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Petrillo, M., Rodrigues, R., Bennett, M. et al. (2026) The gendered landscape of informal caregiving: cohort effects and socioeconomic inequalities in England. Social Science & Medicine, 393. 119052. ISSN: 0277-9536

https://doi.org/10.1016/j.socscimed.2026.119052

The Gendered Landscape of Informal Caregiving: Cohort Effects and Socioeconomic Inequalities in England.

Abstract

We provide the first detailed cohort analysis of the gender care gap that examines the association between caregiving provision, individual-level poverty, meso-level deprivation, and individual circumstances. Using data from the UK Household Longitudinal Study, we use (i) multilevel mixed-effects logistic regression to provide a detailed age cohort analysis of the probability of providing informal care by sex; and (ii) Multilevel Analysis of Individual Heterogeneity and Discriminatory Accuracy (MAIHDA) to provide an intersectional examination of informal carers.

Our results reveal a clear age pattern in caregiving, peaking between ages 60–70 before declining, with earlier-born cohorts showing higher caregiving likelihood at the same ages than later-born cohorts. The gender care gap is most pronounced among middle-born cohorts (1969–1978, 1959–1968, and 1949–1958), particularly between ages 50 and 60. While overall caregiving prevalence is higher among individuals experiencing poverty and living in deprived areas, the gender care gap is larger among individuals above the poverty line and in non-deprived areas. Caregiving is primarily associated with the independent effects of cohort, gender, poverty, and meso-level deprivation, with limited evidence of multiplicative intersectional effects.

Policy attempts to address the gender care gap need to be mindful of these variations, not least because they potentially elucidate the potential sources of gender inequalities in care.

Introduction

Informal (unpaid) caregivers provide essential support to sick, disabled, or older people without formal compensation (Humphries, 2023). In England, austerity measures and cuts to long-term care budgets have

increased the pressure on caregivers (Brimblecombe et al., 2018), with over 4.6 million people now providing informal care. The support they provide is estimated at £151 billion - equivalent to the National Health Service (NHS) budget and approximately four times the amount of state-supported long-term care services (Petrillo and Bennett, 2023).

Informal care is also at the heart of gender inequality (Ferrant et al., 2014). Women disproportionately take on caregiving responsibilities (Swinkels et al., 2019; Petrillo and Bennett, 2023; Carr et al., 2018) across all stages of life (Glaser et al., 2013; Patterson and Margolis, 2019). The gendered division of caregiving is deeply rooted in societal expectations and cultural norms that associate caregiving with women - a norm internalised by both genders, creating a self-reinforcing cycle of caregiving inequality (Ophir and Polos, 2022; Glauber, 2017).

How has the Gender Care Gap Evolved by Age and Cohort?

Our first research question asks how gender differences in informal care vary by age and across cohorts. In the UK, working-age adults (31-45 and 46–65) currently represent the largest share of informal carers, followed by older adults (66+), while younger groups (15-30) are less likely to take on caregiving roles (Petrillo et al., 2022).

For younger adults, caring responsibilities can disrupt early career development at a time when opportunities for education and training are crucial for long-term financial stability (Brimblecombe et al., 2020; D'Amen et al., 2021). As women from later-born cohorts gain access to university education, they may become more likely to enter and remain in the labour market, potentially reducing their availability to provide informal care while increasing their labour supply along both the extensive and intensive margins (Henz, 2010). From a cultural perspective, theories focusing on gender and normative change suggest that generational shifts toward more egalitarian values – driven by changing population dynamics

– may lead later-born cohorts of men (typically men born after 1945) to be more inclined to provide care (Sheehan et al., 2019).

The gender care gap is typically largest among working-aged adults. These individuals, particularly women in later-born cohorts, are the most likely to be sandwich carers, simultaneously responsible for their children and ageing parents (Grundy and Henretta, 2006; Vlachantoni et al., 2019; Patterson and Margolis, 2019). Among people aged 50 and older, the prevalence of caregiving—and the gender care gap—is highest in the years leading up to retirement, largely reflecting care provided to non-cohabiting older parents (Ophir and Polos, 2022). This pattern is closely linked to gendered life-course trajectories in employment and social roles, as full-time work often constrains the ability to provide such care (Glauber, 2017; He and McHenry, 2016; Henz, 2010).

In recent decades, sociodemographic shifts have reshaped caregiving trajectories for both women and men, raising questions about inter-cohort relations and the sustainability of these informal care arrangements. The 2021 Census reveals an increasingly ageing population in England (ONS, 2023a), declining fertility rates (ONS, 2024a), later-life marriages, rising divorce rates, changing family structures (ONS, 2024b), and higher labour market participation — particularly among women in earlier-born cohorts — which may be altering the landscape of caregiving.

As statutory retirement ages increase, a growing share of women in their encore years are remaining in full-time employment, potentially reducing their availability to provide care outside the household (Rodrigues and Ilinca, 2021). Conversely, delayed childbearing and the longer survival of older relatives, often in poor health, have expanded the period of overlapping intergenerational needs, intensifying dual caregiving pressures among women approaching retirement (Moen, 2016; Patterson and Margolis, 2019). Increased rates of family dissolution can disrupt intergenerational ties and reduce levels of intergenerational support (Kalmijin, 2008; Žilinčíková and Kreidl, 2018). For instance, it may reduce a woman's responsibility to care for in-laws, leaving her former partner to provide care without spousal

support. Furthermore, a growing share of childless older adults together with changes in marriage and divorce patterns may increase the relevance of horizontal care provided to friends or neighbours—a form of non-cohabiting support more commonly undertaken by women (Patterson and Margolis, 2019).

As individuals retire, caregiving tends to decline due to health limitations, the death of the person they had been caring for, or because they become care recipients themselves. Male caregiving responsibilities typically emerge in later life, often after retirement, when they reallocate time from full-time work to spousal care (Kahn, McGill, and Bianchi, 2011; Zhang and Bennett, 2024). It remains unclear, however, whether this trend persists in later generations of men who are faced with a higher statutory retirement age. This dynamic is reinforced by the "gender health paradox", whereby women live longer than men but often in poor health, increasing their likelihood of both providing and needing care in old age (Rodrigues et al., 2023). However, men now live longer than in previous decades, and the gender gap in life expectancy has narrowed (ONS, 2025). While there is some evidence of narrowing gender care gaps in later life due to increased male involvement in spousal care (Glauber, 2017; Hist, 2001), a pronounced gap persists across most of the life course (Ophir & Polos, 2022), albeit with only limited knowledge of how this gap may evolve across cohorts (Rodrigues et al., 2023).

Understanding how the gender care gap evolves across cohorts is crucial, not only from a gender equality perspective, but also for assessing whether the supply of informal care is likely to persist among later-born cohorts, with important implications for supporting older people and planning future care policies. With fewer adult children available to care for ageing parents and the duration of care needs extending, the tension between rising care demands and the shrinking supply of informal caregivers within families is becoming critical (Ophir and Polos, 2022; Agree and Glaser, 2009).

How Does the Gender Care Gap Intersect with Poverty?

Our second research question is how the gender care gap intersects with poverty. The growing demand for informal caregiving places many carers under substantial financial strain (Cartagena-Farias and Brimblecombe, 2025). In the UK, 1.2 million informal carers live in poverty (Wyjadlowska et al., 2024). Carers are 4% more likely to experience poverty than non-carers, with differences by age, intensity of care, and relationship to the care recipient (Aldridge and Hughes, 2016). The risk of financial vulnerability is particularly acute among working-age carers providing high-intensity care (Thompson, 2024; Aldrige and Hughes, 2016), who often struggle to combine caregiving with employment (He and McHenry, 2016; Mazzotta, Bettio and Zigante, 2020). Previous research also finds that 28% of informal carers live in poverty compared to 20% of non-carers, with financial hardship increasing social isolation and limiting access to health and respite services (Joseph Rowntree Foundation, 2024). Although 1.9 million people in the UK combine caregiving with paid work (Petrillo et al., 2022), many face income loss, reduced work hours, and insecure employment as they may require more flexible work arrangements, which can be challenging to secure (Carr et al., 2018; Jacobs et al., 2019; Longacre et al., 2017).

Insufficient welfare support compounds this issue: Carer's Allowance remains the lowest welfare benefit in the UK and excludes many due to strict eligibility criteria. This may lead caregivers to prioritise caregiving over their work commitments (Lilly et al., 2007; Keating et al., 2014), particularly when the opportunity cost of doing so is low due to limited employment prospects and lower wages. This is especially true for women. Earlier studies focusing on women from earlier-born cohorts showed that they are more likely than men to reduce working hours, take on part-time or flexible roles, or withdraw from employment altogether when unable to balance paid work and caregiving (Gomez-Leon et al., 2019; Dunham and Dietz, 2003; Dentinger and Clarkberg, 2002). As a result, caregiving tends to reinforce existing gender inequality, further reducing women's earning and pension entitlement and generating

long-term economic disadvantage (Petrillo et al., 2024; Van Houtven et al., 2013), particularly among middle-aged women (Mentzakis, McNamee and Ryan, 2009; He and McHenry, 2016) and those with lower education attainment (Rodrigues and Ilinca, 2021) who are disproportionately affected by the intersection of caregiving responsibilities and constrained labour market options.

How Does the Gender Care Gap Interact with Geographic Inequalities?

Our third research question asks how the gender care gap interacts with meso-level deprivation. While there is a well-established body of literature showing that individual-level and household-level socioeconomic inequalities—such as low income, limited education, and insecure employment—affect caregiving responsibilities, research on meso-level deprivation and its impact on informal caregiving is scarce. Geographical context is potentially important as caregivers in socioeconomically deprived Local Authority Districts (LADs) often experience intensified pressures due to limited access to formal care, poorer health outcomes, increased social isolation and greater unemployment rates (ONS, 2022; Laxton et al., 2024). In contrast, caregivers in economically prosperous areas may secure employment and a higher wage that better accommodate caregiving responsibilities (He and McHenry, 2016), thereby lessening the impact of caregiving on their livelihoods.

In England, the rate of informal carers is 10.1% in the most deprived LADs compared to 8.1% in the least deprived, and the gap in the probability of providing informal care between these areas has widened between 2011 and 2021 (ONS, 2023b). Those living in the most deprived LADs are also more likely to provide intensive levels of care, with 4.0% providing over 50 hours of care per week, compared to just 1.9% in the least deprived LADs (ONS, 2023b). Intensive caregiving is also more likely to fall on women (ONS, 2023c). The most deprived LADs are more likely to have limited economic opportunities for employment, and this is likely to disproportionately affect women in those areas. These geographical disparities underscore the need to understand more fully the role that location plays in caregiving

inequalities. Additionally, the devolution of health and social care decision-making (NHS Confederation, 2024) further complicates this landscape; while a localised approach can help address regional disparities and better target care services, it also creates variability in service provision and resource distribution, potentially exacerbating existing inequalities among caregivers across time and cohorts.

Our Approach

We synthesise these findings from the literature into five hypotheses to guide our empirical analysis. Using nationally representative panel data of 40,324 individuals across 308 LADs in England from 2009 to 2021, we apply multilevel mixed-effect logistic regression and Multilevel Analysis of Individual Heterogeneity and Discriminatory Accuracy (MAIHDA) to test these hypotheses.

Our first and primary hypothesis addresses the overarching evolution of the gender care gap across cohorts:

H1: We hypothesise that the gender care gap will narrow across later-born cohorts as traditional gender norms weaken and women's educational and employment opportunities expand. As structural constraints on available time converge between men and women, the distribution of informal care is expected to become more balanced (Glauber, 2017), reflecting both normative change and changing life-course trajectories. However, we argue that this general trend is significantly moderated by socioeconomic factors at both the individual and geographical levels.

H2: We expect individual-level poverty to increase the likelihood of providing informal care because (i) individuals with limited financial resources will face greater barriers to providing formal care services for relatives, and (ii) those on low wages will face lower opportunity costs of caregiving when reducing work hours or leaving employment to provide care.

H3: Higher rates of caregiving will be more likely in geographically deprived LADs. Deprived areas are characterised by fewer employment opportunities and more limited formal care provision, increasing the reliance on informal care to meet needs.

H4: Women will be disproportionately affected by poverty (H4a) -and- meso-level deprivation (H4b). Poverty and deprivation are not gender-neutral. Women are more likely to be society's default caregivers, and in the context of economic scarcity, they face compounded pressure to take on caregiving roles. We therefore hypothesise that this intensifies the gendered division of care.

Central to our study is the potential for the magnitude of these socioeconomic effects to evolve across cohorts. This may be driven by the dual pressures of a contracting welfare state, marked by sustained austerity, and profound sociodemographic shifts that have increased the demand for care while shrinking the pool of available family caregivers. For example, we might expect the positive association between the likelihood of providing informal care and both individual-level poverty and meso-level deprivation to be more pronounced for later-born cohorts. The latter face the dual pressure of rising demand for care within smaller families alongside the shrinking supply of formal support from the state. We further posit that these pressures disproportionately impact women. For those in later-born cohorts, we hypothesise that the structural constraints imposed by poverty and a deprived local context will override the potential liberating effects of higher educational attainment and more egalitarian norms, thus intensifying the gender care gap among the most disadvantaged in more recent cohorts.

Finally, building on the literature reviewed, we move beyond assessing these factors in isolation to hypothesise how they intersect:

H5: We hypothesise that the intersection of sex, age cohort, individual-level poverty, and meso-level deprivation produces compounded and unequal caregiving outcomes, which cannot be fully explained by the additive effects of each factor alone. The intuition is that we would expect different dimensions of disadvantage to interact and reinforce each other. This will create an overall effect that is larger than the sum of the parts.

Contributions

This study makes several novel contributions to the literature. It is the first to examine differences between earlier- and later-born cohorts in England, moving beyond the typical focus on older adults and providing new evidence on how caregiving patterns evolve across generations. By employing an age-cohort framework, it advances understandings of how gendered caregiving patterns have evolved across time. It is also the first study to investigate how individual-level poverty and meso-level deprivation shape the gender care gap across cohorts, capturing England's pronounced regional and socioeconomic diversity. Finally, from a methodological perspective, it is the first to apply MAIHDA to this topic, enabling a nuanced assessment of the additive and multiplicative effects of gender, cohort, and socioeconomic disadvantage and thus showing the potential of this methodology to advance gender analysis of care.

Data and Sample Selection

We use geocoded data from the UK Household Longitudinal Study (UKHLS), a nationally representative individual and household panel study, spanning from wave 1 to 12 (years 2009-2021) (University of Essex, Institute for Social and Economic Research, 2025a, 2025b). This allows us to link longitudinal information on people's lives, caregiving activities, and residential location to understand the role of contextual-level effects in addition to individual-level effects.

Our analytical sample contains two restrictions. Firstly, it comprises people living in England who entered the UKHLS sample for the first time in the first, second or third wave, and who participated in at least two panel waves overall. This restriction ensures that all respondents have sufficient follow-up time for longitudinal comparison. Secondly, cases with missing values for the dependent and key explanatory variables are dropped from our sample. Once these restrictions are considered, approximately 31.3% of the original full sample is excluded, resulting in a final analytical sample of 270,275 observations and 40,324 individuals. Participants included in the analytical sample were more likely to be White, employed, married, and less likely to be from later-born cohorts compared with those excluded (Tables S.18-S.19).

The sample was grouped into seven birth cohorts (1908-1938, 1939-1948, 1949-1958, 1959-1968, 1969-1978, 1979-1988, 1989-1988) spanning a 10-year interval, with the exception of the first and last cohorts, due to the small sample sizes for those groups (Please refer to Supplementary Information S.5).

The details of the selected sample characteristics across Waves 1-12 (2009-2021) for each cohort considered are described in Table S.1.

Measures

Outcome variable: Caregiving status

The dependent variable is a binary variable indicating whether an individual is an informal carer, defined as providing informal care or special assistance to sick, disabled, or older individuals, whether residing within or outside their own household (See Supplementary Information S.1).

Individual Level Poverty

We compute the poverty line at 60% of the median household income (no deduction costs), equalised using the McClements Scale equivalence (McClements, 1977) to reflect the proportion of households

earning less than a substantial fraction of the typical income (indicating relative individual-level poverty). This household-based measure is applied at the individual level to capture each respondent's relative economic position.

Meso-level Deprivation

Geographical information on the location (LADs) of the participants in UKHLS was obtained using Special Licence Access from the UK Data Service, and enabled us to merge average scores of the Index of Multiple Deprivation (IMD) - a population-weighted average of the combined scores for the Lower Layer Super Output Areas (LSOAs) in a larger area. The average score summary measure is calculated by averaging the LSOA scores in each larger area after they have been population-weighted (See Supplementary Information S.2). As shown by the correlation between individual-level poverty and meso-level deprivation (0.125), these variables are only weakly associated.

Additional Control Variables

Additional covariates were included to reflect the evolving determinants of informal care, as identified in the literature, and to capture potential shifts in the gender care gap over time. The respondent's health status was measured using a binary variable indicating long-standing illness. We also included: the respondent's highest educational level (primary, secondary, or tertiary), employment status (part time/ full time/ unemployed), relationship status (married/lives with a partner, or single), time elapsed between the first wave and the interview date, sex (male/female), ethnicity (White, Black, Asian, Mixed, Other), and birth cohort (Rodrigues et al, 2023) (See Supplementary Information Table S.2).

Descriptive Statistics

Table 1 presents the demographic, social, and economic characteristics by meso-level deprivation and individual-level poverty status, disaggregated by sex. Care provision is consistently higher among females than males across all groups. Individuals in not-deprived LADs and above the poverty line tend to be older on average.

Figure 1 displays the gender composition of carers across cohorts. Women generally provide more care than men across most cohorts, especially in the 1959-1968 and 1969-1978 cohorts, where female caregiving rates peak around 65-67%, while male rates remain much lower (33-35%). The highest percentage of female caregivers is observed within the 1969-1978 cohort, followed by the 1959-1968 and 1979-1988 cohorts. The highest proportion of male caregivers is found in the 1908-1938 cohort, closely followed by the 1939-1948 and 1989-2006 cohorts. These variations across cohorts may partly reflect age-related factors, underscoring the need for an analysis that distinguishes between cohort effects and age effects. Poverty affects men and women differently — male caregiving rates are slightly lower, on average, below the poverty line, while female caregiving rates tend to remain high or increase slightly, particularly in older cohorts. The effect of meso-level deprivation is less consistent than expected. Overall, caregiving rates are highest for women in earlier-born cohorts, particularly those in poverty, while men's caregiving rates are more stable across different conditions.

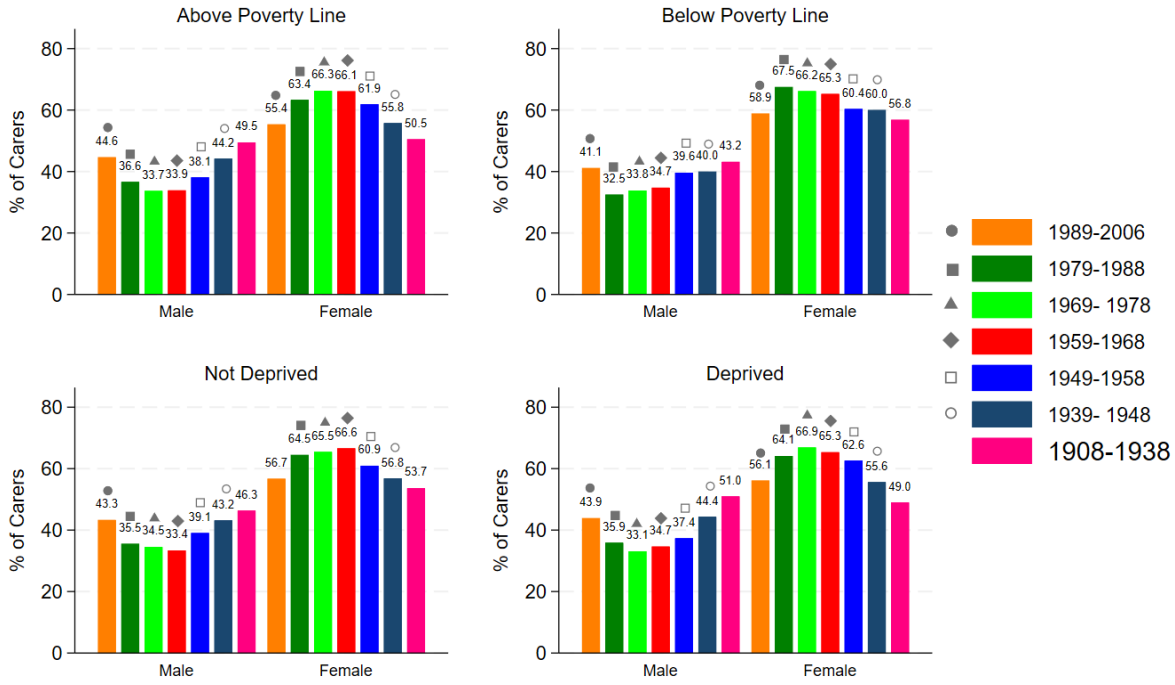

Figure 1: Percentage of people providing care by sex, individual level poverty, and meso-level deprivation across birth cohorts

Source: UKHLS data, wave1-12, England.

	Deprived LAD		Not Deprived LAD		Below Poverty Line		Above Poverty Line	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Provide care	0.19	0.24	0.18	0.24	0.21	0.25	0.18	0.24
Age	47.87	45.99	51.56	49.37	47.54	44.80	50.24	48.32
Ethnicity								
White	0.73	0.71	0.91	0.90	0.66	0.67	0.85	0.84
Mixed	0.02	0.03	0.01	0.02	0.02	0.02	0.01	0.02
Asian	0.19	0.17	0.05	0.05	0.25	0.21	0.09	0.09
Black	0.05	0.07	0.02	0.02	0.05	0.08	0.03	0.04
Other ethnicity	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01
Disability	0.33	0.35	0.34	0.34	0.36	0.36	0.33	0.34
Married	0.79	0.69	0.84	0.77	0.75	0.61	0.83	0.76
Education								
Low	0.39	0.40	0.36	0.35	0.51	0.52	0.36	0.35
Intermediate	0.25	0.29	0.24	0.30	0.26	0.29	0.25	0.29
Advanced	0.36	0.31	0.39	0.35	0.23	0.18	0.40	0.36
Employment								
Unemployed	0.38	0.47	0.38	0.42	0.62	0.74	0.34	0.39
Part-time	0.08	0.20	0.06	0.24	0.09	0.17	0.07	0.23
Full-time	0.54	0.33	0.56	0.35	0.29	0.10	0.60	0.39

Table 1: Demographic, social, and economic characteristics by meso-level deprivation and individual level poverty, disaggregated by sex.
Source: UKHLS data, wave1-12, England.

Methods

Our goal is to provide a detailed analysis of how caregiving varies by cohort, gender, individual poverty and meso-level deprivation. To achieve this, we adopt two analytical strategies. First, we visualise the gender care gap by age and cohort based on multilevel mixed-effect logistic regression models that account for the nested structure of the data used (Rodrigues et al, 2023; Marshall et al., 2015). Second, we focus on the intersectional effects of sex, cohort, poverty and meso-level deprivation using MAIHDA methods to establish whether the factors that shape the probability of providing care have additive or intersectional (multiplicative) effects.

(i) Multilevel Mixed-Effect Logistic Regression

We model each individual's informal care trajectory as a function of time. At the first level of the model, time-variant individual characteristics (e.g., relationship status, disability, employment status and education) are included to capture dynamic changes in caregiving roles. This allows us to understand how various factors influence and differentiate informal care trajectories across different individuals. At the second level, the model includes random effects at the observation level for each survey wave, addressing heterogeneity in informal care provision. This approach enables us to model each individual's informal care trajectory as a function of time. Time-invariant variables such as sex and ethnicity are also included at Level 2. Finally, Level 3 accounts for clustering at the LADs level, capturing variations in caregiving patterns across different areas. It recognises that caregiving experiences differ based on local policies, service availability, and socioeconomic conditions (Julià, Escapa, & Gallo, 2022; Cartagena-Farias & Brimblecombe, 2025). The formal model specification is provided in Supplementary Information S.4.

This approach offers two key methodological advantages. First, it effectively addresses the unbalanced panel structure by accommodating unequal group sizes, overcoming the limitations of conventional analytical methods. Second, it captures nuanced individual-level dynamics in caregiving decisions, allowing for a detailed examination of variability in caregiving activities among individuals.

(ii) MAIHDA

The second stage of our analysis explores the intersectional effects of sex, cohort, poverty and meso-level deprivation, distinguishing between the additive and multiplicative effects of these different drivers. Additive effects occur when social characteristics independently contribute to variations in the provision of informal care, meaning their influence can be understood as the sum of their individual contributions. In contrast, multiplicative effects arise when the combination of these characteristics produces interactions that go beyond their independent contributions, altering the likelihood of caregiving due to their interaction. Disentangling additive and multiplicative effects of social characteristics on the likelihood of caring is crucial for a richer understanding of inequalities in care.

Using a MAIHDA framework (Evans et al., 2024), we assess how much variation in the provision of informal care is explained by structural differences across social strata. Social strata are the unique combination of characteristics of each group and are defined in this study by the interaction of sex (2 categories), cohort (7 categories), individual-level poverty (2 categories) and meso-level deprivation (2 categories), resulting in 56 unique social strata (intersectional profiles). This approach extends the previous multilevel mixed-effects logistic regression by nesting individuals -Level 1- within intersectional social strata -Level 2- (Evans et al., 2018; Evans et al., 2024).

Results

(i) Multilevel Mixed-Effect Logistic Regression

Table 2 presents the Average Marginal Effects illustrating gender disparities in informal caregiving across cohorts, based on results from the adjusted model (See Tables S.3-S.4; See Figure S.1 for the unadjusted model). Figure 2 visually represents informal caregiving trajectories for each cohort, delineating patterns for women and men separately over 11 years within our sample and across diverse age ranges. The vertical distance between overlapping cohort lines for the same age range indicates the **cohort effect,** reflecting differences in caregiving likelihood by birth period. The **age effect** refers to the influence of an individual's age on the likelihood of providing informal care and is graphically shown by the slope of each cohort line.

Figure 2 shows a clear age-related pattern in informal caregiving across cohorts: the likelihood of providing care increases with age, peaking between ages 60 and 70. After this point, the probability of providing informal care begins to decline. Earlier-born cohorts exhibit higher probabilities of caregiving at comparable ages than their later-born counterparts. The most significant cohort effects (distance between cohort lines for overlapping ages gets wider) occur between ages 50 and 60, and although the cohort effects are similar for women and men, they appear to be more pronounced for men, particularly among those born in the 1959-1968 and 1949-1958 cohorts. This difference starts to diminish with earlier-born cohorts, indicating a tapering effect as cohorts age. Finally, results highlight a significant and persistent gender care gap, particularly evident as the caregiving trajectories of women and men diverge with age (Table 2). The gap is most pronounced for the 1959-1968 and 1949-1958 cohorts, aged 50-70, underscoring the higher burden of care that falls on women during midlife. This supports H1, which posits a diminishing gender care gap in later-born cohorts (See Supplementary Information S.3 and Figures S.2–

S.4 for analyses considering care intensity, caregiver–recipient relationships and care provided outside the household. See Figure S.5 for an additional sensitivity test).

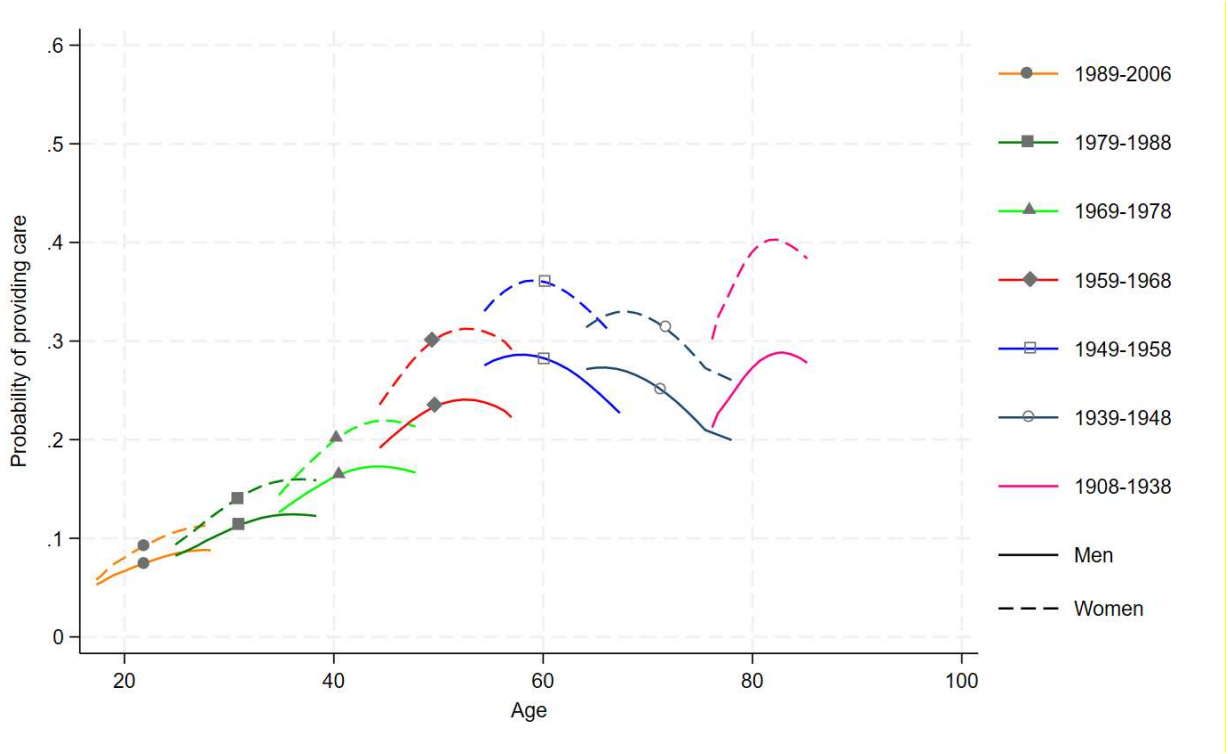

Figure 2: Probability of providing informal care, by cohort and sex, adjusted.
Note: Adjusted mixed-effect logistic regression model. Variables considered: sex, cohort, time, and their interactions. The model also accounts for ethnicity, long-standing illness or impairment, partner, highest education achieved, and employment. (Supplementary Information Table S.2).
Source: UKHLS data, wave1-12, England.

	Coefficient	*95% CI (Lower)*	*95% CI (Upper)*
Gender difference in the probability of providing care for each cohort (female - male)			
Cohort 1989-2006	*0.015***	*0.006*	*0.024*
Cohort 1979-1988	*0.025****	*0.014*	*0.036*
Cohort 1969-1978	*0.035****	*0.022*	*0.048*
Cohort 1959-1968	*0.063****	*0.049*	*0.078*
Cohort 1949-1958	*0.072****	*0.053*	*0.091*
Cohort 1939-1948	*0.059****	*0.037*	*0.082*
Cohort 1908-1938	*0.110****	*0.074*	*0.146*
Gender difference in the probability of providing care between consecutive cohorts			
1979-1988 vs 1989-2006	*0.010*	*-0.004*	*0.024*
1969-1978 vs 1979-1988	*0.010*	*-0.007*	*0.026*
1959-1968 vs 1969-1978	*0.029***	*0.009*	*0.047*
1949-1958 vs 1959-1968	*0.008*	*-0.015*	*0.032*
1939-1948 vs 1949-1958	*-0.013*	*-0.041*	*0.016*
1908-1938 vs 1939-1948	*0.051***	*0.009*	*0.092*

Table 2: Cohort-specific average marginal effects for male and female informal caregivers *Note: Adjusted mixed-effect logistic regression model. Variables considered: sex, cohort, time, and their interactions. The model also accounts for ethnicity, long-standing illness or impairment, partner, highest education achieved, and employment (Supplementary Information Table S.2).*
Source: UKHLS data, wave1-12, England.

Figure 3 and Table 3 present the probability of providing care across different cohorts and age groups, with the top panel of Figure 3 showing individuals below the poverty line (hence, in relative poverty) and the bottom panel of Figure 3 showing those above the poverty line(See Table S.5-S.8).

The probability of providing informal care for individuals above the poverty line tends to be lower than for those below the poverty line at corresponding ages. This confirms the hypothesised positive association between poverty and caregiving (H2). The decline after the peak (age 50-60) is less sharp among those above the poverty line than their richer counterpart. For women, cohort effects appear relatively consistent, with later-born cohorts less likely to provide informal care. For men, cohort effects are similar; however, these effects are more noticeable among those below the poverty line up to age 40, and above the poverty line between ages 55 and 80.

Once again, across both income groups, women consistently have a higher probability of providing care compared to men, reinforcing earlier findings on the gender care gap. However, this gap is more pronounced and statistically significant among individuals above the poverty line (Table 3), except for later-born cohorts, contradicting our hypothesis (H4a). To assess the impact of within-individual changes in poverty status, we estimated a multilevel model including a three-way interaction between gender, cohort, and poverty, allowing poverty to vary across waves (see Tables S.20-S.22). The results are robust across alternative model specifications.

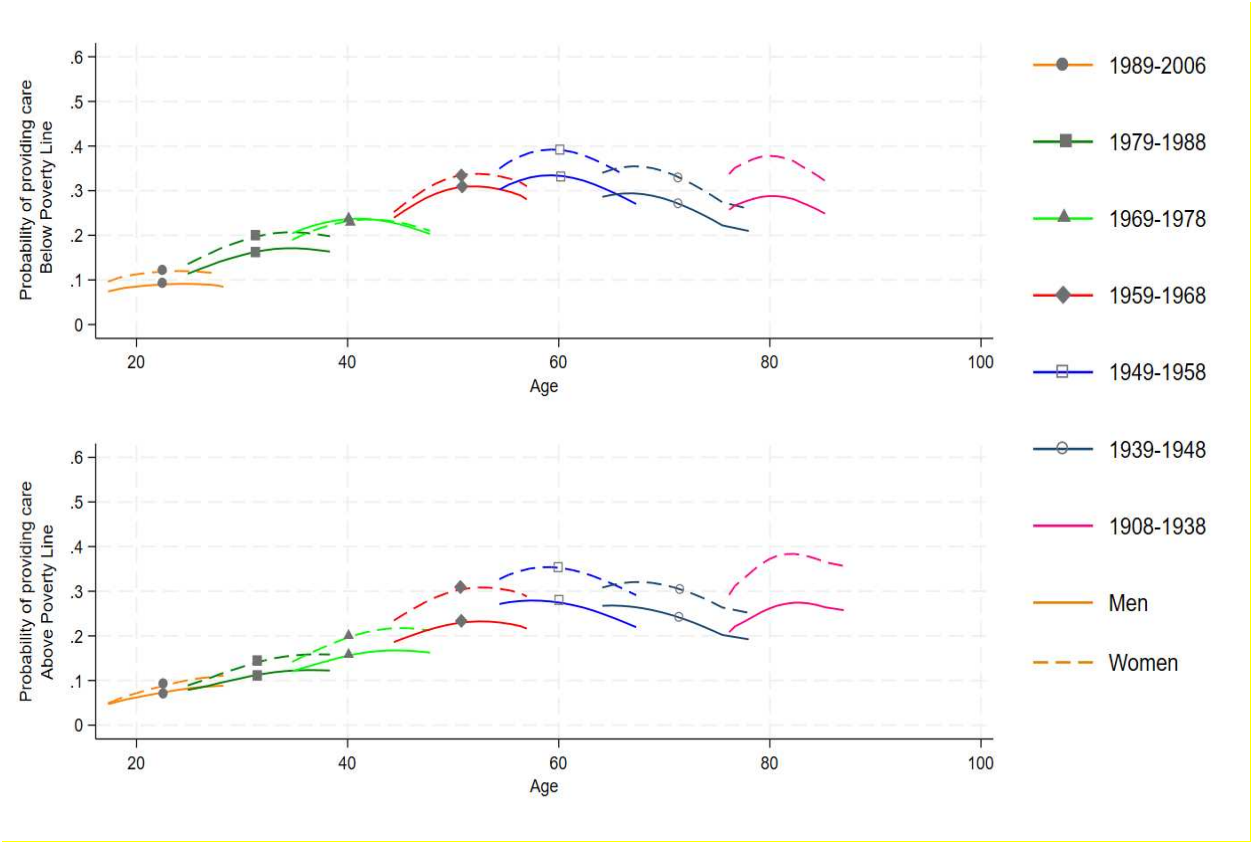

Figure 3: Gender care gap and poverty.

Note: Adjusted mixed-effect logistic regression model. Variables considered: sex, cohort, time, and their interactions. The model also accounts for ethnicity, long-standing illness or impairment, partner, highest education achieved, and employment. (Supplementary Information Table S.2).
Source: UKHLS data, wave1-12, England.

	Below the Poverty line	***Above the Poverty line***	***Deprived LADs***	***Not Deprived LADs***
Gender difference in the probability of providing care for each cohort				
Cohort 1989-2006	***0.026*****	*0.011**	*0.012*	*0.017***
Cohort 1979-1988	***0.029****	*0.024****	*0.022***	*0.027****
Cohort 1969-1978	*-0.008*	*0.038****	*0.034***	*0.035****
Cohort 1959-1968	*0.021*	*0.068****	*0.057****	*0.068****
Cohort 1949-1958	*0.054**	*0.073****	*0.069***	*0.074****
Cohort 1939-1948	*0.059**	*0.058****	*0.052***	*0.067****
Cohort 1908-1938	*0.086**	*0.104****	*0.077***	*0.122****
Gender difference in the probability of providing care between consecutive cohorts				
1979-1988 vs 1989-2006	*0.003*	*0.013*	*0.010*	*0.010*
1969-1978 vs 1979-1988	*-0.037*	*0.014*	*0.012*	*0.008*
1959-1968 vs 1969-1978	*0.029*	*0.029***	*0.022*	*0.033***
1949-1958 vs 1959-1968	*0.033*	*0.005*	*0.012*	*0.006*
1939-1948 vs 1949-1958	*0.004*	*-0.015*	*-0.017*	*-0.007*
1908-1938 vs 1939-1948	*0.027*	*0.046**	*0.025*	*0.055**

Table 3: Average marginal caregiving effect for women and men in poverty across cohorts for overlapping ages, 2009-2021- meso-level deprivation and individual-level poverty
Note: Adjusted mixed-effect logistic regression model. Variables considered: sex, cohort, time, and their interactions. The model also accounts for ethnicity, long-standing illness or impairment, partner, highest education achieved, and employment (Supplementary Information Table S.2). Deprived LADs: above the median value of the Index of Multiple Deprivation. Not Deprived LADs: below the median value of the Index of Multiple Deprivation. *Source: UKHLS data, wave1-12, England.*

The variance component analysis of the baseline multilevel mixed-effects model reveals statistically significant variation in the probability of providing informal care across different LADs in England (Table S.3). Building on this finding, the relationship between meso-level deprivation and the provision of informal care is further explored in Figure 4 and Table 3, which present the probability of providing care across different cohorts and age groups (See Tables S.9-S.12). The top panel of Figure 4 depicts individuals

living in deprived LADs, while the bottom panel of Figure 4 represents those in less deprived LADs. The figure reports a higher prevalence of care provision in more deprived LADs among both genders (confirming H3). Across all cohorts and age groups, women consistently exhibit a higher probability of providing care than men, regardless of deprivation status. Men and women exhibit similar cohort effects, with the exception of 1949-1958 and 1959-1968 cohorts, where cohort effects are stronger for men in both more and less deprived LADs, with later-born cohorts less likely to provide informal care. The gender care gap is most pronounced among middle-born cohorts (1959–1968, and 1949–1958). While the overall prevalence of caregiving is higher among those living in deprived LADs, the gender care gap is more pronounced in not-deprived LADs. This pattern could reflect higher predicted probabilities of caregiving among men in deprived LADs compared with non-deprived LADs, while female probabilities increase more modestly or even plateau in older cohorts, mechanically compressing the gender gap relative to non-deprived areas (See table S.10 and S.12). This contradicts our hypothesis (H4b).

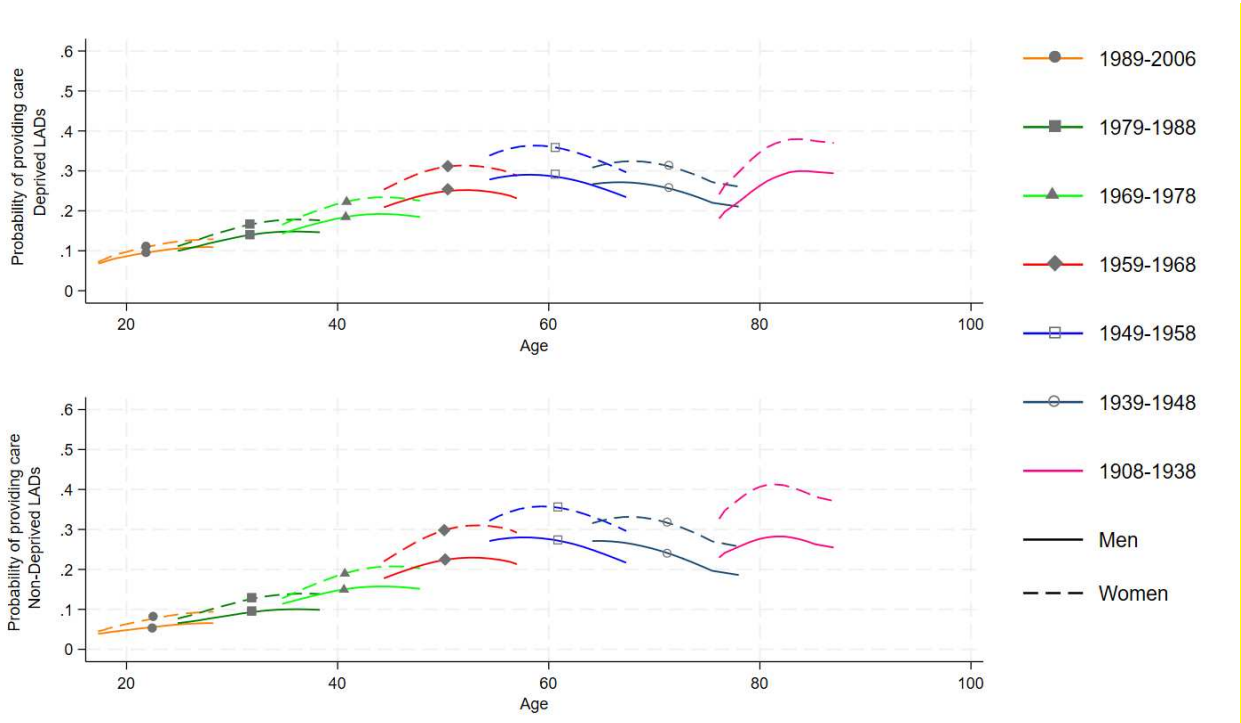

Figure 4: Gender care gap and meso-level deprivation

Note: Adjusted mixed-effect logistic regression model. Variables considered: sex, cohort, time, and their interactions. The model also accounts for ethnicity, long-standing illness or impairment, partner, highest education achieved, and employment (Supplementary Information Table S.2). Deprived LADs: above the median value of the Index of Multiple Deprivation. Not Deprived LADs: below the median value of the Index of Multiple Deprivation. *Source: UKHLS data, wave1-12, England.*

(ii) MAIHDA

Results of the MAIHDA estimation based on Wave 1 are presented in Table 4. Wave 1 was selected for primary analysis due to its larger sample size (N=34,555), but findings are consistent across waves (See Supplementary Information-Tables S.13-S.17). Model 1 is a Null Model, with no fixed effect included at level 2, that captures differences in the probability of informal caregiving provision across the intersectional social strata. It is key for assessing overall inequity, as it provides stratum-specific predictions and quantifies outcome variation within and between strata. In Model 1, stratum-level differences explain 7.5% of the variance (Variance Partition Coefficient, VPC), suggesting that caregiving probability varies across intersectional strata, indicating structural disparities in caregiving likelihood beyond individual characteristics and confirming the presence of both additive and potential multiplicative effects of cohort, gender, individual level poverty and meso-level deprivation. Model 2 adjusts for the strata-defining variables, thereby accounting for the additive contributions of cohort, gender, poverty, and meso-level deprivation, which leads to a substantial reduction of the VPC to 0.2%. This is also shown by the Proportional Change in Variance (PCV). This substantial reduction suggests that much of the observed variance in caregiving probability is primarily driven by the independent contributions of cohort-related caregiving trends, gendered caregiving expectations, and the structural constraints of individual-level poverty and meso-level deprivation (See Table S.13, Supplementary Information). However, the remaining variance indicates that interactions between these dimensions still play a role in shaping caregiving probabilities. Model 3 further includes additional covariates – relationship

status, education, ethnicity and employment -- to better capture individual-level variation. The model registers a further shrinking of the unexplained variance to zero. The PCV reveals a 100% reduction in the stratum-level variance from Model 1 to Model 3, suggesting that individual characteristics absorb most of the differences across strata (Robustness checks using Waves 5 and 12 confirm these patterns. See Supplementary Information Tables S.14-S.17.) Thus, we reject H5.

	Model 1	95% CI	Model 2	95% CI	Model 3	95% CI
Random Effect: Variances						
Stratum-Level	0.26	[0.18, 0.40]	0.06	[0.002, 0.02]	0.00	-
Summary Statistics						
Variance Partition Coefficient (VPC)	7.5%		0.2%		0%	
Proportional Change in Variance (PCV)			97.8%		100%	
Area Under Receiver Operating Characteristic Curve (AUC)	0.64		0.64		0.68	

Table 4: Multilevel Analysis of Individual Heterogeneity and Discriminatory Accuracy: Variance Decomposition.

Notes: MAIHDA.Maximum likelihood estimation was used for all models shown. 95% CIs shown in parentheses. VPC for logistic models are *calculated using the latent response approach. Model 1 is a Null Model, Model 2 controls for gender, cohort, individual-level poverty and meso-level deprivation. Model 3 also accounts for covariates including ethnicity, long-standing illness or impairment, partner, highest education achieved, and employment (Supplementary Information Table S.2). Source: UKHLS data, wave 1, England.*

Figure 5 visualises the predicted probability of providing care across intersectional strata, computed by implementing Model 3, with 95% confidence intervals. The predicted values for the 56 strata are ranked

from low to high. Men (represented by triangles) show a 23% lower odds of providing care than women(represented by dots) with an odds ratio (OR) equal to 0.77. Cohort demonstrates a strong positive association with caregiving, indicating that individuals in older birth cohorts are significantly more likely to provide care: individuals born in 1949–1958 have more than six times higher odds of caregiving (OR = 6.75), and those in the oldest cohort (1908–1938) have odds more than five times higher (OR=5.22). Poverty status is not statistically associated with caregiving after full adjustment, whereas living in less deprived LADs is associated with 14% lower odds of caregiving (OR=0.86). Consistent with existing literature, the findings indicate that individuals with higher levels of education, no disabilities, and those who are employed have significantly lower odds of providing care. There are also significant differences in the odds of providing care across different ethnic groups (See S.13). These patterns are consistent across Waves 5 and 12, confirming the robustness of findings. Figure S.6 illustrates the difference in predicted probabilities of caregiving between the total predicted probability in each stratum and the probability based solely on additive main effects (from Model 3). All differences cluster around zero, with the intervals including zero, suggesting limited evidence of substantial multiplicative interaction effects across strata. This implies that the additive model captures all of the variability in caregiving probabilities.

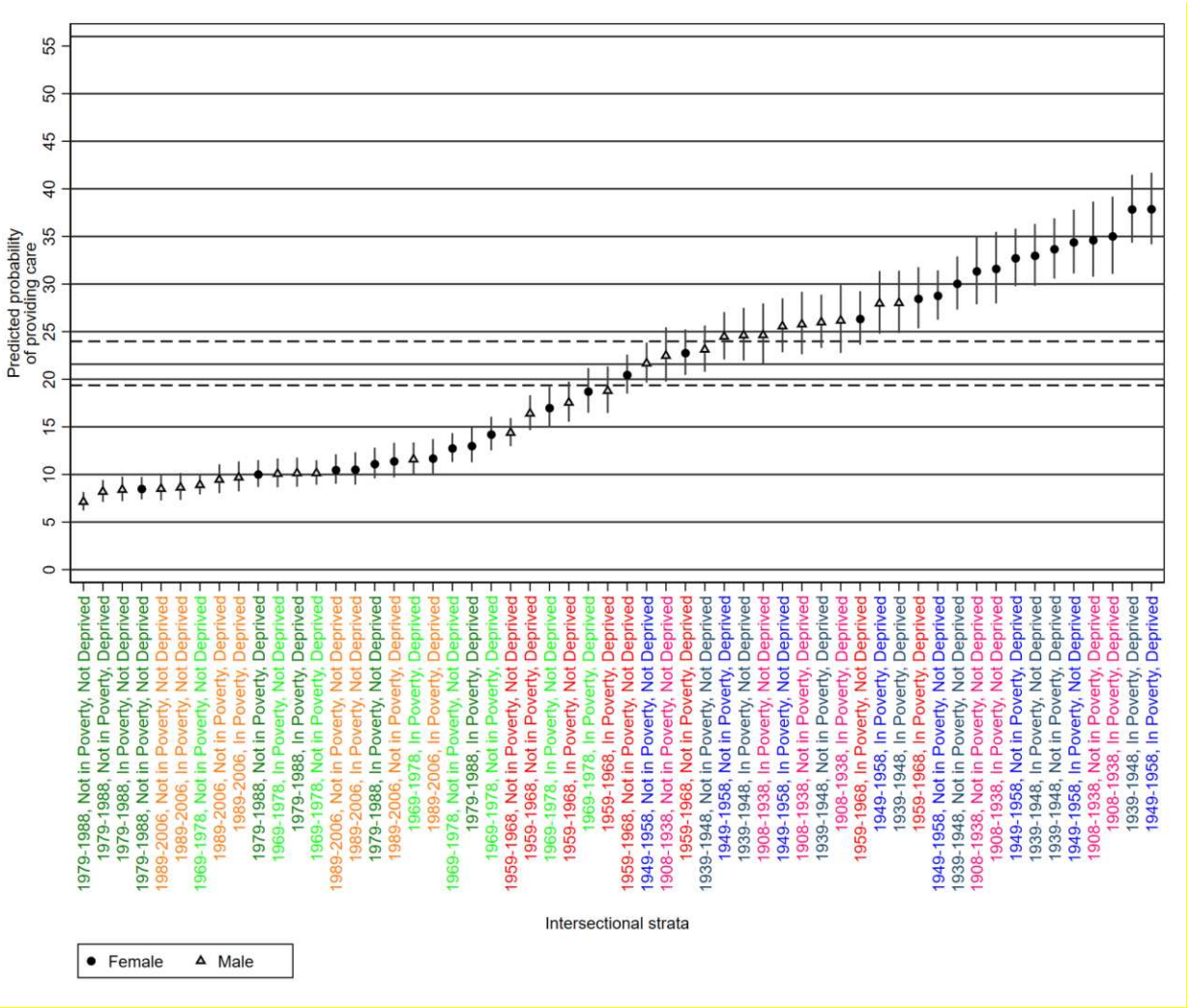

Figure 5: Predicted probability of providing care by gender, cohort, individual-level poverty, and meso-level deprivation

Notes: Based on MAIHDA estimation. Predicted stratum interaction effects, ranked low to high. Markers indicate the predicted value for each stratum. Spikes indicate 95% Confidence Intervals (Model 3). Source: UKHLS data, wave 1, England.

Discussion and Conclusion

This study makes a novel contribution to the literature on informal caregiving by juxtaposing intersectional and cohort-sensitive perspectives on gendered care inequalities. Using UKHLS data for England (2009–2021), we are the first to apply both multilevel mixed-effect logistic regression and MAIHDA to explore how gender, age cohort, individual-level poverty, and meso-level deprivation intersect to shape caregiving

patterns. While prior research has examined gendered caregiving patterns, our approach highlights how structural disadvantage and individual socioeconomic status are associated with the gender care gap. We offer the first England-based evidence that caregiving responsibilities, disproportionately shouldered by women, are compounded by both individual-level poverty and meso-level deprivation in ways that the previous literature has often overlooked.

First, the multilevel mixed-effect logistic regression model reveals that caregiving follows a strong age pattern, peaking between ages 60–70 before declining. This trend suggests that as people age, their probability of taking on caregiving responsibilities often changes due to various life-stage factors. Beyond age, cohort effects are evident, with earlier-born cohorts more likely to provide care at the same age compared to later-born cohorts. This effect could reflect generational differences in attitudes, behaviours, and life experiences that can affect caregiving patterns. For instance, individuals born in earlier cohorts may have different expectations regarding family roles and caregiving compared to those born in later cohorts, possibly due to changes in social norms, healthcare systems, and economic conditions across decades. The gender care gap is most pronounced in middle-born cohorts (1969–1978, 1959–1968, and 1949–1958), particularly between ages 50-60, supporting H1.

Second, the study examines the role of individual-level poverty in shaping gendered caregiving inequalities. Individuals above the poverty line generally have a lower probability of providing informal care than those below it (confirming H2), with a less sharp decline after age 50-60 suggesting that those with fewer resources may be unable to sustain caregiving responsibilities longer (for example, due to faster declining health) or may have different dynamics in caregiving due to worse health or less support. Poverty's role in shaping cohort effects is evident: cohort effects are more pronounced for men below the poverty line up to age 40, and for those above the poverty line between ages 55 and 80, while they are more consistent for women. This pattern may reflect improvements in the health of older parents,

delaying the need for care from younger generations, or better access to care services for economically disadvantaged individuals. The gender care gap is wider and more statistically significant among those above the poverty line; thus, we reject H4a. While the absence of directly comparable studies limits our ability to situate this result within an existing empirical tradition, there are plausible theoretical mechanisms that could help explain it. This discrepancy may arise because women in higher income brackets have more economic flexibility, allowing them to take on caregiving roles without the immediate financial pressure to work long hours or multiple jobs to cover basic needs. This economic buffer enables women to assume a larger share of caregiving responsibilities, thereby widening the gender care gap.

Third, the association between meso-level deprivation and the gender care gap is explored. The results show that caregiving is more prevalent in deprived LADs, with women having a higher probability of providing care than men, confirming H3. Cohort effects are stronger for both women and men in deprived LADs, particularly before retirement. However, the gender care gap is most pronounced in middle-born cohorts and it is wider in not-deprived LADs, contradicting H4b.

Finally, the study applies MAIHDA to explore the intersectional social profile of caregiving and how social characteristics interact as predictors of caregiving. This approach assesses both multiplicative and additive effects of the key social characteristics—gender, cohort, individual-level poverty, and meso-level deprivation—and how they explain differences in the likelihood of becoming a caregiver. This is crucial for a deeper understanding of the heterogeneity of caregiving inequalities. The findings suggest that caregiving likelihood is associated with the independent effects of cohort, gender and poverty; thus, we reject H5.

This paper demonstrates that whilst caregiving affects people from all walks of life, the likelihood of caregiving is not experienced equally among them. The study confirms the reduced informal caregiving among later-born cohorts of women, which is not offset by the higher involvement of later-born cohorts

of men. While this may be partially driven by improvements in the health of cared-for older persons, it does raise concerns regarding the future availability of informal care as the population ages and the need for further investment in long-term care for older people in the UK.

Moreover, the heterogeneity in caregiving trajectories along socioeconomic lines underscores the need for targeted policies that address the unique experiences and challenges faced by caregivers. Our findings heighten the case for policies to reduce the gendered pattern of informal caregiving by expanding paid Carer's Leave, workplace flexibility, and pension credits for caregivers, particularly for midlife women. Financial support for caregivers in poverty could be strengthened either through higher Carer's Allowances or by introducing policies that help carers continue in paid employment. The latter could include accessible formal care services, to prevent informal caregiving from being a financial necessity and allow for the conciliation of care and paid work, or tax credits to low-income carers who take up paid work. Results also confirm that the currently observed geographic disparities in economic development across the UK are entwined with caregiving and poverty. The substantive significance of these geographic disparities suggests that a "one-size-fits-all" national strategy for social care is likely to fail the communities that need it most. Instead, our findings argue for a transition toward place-based, gender-sensitive interventions that recognize care as a core component of economic infrastructure. Within regional regeneration frameworks, formal care investment in deprived LADs acts as a labor market activation strategy; reducing the disproportionate care responsibilities faced by women in these areas is a necessary step towards improving local workforce participation. Furthermore, this evidence provides a data-driven argument for a fundamental reform of local government funding formulas. As current allocations often rely on metrics that overlook the limited revenue-raising capacity of poorer councils (Phillips et al., 2024), there is a compelling case for future reforms—such as the Fair Funding Review 2.0—to move beyond simple demographic age structures. Integrating a "Deprivation Care Premium" would allow resources to be channelled to LADs where the mismatch between informal care demand and formal

service provision is most acute. Such targeted fiscal redistribution is essential to ensuring that the UK's regional economic divide is not further entrenched by an invisible, gendered, and geographically concentrated care crisis.

This study has several limitations. First, it does not separately examine the variation in age, cohort, and period. However, due to exact collinearity between the three (age = period – birth year), it is not possible to freely estimate all three effects in regression models. Attempts to solve the age, period, cohort identification problem have not worked without introducing biased assumptions (Bell, 2020; Bell & Jones, 2018). Therefore, we assume that the trend over time, net of age and cohort effects, is flat, with age and cohort being the key drivers of long-run change. The overlap of age ranges between cohorts is only partial, as with other similar cohort studies in the past (Marshall et al., 2015; Rodrigues et al., 2023). This limits the ability to draw stronger conclusions as to some of the cohort effects, which future studies using longer follow-up periods of the UKHLS may address.

Additional limitations stem from the use of self-reported caregiving status within the UKHLS data, which may affect the reliability and consistency of responses over time. In some instances, especially for the earlier-born cohort subgroup, the analytical sample size is relatively small, limiting the statistical power of our estimation. Although our analysis captures caregiving intensity, the UKHLS lacks detailed information on the needs, health conditions, or functional limitations of care recipients, preventing us from accounting for how recipient characteristics may influence observed caregiving inequalities. Similarly, the measure of long-standing illness used in the analysis does not capture the severity of functional limitations—which can be a key driver of caregiving capacity—but was retained to ensure longitudinal consistency across survey waves and modes. Future research using clinical or more granular functional data (e.g., ADL/IADL

scales) would be beneficial to refine these findings. Finally, while our study provides important descriptive and multilevel evidence on caregiving inequalities, both approaches are limited in establishing causality.

Finally, while the MAIHDA approach explores intersectional inequalities, ethnicity is not included as a stratum in this analysis. This reflects the paper's scope, centered on age–cohort patterns, and acknowledges that ethnicity deserves a more in-depth, focused treatment than this paper can accommodate. Future work should incorporate ethnicity more fully to understand its intersection with other social determinants of caregiving. We also acknowledge that, although we are limited by data availability, the measure used to create the main explanatory variable — gender — may mask its multidimensionality. Gender intersects with multiple axes of structural disempowerment, such as sexual orientation, which we could not incorporate here.

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Supplementary Information

S.1 Provision of Care

Respondents are defined as informal caregivers if they answer 'yes' to any of the following two questions:

"Is there anyone living with you who is sick, disabled or elderly whom you look after or give special help to (for example, a sick, disabled or elderly relative, husband, wife or friend, etc.)?"

"Do you provide some regular service or help for any sick, disabled or elderly person not living with you?

S.2 Index of Multiple Deprivation

The Index of Multiple Deprivation (IMD) is an overall relative measure of deprivation constructed by combining seven domains of deprivation according to their respective weights. The seven domains of deprivation are as follows:

- The Income Deprivation Domain measures the proportion of the population experiencing deprivation relating to low income. The definition of low income used includes both those people who are out of work, and those who are in work but have low earnings (and who satisfy the respective means tests).

- The Employment Deprivation Domain measures the proportion of the working-age population in an area involuntarily excluded from the labour market. This includes people who would like to work but are unable to do so due to unemployment, sickness or disability, or caring responsibilities.

- The Education, Skills and Training Deprivation Domain measures the lack of attainment and skills in the local population. The indicators fall into two sub-domains: one relating to children and young people and one relating to adult skills.

- The Health Deprivation and Disability Domain measures the risk of premature death and the impairment of quality of life through poor physical or mental health. The domain measures morbidity, disability and premature mortality but not aspects of behaviour or environment that may be predictive of future health deprivation.

- The Crime Domain measures the risk of personal and material victimisation at the local level.

- The Barriers to Housing and Services Domain measures the physical and financial accessibility of housing and local services. The indicators fall into two sub-domains: 'geographical barriers', which relate to the physical proximity of local services, and 'wider barriers', which include issues relating to access to housing, such as affordability.

- The Living Environment Deprivation Domain measures the quality of the local environment. The indicators fall into two sub-domains. The 'indoors' living environment measures the quality of housing, while the 'outdoors' living environment contains measures of air quality and road traffic accidents.

S.3 Intensity of care, relationship between caregiver and care recipient and provision of care outside the household

The UKHLS is a comprehensive, nationally-representative household panel survey designed to follow the same individuals and households over time. Building upon the British Household Panel Survey (BHPS), the UKHLS aims to represent the population residing in UK households. With an initial sample size of approximately 40,000 households, it stands as the largest household panel survey of its kind.

Intensity of care provided and spousal care

Recognising that extensive research highlights an inverse relationship between the intensity and likelihood of providing care for adults (Albertini et al., 2007; Schmid et al., 2012), we also construct a variable to measure caregiving intensity. The UKHLS offers a unique advantage by allowing us to quantify informal caregiving responsibilities on a weekly basis. Based on this, we categorise informal carers into two distinct groups: high-intensity carers, who provide more than 20 hours of care per week, and low-intensity carers, who provide up to 19 hours of care per week.

The intensity of care provided has been identified with the following question:

Now thinking about everyone who you look after or provide help for, both those living with you and not living with you - in total, how many hours do you spend each week looking after or helping them?"

1.0-4 hours per week, 2. 5-9 hours per week, 3. 10-19 hours per week, 4. 20-34 hours per week, 5. 35-49 hours per week, 6. 50-99 hours per week, 7. 100 or more hours per week/continuous care, 8. Varies under 20 hours, 9. Varies 20 hours or more, 10. Other.

Relationship between caregiver and care recipient

The relationship between respondents and their coresident care recipient is categorised into 30 classifications. However, the data only provide six categories for the relationships between the respondents and their care recipients who live separately. The data do not reveal if the care recipient who lives outside the household is the caregiver's spouse, child, or "other relative." In particular:

1. Extra household care

Who is the person that you look after if you care for someone who lives outside the household? (What is his/her relationship to you?)

1 parent/parent-in-law, 2 grandparent, 3 aunt/uncle, 4 other relatives, 5 friend or neighbour, 6 clients of voluntary organisation, 97 Other.

2. Provide care to someone who lives in the same household

What is the relationship between you and the person that you look after for if you care for someone lives within the household?

1 husband/wife, 2 partner/cohabitee, 3 civil partner, 4 natural son/daughter, 5 adopted son/daughter, 6 foster child, 7 stepson/stepdaughter, 8 son-in-law/daughter-in-law, 9 natural parent, 10 adoptive parent, 11 foster parent, 12 step-parent, 13 parent-in-law, 14 natural brother/sister, 15 half-brother/sister, 16 step-brother/sister, 17 adopted brother/sister, 18 foster brother/sister, 19 brother/sister-in-law, 20 grand-child, 21 grand-parent, 22 cousin, 23 aunt/uncle, 24 niece/nephew, 25 other relative, 26 employee, 27 employer, 28 lodger/boarder/tenant, 29 landlord/landlady, 30 other non-relative

To differentiate the caregivers and care recipients' relationship, caregivers were divided in two groups: the subsample of people who care for a spouse, and the group of people who look after anyone else.

Supplementary analysis on the intensity of care provided and spousal care:

Figure S.2 depicts the probability of providing high-intensity care. The latter increases slightly with age, particularly from the early 20s to around 50-60 years, but the overall increase is modest across all cohorts. After age 60, the probability of providing high-intensity care remains relatively stable for men and slightly declines for women, with a consequent reduction of the gender care gap after age 70. The probability of providing high-intensity care appears to be quite similar across cohorts with overlapping ages, indicating a weaker cohort effect. All cohorts, regardless of the time period they were born in, show a similar pattern, with no significant cohort showing a marked increase or decrease in the likelihood of providing high-intensity care. The relative flatness of the lines suggests that high-intensity caregiving is not strongly influenced by generational changes; rather, it seems to be more of a constant demand across different cohorts. Once again, a statistically significant gender care gap persists across all cohorts, except for the earliest-born cohort. This exception may be due to reduced statistical power stemming from the small sample size in this oldest group.

Figure S.3 illustrates the probability of providing spousal care. For both men and women, the probability of providing spousal care increases with age, especially after the age of 60. This is consistent with the life course perspective, where the need for spousal care typically rises in older age due to health declines and increased dependency. For the younger cohorts - 1989-2006, 1979-1988, and 1959-168 - the probability of providing spousal care remains low up to age 60, with only a slight increase thereafter. This suggests that younger generations may engage less in spousal caregiving at earlier stages of life, possibly due to differing marital patterns, life expectancy, or social support systems. For the overlapping age ranges of the 1939-1948 and 1949-1958 cohorts, it is notable that the 1939-1948 cohort shows a lower probability of providing spousal care compared to the 1949-1958 cohort, for both women and men. Finally, the gender care gap appears to widen with age, particularly in the oldest cohorts (1939-1948 and 1908-1938), where women's probability of providing spousal care increases sharply after age 70, much more so than for men. In younger cohorts, this gap is less pronounced and not statistically significant.

Supplementary analysis on caregiving provision outside the household.

Figure S.4 highlights distinct gender and age–cohort effects in the probability of providing informal care outside the household. Across all cohorts, women consistently show a higher likelihood of caregiving than men, particularly between ages 40 and 70, underscoring a persistent gender care gap. For women, the prevalence of caregiving remains relatively stable across cohorts, suggesting primarily age-related rather than cohort-specific effects. Conversely, there is a pronounced cohort effect for men for the age groups where cohorts overlap (i.e., the vertical distance between cohort lines across overlapping ages within men is wider), particularly for the cohorts born between 1959- 1968, 1949-1958 and 1939-1948. Among younger cohorts, both men and women show flatter and delayed caregiving profiles, suggesting that caregiving is occurring later in the life course. The gender gap narrows across earlier-born cohorts, implying that while caregiving remains gendered, men's participation has increased, and the timing of care has become more aligned between women and men over time.

S.4 Methods

The first stage of our analysis uses a multilevel age-cohort model to examine individual informal care trajectories over time. Level 1 includes time-varying characteristics (e.g., relationship status, disability, employment, education) to capture dynamic changes in caregiving roles, Level 2 incorporates time-invariant variables (e.g., sex, ethnicity) and random effects for each survey wave, and Level 3 accounts for clustering at the local authority level, capturing area-level variations in caregiving patterns. This structure allows us to assess how individual and contextual factors jointly shape informal care trajectories. Formally:

Let Y_{tij} be the binary outcome variable indicating whether at time t $(t = 1, \dots, T)$ an individual i $(i = 1, \dots, I)$ in local authority j $(j = 1, \dots, J)$ provides care. The model can be expressed as:

$$
\begin{aligned}
&logit\, P(Y_{tij} = 1) \\
&\quad = \beta_0 + \beta_1 Female_i + \beta_2 Cohort_i + \beta_3 Time_t + \beta_4 (Time\ x\ Cohort)_{it} \\
&\quad + \beta_5 (Time\ x\ Female)_{it} + \beta_6\, (Cohort\ x\ Female)_i + \beta_7 Time_t^2 + X_{it} + u_j + v_{i(j)} \\
&\quad + \varepsilon_{ijt}
\end{aligned}
$$

Our model is designed to include the main effects for sex, cohort, and time, alongside interaction terms enabling distinct slope estimates across these factors. In particular:

- β_0 represents the mean probability of care provision across all local authorities when all predictors are at their reference category.
- β_1 (Female) indicates the effect of being female on the probability of providing care, compared to males.
- β_2 (Cohort) indicates the effect of birth cohort on the likelihood of providing care.

- β_3 (Time) indicates the effect of time on caregiving probability with $Time_t$ included as a continuous variable
- β_4 (Time × Cohort) tells how the effect of time on caregiving varies across birth cohorts.
- β_5 (Time × Female) tells how the effect of time on caregiving differs by sex.
- β_6 (Cohort × Female) tells how the effect of cohort on caregiving differs by sex.

We further include a quadratic term for time to capture nonlinearity in individual slopes (β_7) to take account of the nonlinear relationship expected between age and the probability of providing informal care.

We adjust our estimation by controlling for a vector of background individual characteristics (X_{it}).

Finally:

- $u_j \sim N(0, \sigma_v^2)$ captures variations in caregiving probability across local authority districts.
- $v_{ij} \sim N(0, \sigma_v^2)$ captures individual-level differences in caregiving probability.
- $\varepsilon_{tij} \sim N(0, \sigma_\varepsilon^2)$ is a residual error term. Time-specific deviation from an individual's predicted outcome

S.5 Choice of cohorts

In our data, respondents are grouped into seven 10-year birth cohorts. At baseline (Wave 1), their ages ranged as follows:

- (1989–2006): aged 16–21
- (1979–1988): aged 20–31
- (1969–1978): aged 30–41
- (1959–1968): aged 40–51
- (1949–1958): aged 50–61
- (1939–1948): aged 60–71
- 1908–1938): aged 70–101

These ranges reflect the actual age distribution of respondents at the study baseline. We acknowledge that the youngest cohort has a lower probability of providing care, but it was retained for completeness and to capture emerging caregiving patterns among younger adults.

The table below summarises the birth cohorts used in the cited literature. For example, Marshall et al. (2025) track individuals born 1932–1952, Rodrigues et al. (2013) cover cohorts from 1900–1954, and Sheehan et al. (2018) include cohorts born before 1924 up to 1959. Our study focuses on more recent cohorts (e.g., 1939–2006), as we extend the coverage to younger generations not previously covered by such studies, while the earlier born cohorts in our study are still comparable to some of the cited studies.

Paper	Cohorts used
Marshall et al., (2025)	Cohorts aged 50–70 and 70+ in 2002. Uses English data from ELSA: primary analysis tracks those aged 50–70 in the 2002 baseline (thus born 1932–1952), with older cohorts (70+) representing earlier birth years; comparisons focus on adjacent cohorts by both age and wealth

Rodrigues et al., (2013)	1950-1954 / 1945-1949 / 1940-1944/ 1935-1939 / 1930-1934/1900-1929. Uses SHARE data to analyse European adults using birth cohorts spanning from the early 20th century (typically 1920s onward) up through more recent cohorts (1950s-1960s), comparing gendered caregiving probabilities across overlapping age ranges
Sheehan et al., (2018)	Six distinct birth cohorts were taken from the Health and Retirement Study (HRS) and its related surveys, spanning over 35 birth years. (born before 1924 / 1923-1930/ 1942-1947 / 1948-1953 / 1954-1959). Segments older US adults using five-year and ten-year birth cohorts, focusing on those born before 1950 up to post-War cohorts, and analyses gender/household labour shifts relative to IADLs
Bell & Jones (2018); Bell (2020)	Model-based, often grouped in five- or ten-year intervals spanning available survey or population data. Discusses methodological considerations for hierarchical age–period–cohort models, often illustrating using large datasets with birth cohorts such as 1950–1959, 1960–1969, etc.; focus is on the impact of grouping structures in analysis rather than any particular generation
Glaser et al. (2013)	Not always explicit, but typically utilises generational birth cohorts (e.g., post-War, Boomers, Gen X) for policy and grandparenting studies
Ophir & Polos (2022); Vlachantoni et al. (2019)	Uses broad generational cohorts (Baby Boomers, Gen X, etc.) for narrative comparison of care life expectancy and mid-life informal care

Figures– Supplementary Information

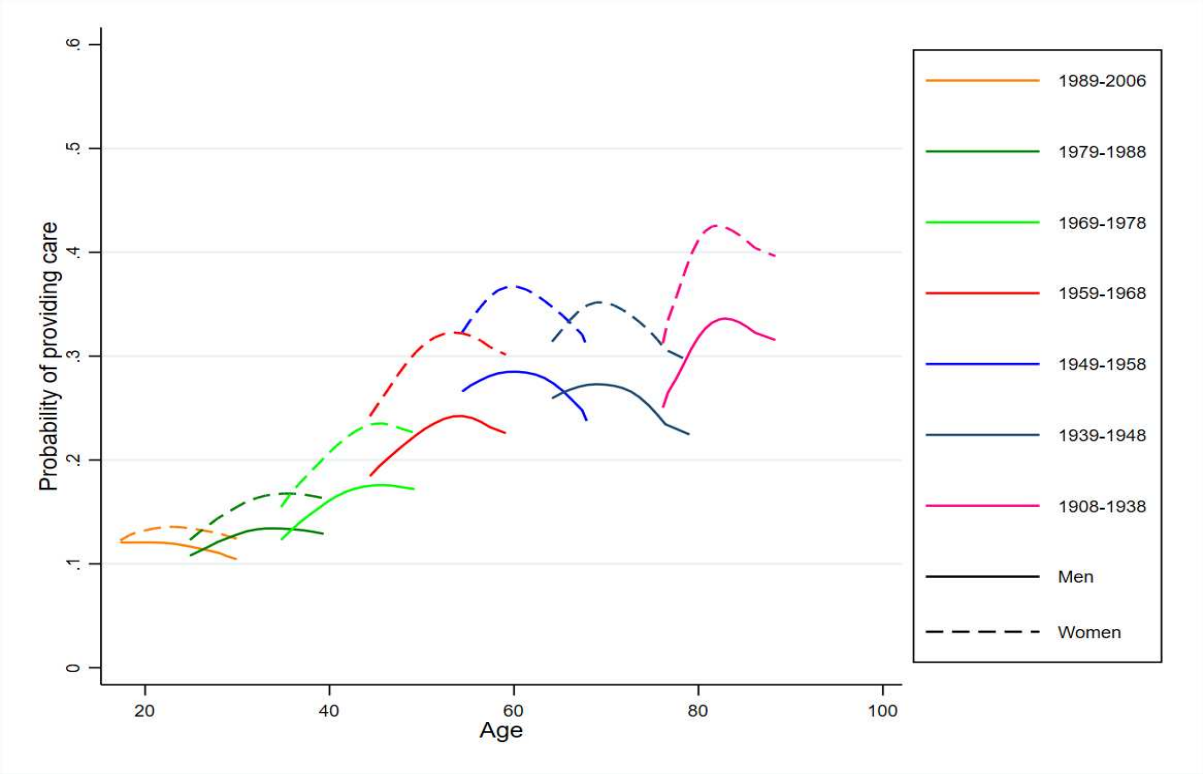

Figure S. 1: Gender care gap, Unadjusted

Notes: Probability of giving care, adjusted mixed-effect logistic regression.
Source: UKHLS data, 2009- 20230, England.

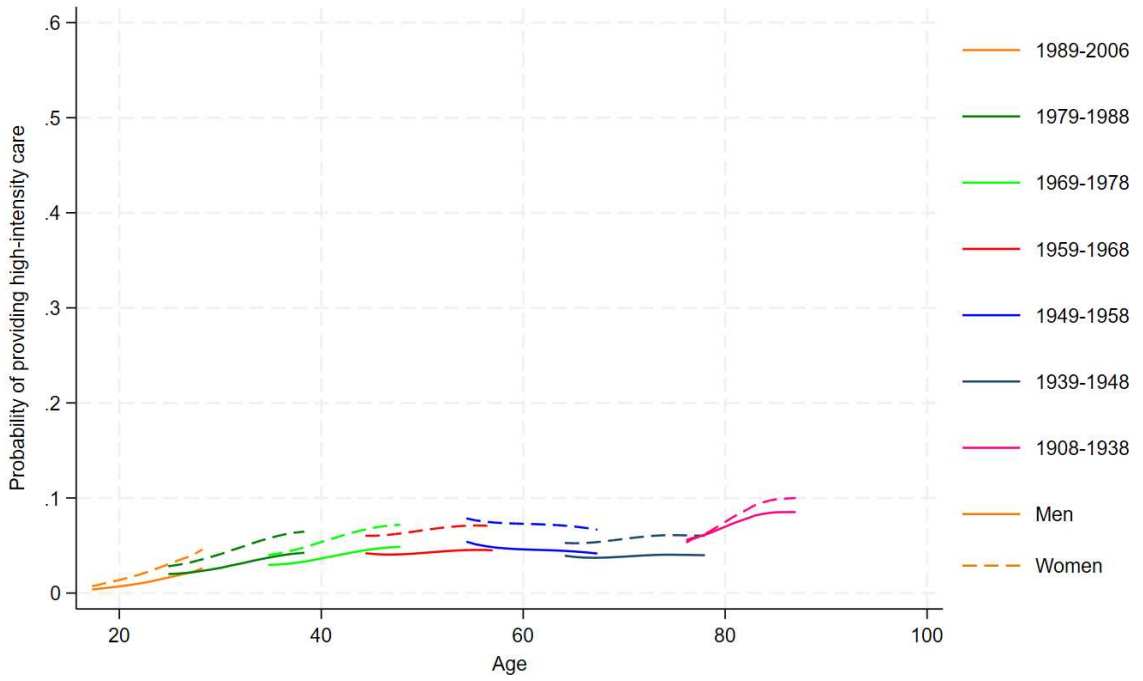

Figure S. 2 : Gender care gap: high-intensity care

Notes: Probability of giving care, adjusted mixed-effect logistic regression. Model adjusted for ethnicity, long-standing illness or impairment, partner, highest education achieved, and employment.. High intensity: Takes value one if the individual provides more than 20 hours per week of care. Providing no spousal care: Takes value one if the individual is providing no spousal care. Source: UKHLS data, 2009- 20230, England.

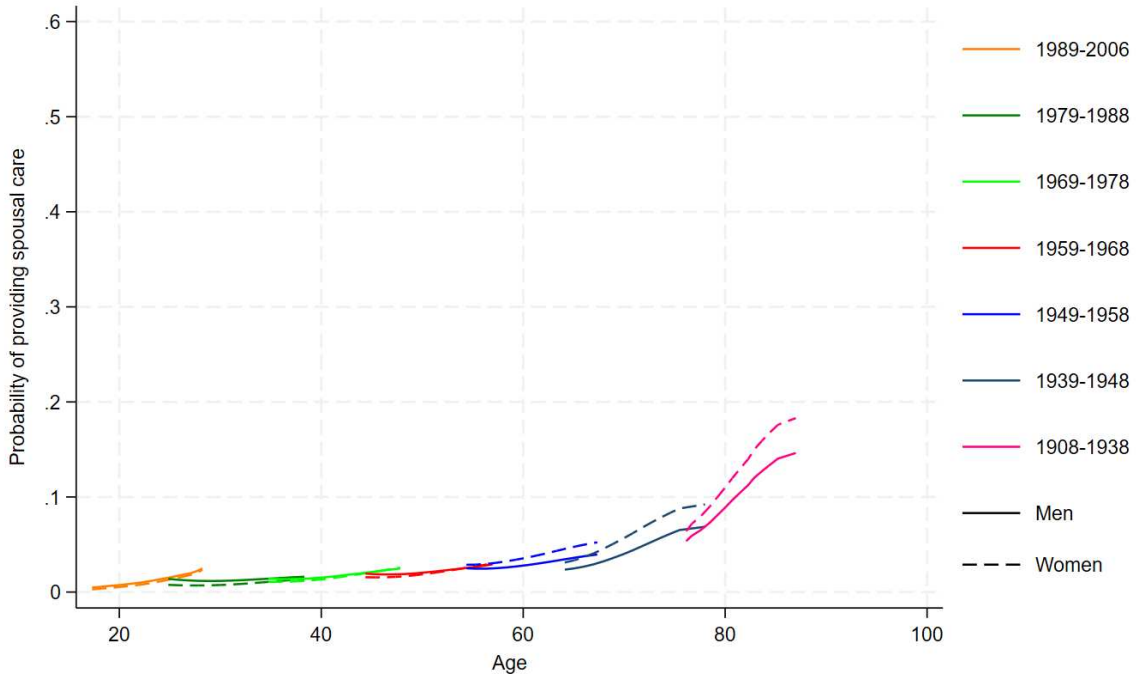

Figure S. 3 Gender care gap: spousal care

Notes: Probability of giving care, adjusted mixed-effect logistic regression. Model adjusted for ethnicity, long-standing illness or impairment, partner, highest education achieved, and employment. High intensity: Takes value one if the individual provides more than 20 hours per week of care. Providing no spousal care: Takes value one if the individual is providing no spousal care. Source: UKHLS data, 2009- 20230, England.

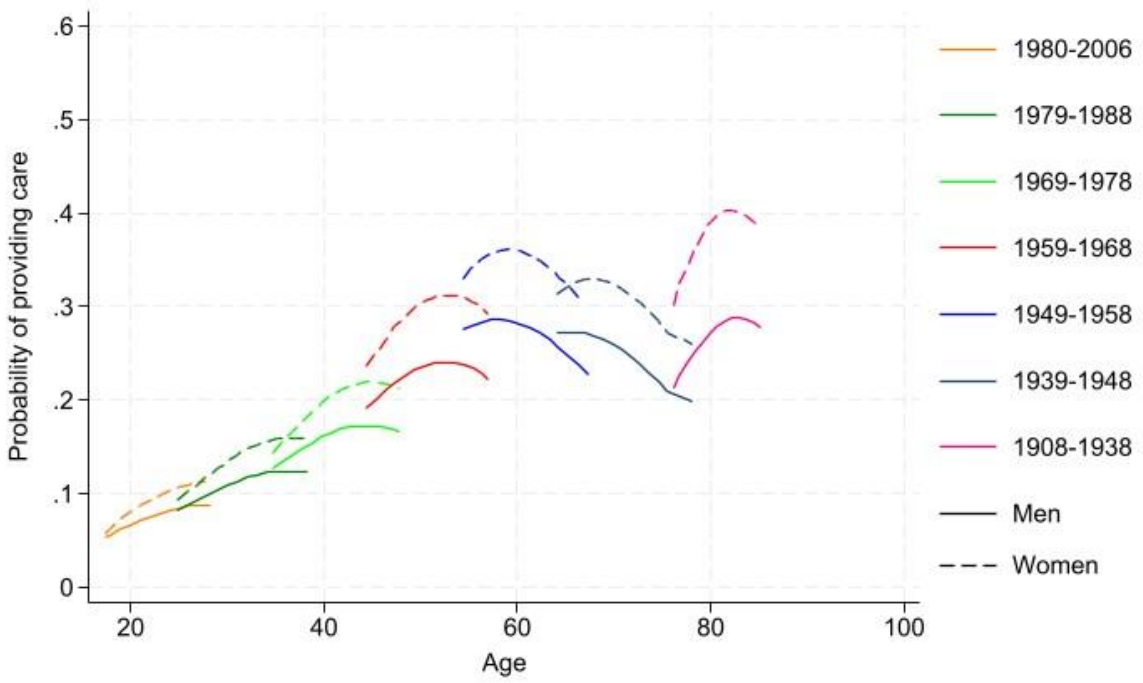

Figure S. 4 Gender care gap - probability of providing informal care outside the household

Note: Adjusted mixed-effect logistic regression model. Variables considered: sex, cohort, time, and their interactions. The model also accounts for ethnicity, long-standing illness or impairment, partner, highest education achieved, and part-time, full-time and unemployment. For more details on the variables, please refer to Table S.2 (Supplementary Information). Source: UKHLS data, 2009- 2020, England.

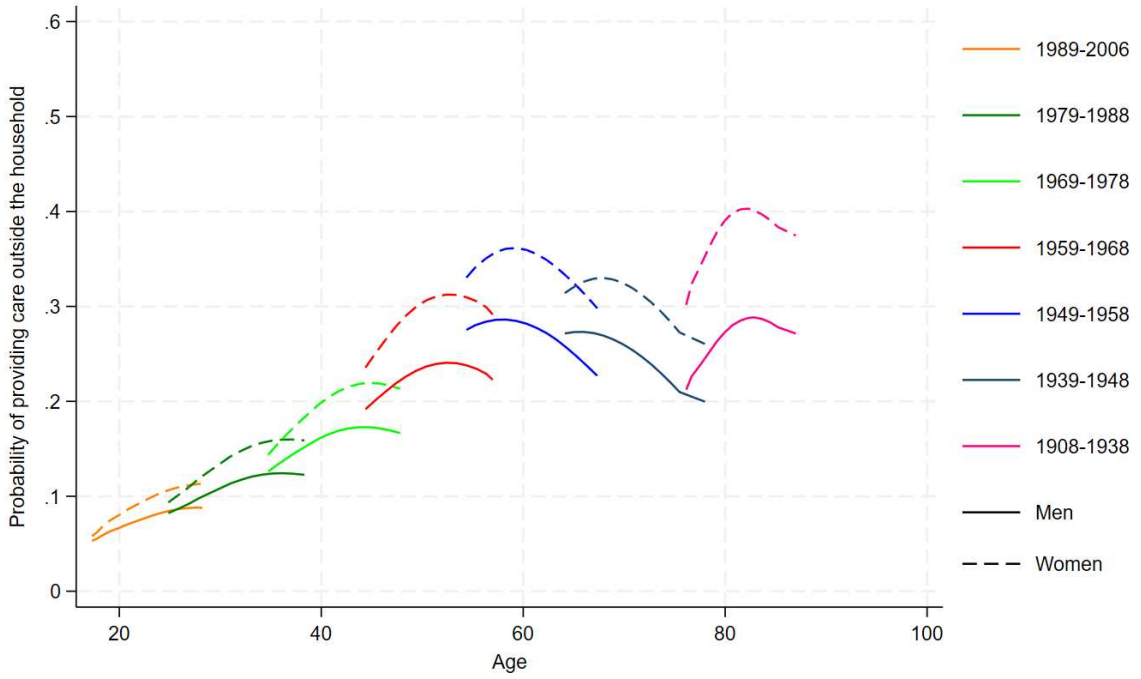

Figure S. 5 Probability of providing informal care outside the household, by cohort and sex, adjusted – family size.

*Note: Adjusted mixed-effect logistic regression model. Variables considered: sex, cohort, time, and their interactions. The model also accounts for ethnicity, long-standing illness or impairment, partner, highest education achieved, and **family size**. For more details on the variables, please refer to Table S.2 (Supplementary Information).*

Source: UKHLS data, 2009- 2020, England.

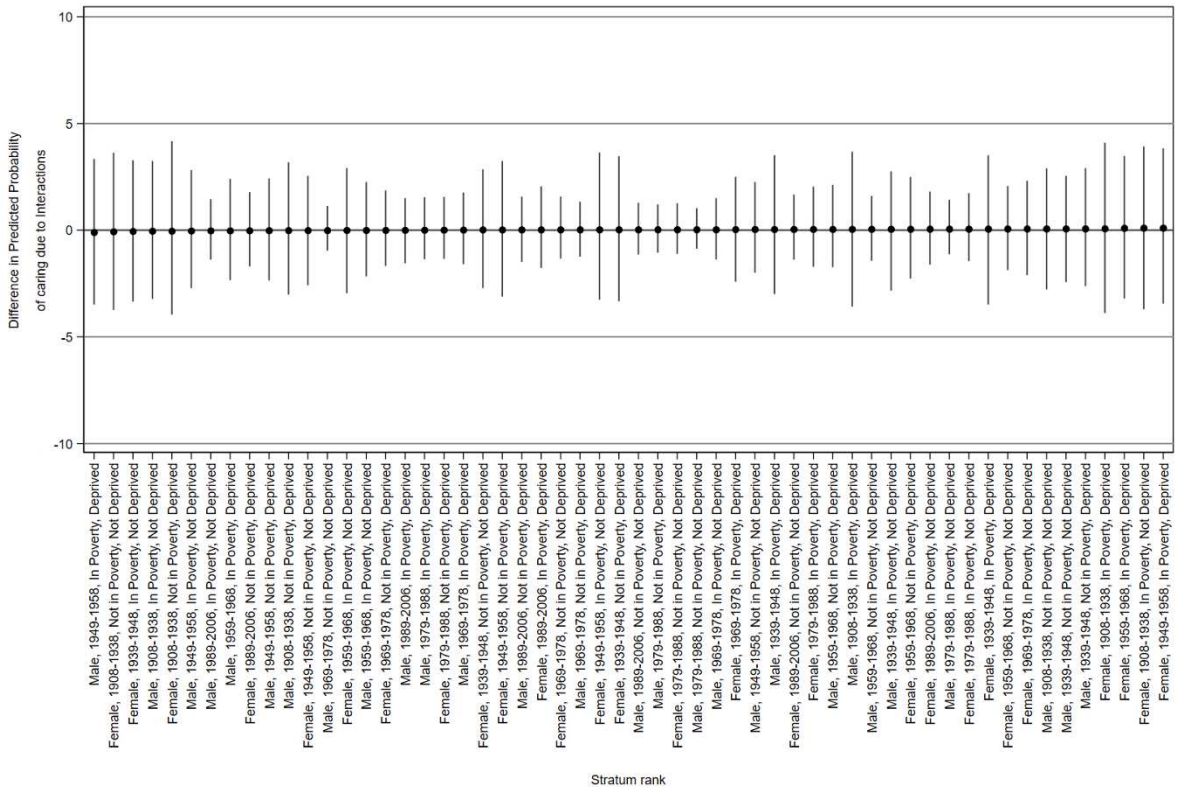

Figure S. 6 MAIHDA: Difference in the predicted probability of providing care due to interaction effect.

Note: Difference between the total predicted probability in each stratum and the probability based on additive main effects.

Source: UKHLS data, wave 1, England.

Tables – Supplementary Information

Starting with 393,357 observations from waves 1–12 in England, individuals who did not join the survey in waves 1–3 and were observed for only two waves or fewer were excluded (61,451 observations removed). An additional 61,632 observations were excluded due to missing information on carer status, sex, or cohort, resulting in a final analytical sample of 270,274 observations and 40,324 individuals

Table S. 1 Descriptive statistics of the analytical sample - weighted estimations

	wave											
Cohort	1	2	3	4	5	6	7	8	9	10	11	12
1989-2006												
Men(n)	971	1,341	1,420	1,232	1,034	824	701	643	526	491	437	388
Carers(n)												
No	866	1,195	1,250	1,116	907	732	644	585	473	441	391	358
Yes	105	146	170	116	127	92	57	58	53	50	46	30
Carers(%)												
No	89.19	89.11	88.03	90.58	87.72	88.83	91.87	90.98	89.92	89.82	89.47	92.27
Yes	10.81	10.89	11.97	9.42	12.28	11.17	8.13	9.02	10.08	10.18	10.53	7.73
Women(n)	1,110	1,528	1,609	1,366	1,209	1,001	857	791	666	623	585	518
Carers(n)												
No	979	1,357	1,423	1,216	1,056	862	772	711	594	543	519	457
Yes	131	171	186	150	153	139	85	80	72	80	66	61
Carers(%)												
No	88.20	88.81	88.44	89.02	87.34	86.11	90.08	89.89	89.19	87.16	88.72	88.22
Yes	11.80	11.19	11.56	10.98	12.66	13.89	9.92	10.11	10.81	12.84	11.28	11.78
1979-1988												
Men(n)	1,616	1,862	1,717	1,517	1,364	1,180	1,103	995	924	862	784	712
Carers(n)												

No	1,449	1,677	1,511	1,341	1,187	1,000	983	883	819	750	685	628
Yes	167	185	206	176	177	180	120	112	105	112	99	84
Carers(%)												
No	89.67	90.06	88.00	88.40	87.02	84.75	89.12	88.74	88.64	87.01	87.37	88.20
Yes	10.33	9.94	12.00	11.60	12.98	15.25	10.88	11.26	11.36	12.99	12.63	11.80
Women(n)	2,514	2,836	2,596	2,324	2,080	1,806	1,696	1,597	1,444	1,372	1,260	1,171
Carers(n)												
No	2,189	2,497	2,246	2,026	1,751	1,511	1,456	1,364	1,220	1,155	1,073	1,009
Yes	325	339	350	298	329	295	240	233	224	217	187	162
Carers(%)												
No	87.07	88.05	86.52	87.18	84.18	83.67	85.85	85.41	84.49	84.18	85.16	86.17
Yes	12.93	11.95	13.48	12.82	15.82	16.33	14.15	14.59	15.51	15.82	14.84	13.83
1969- 1978												
Men(n)	2,211	2,563	2,332	2,118	1,961	1,711	1,628	1,557	1,399	1,308	1,250	1,144
Carers(n)												
No	1,963	2,248	2,032	1,870	1,711	1,444	1,419	1,348	1,199	1,139	1,072	991
Yes	248	315	300	248	250	267	209	209	200	169	178	153
Carers(%)												
No	88.78	87.71	87.14	88.29	87.25	84.40	87.16	86.58	85.70	87.08	85.76	86.63
Yes	11.22	12.29	12.86	11.71	12.75	15.60	12.84	13.42	14.30	12.92	14.24	13.37
Women(n)	3,351	3,715	3,383	3,059	2,861	2,532	2,443	2,277	2,033	1,968	1,814	1,656
Carers(n)												
No	2,834	3,137	2,815	2,533	2,355	1,999	1,998	1,839	1,632	1,576	1,440	1,266
Yes	517	578	568	526	506	533	445	438	401	392	374	390
Carers(%)												
No	84.57	84.44	83.21	82.80	82.31	78.95	81.78	80.76	80.28	80.08	79.38	76.45
Yes	15.43	15.56	16.79	17.20	17.69	21.05	18.22	19.24	19.72	19.92	20.62	23.55
1959-1968												
Men(n)	2,273	2,653	2,467	2,212	2,095	1,859	1,758	1,684	1,548	1,498	1,412	1,311
Carers(n)												

No	1,873	2,176	1,976	1,811	1,692	1,453	1,438	1,346	1,259	1,192	1,141	1,037
Yes	400	477	491	401	403	406	320	338	289	306	271	274
Carers(%)												
No	82.40	82.02	80.10	81.87	80.76	78.16	81.80	79.93	81.33	79.57	80.81	79.10
Yes	17.60	17.98	19.90	18.13	19.24	21.84	18.20	20.07	18.67	20.43	19.19	20.90
Women(n)	3,311	3,705	3,447	3,171	2,937	2,629	2,496	2,303	2,093	2,019	1,932	1,767
Carers(n)												
No	2,528	2,743	2,437	2,324	2,146	1,854	1,824	1,629	1,447	1,406	1,353	1,238
Yes	783	962	1,010	847	791	775	672	674	646	613	579	529
Carers(%)												
No	76.35	74.04	70.70	73.29	73.07	70.52	73.08	70.73	69.14	69.64	70.03	70.06
Yes	23.65	25.96	29.30	26.71	26.93	29.48	26.92	29.27	30.86	30.36	29.97	29.94
1049-1958												
Men(n)	1,862	2,173	2,013	1,866	1,770	1,600	1,514	1,469	1,367	1,298	1,245	1,160
Carers(n)												
No	1,400	1,653	1,478	1,374	1,312	1,138	1,156	1,114	1,044	989	970	940
Yes	462	520	535	492	458	462	358	355	323	309	275	220
Carers(%)												
No	75.19	76.07	73.42	73.63	74.12	71.12	76.35	75.83	76.37	76.19	77.91	81.03
Yes	24.81	23.93	26.58	26.37	25.88	28.88	23.65	24.17	23.63	23.81	22.09	18.97
Women(n)	2,424	2,727	2,495	2,330	2,185	1,945	1,852	1,765	1,626	1,531	1,478	1,396
Carers(n)												
No	1,661	1,826	1,615	1,510	1,427	1,240	1,241	1,187	1,114	1,068	1,064	992
Yes	763	901	880	820	758	705	611	578	512	463	414	404
Carers(%)												
No	68.52	66.96	64.73	64.81	65.31	63.75	67.01	67.25	68.51	69.76	71.99	71.06
Yes	31.48	33.04	35.27	35.19	34.69	36.25	32.99	32.75	31.49	30.24	28.01	28.94
1939- 1948												
Men(n)	1,740	2,029	1,874	1,726	1,634	1,463	1,369	1,296	1,198	1,144	1,067	980
Carers(n)												

No	1,340	1,532	1,359	1,325	1,229	1,099	1,049	1,013	932	925	866	807
Yes	400	497	515	401	405	364	320	283	266	219	201	173
Carers(%)												
No	77.01	75.51	72.52	76.77	75.21	75.12	76.63	78.16	77.80	80.86	81.16	82.35
Yes	22.99	24.49	27.48	23.23	24.79	24.88	23.37	21.84	22.20	19.14	18.84	17.65
Women(n)	1,852	2,184	2,015	1,795	1,668	1,478	1,397	1,285	1,164	1,122	1,016	893
Carers(n)												
No	1,303	1,506	1,365	1,259	1,191	1,021	994	909	846	852	782	695
Yes	549	678	650	536	477	457	403	376	318	270	234	198
Carers(%)												
No	70.36	68.96	67.74	70.14	71.40	69.08	71.15	70.74	72.68	75.94	76.97	77.83
Yes	29.64	31.04	32.26	29.86	28.60	30.92	28.85	29.26	27.32	24.06	23.03	22.17
1908-1938												
Men(n)	1,207	1,398	1,245	1,050	917	787	672	567	461	395	312	232
Carers(n)												
No	934	1,043	912	775	674	584	500	404	348	302	247	181
Yes	273	355	333	275	243	203	172	163	113	93	65	51
Carers(%)												
No	77.38	74.61	73.25	73.81	73.50	74.21	74.40	71.25	75.49	76.46	79.17	78.02
Yes	22.62	25.39	26.75	26.19	26.50	25.79	25.60	28.75	24.51	23.54	20.83	21.98
Women(n)	1,012	1,196	1,039	870	745	629	522	446	358	305	232	177
Carers(n)												
No	733	828	704	559	489	418	362	300	253	203	167	125
Yes	279	368	335	311	256	211	160	146	105	102	65	52
Carers(%)												
No	72.43	69.23	67.76	64.25	65.64	66.45	69.35	67.26	70.67	66.56	71.98	70.62
Yes	27.57	30.77	32.24	35.75	34.36	33.55	30.65	32.74	29.33	33.44	28.02	29.38

Table S. 2 Variables Description

Variables	Description
informal carer	The variable has been created by combining the variables (aidhh - care for sick/ handicapped/elderly in the household- and aidxhh - non-resident cared for).
Highest educational level achieved:	3 dummy variables were generated from qfhigh_dv: low_education (including values: GCSE/O level, CSE, Standard/o/lower, Other school cert) intermediate_edu (including values: Diploma in he, Teaching qualification not pgce, Nursing/other med qualification, A level, Welsh baccalaureate, AS level, Highers(Scotland), Cert 6th year studies) and advanced_edu (including values: Higher degree, 1st degree or equivalent, other higher degree).
Employment status	Dummy variable generated from the variable jbstat, taking value of one if the individual is employed (self-employed, paid employment (ft/pt), on maternity leave, govt training scheme, on apprenticeship) and zero if unemployed (unemployment, retired, family care or home, full-time student, LT sick or disabled, unpaid-family business, on furlough, temporarily laid off, doing something else). We then use variable jbft_dv to identify part-time and full-time employee (including self-employed)
Ethnicity	Five dummy variables derived from ethn_dv (white, black, asian, mixed, other)
Partner	Dummy variable derived from mastat_dv taking value of one if the individual has a partner (married, in a registered same-sex civil partnership, living as a couple) and value of zero if single (single and never married/civil partnership, separated but legally married, divorced, widowed, separated from civil partner, a surviving civil partner)
Disability	Dummy variable generated from health. It takes value zero if the individual has no long-standing illness/impairment and one otherwise.
Female	dummy variable derived from sex, taking value of 1 if the individual is female, zero otherwise.
Age	continuous variable generated from age_dv
Nation	Categorical variable generated from gor_dv, taking value 1 for England, 2 for Wales, 3 for Scotland and 4 for Norther Ireland
Weight_year	Variable generated from indscus_xw, indinus_lw, indinub_lw and indinui_lw
Care_intensity	Dummy variable generated from aidhres. It takes value of zero if no care is provided, 1 if care is provided for 0 to 19 hours, 2 if provided for more than 20 hours.
Cohort_5y	Categorical variable equal to 0 if the individual is part of the cohort is 1989-2006, 1 if the cohort is 1979-1988, 2 if the cohort is 1969-1978, 3 if the cohort is 1959-1968, 4 if the cohort is 1949-1958, 5 if the cohort is 1939-1948, 6 if the cohort is 1929-1938 and 7 if the cohort is 1908-1928
Time	Variable derived from istrdaty - 2009 (starting year of the survey)

Table S. 3 Mixed effects logistic regression for informal caregiving (underlying model for Figure 2).

Variable	Coeff	Standard Error	P-Value	LCI	UCI
Female	0.156	0.138	0.259	-0.114	0.426
Cohort (ref = 1989–2006)					
1979–1988	0.792	0.153	0.000	0.492	1.092
1969–1978	1.626	0.152	0.000	1.329	1.924
1959–1968	2.563	0.148	0.000	2.273	2.853
1949–1958	3.549	0.155	0.000	3.244	3.853
1939–1948	3.508	0.164	0.000	3.187	3.829
1908–1938	2.822	0.201	0.000	2.428	3.216
Time	0.068	0.021	0.001	0.027	0.108
Cohort × Time (ref = 1989–2006)					
1979–1988	0.026	0.020	0.199	-0.014	0.066
1969–1978	0.048	0.019	0.014	0.010	0.086
1959–1968	0.064	0.019	0.001	0.027	0.101
1949–1958	-0.006	0.020	0.766	-0.045	0.033
1939–1948	-0.043	0.022	0.046	-0.086	-0.001
1908–1938	0.112	0.030	0.000	0.054	0.170
Female × Time	0.053	0.009	0.000	0.035	0.072
Cohort × Female (ref = 1989–2006)					
1979–1988	0.087	0.173	0.616	-0.253	0.427
1969–1978	0.120	0.168	0.473	-0.209	0.450
1959–1968	0.382	0.164	0.019	0.062	0.703
1949–1958	0.414	0.174	0.017	0.074	0.754
1939–1948	0.292	0.191	0.126	-0.082	0.665
1908–1938	0.851	0.249	0.001	0.362	1.339
Time × Time	-0.018	0.001	0.000	-0.020	-0.016
Education (ref = Advanced)					
Low education	0.599	0.054	0.000	0.494	0.704
Intermediate education	0.372	0.055	0.000	0.264	0.480
Disability	0.314	0.027	0.000	0.262	0.367
Married	-1.170	0.046	0.000	-1.259	-1.080
Employed (ref=Unemployed)					
Part-time	-0.263	0.041	0.000	-0.342	-0.183
Full-time	-0.515	0.038	0.000	-0.590	-0.441
Ethnicity (ref = Other)					
White	0.369	0.196	0.060	-0.016	0.754
Mixed	0.305	0.244	0.212	-0.173	0.783
Asian	0.523	0.204	0.010	0.123	0.924
Black	-0.121	0.218	0.577	-0.548	0.305
Intercept	-5.217	0.235	0.000	-5.678	-4.756
LAD-level variance	0.183	0.028		0.135	0.248
Individual-level time slope variance	0.122	0.004		0.114	0.131
Individual-level variance	8.275	0.217		7.861	8.711
No. of observations: 185,821 **No. of individuals: 32,250**					
No. of LAD: 308					

Note: Pooled sample (LCI, lower confidence interval; UCI, upper confidence interval).

Table S. 4 Predicted probabilities for informal caregiving by cohort and sex.

Variable	Odds-Ratio	P value	LCI	UCI
Male*1989–2006	0.071	0.000	0.064	0.078
Male*1979–1988	0.107	0.000	0.098	0.115
Male*1969–1978	0.156	0.000	0.146	0.166
Male*1959–1968	0.225	0.000	0.213	0.237
Male*1949–1958	0.277	0.000	0.262	0.291
Male*1939–1948	0.259	0.000	0.242	0.275
Male*1908–1938	0.263	0.000	0.239	0.288
Female*1989–2006	0.086	0.000	0.079	0.093
Female*1979–1988	0.132	0.000	0.123	0.140
Female*1969–1978	0.191	0.000	0.181	0.200
Female*1959–1968	0.288	0.000	0.277	0.299
Female*1949–1958	0.348	0.000	0.334	0.363
Female*1939–1948	0.318	0.000	0.300	0.336
Female*1908–1938	0.373	0.000	0.343	0.404

Note: Pooled sample, adjusted for control variables (PP, predicted probability; LCI, lower confidence interval; UCI, upper confidence interval). Weighted values.

Table S. 5 Mixed effects logistic regression for informal caregiving – above the poverty line (underlying model for Figure 3a).

Variable	Coefficient	Std. Error	P-Value	LCI	UCI
Female	0.069	0.155	0.658	-0.235	0.372
Cohort (ref = 1989–2006)					
1979–1988	0.913	0.173	0.000	0.574	1.251
1969–1978	1.734	0.171	0.000	1.400	2.069
1959–1968	2.694	0.166	0.000	2.369	3.019
1949–1958	3.707	0.173	0.000	3.368	4.045
1939–1948	3.664	0.181	0.000	3.310	4.018
1908–1938	2.977	0.220	0.000	2.544	3.409
Time	0.083	0.023	0.000	0.038	0.128
Cohort × Time (ref = 1989–2006)					
1979–1988	0.015	0.023	0.511	-0.029	0.059
1969–1978	0.030	0.021	0.160	-0.012	0.072
1959–1968	0.041	0.021	0.049	0.000	0.083
1949–1958	-0.032	0.022	0.151	-0.075	0.012
1939–1948	-0.069	0.024	0.003	-0.115	-0.023
1908–1938	0.078	0.032	0.014	0.016	0.141
Female × Time	0.053	0.010	0.000	0.034	0.073
Cohort × Female (ref = 1989–2006)					
1979–1988	0.162	0.191	0.397	-0.213	0.537
1969–1978	0.272	0.185	0.141	-0.090	0.634
1959–1968	0.527	0.179	0.003	0.175	0.879
1949–1958	0.511	0.189	0.007	0.141	0.881
1939–1948	0.364	0.205	0.077	-0.039	0.766
1908–1938	0.882	0.267	0.001	0.358	1.406
Time × Time	-0.018	0.001	0.000	-0.020	-0.015
Education (ref = Advanced)					
Low education	0.606	0.057	0.000	0.495	0.717
Intermediate education	0.384	0.058	0.000	0.269	0.498
Disability	0.304	0.029	0.000	0.248	0.361
Married	-1.243	0.050	0.000	-1.341	-1.144
Employed (ref=Unemployed)					
Part-time	-0.324	0.046	0.000	-0.413	-0.235
Full-time	-0.550	0.043	0.000	-0.634	-0.467
Ethnicity (ref = Other)					
White	0.268	0.218	0.218	-0.159	0.694
Mixed	0.168	0.268	0.533	-0.359	0.694
Asian	0.490	0.227	0.031	0.045	0.935
Black	-0.235	0.241	0.329	-0.708	0.237
Intercept	-5.179	0.262	0.000	-5.694	-4.665
LAD-level variance	0.199	0.032		0.146	0.272

Individual-level time slope variance	0.119	0.004	0.111	0.128
Individual-level variance	8.231	0.236	7.781	8.707
No. of observations: 161,642 **No. of individuals: 30,454**				
No. of LAD: 308				

Note: Pooled sample (LCI, lower confidence interval; UCI, upper confidence interval).

Table S. 6 Predicted probabilities for informal caregiving by cohort and sex above the poverty line.

Variable	Odds-Ratio	P-value	LCI	UCI
Male*1989–2006	0.068***	0.000	0.060	0.075
Male*1979–1988	0.105***	0.000	0.096	0.114
Male*1969–1978	0.151***	0.000	0.140	0.161
Male*1959–1968	0.218***	0.000	0.206	0.230
Male*1949–1958	0.269***	0.000	0.254	0.284
Male*1939–1948	0.250***	0.000	0.233	0.268
Male*1908–1938	0.254***	0.000	0.228	0.280
Female*1989–2006	0.079***	0.000	0.072	0.087
Female*1979–1988	0.129***	0.000	0.121	0.138
Female*1969–1978	0.190***	0.000	0.180	0.200
Female*1959–1968	0.286***	0.000	0.275	0.298
Female*1949–1958	0.341***	0.000	0.327	0.356
Female*1939–1948	0.308***	0.000	0.290	0.327
Female*1908–1938	0.358***	0.000	0.327	0.390

Note: Pooled sample, adjusted for control variables (PP, predicted probability; LCI, lower confidence interval; UCI, upper confidence interval). Weighted values.

Table S. 7 Mixed effects logistic regression for informal caregiving – below the poverty line (underlying model for Figure 3b).

Variable	Coefficient	Std. Error	P-Value	LCI	UCI
Female	0.499	0.231	0.031	0.046	0.952
Cohort (ref = 1989–2006)					
1979–1988	0.842	0.281	0.003	0.292	1.391
1969–1978	2.199	0.283	0.000	1.645	2.754
1959–1968	2.628	0.283	0.000	2.073	3.183
1949–1958	3.323	0.315	0.000	2.706	3.941
1939–1948	3.155	0.344	0.000	2.481	3.828
1908–1938	2.833	0.399	0.000	2.051	3.616
Time	0.066	0.050	0.193	-0.033	0.165
Cohort × Time (ref = 1989–2006)					
1979–1988	0.102	0.047	0.030	0.010	0.194
1969–1978	0.059	0.045	0.189	-0.029	0.147
1959–1968	0.129	0.046	0.005	0.039	0.219
1949–1958	0.063	0.052	0.224	-0.038	0.164
1939–1948	-0.005	0.060	0.930	-0.122	0.112
1908–1938	0.058	0.077	0.454	-0.094	0.209
Female × Time	0.025	0.026	0.334	-0.026	0.076
Cohort × Female (ref = 1989–2006)					
1979–1988	-0.125	0.307	0.684	-0.727	0.477
1969–1978	-0.690	0.296	0.020	-1.271	-0.109
1959–1968	-0.351	0.294	0.233	-0.928	0.225
1949–1958	-0.023	0.329	0.943	-0.668	0.621
1939–1948	0.052	0.391	0.895	-0.714	0.818
1908–1938	0.346	0.485	0.475	-0.604	1.296
Time × Time	-0.019	0.003	0.000	-0.025	-0.012

Education (ref = Advanced)					
Low education	0.515	0.118	0.000	0.283	0.746
Intermediate education	0.497	0.126	0.000	0.251	0.744
Disability	0.495	0.075	0.000	0.347	0.642
Married	-1.383	0.098	0.000	-1.574	-1.192
Employed (ref=Unemployed)					
Part-time	-0.312	0.099	0.002	-0.506	-0.119
Full-time	-0.991	0.107	0.000	-1.200	-0.782
Ethnicity (ref = Other)					
White	1.055	0.332	0.001	0.404	1.705
Mixed	0.731	0.415	0.078	-0.082	1.544
Asian	0.951	0.340	0.005	0.284	1.617
Black	0.316	0.363	0.383	-0.395	1.027
Intercept	-5.542	0.419	0.000	-6.363	-4.722
LAD-level variance	0.249	0.069		0.144	0.429
Individual-level time slope variance	0.099	0.016		0.073	0.135
Individual-level variance	8.468	0.617		7.341	9.768
No. of observations: 24,028 **No. of individuals: 10,962**					
No. of LAD: 308					

Note Pooled sample (LCI, lower confidence interval; UCI, upper confidence interval).

Table S. 8 Predicted probabilities for informal caregiving by cohort and sex below the poverty line.

Variable	Odds-Ratio	P value	LCI	UCI
Male*1989–2006	0.083	0.000	0.069	0.098
Male*1979–1988	0.143	0.000	0.122	0.165
Male*1969–1978	0.225	0.000	0.199	0.250
Male*1959–1968	0.281	0.000	0.254	0.309
Male*1949–1958	0.322	0.000	0.286	0.357
Male*1939–1948	0.284	0.000	0.243	0.325
Male*1908–1938	0.276	0.000	0.224	0.329
Female*1989–2006	0.110	0.000	0.094	0.125
Female*1979–1988	0.173	0.000	0.155	0.190
Female*1969–1978	0.217	0.000	0.199	0.236
Female*1959–1968	0.303	0.000	0.280	0.325
Female*1949–1958	0.376	0.000	0.344	0.408
Female*1939–1948	0.343	0.000	0.298	0.388
Female*1908–1938	0.362	0.000	0.298	0.426

Note: Pooled sample, adjusted for control variables (PP, predicted probability; LCI, lower confidence interval; UCI, upper confidence interval). Weighted values.

Table S. 9 Mixed effects logistic regression for informal caregiving – not deprived area (underlying model for Figure 4a). Pooled

Variable	Coefficient	Std. Error	P-Value	LCI	UCI
Female	0.240	0.223	0.282	-0.197	0.677
Cohort (ref=1989–2006)					
1979–1988	0.915	0.254	0.000	0.417	1.412
1969–1978	1.964	0.244	0.000	1.486	2.441
1959–1968	2.933	0.235	0.000	2.473	3.393
1949–1958	4.060	0.240	0.000	3.589	4.531
1939–1948	4.060	0.247	0.000	3.575	4.544
1908–1938	3.585	0.283	0.000	3.030	4.141
Time	0.047	0.033	0.154	-0.017	0.110
Cohort*Time (ref=1989–2006)					
1979–1988	0.030	0.033	0.372	-0.036	0.096
1969–1978	0.066	0.031	0.035	0.005	0.128
1959–1968	0.094	0.030	0.002	0.034	0.154
1949–1958	0.013	0.032	0.684	-0.049	0.075
1939–1948	-0.035	0.033	0.296	-0.100	0.030
1908–1938	0.104	0.042	0.013	0.022	0.185
Female*Time	0.069	0.013	0.000	0.043	0.096
Cohort*Female (ref=1989–2006)					
1979–1988	0.057	0.284	0.841	-0.500	0.613
1969–1978	-0.009	0.266	0.973	-0.530	0.512
1959–1968	0.296	0.255	0.246	-0.204	0.796

1949–1958	0.296	0.263	0.261	-0.220	0.812
1939–1948	0.234	0.279	0.403	-0.314	0.782
1908–1938	0.818	0.341	0.016	0.151	1.486
Time x Time	-0.019	0.001	0.000	-0.022	-0.016
Education (ref=Advanced)					
Low Education	0.559	0.076	0.000	0.409	0.709
Intermediate Education	0.195	0.080	0.014	0.039	0.351
Disability	0.291	0.038	0.000	0.217	0.365
Married	-1.397	0.069	0.000	-1.533	-1.261
Employed (ref=Unemployed)					
Part-time employed	-0.238	0.058	0.000	-0.352	-0.123
Full-time employed	-0.473	0.056	0.000	-0.582	-0.364
Ethnicity (ref=Other)					
White	0.356	0.315	0.258	-0.261	0.973
Mixed	0.389	0.401	0.333	-0.398	1.175
Asian	0.251	0.338	0.457	-0.411	0.914
Black	-0.471	0.377	0.211	-1.209	0.268
Intercept	-5.473	0.377	0.000	-6.213	-4.734
LAD-level variance	0.120	0.033		0.070	0.206
Individual-level time slope variance	0.125	0.006		0.114	0.138
Individual-level variance	8.442	0.314		7.849	9.080
No. of observations: 94,511					
No. of individuals: 16,449					
No. of LAD: 193					

Note: Pooled sample (LCI, lower confidence interval; UCI, upper confidence interval).

Table S. 10 Predicted probabilities for informal caregiving by cohort and sex – not deprived area.

Variable	Odds-Ratio	P-value	LCI	UCI
Male*1989-2006	0.052	0.000	0.043	0.060
Male*1979-1988	0.085	0.000	0.074	0.096
Male*1969-1978	0.142	0.000	0.128	0.156
Male*1959-1968	0.213	0.000	0.197	0.229
Male*1049-1958	0.270	0.000	0.251	0.289
Male*1939-1948	0.251	0.000	0.230	0.273
Male*1908-1938	0.267	0.000	0.236	0.298
Female*1989-2006	0.069	0.000	0.059	0.079
Female*1979-1988	0.112	0.000	0.101	0.123
Female*1969-1978	0.177	0.000	0.164	0.190

Female*1959-1968	0.281	0.000	0.267	0.295
Female*1949-1958	0.344	0.000	0.326	0.363
Female*1939-1948	0.319	0.000	0.296	0.341
Female*1908-1938	0.388	0.000	0.350	0.427

Note: Pooled sample, adjusted for control variables (PP, predicted probability; LCI, lower confidence interval; UCI, upper confidence interval). Weighted values.

Table S. 11 Mixed effects logistic regression for informal caregiving – deprived area (underlying model for Figure 4b).

Variable	Coefficient	Std. Error	P-Value	LCI	UCI
Female	0.107	0.175	0.540	-0.235	0.449
Cohort (ref=1989–2006)					
1979–1988	0.706	0.191	0.000	0.332	1.079
1969–1978	1.434	0.194	0.000	1.055	1.814
1959–1968	2.319	0.191	0.000	1.944	2.694
1949–1958	3.110	0.208	0.000	2.702	3.519

1939–1948	2.986	0.228	0.000	2.540	3.433
1908–1938	1.961	0.307	0.000	1.358	2.564
Time	0.085	0.027	0.002	0.032	0.137
Cohort*Time (ref=1989–2006)					
1979–1988	0.024	0.025	0.336	-0.025	0.074
1969–1978	0.034	0.025	0.164	-0.014	0.083
1959–1968	0.035	0.024	0.155	-0.013	0.083
1949–1958	-0.022	0.026	0.416	-0.073	0.030
1939–1948	-0.046	0.030	0.128	-0.105	0.013
1908–1938	0.146	0.046	0.001	0.057	0.236
Female*Time	0.036	0.013	0.006	0.010	0.062
Cohort*Female (ref=1989–2006)					
1979–1988	0.107	0.218	0.623	-0.319	0.533
1969–1978	0.213	0.216	0.322	-0.209	0.636
1959–1968	0.411	0.214	0.055	-0.008	0.830
1949–1958	0.501	0.235	0.033	0.040	0.961
1939–1948	0.329	0.271	0.224	-0.202	0.861
1908–1938	0.633	0.386	0.101	-0.124	1.390
Time x Time	-0.017	0.001	0.000	-0.020	-0.014
Education (ref=Advanced)					
Low Education	0.627	0.074	0.000	0.482	0.773
Intermediate Education	0.520	0.076	0.000	0.371	0.669
Disability	0.348	0.039	0.000	0.272	0.424
Married	-0.988	0.060	0.000	-1.106	-0.871
Employed (ref=Unemployed)					
Part-time employed	-0.279	0.057	0.000	-0.390	-0.168
Full-time employed	-0.543	0.052	0.000	-0.646	-0.441
Ethnicity (ref=Other)					
White	0.468	0.249	0.061	-0.021	0.956
Mixed	0.345	0.304	0.256	-0.250	0.941
Asian	0.621	0.256	0.015	0.120	1.122
Black	0.051	0.268	0.849	-0.474	0.576
Intercept	-5.060	0.300	0.000	-5.648	-4.472
LAD-level variance	0.202	0.044		0.133	0.308
Individual-level time slope variance	0.116	0.006		0.105	0.128
Individual-level variance	8.050	0.297		7.488	8.654
No. of observations: 91,310					
No. of individuals: 16,436					
No. of LAD: 131					

Note: Pooled sample (LCI, lower confidence interval; UCI, upper confidence interval).

Table S. 12 Predicted probabilities for informal caregiving by cohort and sex- deprived area.

Variable	Odds-Ratio	P-value	LCI	UCI
Male*1989–2006	0.090	0.000	0.079	0.101

Male*1979–1988	0.128	0.000	0.116	0.141
Male*1969–1978	0.175	0.000	0.160	0.190
Male*1959–1968	0.239	0.000	0.221	0.256
Male*1949–1958	0.281	0.000	0.259	0.304
Male*1939–1948	0.261	0.000	0.235	0.288
Male*1908–1938	0.254	0.000	0.213	0.294
Female*1989–2006	0.102	0.000	0.091	0.113
Female*1979–1988	0.151	0.000	0.139	0.163
Female*1969–1978	0.209	0.000	0.195	0.223
Female*1959–1968	0.295	0.000	0.279	0.312
Female*1949–1958	0.351	0.000	0.329	0.372
Female*1939–1948	0.313	0.000	0.285	0.342
Female*1908–1938	0.331	0.000	0.283	0.379

Note: Pooled sample, adjusted for control variables (PP, predicted probability; LCI, lower confidence interval; UCI, upper confidence interval). Weighted values.

Table S. 13 Multilevel Analysis of Individual Heterogeneity and Discriminatory Accuracy (Wave 1)

Variable	Category	Model 1	Model 2	Model 3
Intercept		0.23***	0.15***	0.11***
Sex	Female (Ref)	-	-	-
	Male	-	0.74***	0.77***
Cohort (5-year groups)	1989-2006 (Ref)	-	-	-
	1979-1988	-	1.01	1.50***
	1969-1978	-	1.35***	2.66***
	1959-1968	-	2.21***	4.39***
	1949-1958	-	3.32***	6.75***
	1939-1948	-	3.13***	6.01***
	1908-1938	-	3.17***	5.22***
Poverty Status	In Poverty (Ref)	-	-	-
	Not in Poverty	-	0.89**	0.99
Deprivation Status	Deprived (Ref)	-	-	-
	Not Deprived	-	0.91*	0.86***
Marital Status	Married (Ref)	-	-	-
	Single	-	-	2.01***
Employment Status	Unemployed (Ref)	-	-	-
	Part-time	-	-	0.86**
	Full-time			0.72***
Ethnicity	White (Ref)	-	-	-
	Mixed	-	-	0.88
	Asian	-	-	1.02
	Black	-	-	0.58***
	Other	-	-	0.52***
Disability Status	Yes (Ref)	-	-	-
	No	-	-	0.70***
Education Level	Low Education (Ref)	-	-	-
	Intermediate Education	-	-	0.89**
	Advanced Education	-	-	0.75***

N. observation:	34,555	34,555	25,774
N. of groups: 56			

Note: MLE estimation is used for all models shown. Wave 1.

Table S. 14 Multilevel Analysis of Individual Heterogeneity and Discriminatory Accuracy (Wave 12)

Variable	**Category**	**Model 1**	**Model 2**	**Model 3**
Intercept		0.23***	0.15***	0.11***
Sex	Female (Ref)	-	-	-
	Male	-	0.64***	0.70***
Cohort (5-year groups)	1989-2006 (Ref)	-	-	-
	1979-1988	-	1.49***	2.81***
	1969-1978	-	2.27***	4.21***
	1959-1968	-	3.55***	6.41***
	1949-1958	-	3.42***	5.24***
	1939-1948	-	2.71***	3.57***
	1908-1938	-	3.53***	4.15***
Poverty Status	In Poverty (Ref)	-	-	-
	Not in Poverty	-	0.81**	0.94
Deprivation Status	Deprived (Ref)	-	-	-
	Not Deprived	-	0.89**	0.89**
Marital Status	Married (Ref)	-	-	-
	Single	-	-	2.30***
Employment Status	Unemployed (Ref)	-	-	-

	Part-time	-	-	0.93
	Full-time			0.68***
Ethnicity	White (Ref)	-	-	-
	Mixed	-	-	0.85
	Asian	-	-	0.88
	Black	-	-	0.82
	Other	-	-	0.81
Disability Status	Yes (Ref)	-	-	-
	No	-	-	0.71***
Education Level	Low Education (Ref)	-	-	-
	Intermediate Education	-	-	1.05
	Advanced Education	-	-	0.90
N. observation:		19,115	19,115	13,670
N. of groups: 56				

Note: MLE estimation is used for all models shown. Wave 12.

Table S. 15 Multilevel Analysis of Individual Heterogeneity and Discriminatory Accuracy: Variance Decomposition (Wave 12).

	Model 1	**95% CI**	**Model 2**	**95% CI**	**Model 3**	**95% CI**
Random Effect: Variances						
Stratum-Level	0.25	[0.16, 0.40]	0.001	[0.00, 0.06]	0.000	-
Summary Statistics						
Variance Partition Coefficient (VPC)	7.1%		0.08%		0.02%	

Proportional Change in Variance (PCV)		98.9%	99.8%
Area Under Receiver Operating Characteristic Curve (AUC)	0.64	0.64	0.69

Table S. 16 Multilevel Analysis of Individual Heterogeneity and Discriminatory Accuracy (Wave 5).

Variable	Category	Model 1	Model 2	Model 3
Intercept		0.27***	0.18***	0.09***
Sex	Female (Ref)	-	-	-

	Male	-	0.74***	0.82***
Cohort (5-year groups)	1989-2006 (Ref)	-	-	-
	1979-1988	-	1.25**	2.13***
	1969-1978	-	1.48***	3.06***
	1959-1968	-	2.50***	5.18***
	1949-1958	-	3.56***	7.05***
	1939-1948	-	3.02***	4.66***
	1908-1938	-	3.63***	5.02***
Poverty Status	In Poverty (Ref)	-	-	-
	Not in Poverty	-	0.82**	1.01
Deprivation Status	Deprived (Ref)	-	-	-
	Not Deprived	-	0.87*	0.87**
Marital Status	Married (Ref)	-	-	-
	Single	-	-	2.02***
Employment Status	Unemployed (Ref)	-	-	-
	Part-time	-	-	0.90
	Full-time			0.64***
Ethnicity	White (Ref)	-	-	-
	Mixed	-	-	0.95
	Asian	-	-	1.22**
	Black	-	-	0.68***
	Other	-	-	0.80
Disability Status	Yes (Ref)	-	-	-
	No	-	-	0.73***
Education Level	Low Education (Ref)	-	-	-
	Intermediate Education	-	-	0.96
	Advanced Education	-	-	0.78***
N. observation:		27,511	34,555	19,168
N. of groups: 56				

Note: MLE estimation is used for all models shown. Wave 5.

Table S. 17 Multilevel Analysis of Individual Heterogeneity and Discriminatory Accuracy: Variance Decomposition. Wave 5

	Model 1	95% CI	Model 2	95% CI	Model 3	95% CI
Random Effect: Variances						
Stratum-Level	0.26	[0.18, 0.40]	0.005	[0.00, 0.02]	0.00	[0.00, 0.03]
Summary Statistics						
Variance Partition Coefficient (VPC)	7.5%		0.1%		0.1%	
Proportional Change in Variance (PCV)			98.3%		98.1%	
Area Under Receiver Operating Characteristic Curve (AUC)	0.64		0.64		0.68	

Table S. 18 Characteristics of included and excluded samples

	Included	Excluded	Difference	p-value
Age	48.678	45.348	3.330	0.000
Women	0.556	0.507	0.049	0.000
Provision of care	0.215	0.131	0.084	0.000
Ethnicity				
White	0.817	0.708	**0.109**	0.000
Black	0.041	0.078	-0.037	0.000
Asian	0.113	0.169	-0.056	0.000
Mixed	0.018	0.030	-0.012	0.000
Other	0.011	0.015	-0.004	0.000
Have long-term illness	0.340	0.344	-0.004	0.019
Married	0.773	0.334	**0.439**	0.000
Employment				
Unemployed	0.414	0.601	**-0.187**	0.000
Part-time	0.152	0.081	**0.071**	0.000
Full-time	0.434	0.318	**0.116**	0.000
Education				
Lower level	0.375	0.400	-0.025	0.000
Intermediate level	0.273	0.303	-0.029	0.000
Advanced level	0.352	0.298	0.055	0.000
Cohorts				
Cohort 1989-2006	0.085	0.249	**-0.164**	0.000
Cohort 1979-1988	0.144	0.151	-0.007	0.000
Cohort 1969-1978	0.198	0.125	0.074	0.000
Cohort 1959-1968	0.208	0.131	0.077	0.000
Cohort 1949-1958	0.164	0.117	0.047	0.000
Cohort 1939-1948	0.135	0.110	0.025	0.000
Cohort 1908-1938	0.065	0.117	-0.052	0.000

Note: To compare the characteristics of included (1) and excluded(2) sample, t-tests were conducted with the p-values and reported in the last column. Source: UKHLS data, 2009- 20230, England.

Table S. 19 Characteristics of included and excluded samples – Individuals at their first observed wave

	Included	Excluded	Difference	p-value
Age	43.511	38.904	4.606	0.000
Women	0.553	0.492	0.061	0.000
Provision of care	0.192	0.138	0.055	0.000
Ethnicity				
White	0.789	0.664	0.125	0.000
Black	0.051	0.091	-0.039	0.000
Asian	0.125	0.196	-0.070	0.000
Mixed	0.019	0.031	-0.012	0.000
Other	0.015	0.018	-0.004	0.000
Have long-term illness	0.324	0.276	0.048	0.000
Married	0.713	0.420	0.293	0.000
Employment				
Unemployed	0.443	0.610	-0.167	0.000
Part-time	0.142	0.082	0.060	0.000
Full-time	0.415	0.308	0.107	0.000
Education				
Lower level	0.432	0.459	-0.026	0.000
Intermediate level	0.275	0.260	0.015	0.000
Advanced level	0.293	0.281	0.012	0.005
Cohorts				
Cohort 1989-2006	0.109	0.282	-0.173	0.000
Cohort 1979-1988	0.156	0.196	-0.039	0.000
Cohort 1969-1978	0.191	0.141	0.049	0.000
Cohort 1959-1968	0.193	0.124	0.069	0.000
Cohort 1949-1958	0.148	0.091	0.057	0.000
Cohort 1939-1948	0.124	0.074	0.050	0.000
Cohort 1908-1938	0.078	0.091	-0.013	0.000

Note: To compare the characteristics of included (1) and excluded(2) sample, t-tests were conducted with the p-values and reported in the last column. Source: UKHLS data, 2009- 20230, England.

Table S. 20 Mixed effects logistic regression for informal caregiving (triple interaction model).

Variable	Coefficient	Std. Error	P-value	LCI	UCI
Female	0.104	0.148	0.483	-0.187	0.395
Cohort (ref = 1989–2006)					
1979–1988	0.827	0.163	0.000	0.507	1.147
1969–1978	1.635	0.161	0.000	1.319	1.950
1959–1968	2.572	0.157	0.000	2.264	2.879
1949–1958	3.563	0.164	0.000	3.242	3.884
1939–1948	3.501	0.172	0.000	3.164	3.839
1908–1938	2.821	0.211	0.000	2.407	3.234
Time	0.068	0.021	0.001	0.027	0.108
Poor	-0.079	0.148	0.592	-0.369	0.211
Cohort × Time (ref = 1989–2006)					
1979–1988	0.025	0.021	0.235	-0.016	0.065
1969–1978	0.046	0.020	0.021	0.007	0.084
1959–1968	0.062	0.019	0.001	0.024	0.100
1949–1958	-0.008	0.020	0.699	-0.048	0.032
1939–1948	-0.045	0.022	0.041	-0.088	-0.002
1908–1938	0.108	0.030	0.000	0.050	0.167
Female × Time	0.052	0.010	0.000	0.034	0.071
Cohort × Female (ref = 1989–2006)					
1979–1988	0.123	0.185	0.506	-0.239	0.484

1969–1978	0.195	0.178	0.274	-0.154	0.545
1959–1968	0.463	0.173	0.008	0.123	0.803
1949–1958	0.473	0.183	0.010	0.115	0.832
1939–1948	0.368	0.200	0.066	-0.024	0.760
1908–1938	0.949	0.261	0.000	0.439	1.460
Female × Poor	0.155	0.192	0.419	-0.221	0.531
Cohort × Poor (ref = 1989–2006)					
1979–1988	-0.105	0.209	0.616	-0.514	0.304
1969–1978	0.076	0.192	0.693	-0.301	0.452
1959–1968	0.058	0.189	0.759	-0.312	0.428
1949–1958	0.040	0.198	0.840	-0.349	0.429
1939–1948	0.091	0.223	0.685	-0.347	0.528
1908–1938	0.051	0.266	0.847	-0.470	0.573
Female × Cohort × Poor					
Female × 1979–1988 x Poor	-0.049	0.260	0.849	-0.558	0.459
Female × 1969–1978 x Poor	-0.304	0.244	0.212	-0.781	0.174
Female × 1959–1968 x Poor	-0.320	0.240	0.183	-0.790	0.151
Female × 1949–1958 x Poor	-0.260	0.258	0.313	-0.767	0.246
Female × 1939–1948 x Poor	-0.370	0.307	0.229	-0.972	0.233
Female × 1908–1938 x Poor	-0.449	0.386	0.246	-1.206	0.309
Time × Time	-0.018	0.001	0.000	-0.020	-0.016
Education (ref = Advanced)					
Low education	0.607	0.054	0.000	0.502	0.712
Intermediate education	0.376	0.055	0.000	0.268	0.485
Disability	0.315	0.027	0.000	0.262	0.368
Married	-1.185	0.046	0.000	-1.274	-1.095
Employment (ref = Unemployed)					
Part-time	-0.281	0.041	0.000	-0.361	-0.200
Full-time	-0.536	0.039	0.000	-0.612	-0.460
Ethnicity (ref = Other)					
White	0.364	0.196	0.064	-0.021	0.749
Mixed	0.303	0.244	0.215	-0.175	0.781
Asian	0.528	0.204	0.010	0.128	0.929
Black	-0.130	0.218	0.522	-0.556	0.297
Intercept	-5.191	0.240	0.000	-5.662	-4.720
LAD-level variance	0.184	0.029		0.136	0.250
Individual-level time slope variance	0.122	0.004		0.114	0.131
Individual-level variance	8.275	0.217		7.860	8.711
No observation: 185,670					
No individuals: 32,232					
No LAD: 308					

Table S. 21 Predicted probabilities for informal caregiving by cohort, sex, and poverty status – (triple interaction model)

Variable	PP	P-Value	LCI	UCI
Male*1989-2006*Not poor	0.071	0.000	0.064	0.079
Male*1989-2006*Poor	0.069	0.000	0.059	0.079
Male*1979-1988*Not poor	0.108	0.000	0.100	0.117
Male*1979-1988*Poor	0.100	0.000	0.087	0.113
Male*1969-1978*Not poor	0.157	0.000	0.146	0.167
Male*1969-1978*Poor	0.156	0.000	0.141	0.172
Male*1959-1968*Not poor	0.226	0.000	0.214	0.238
Male*1959-1968*Poor	0.224	0.000	0.205	0.243

Male*1949-1958*Not poor	0.278	0.000	0.263	0.293
Male*1949-1958*Poor	0.274	0.000	0.250	0.298
Male*1939-1948*Not poor	0.258	0.000	0.241	0.275
Male*1939-1948*Poor	0.259	0.000	0.230	0.288
Male*1908-1938*Not poor	0.263	0.000	0.237	0.288
Male*1908-1938*Poor	0.260	0.000	0.222	0.299
Female*1989-2006*Not poor	0.084	0.000	0.077	0.092
Female*1989-2006*Poor	0.087	0.000	0.077	0.097
Female*1979-1988*Not poor	0.132	0.000	0.124	0.141
Female*1979-1988*Poor	0.128	0.000	0.117	0.140
Female*1969-1978*Not poor	0.193	0.000	0.183	0.202
Female*1969-1978*Poor	0.182	0.000	0.169	0.196
Female*1959-1968*Not poor	0.291	0.000	0.280	0.303
Female*1959-1968*Poor	0.276	0.000	0.260	0.292
Female*1949-1958*Not poor	0.350	0.000	0.335	0.364
Female*1949-1958*Poor	0.337	0.000	0.314	0.359
Female*1939-1948*Not poor	0.319	0.000	0.301	0.337
Female*1939-1948*Poor	0.301	0.000	0.269	0.333
Female*1908-1938*Not poor	0.376	0.000	0.345	0.408
Female*1908-1938*Poor	0.347	0.000	0.298	0.396

Note: Pooled sample, adjusted for control variables (PP, predicted probability; LCI, lower confidence interval; UCI, upper confidence interval). Weighted values.

Table S. 22 Cohort-specific average marginal effects for women and men in informal caregiving provision (triple interaction model)

	Below the Poverty line	Above the Poverty line
Gender difference in the probability of providing care for each cohort		
Cohort 1989-2006	0.018**	0.013**
Cohort 1979-1988	0.028**	0.024***
Cohort 1969-1978	0.026**	0.036***
Cohort 1959-1968	0.052***	0.066***
Cohort 1949-1958	0.062***	0.072***
Cohort 1939-1948	0.042*	0.061***
Cohort 1908-1938	0.086**	0.114***
Gender difference in the probability of providing care between consecutive cohorts		
1979-1988 vs 1989-2006	0.006	0.012
1969-1978 vs 1979-1988	0.002	0.015
1959-1968 vs 1969-1978	0.028	0.028**
1949-1958 vs 1959-1968	0.010	0.007
1939-1948 vs 1949-1958	-0.017	-0.018
1908-1938 vs 1939-1948	0.045	0.055*