	0.54	0.66	0.64
Individuals	3,112	2,712	3,080	3,112	3,059	2,708
Observations	28,159	20,291	27,778	28,278	26,418	20,254

Clustered (pidp) standard-errors in parentheses
*Significance: ***: 1%, **: 5%, *: 10%*

Note: The sample is constructed

TABLE C–7: Co-residence bias in the BHPS sample - 2SLS Results for the full sample of older father

Dependent Variables:	Weekly working hours	Leisure Satisfaction	Financial Satisfaction	GHQ	Subjective health	Life Satisfaction
	(1)	(2)	(3)	(4)	(5)	(6)
Second-stage IV results						
Father retired	-1.0***	0.50***	-0.23***	0.29***	0.18***	0.37***
	(0.07)	(0.10)	(0.07)	(0.08)	(0.07)	(0.08)
R^2	0.83148	0.62519	0.64160	0.54858	0.65402	0.65973
First-stage IV results						
Father above SPA	0.33***	0.33***	0.33***	0.33***	0.33***	0.33***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
F-stat	1951.430	1388.402	1876.403	1940.514	1786.411	1401.780
Reduced Form						
Father above SPA	-0.35***	0.16***	-0.07***	0.10***	0.06***	0.13***
	(0.03)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)
R^2	0.78252	0.61769	0.64898	0.55066	0.65691	0.65921
OLS						
Father retired	-0.93***	0.38***	0.08***	0.10***	0.02	0.08***
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)
R^2	0.83278	0.62487	0.64916	0.55212	0.65663	0.65890
Individuals	3,112	2,712	3,080	3,112	3,059	2,708
Observations	20,879	14,813	20,485	20,998	19,608	14,792

Clustered (pidp) standard-errors in parentheses
*Significance: ***: 1%, **: 5%, *: 10%*

TABLE C–8: Co-residence bias in the UKHLS sample - DiD Results for the full sample of older parents

Dependent Variables:	Weekly working hours (1)	Leisure Satisfaction (2)	Financial Satisfaction (3)	GHQ (4)	Subjective health (5)	Life Satisfaction (6)
panel A						
Mother above SPA	-0.21***	0.18***	-0.17***	0.05**	-0.001	0.10***
	(0.02)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)
Observations	55,697	46,812	53,883	56,027	41,614	46,810
R^2	0.77	0.52	0.66	0.55	0.75	0.55
panel B						
Father above SPA	-0.13***	0.10*	-0.04	-0.10*	0.06	0.09
	(0.05)	(0.06)	(0.05)	(0.06)	(0.08)	(0.06)
Observations	40,822	34,445	37,699	41,196	26,374	34,444
R^2	0.79	0.51	0.68	0.59	0.77	0.54

Clustered (pidp) standard-errors in parentheses
*Significance: ***: 1%, **: 5%, *: 10%*

Appendix D Fuzzy RDD Additional Results

D.1 Identifying Assumptions

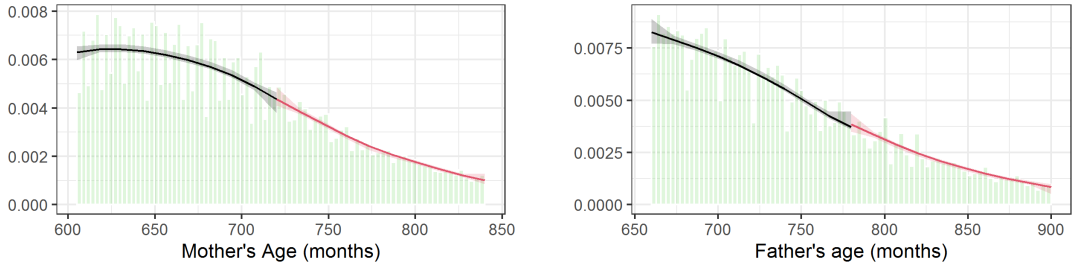
Smoothness in density: For RDD results to be valid, individuals must not be able to manipulate the assignment variable, which in our case is the parent's age in months. We run continuity density tests around the cutoff separately for mothers and fathers to test for continuity in the parent's age. The null hypothesis is that the density of the running variable is continuous at the cutoff, so that there is no "manipulation" of the running variable. A failure to reject implies that there is no statistical evidence of manipulation at the cutoff (Cattaneo et al., 2019). Figure D–3 illustrates the results, and confirm that there is no manipulation around the cutoff.
Choice of bandwidth: One of the central choices in RDD analyses is the appropriate bandwidth around the cutoff. This parameter establishes the maximum age range from the discontinuity, dropping observations outside of this range. Narrow bandwidths minimise bias but may increase variance due to the associated smaller sample; analogously, larger bandwidths reduce variance but at the expense of potentially-larger bias. The main specification uses a bandwidth of ten years, covering ages 50 to 70 for mothers and 55 to 75 for fathers. We carry our robustness checks using bandwidths of eight, five and three years.
Smoothness in covariates: One fundamental RDD assumption is that any other predetermined characteristics of the parents and adult children that may affect adult children's well-being do not change discontinuously at the threshold. The parental predetermined variables are race, college degree and number of biological children; those for adult children are race, the female/male ratio, years of education, and Degree. We illustrate

the RD plot for children, mothers, and fathers, overlaid with lines from local linear regressions using data within a ±10 year window. These graphs reveal no visible discontinuities at the cutoff, so that local assignment around the cutoff is random. In general, RD validity checks provide support for the use of this method, with no evidence of violations of the key identifying assumptions.

Instrument validity: There are three necessary conditions for the causal interpretation of the two-stage least squares estimate. First, that parents' age be strongly associated with retirement status (relevance of the instrument). We show the validity and magnitude of the first-stage relationship in Section 4.1.2. Second, we assume that parents' age only impacts adult children's outcomes through the change in retirement probability. This assumption might be violated if adult children anticipate their parent's eligibility for the State Pension and change their behaviour around this eligibility age. The third assumption is monotonicity, or that there are no defiers.

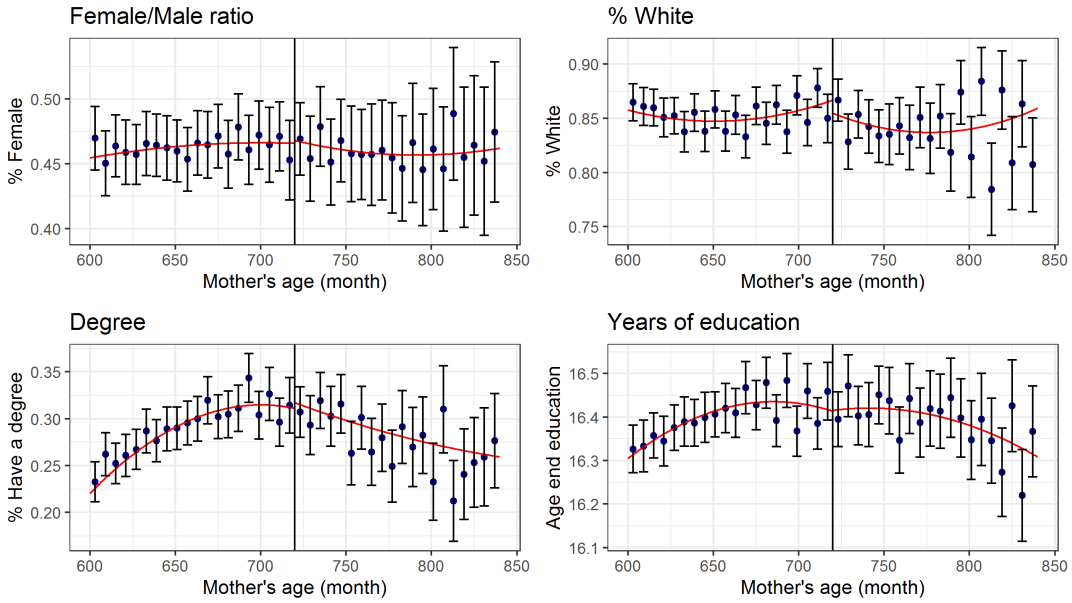
FIGURE D–3: Density plots of the running variable. Mothers (left panel) and fathers (right panel)

(A) Mother (B) Father



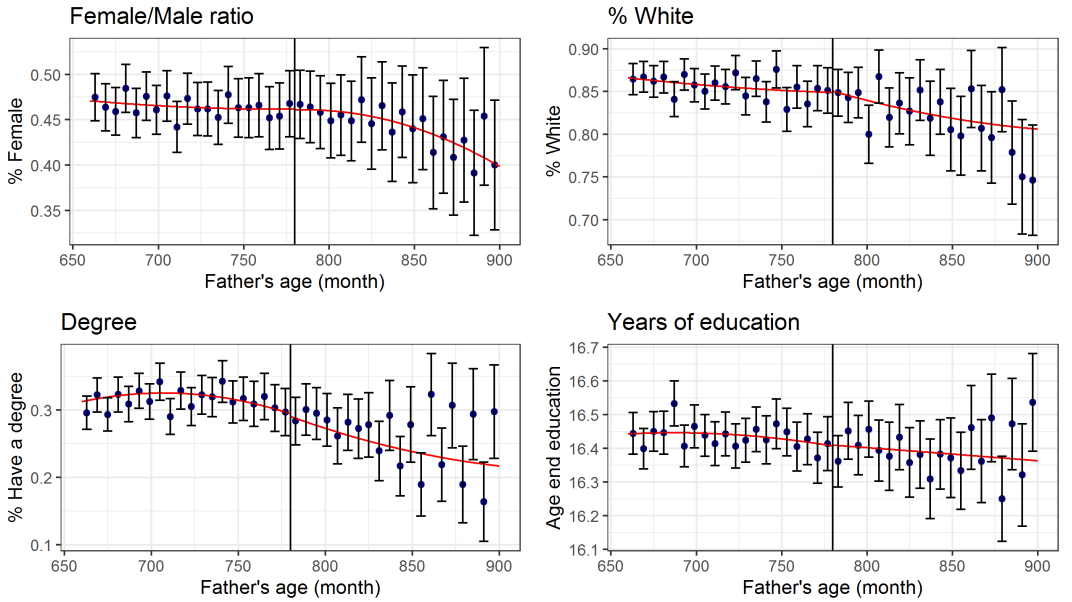
Notes: These plots show the estimated probability density function of the running variable. The plot uses parental age (in months) as the running variable, and imposes a threshold at age 720 for mothers and 780 for fathers. The density functions were estimated using the *rddensity* package in R, using a local quadratic polynomial for the estimation, a cubic polynomial for the bias correction, a triangular kernel, and jackknife standard errors.

FIGURE D–4: Tests for the continuity of the adult child's predetermined variables around the mother's SPA.



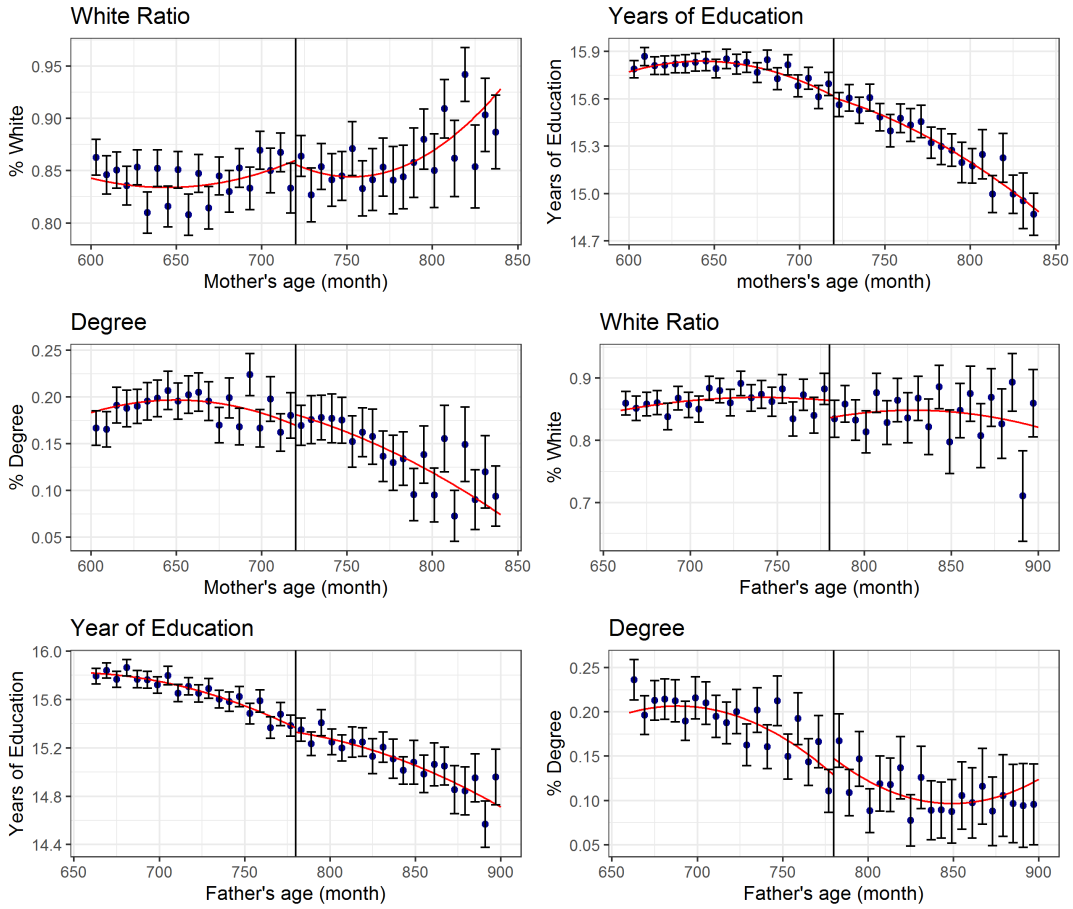
Source: BHPS. The dots plot the averages by parental age in years. The lines depict the quadratic fit, and the shaded areas the 95% confidence interval.

FIGURE D–5: Tests for the continuity of the adult child's predetermined variables around the father's SPA.



Note: see Figure D–4

FIGURE D–6: Tests for the continuity of the parent's predetermined variables across the parent's SPA threshold



Note: see Figure D–4.

D.2 Sensitivity Analysis

The RDD results may be sensitive to the definition of retirement. The main analysis defined parents as retired according to their self-reported status. However, there are other potentially valid definitions of retirement. We here consider three alternatives.

The first alternative is that parents are retired if they self-report being either retired or inactive and not looking for a job in the month before the interview date. The second considers parents as retired only if they receive a State Pension. The third uses self-reported parental working hours instead of self-reported retirement as the outcome variable in the first stage of Equation 4.1.

Tables D–9 and D–10 report the second-stage IV, first-stage IV and OLS results using these three alternative retirement definitions for mothers and fathers, respectively.

Across all specifications and definitions, maternal retirement has a positive and statistically-significant effect

on adult children's life satisfaction and income satisfaction. Under the first alternative definition, life satisfaction increases by 0.36 standard deviations, and income satisfaction by 0.39 standard deviations. Very similar figures are found for the second alternative definition, while the estimated coefficients using working hours are a little smaller (although still significant). The impact of retirement on psychological distress (GHQ) is positive but not statistically significant across all retirement definitions (as was the case in the main text).

The first-stage results confirm that the State Pension Age (SPA) eligibility strongly predicts maternal retirement across all definitions, with coefficients ranging between 17 and 33 percentage points. The associated F-statistics are well above the conventional threshold of 10, indicating considerable instrument relevance. This is also true when using working hours as an alternative indicator of retirement, where the effect of SPA on hours worked is large and negative.

The OLS estimates are smaller in magnitude and generally insignificant across all well-being outcomes. This difference between OLS and IV estimates is consistent with endogeneity in the retirement decision, with IV capturing the causal effect of retirement more reliably.

Overall, the effects of maternal and paternal retirement on adult children's life satisfaction and income satisfaction are robust to alternative definitions of retirement. The first-stage results provide confidence in instrument validity, and the consistent reduction in working hours suggests that increased parental free time plays a role in these outcomes. However, the continuing lack of significant effects on psychological distress (GHQ) suggests that the improvements in subjective well-being may be more closely tied to satisfaction with financial and general life circumstances rather than mental-health outcomes.

TABLE D–9: Mother's Retirement and Adult Child Well-being: Alternative Retirement Definitions

Dependent Variables:	Life satisfaction			Income Satisfaction			GHQ		
	First alternative	Second alternative	Working hours	First alternative	Second alternative	Working hours	First alternative	Second alternative	Working hours
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Second-stage IV results									
Retired (1^{st} Alt.)	0.36**			0.39**			0.20		
	(0.18)			(0.17)			(0.19)		
Retired (2^{nd} Alt.)		0.33*			0.39**			0.19	
		(0.18)			(0.17)			(0.19)	
Working hours			-0.20**			-0.21**			-0.12
			(0.09)			(0.09)			(0.10)
R^2	0.57	0.57	0.57	0.57	0.57	0.56	0.50	0.51	0.50
Observations	16,775	16,572	16,897	16,775	16,572	16,897	16,398	16,197	16,510
First-stage IV results									
Mother above SPA	0.17***	0.17***	-0.33***	0.17***	0.17***	-0.33***	0.17***	0.17***	-0.33***
	(0.02)	(0.01)	(0.03)	(0.02)	(0.01)	(0.03)	(0.02)	(0.01)	(0.03)
R^2	0.79	0.75	0.80	0.79	0.75	0.80	0.79	0.76	0.80
Observations	16,775	16,572	16,897	16,775	16,572	16,897	16,398	16,197	16,510
OLS									
Retired (1^{st} Alt.)	-0.01			0.02			-0.009		
	(0.03)			(0.03)			(0.03)		
Retired (2^{nd} Alt.)		-0.010			0.04			0.01	
		(0.03)			(0.04)			(0.04)	
Working hours			-0.006			-0.008			9.9×10^{-5}
			(0.01)			(0.01)			(0.01)
R^2	0.58	0.58	0.58	0.57	0.58	0.57	0.50	0.51	0.50
Observations	16,775	16,572	16,897	16,775	16,572	16,897	16,398	16,197	16,510

Clustered (pidp) standard-errors in parentheses
*Significance: *** = 10%; ** = 5%; * = 10%*

These regressions include a quadratic trend for the child and parents' ages, and adult children, year and month fixed effects. The age bandwidth is ten years. All second-stage coefficients are standardised.

TABLE D–10: Father's Retirement and Adult Child Well-being: Alternative Retirement Definitions

Dependent Variables:	Life satisfaction			Income Satisfaction			GHQ		
	First alternative	Second alternative	Working hours	First alternative	Second alternative	Working hours	First alternative	Second alternative	Working hours
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Second-stage IV results									
Retired (1^{st} Alt.)	0.07			-0.11			-0.26		
	(0.23)			(0.24)			(0.26)		
Retired (2^{st} Alt.)		0.12			-0.21			-0.37	
		(0.34)			(0.36)			(0.39)	
Working hours			0.004			0.04			0.11
			(0.13)			(0.13)			(0.14)
R^2	0.58	0.58	0.58	0.58	0.59	0.59	0.52	0.52	0.52
Observations	10,112	9,746	10,661	10,112	9,746	10,661	9,845	9,487	10,372
First-stage IV results									
Father above SPA	0.17***	0.11***	-0.30***	0.17***	0.11***	-0.30***	0.17***	0.12***	-0.31***
	(0.02)	(0.02)	(0.04)	(0.02)	(0.02)	(0.04)	(0.02)	(0.02)	(0.04)
R^2	0.79	0.78	0.81	0.79	0.78	0.81	0.79	0.78	0.81
Observations	10,112	9,746	10,661	10,112	9,746	10,661	9,845	9,487	10,372
OLS									
Retired (1^{st} Alt.)	-0.06			0.02			-0.01		
	(0.04)			(0.04)			(0.04)		
Retired (2^{nd} Alt.)		-0.09***			-0.04			-0.07**	
		(0.03)			(0.04)			(0.04)	
Working hours			0.03			0.005			0.006
			(0.02)			(0.02)			(0.02)
R^2	0.58	0.58	0.58	0.59	0.59	0.59	0.52	0.52	0.53
Observations	10,112	9,746	10,661	10,112	9,746	10,661	9,845	9,487	10,372

Clustered (pidp) standard-errors in parentheses
*Significance: ***: 1%, **: 5%, *: 10%*

These regressions include a quadratic trend for the child and parents' ages and adult children, year and month fixed effects. The age bandwidth is ten years. All second-stage coefficients are standardised.

D.3 Robustness checks

We perform four robustness checks for the model and sample specification for both the mother and father samples. The first assesses the robustness of the RDD-IV results to changes in the parental age bandwidth around the cutoff, considering alternatives of eight, five and three years. The second widens the age bandwidth of the adult children from 20-45 to 16-50, holding the parental age at ±10 years before and after the State Pension Age. The third modifies the functional form of the age variable in the main specification from quadratic to linear, cubic or quartic. The last restricts the estimation sample for the RDD-IV to child-parent dyads that have biological ties.

Table D–11 shows that the positive and significant effect of maternal retirement is robust to an age bandwidth up to 5 years for life satisfaction and 8 years for income satisfaction, and it is robust to the increased age bandwidth of children (columns 4, 8 and 12). Table D–12 shows that the estimated retirement effect is robust to different adult child and mother age function forms. The small and insignificant effect of paternal retirement holds for each robustness test, as shown in Table D–13 and D–14.

Lastly, we estimate the robustness of the estimated coefficient when restricting the sample to biological dyads. The results in Tables D–15 and D–16 illustrate the findings. We found that the impact of biological mothers' retirement is more substantial for adult children's life satisfaction and only slightly higher for income satisfaction. The effect of paternal retirement remains small and is not statistically significant.

TABLE D–11: Mother's Retirement and Adult Children's Outcomes - Robustness Checks: Age Bandwidths.

Dependent Variables:	Life Satisfaction				Income Satisfaction				GHQ			
Bandwidth:	8 years	5 years	3 years	16-50	8 years	5 years	3 years	16-50	8 years	5 years	3 years	16-50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Second-stage IV results												
Mother retirement	0.25**	0.29**	0.28	0.20**	0.19*	0.20	0.17	0.19**	0.09	0.08	0.16	0.13
	(0.10)	(0.12)	(0.19)	(0.09)	(0.11)	(0.13)	(0.20)	(0.10)	(0.10)	(0.13)	(0.18)	(0.09)
R^2	0.58	0.62	0.67	0.57	0.59	0.63	0.67	0.57	0.50	0.53	0.58	0.48
Observations	14,423	9,434	6,104	19,417	14,444	9,458	6,121	19,420	16,785	10,746	6,838	22,943

Clustered (pidp) standard-errors in parentheses
*Significance: ***: 1%, **: 5%, *: 10%*

TABLE D–12: Mother's Retirement and Adult Children's Outcomes - Robustness Checks: Functional Form for Age

Dependent Variables:	Life Satisfaction			Income Satisfaction			GHQ		
	Linear	Cubic	Quartic	Linear	Cubic	Quartic	Linear	Cubic	Quartic
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Second-stage IV results									
Mother retirement	0.19*	0.22**	0.22**	0.24***	0.23**	0.23**	0.14	0.14	0.14
	(0.10)	(0.10)	(0.10)	(0.09)	(0.10)	(0.10)	(0.10)	(0.11)	(0.11)
R^2	0.57	0.57	0.57	0.57	0.57	0.57	0.50	0.50	0.50
Observations	16,984	16,984	16,984	16,984	16,984	16,984	16,597	16,597	16,597

Clustered (pidp) standard-errors in parentheses
*Significance: ***: 1%, **: 5%, *: 10%*

Note: All regressions include adult children and year and month fixed effects. The maternal age bandwidth is ten years. All coefficients are standardised

TABLE D–13: Father's Retirement and Adult Children's Outcomes - Robustness Checks: Age Bandwidths

Dependent Variables:	Life Satisfaction				Income Satisfaction				GHQ			
Bandwidth:	8 years	5 years	3 years	16-50	8 years	5 years	3 years	16-50	8 years	5 years	3 years	16-50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Second-stage IV results												
Father retirement	0.12	0.06	-0.14	0.02	0.05	0.17	0.06	-0.16	-0.26	-0.47	-0.34	-0.26
	(0.24)	(0.27)	(0.36)	(0.17)	(0.25)	(0.29)	(0.39)	(0.18)	(0.25)	(0.32)	(0.43)	(0.20)
R^2	0.58	0.62	0.64	0.57	0.59	0.63	0.67	0.58	0.50	0.53	0.57	0.50
Observations	9,877	6,140	3,760	13,981	9,877	6,140	3,760	13,981	9,559	5,918	3,631	13,548

Clustered (pidp) standard-errors in parentheses
*Significance: *** = 10%; ** = 5%; * = 10%*

TABLE D–14: Father's Retirement and Adult Children's Outcomes - Robustness Checks: Functional Form for Age

Dependent Variables:	Life Satisfaction			Income Satisfaction			GHQ		
	Linear	Cubic	Quartic	Linear	Cubic	Quartic	Linear	Cubic	Quartic
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Second-stage IV results									
Father retirement	0.04	0.11	0.11	-0.19	-0.13	-0.14	-0.23	-0.22	-0.22
	(0.22)	(0.22)	(0.22)	(0.23)	(0.23)	(0.23)	(0.24)	(0.24)	(0.24)
R^2	0.57	0.57	0.57	0.58	0.58	0.58	0.50	0.50	0.50
Observations	13,755	13,755	13,755	13,755	13,755	13,755	13,325	13,325	13,325

Clustered (pidp) standard-errors in parentheses
*Significance: ***: 1%, **: 5%, *: 10%*

Note: All regressions include adult children and year and month fixed effects. The age bandwidth is ten years. All second-stage and reduced-form coefficients are standardised

TABLE D–15: Mother's Retirement and Adult Children's Outcomes - Robustness Checks: Biological Adult Children and Mothers

Dependent Variables:	Life Satisfaction (1)	Income Satisfaction (2)	GHQ (3)
Second-stage IV results			
Mother retirement	0.32**	0.26**	0.20
	(0.15)	(0.11)	(0.16)
R^2	0.56	0.57	0.49
Reduced form			
Mother above SPA	0.08**	0.07**	0.05
	(0.04)	(0.03)	(0.04)
R^2	0.56	0.57	0.50
OLS			
Mother retirement	-0.005	0.06	0.02
	(0.04)	(0.04)	(0.04)
R^2	0.56	0.56	0.50
Individuals	2,129	2,1296	2,089
Observations	10,783	10,783	10,532

Clustered (pidp) standard-errors in parentheses
*Significance: ***: 1%, **: 5%, *: 10%*

Note: All regressions include adult children and year and month-fixed effects. The age bandwidth is ten years. All second-stage and reduced-form coefficients are standardised

TABLE D–16: Father's Retirement and Adult Children's Outcomes - Robustness Checks: Biological Adult Children and Fathers

Dependent Variables:	Life Satisfaction (1)	Income Satisfaction (2)	GHQ (3)
Second-stage IV results			
Father retirement	-0.02	-0.10	-0.15
	(0.27)	(0.29)	(0.31)
R^2	0.57	0.58	0.49
Reduced form			
Father above SPA	-0.004	-0.02	-0.02
	(0.04)	(0.05)	(0.05)
R^2	0.81	0.79	0.81
OLS			
Father retirement	-0.05	0.05	0.009
	(0.05)	(0.05)	(0.06)
R^2	0.57	0.57	0.49
Individuals	1,594	1,594	1,557
Observations	8,276	8,276	8,019

Clustered (pidp) standard-errors in parentheses
*Significance: ***: 1%, **: 5%, *: 10%*

Note: All regressions include adult children and year and month fixed effects. The age bandwidth is ten years. All second-stage and reduced-form coefficients are standardised

D.4 Placebo regressions

We run two placebo regressions analysis to examine the credibility of the Fuzzy RDD estimates. First, we re-estimate our main specification using variables as outcomes that should not be affected by parental retirement: (i) whether the adult children have a University Degree; (ii) whether they vote or support any political party. Second, we estimated separate regressions with varying State Pension Ages as placebo cutoffs. Lastly, we conduct an additional placebo analysis examining how retirement affects post-retirement parental outcomes for parents who have never worked. Unlike working parents, these individuals do not experience a transition from employment to retirement but only a shift into the minimum State Pension eligibility. As a result, we expect their response to retirement status to differ from working parents.

Table D–17 reports the estimates of the effect of retirement on the two placebo adult children outcomes, which are small and statistically insignificant for both mother (panel A) and father (panel B), supporting our main RDD findings. However, the results from the second placebo exercise highlight anticipation effects in adult children's well-being outcomes.

Specifically, as shown in Table D–17, the significant and similarly-sized estimates for life satisfaction appear as early as one year and six months before the mother SPA. This pattern is consistent with anticipation effects, where adult children may look forward to the increased availability of their parents after retirement. Alternatively, it could reflect early retirement, where parents retire a few months before becoming eligible for the State Pension. For income satisfaction, the effects are observed up to 18 months after the SPA, suggesting that financial transfers between parents and children may take time to materialize.

The results from the sample of never working parents are presented in Tables D–20 and D–21. The sample size, once removing missing values is much smaller than the main sample. But overall, none of the coefficients is statistically significant.

TABLE D–17: Parental Retirement and Adult Children's Outcomes - Placebo Outcome Regressions

Dependent Variables:	Degree			Vote		
Sample:	All	Daughters	Sons	All	Daughters	Sons
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Second-stage IV results						
Mother retirement	-0.02	-0.04	0.005	0.02	-0.003	0.05
	(0.02)	(0.02)	(0.02)	(0.10)	(0.18)	(0.11)
R^2	0.93	0.92	0.93	0.71	0.73	0.60
Observations	15,417	7,505	7,912	15,601	7,580	8,021
Panel B						
Second-stage IV results						
Father retirement	-0.05	-0.07	-0.02	-0.13	-0.13	-0.14
	(0.04)	(0.05)	(0.05)	(0.11)	(0.15)	(0.17)
R^2	0.95	0.95	0.95	0.59	0.61	0.58
Observations	13,570	6,685	6,885	13,747	6,752	6,995

Clustered (pidp) standard-errors in parentheses
*Significance: ***: 1%, **: 5%, *: 10%*

Note: The regressions include a quadratic term for the child and parents' age, and adult child and year and month fixed effects. The age bandwidth is ten years. All second-stage coefficients are standardised.

TABLE D–18: Placebo State Pension Ages for Maternal Retirement

Distance to actual cutoff:	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2
Dependent Variables									
Life Satisfaction	0.41	0.46	0.36*	0.32*	0.20**	0.24**	0.10	0.12	0.02
	(0.41)	(0.40)	(0.18)	(0.18)	(0.10)	(0.11)	(0.12)	(0.12)	(0.18)
Income Satisfaction	0.37	0.39	0.20	0.21	0.23**	0.23**	0.25**	0.21*	0.27
	(0.41)	(0.40)	(0.18)	(0.18)	(0.10)	(0.10)	(0.12)	(0.12)	(0.18)
GHQ	0.54	0.44	0.19	0.17	0.14	0.20*	-0.03	-0.03	0.11
	(0.42)	(0.41)	(0.19)	(0.19)	(0.11)	(0.12)	(0.13)	(0.13)	(0.19)
Observations	16,984	16,984	16,984	16,984	16,984	16,984	16,984	16,984	16,984

Clustered (pidp) standard-errors in parentheses
*Significance: ***: 1%, **: 5%, *: 10%*

Note: The number in the first row represents the number of years from the actual pension-eligibility threshold. Data Source: BHPS waves 6-10 and 12-18

TABLE D–19: Placebo State Pension Ages for Paternal Retirement

Distance to actual cutoff:	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2
Dependent Variables									
Life Satisfaction	0.46	0.52	0.36	0.27	0.01	0.03	-0.05	-0.11	-1.3
	(0.42)	(0.41)	(0.29)	(0.31)	(0.18)	(0.18)	(0.28)	(0.30)	(1.5)
Income Satisfaction	-0.20	-0.14	-0.12	-0.16	-0.07	-0.007	-0.13	-0.32	-1.1
	(0.40)	(0.40)	(0.28)	(0.29)	(0.19)	(0.18)	(0.29)	(0.30)	(1.4)
GHQ	0.51	0.37	-0.05	-0.11	-0.16	-0.19	-0.24	-0.27	-2.2
	(0.49)	(0.47)	(0.30)	(0.31)	(0.18)	(0.19)	(0.28)	(0.29)	(1.7)
Observations	13,656	13,656	13,656	13,656	13,656	13,656	13,656	13,656	13,656

Clustered (pidp) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Note: The number in the first row represents the number of years from the actual pension-eligibility threshold. Data Source: BHPS waves 6-10 and 12-18

TABLE D–20: Placebo Regression: Never Working Mothers and Parents WB Outcomes

Dependent Variables:	Leisure Satisfaction (1)	Financial Satisfaction (2)	GHQ (3)	Subjective Health (4)	Life Satisfaction (5)
Second-stage IV results					
Mother retirement	-0.39	-0.02	-0.58	0.40	-0.60
	(0.48)	(0.36)	(0.59)	(0.40)	(0.55)
R^2	0.67	0.78	0.59	0.73	0.68
Individual	167	197	199	195	167
Observations	689	1,037	1,068	991	694

Clustered (pidp) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

These regressions include a quadratic trend for the parents' ages, year and month fixed effects. The age bandwidth is ten years. All second-stage coefficients are standardised.

TABLE D–21: Placebo Regression: Never Working Fathers and Parents WB Outcomes

Dependent Variables:	Leisure Satisfaction (1)	Financial Satisfaction (2)	GHQ (3)	Subjective Health (4)	Life Satisfaction (5)
Second-stage IV results					
Father retirement	-1.6	-0.64	-0.82	0.44	-0.49
	(1.3)	(0.73)	(0.69)	(0.56)	(1.2)
R^2	0.54	0.68	0.59	0.72	0.67
Individuals	95	111	115	112	95
Observations	466	654	705	656	466

Clustered (pidp) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

These regressions include a quadratic terms only for parents' ages and individual, year and month fixed effects. The age bandwidth is ten years. All second-stage coefficients are standardised.

Appendix E Joint Parental Retirement Specification

In this section, we explore two additional RDD specifications combined with the BHPS mothers and fathers' sample. The first specification estimates the effect of the first parent reaching the State Pension Age (SPA). The second specification allows for two reduced-form coefficients: one for fathers reaching SPA and another for mothers reaching SPA and their interactions.

The results in Panel A of Table E–22 indicate that when the first parent reaches the State Pension Age, there is a negative effect of 0.06 standard deviations on adult children's income satisfaction. However, the impact on the other two well-being outcomes is not statistically significant. In contrast, when the regression model accounts for both mother and father reaching their own SPA, the only positive and significant effect emerges for

mothers who are above the eligibility age.

TABLE E–22: Alternative Retiremennt Specifications

Dependent Variables:	Life Satisfaction (1)	Income Satisfaction (2)	GHQ (3)
Panel A: First Parent Reaching SPA			
First parent above SPA	0.02	-0.06*	0.02
	(0.04)	(0.04)	(0.04)
R^2	0.59	0.60	0.50
Individuals	3,367	3,366	3,508
Observations	14,801	14,816	17,383
Panel B: Dual RF			
Mother above SPA	0.09***	0.08**	0.06*
	(0.03)	(0.03)	(0.04)
Father above SPA	0.005	0.02	0.01
	(0.06)	(0.06)	(0.07)
Mother above SPA × **Father above SPA**	0.02	0.009	-0.06
	(0.07)	(0.06)	(0.07)
R^2	0.56	0.57	0.50
Individual	2,826	2,826	2,775
Observations	13,924	13,924	13,575

Clustered (pidp) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Note: Data Source: BHPS waves 6-10 and 12-18

Appendix F Evidence from Pension Reforms

The second identification strategy exploits the changes in the SPA resulting from the 1995 and 2011 UK Pension Acts, which gradually raised the State Pension Age for women from 60 to 66 over the April 2010 to October 2020 period, and for men from 65 to 66 over the December 2018 to October 2020 period.

The causal impact of the resulting delayed retirement on adult children's well-being can be estimated by comparing their well-being outcomes to that of otherwise similar adult children whose similar parents had different State Pension eligibility ages. We thus carry out a difference-in-differences analysis, as in Cribb et al. (2016), Della Giusta and Longhi (2021) and Cribb et al. (2022), who estimated the impact of these same reforms

on the retirees' own labor-market outcomes and well being. The regression equation is:

$$WB_{it} = \alpha T_{it} + \lambda_i + \gamma_t + \sum_{\text{pa}=50,55}^{70,75} \delta[\text{page}_{it} == \text{pa})] + X_{it}\theta + \epsilon_{it} \quad \text{(F.1)}$$

Here the outcome of interest WB_{it}, for adult child i in period t, is regressed on a dummy variable T_{it} for whether his/her parent is above the State Pension Age at time t and a set of parental and adult-children controls. These are the adult child's marital status and age in months, the elderly parents' and adult children's home ownership, and a dummy variable for the adult child and parent living in the same household. The dummy T_{it} is constructed by comparing the adult child's survey interview date to their parents' State Pension eligibility. Given the nature of the reform, this is determined by both the parent's birth cohort and their age at the time of the interview.

F.1 Descriptive Statistics in the DiD Sample

The sample in the difference-in-differences is of mothers born between 1935 and 1965 (who are aged from 50 to 70 at the time of the interview) and fathers born between 1938 and 1968 (aged 55 to 75). This allows for the comparison of adult-child outcomes across 15 parental cohorts that were unaffected by the reform (born 1935 to March 1950) to the subsequent 15 cohorts (born April 1950 to 1965) who were exposed to the gradual rises in the SPA.

The data used in this analysis come from the harmonized British Household Panel Survey (BHPS) and Understanding Society (UKHLS) surveys. The resulting panel from this combination is unbalanced. The attrition analysis for this sample appears in Appendix B. As above, we exclude older mothers and fathers who never worked (2,815 mothers and 683 fathers) and those who passed away within the specified age range (115 mothers and 185 fathers). The final estimation sample encompasses 11036 adult children, 5196 older mothers and 3768 older fathers. The descriptive statistics for this sample appear in Table F–23.

TABLE F–23: UKHLS Difference-in-Differences Sample Descriptive Statistics

	Mother sample				Father sample			
Variable	N	Individuals	Mean or %	SD	N	Individuals	Mean or %	SD
A. Adult child outcomes								
GHQ (0-36)	59796	11036	24.8	5.6	35344	7447	24.9	5.5
Life satisfaction (1-7)	59796	11036	5.1	1.6	35942	7525	5.2	1.5
Income satisfaction (1-7)	59796	11036	4.5	1.8	35942	7525	4.6	1.7
A. Adult child characteristics								
Age	59796	11036	29.4	6.1	35942	7525	29.7	6.1
Year of birth	59796	11036	1981.5	8.5	35942	7525	1981.9	8.4
Married	59796	11036	29		35942	7525	32	
Age left school	42760	9098	16.9	1.7	24681	5872	17.0	1.8
Female	59795	11035	51		35942	7525	51	
Number of children	59796	11036	0.6	0.9	35942	7525	0.6	0.9
Real Monthly Individual Income	59281	10987	1631.5	2805	35565	7475	1698.8	2355.8
Live with father	59796	11036	26		35942	7525	35	
Live with mother	59796	11036	36		35942	7525	34	
White	59685	11016	82		35869	7506	79	
B. Older Parent								
Retired	54216	5196	26		35942	3768	34	
Above SPA	59796	5666	26		35942	3768	27	
Age	59796	5666	58.0	5.2	35942	3768	61.5	5.1
Weekly work hours	46575	4879	17.5	16.6	31637	3520	21.8	21.1

Note: The data refers to UKHLS Waves 1-9 (2009/10-2018/19)

F.2 Results

One potential limitation of the RDD approach is anticipation effects, whereby older parents and their adult children may adjust their behavior in anticipation of changes in their well-being. For example, adult children might make choices regarding fertility or employment that affect their parents' propensity to retire and/or their parents' overall well-being around the time of the latter's eligibility for the State Pension. It is hard to disentangle these alternative explanations in RDD estimation. However, changes in policy or other exogenous events that affect parents' pension eligibility provide a source of exogenous variation that can help tackle these issues and provide more-robust evidence on the relationship between parental retirement and adult child well-being.

As for the RDD analysis above, we first evaluate the direct effect of the UK pension reform on the labour-market and well-being outcomes of the elderly parents, and then the reforms' indirect effects on these parents' adult children.

The direct parental effect are listed in Table F–24. In column (1), as in the results from the RDD and other contributions (see Cribb et al., 2016, Della Giusta and Longhi, 2021), being above the SPA reduces parental

weekly working hours by 0.20 and 0.27 standard deviations for mothers and fathers respectively. The analogous effects on parents' leisure satisfaction (Column 2) are positive and significant at 0.11 and 0.17, and those on financial satisfaction are significantly negative at 0.10 and 0.16. The effects on mental and subjective health (in Columns 4 and 5) are positive and significant for mothers only. Last, overall life satisfaction (Column 6) is positively correlated with being above the SPA, with figures of 0.06 and 0.13 standard deviations for mothers and fathers, respectively.

TABLE F–24: The Rise in the State Pension Age and Older Parents' Labour-market and Well-being Outcomes

	Weekly working hours	Leisure Satisfaction	Financial Satisfaction	GHQ	Subjective Health	Life Satisfaction
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Mother above SPA	-0.20***	0.11***	-0.10***	0.10***	0.04*	0.06*
	(0.04)	(0.03)	(0.03)	(0.04)	(0.02)	(0.03)
R^2	0.76	0.52	0.67	0.58	0.74	0.53
Individuals	5,048	4,913	4,981	4,886	5,045	4,913
Observations	49,516	47,785	49,048	47,335	49,275	47,785
Panel B						
Father above SPA	-0.27***	0.17**	-0.16***	-0.06	0.05	0.13**
	(0.07)	(0.07)	(0.06)	(0.07)	(0.07)	(0.06)
R^2	0.75	0.53	0.68	0.63	0.75	0.53
Individuals	3,518	3,265	3,324	3,247	3,464	3,265
Observations	31,576	29,069	30,066	28,816	16,040	29,066

Clustered (birth year) standard-errors in parentheses
*Significance: ***: 1%, **: 5%, *: 10%*

Note: The data refers to UKHLS Waves 1-9 (2009/10-2018/19). All coefficients are standardised. The control variables are being married, having a degree, living with their adult child, the adult child's age in months and individual, interview year and month fixed effects.

Table F–25 then turns to the adult children of these parents. In contrast to the RDD results, there are here no significant effects of a mother being above the SPA on adult-child well-being, with all of the estimated coefficients being close to zero. This may reflect the anticipation of reforms by adult children, who adjusted their expectations and behaviour accordingly. This anticipation will reduce the estimated effect of the reform (as some of the observations in the control group will actually be treated). A second potential explanation is the concurrent expansion of publicly-provided and free childcare in the UK during the period the pension reforms were implemented (UK Government, 2023).

However, in Panel B of Table F–25, having a father above the SPA does have significant adverse effects on adult sons' life and income satisfaction. Paternal retirement eligibility thus increases the leisure and life satisfaction of the parents who are concerned, but it is detrimental to the well-being of adult sons.

TABLE F–25: The Rise in the State Pension Age and Adult Child Well-being

Dependent Variables:	Life Satisfaction			Income Satisfaction			GHQ		
	All	Daughters	Sons	All	Daughters	Sons	All	Daughters	Sons
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Panel A									
Mother above SPA	0.003	0.01	-0.008	-0.007	-0.02	0.004	-0.008	-0.03	0.02
	(0.02)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)
R^2	0.51	0.49	0.54	0.53	0.51	0.55	0.51	0.50	0.52
Individuals	11,033	5,476	5,566	11,033	5,476	5,566	10,957	5,435	5,530
Observations	59,778	30,464	29,313	59,778	30,464	29,313	58,957	30,009	28,947
Panel B									
Father above SPA	-0.04	0.05	-0.14**	-0.02	0.06	-0.12**	-0.005	0.02	-0.04
	(0.05)	(0.08)	(0.07)	(0.06)	(0.06)	(0.06)	(0.05)	(0.07)	(0.07)
R^2	0.52	0.49	0.55	0.54	0.51	0.57	0.53	0.52	0.54
Individuals	7,523	3,770	3,754	7,523	3,770	3,754	7,445	3,735	3,713
Observations	35,923	18,222	17,665	35,923	18,222	17,665	35,328	17,930	17,397

Clustered (pidp) standard-errors in parentheses
*Significance: ***: 1%, **: 5%, *: 10%*

Note: The data refers to UKHLS Waves 1-9 (2009/10-2018/19). All coefficients are standardised. Standard errors in parentheses are clustered at the adult-child level. All regressions control for adult children and older parent variables: age, marital status, home ownrshipt, labour-market activity, living with their parent and individual, interview year and month fixed effects. We acknowledge that howownership and coresidence might be "bad controls", as they are themselves influenced by parents reaching the SPA. We thus re-estimated the model after removing children's home ownership and coresidence as control variables. The results are consistent with the main findings presented in this table, so the mediating role that these variables play is only minor.

F.3 Heterogeneity

The finding above that adult sons' life and income satisfaction are negatively affected by paternal retirement eligibility could reflect that adult children support their fathers financially after their eligibility age. Equally, older fathers who stop working after reaching the state pension eligibility age may be less able to support their adult children financially.

One implication is that the effect of a father reaching the SPA should differ by the adult child's income. With transfers from the adult child to the parent, delayed retirement of the latter should have a greater effect on higher-income sons (as they are more likely to support their retired fathers financially); conversely, lower-income sons will likely be more affected by transfers in the opposite direction. To investigate heterogeneity by adult-child income, we re-estimate Equation F.1 with an interaction term between the treatment dummy and the income quartile dummies of the adult child.

Table F–26 lists the results. The effect for adult children in the first income quartile is given by the estimated treatment coefficient (Mother above the SPA and Father above the SPA). At the same time, the interaction term

shows the differential impact on adult children in higher-income quartiles. There are no significant estimates for the whole sample of adult children in columns (1), (3) and (5). The results for sons in columns (2), (4), and (6) mostly reveal smaller point estimates for richer adult sons regarding life and income satisfaction (although none of the interaction terms are statistically significant).

We also analyze the interaction between parents above the SPA and travel distance, expecting more significant effects for adult children who either still live with their fathers or live nearby. As well as the time-transfer channel, it may also be that financial support from older parents to adult children increases with proximity (Berry, 2008).

Table F–27 shows the estimated coefficients on the interactions between travel distance and the treatment dummy. The main treatment coefficient (mother above the SPA and father above SPA) reveals the effect for adult children who co-reside with their parents. The effect of mother pension eligibility on income satisfaction now turns statistically significant and negative for adult children who live with their mothers, while it becomes more positive for those living further away. This suggests that adult children who remain in close proximity may experience financial strain when their mothers retire, possibly due to reduced financial support or increased caregiving responsibilities. The effect of a father's pension eligibility on adult-child well-being is almost always more significant for children (and especially sons) who live close by, as shown by the estimated coefficient on Father above SPA × distance <= 1 hour.

Finally, in table F–28, we analyze the interaction effect of parental retirement with the presence and age of grandchildren. In this regression, the treatment coefficient (Mother above SPA and Father above SPA) captures the effect for adult children without children. The interaction terms then examine how the well-being effects vary depending on whether the adult child has children in different age ranges (0–2, 3–4, and 5–11).

The baseline effect of maternal pension eligibility on adult children's life satisfaction is small and statistically insignificant for adult children without children. The interaction effects suggest a differentiated impact based on the grandchildren's age: the estimates for adult children with children aged 0–2 or 3–4 are negative but not statistically significant. The interaction term for children aged 5–11 is negative and statistically significant at the 5% level, suggesting a potential decline in life satisfaction for these adult children. For income satisfaction, none of the interaction terms show strong statistical significance. No apparent effects are observed for mental health (GHQ).

Paternal person eligibility appears to have a small, mostly insignificant impact on life satisfaction, except for a negative and significant interaction for adult children with children aged 3–4. Income satisfaction shows some

negative effects, particularly for adult children without children.

TABLE F–26: The Rise in State Pension Age and Adult Child Well-being: Heterogeneity by Adult Child Income

Dependent Variables:	Life Satisfaction		Income Satisfaction		GHQ	
	All	Sons	All	Sons	All	Sons
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Mother above SPA	-0.01	0.0008	-0.01	-0.02	-0.006	-0.010
	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.05)
Mother above SPA × 2nd quartile	-0.0007	0.01	-0.005	-0.02	-0.03	-0.01
	(0.02)	(0.04)	(0.03)	(0.04)	(0.03)	(0.05)
Mother above SPA × 3nd quartile	0.003	-0.01	0.01	0.04	0.0008	0.06
	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.05)
Mother above SPA× 4th quartile	0.02	0.01	0.02	0.05	0.04	0.06
	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.05)
R^2	0.53	0.55	0.54	0.56	0.51	0.52
Individuals	10,174	5,146	10,174	5,146	10,143	5,129
Observations	53,723	26,495	53,723	26,495	53,418	26,356
Panel B						
Father above SPA	-0.05	-0.22***	-0.04	-0.16*	-0.0008	0.03
	(0.06)	(0.08)	(0.06)	(0.08)	(0.06)	(0.07)
Father above SPA × 2nd quartile	-0.005	0.05	0.02	-0.04	-0.01	-0.11
	(0.04)	(0.07)	(0.04)	(0.07)	(0.05)	(0.07)
Father above SPA × 3rd quartile	0.008	0.10	0.010	0.04	-0.03	-0.04
	(0.04)	(0.06)	(0.04)	(0.06)	(0.05)	(0.07)
Father above SPA × 4th quartile	0.02	0.09	0.03	0.07	-0.008	-0.03
	(0.04)	(0.06)	(0.04)	(0.06)	(0.05)	(0.07)
R^2	0.52	0.55	0.54	0.57	0.54	0.55
Individuals	7,473	3,727	7,473	3,727	7,444	3,712
Observations	35,547	17,501	35,547	17,501	35,325	17,395

Clustered (pidp) standard-errors in parentheses
*Significance: *** = 10%; ** = 5%; * = 10%*

TABLE F–27: The Rise in Father's State Pension Age and Adult Child Well-being: Heterogeneity by Travel Distance

Dependent Variables:	Life Satisfaction		Income Satisfaction		GHQ	
	All	Sons	All	Sons	All	Sons
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Mother above SPA	-0.009	0.009	-0.07**	-0.06	-0.04	0.03
	(0.04)	(0.05)	(0.04)	(0.05)	(0.04)	(0.06)
Mother above SPA× <=1hr	0.0009	-0.02	0.08**	0.08*	0.05	-0.02
	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.05)
Mother above SPA × >1hr	0.08*	0.02	0.14***	0.14**	0.06	0.0003
	(0.04)	(0.06)	(0.05)	(0.06)	(0.06)	(0.07)
R^2	0.46	0.49	0.50	0.52	0.51	0.51
Individuals	6,011	2,844	6,011	2,844	5,995	2,838
Observations	40,765	19,121	40,765	19,121	40,251	18,921
Panel B						
Father above SPA	0.07	0.02	-0.007	-0.11	0.08	0.11
	(0.06)	(0.08)	(0.06)	(0.08)	(0.07)	(0.10)
Father above SPA × <=1hr	-0.14***	-0.17***	-0.05	-0.03	-0.09*	-0.18***
	(0.05)	(0.06)	(0.05)	(0.06)	(0.05)	(0.06)
Father above SPA × >1hr	-0.07	-0.10	0.04	0.02	-0.06	-0.14*
	(0.05)	(0.07)	(0.06)	(0.07)	(0.06)	(0.08)
R^2	0.46	0.49	0.50	0.52	0.51	0.51
Individuals	4,076	1,906	4,076	1,906	4,052	1,895
Observations	24,579	11,517	24,579	11,517	24,252	11,381

Clustered (pidp) standard-errors in parentheses
*Significance: ***: 1%, **: 5%, *: 10%*

TABLE F–28: The Rise in State Pension Age and Adult Child Well-being: Heterogeneity by Adult Child Present of Children and Age

Dependent Variables:	Life satisfacion			Income Satisfaction			GHQ		
	Age 0-2 (1)	Age 3-4 (2)	Age 5-11 (3)	Age 0-2 (4)	Age 3-4 (5)	Age 5-11 (6)	Age 0-2 (7)	Age 3-4 (8)	Age 5-11 (9)
Panel A									
Mother above SPA	0.03	0.01	0.02	0.010	4.4×10^{-5}	0.005	0.01	-0.010	0.0003
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)
Mother above SPA× Age 0-2	-0.03			-0.02			-0.001		
	(0.03)			(0.03)			(0.03)		
Mother above SPA× Age 3-4		-0.02			-0.008			0.06	
		(0.03)			(0.04)			(0.04)	
Mother above SPA × Age 5-11			-0.07**			-0.04			0.002
			(0.03)			(0.03)			(0.04)
R^2	0.56	0.56	0.55	0.56	0.57	0.56	0.53	0.54	0.53
Individuals	9,790	9,719	9,855	9,791	9,720	9,856	9,709	9,642	9,777
Observations	44,476	41,918	45,266	44,477	41,919	45,267	43,874	41,357	44,638
Panel B									
Father above SPA	-0.04	-0.02	0.02	-0.12**	-0.07	-0.05	0.003	0.03	0.05
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.06)
Father above SPA × Age 0-2	-0.06			-0.005			0.006		
	(0.04)			(0.04)			(0.05)		
Father above SPA × Age 3-4		-0.13**			-0.07			-0.002	
		(0.06)			(0.06)			(0.07)	
Father above SPA × Age 5-11			-0.04			0.02			0.02
			(0.06)			(0.05)			(0.06)
R^2	0.56	0.56	0.55	0.57	0.57	0.57	0.59	0.60	0.59
Individuals	5,643	5,565	5,706	5,644	5,566	5,706	5,616	5,536	5,678
Observations	20,280	18,785	20,524	20,281	18,786	20,524	20,139	18,653	20,382

Clustered (pidp) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*