

The Gendered Impacts of Partnership and Parenthood on Paid Work and Unpaid Work Time in Great Britain, 1992–2019

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Using data from the British Household Panel Study and the UK Household Longitudinal Study (1992–2019), this study investigates the impacts of partnership and parenthood on women's and men's paid work and unpaid work time and how these impacts have changed in the last three decades in Great Britain. We applied two fixed-effect models—one conventional, one novel—with individual constants and slopes to account for the selection and longitudinal changes in time use. We found that the gender-traditionalizing effect of partnership on the use of time has weakened over the years. Marriage did not affect women's and men's paid work time, and since the 2010s, marriage no longer affect women's and men's time spent on housework differently. However, motherhood continues to reduce women's paid work time substantially, and the extent of this impact has remained unchanged over the previous three decades. Partnership and parenthood have resulted in minor changes to men's paid work and unpaid work time; the extent of their effects has likewise remained modest over the previous three decades. Our findings suggest that in Britain, the gender revolution of the division of labor among parents has stalled, and family policies have not successfully increased mothers' paid work time and fathers' unpaid work time.

Introduction

Since the publication of Paula England's seminal paper, "The Gender Revolution: Uneven and Stalled" (2010), a plethora of research has aimed to measure the progress of gender equality in the public and private spheres (e.g., Cotter, Hermsen, and Vanneman 2011; Kan et al. 2022; Pailhé, Solaz, and Stanfors 2021). These studies reported that gender gaps in educational

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attainments, labor force participation, and income had narrowed between the 1990s and the 2010s. However, since the 2010s, the closure of the gaps has slowed down or has even stalled, and women still shoulder the lion's share of domestic work (McDonald 2000; Sullivan, Gershuny, and Robinson 2018). Goldscheider, Bernhardt, and Lappegård (2015) argue that the gender revolution will occur in two phases: in the first phase, women increase their participation in the labor market and reduce their housework time; in the second phase, men will increase their participation in domestic work when more egalitarian gender values prevail.

The gender revolution and the changing gendered division of labor

Foundational to the theoretical background of this study, Goldscheider, Bernhardt, and Lappegård (2015) have proposed the gender revolution framework, which contends that gender relations will become more equal over time and that a gender-egalitarian division of labor will be achieved through two phases. During the first, women will increase their paid work time and decrease their domestic work time following the expansion of educational and employment opportunities. During the second phase, gender-egalitarian values are commonly accepted while gender-equal and dual-earner families dominate; hence, men increase their participation in domestic work. When the gender revolution enters the second phase, as in the case of Nordic countries, gender relations move to an egalitarian equilibrium (Kan and Kolpashnikova 2021), and the society's fertility level will increase (Esping-Andersen and Billari 2015; Rindfuss, Choe, and Brauner-Otto 2016).

In support of this framework, since the 1950s, gender roles in industrialized countries have been converging. More women have received higher education and engaged in paid work than in the past, the number of male-breadwinner families has been decreasing and dual-earner families have been increasing (Blossfeld and Drobnic 2001). Fertility rates have been on the decline, and gender-egalitarian attitudes have become increasingly common (Barnett 2008). Between the 1980s and the 2000s, the gender gap in domestic work time decreased. Although the reduction in the gender gap was primarily due to a reduction in women's time spent in domestic work and an increase in paid work hours, men also spent more time in housework and childcare (Altintas and Sullivan 2016; Kan, Sullivan, and Gershuny 2011; Pailhé, Solaz, and Stanfors 2021).

Nevertheless, feminist scholars suggest that the gender revolution in the division of labor has been unbalanced or has even stalled (England 2010; Hochschild and Machung 1989). The latest research on time use has shown that in several industrialized countries, including the United Kingdom, gender gaps in domestic work and paid work time ceased to narrow in the 2010s

(Kan et al. 2022). In other words, women have increased their paid work hours and reduced housework, but such changes have slowed, and the increase in men's housework has remained modest. Another evidence of the stalled gender revolution is that since 2010—even in the Nordic countries, which have long been characterized by a high degree of gender equality and relatively stable and high birth rates—fewer families have had children (Hellstrand et al. 2021). Moreover, in the United States, the wage penalty for motherhood remained persistent and even worsened from 1986 to 2014 (Jee, Misra, and Murray-Close 2019). According to the literature, housework and childrearing are key factors contributing to the gender wage gap (Aassve et al. 2006; Kahn, García-Manglano, and Bianchi 2014; Miller 2011; Muller, Hiekel, and Liefbroer 2020). Marriage and parenthood are critical factors to reinforce a gendered division of labor and maintain this wage gap.

As summarized above, there remains a debate about whether the gender revolution has stalled or has progressed to the second phase. The literature to date has largely focused on gender differences in earned income or time use (Bianchi et al. 2000; Hook 2006; Kan et al. 2022; Sayer 2016), but rarely examines how the root of gender inequality—family formation—may have evolved over the years. Marriage and parenthood are two major life course events that reinforce a gendered division of labor (Goldin 2006). By focusing on these two life course events in this study, we investigate the progress of the gender revolution in the division of labor in Great Britain. We seek to answer the following questions: How do transitions into marriage and parenthood affect women's and men's paid and unpaid work time? Have these effects changed over the last three decades? To answer these questions, we harmonize longitudinal data from the British Household Panel Survey (BHPS) and the UK Household Longitudinal Study (UKHLS) from 1992 to 2019.

We improve upon previous studies in three main ways. First, we draw upon longitudinal data from the 1990s to the 2010s to estimate the periodic change in the effect of marriage and parenthood on time use. Previous research on the periodic changes in the time-use gender gap was mainly based on cross-sectional data and was thus unable to test the effects of marriage and parenthood on time use or how these effects change over time (Bianchi et al. 2000; Hook 2006; Kan et al. 2022; Sayer 2016). In the last three decades, family policies in the United Kingdom have changed substantially—from providing parents with generous maternity leave but expensive private childcare services to encouraging partners to share parental leave and offering them childcare subsidies. Our findings help elucidate the effectiveness of these policies in reducing gender inequalities in time use. Second, we employ two types of fixed-effects models to provide a robust estimation of the causal relationship between partnership, parenthood, and time use. Our findings are from two fixed-effects models—one conventional and one novel—that account for the selection into marriage

and parenthood according to time use level and time-use trajectories. Third, by analyzing a lengthy period of household panel survey data, we examine more than the immediate impacts of partnership and the birth of a child on time use, as we also consider the seven years since these life course events.

In the following, we examine the social and political context in the United Kingdom, its relevance with theories, and present hypotheses. Subsequently, we discuss the study's data, methods, results, and conclusions.

Social contexts and family policies in the United Kingdom

Since the early 1990s, progress has occurred in gender equality in the United Kingdom's labor market. The employment rate of men fell from 82 percent in 1989 to 80 percent in 2019, and the employment rate of women rose from 62 percent in 1989 to 72 percent in 2019 (Office for National Statistics 2019b). The gender pay gap based on median hourly earnings narrowed from 27.5 percent in 1997 to 16.3 percent by 2019 (Office for National Statistics 2019a). Gender attitudes have become more egalitarian. For example, the percentage of people who believe that "a man's job is to earn money, a woman's job is to look after home and family" fell by 25 percentage points between 1990 and 2017, although 8 percent of respondents still held this view in 2017 (Taylor and Scott 2018).

Nevertheless, the cost of childcare services has remained prohibitive. In the United Kingdom, family policies position the family and the private market as the primary sources of childcare and support. Maternity leave was generous in the past: new mothers could access a maximum of 52 weeks of leave, of which a maximum of 39 weeks was paid (Waldfoegel 1998). Then, in 2003, paid paternity leave of up to two weeks was introduced, and today, the cost of childcare services in the United Kingdom is among the highest among OECD countries (OECD 2015). In 2018, the average cost of full-time childcare for children under two years old was £122 per week. The UK government's level of financial support for childcare was the lowest among OECD countries. Expensive and inadequate childcare was the most prevalent reason mothers left full-time employment (Chevalier and Viitanen 2002). Before the 2000s, the United Kingdom was considered the "main visible obstacle to the EU's legislative route to gender equality" (Fagan and Rubery 2018). The family policies in the United Kingdom reinforce a gendered division of labor, as many women quit full-time employment after becoming a mother (Zhou 2017). Therefore, we expected to find from our analysis that marriage and parenthood will reduce women's paid work time and increase their housework time and that the impacts on men's time use will be less substantive.

Since 2010, some new measures to promote gender equality in the domestic division of labor have been introduced. The annual free childcare provision was increased from 412 hours in 1998 to 570 hours in

2010, and more recently, it has been extended to all parents of three- and four-year-olds in England and those of two-year-olds from disadvantaged backgrounds (National Audit Office 2016). Since 2015, parental leave can be shared between spouses. These policies may have reduced the gender-traditionalizing impacts of family formation: the change in women's time allocation to paid work and unpaid work following marriage and parenthood should have diminished.

Previous empirical studies about marriage, parenthood, and time use

Impacts of marriage on time use

Generally, research has suggested that marriage reinforces the gender division of labor. Regarding paid work hours, studies based on US longitudinal data have shown that marriage is associated with an increase in paid work hours for both men and women (Astone et al. 2010; Killewald and Gough 2013). A study based on UK longitudinal data from 1994 to 2005 showed that paid work hours increased in the year after marriage for both men and women (Kan and Gershuny 2009).

After marriage, women increase their housework, but men do not (Gupta 1999; Hersch and Stratton 2000; Pollmann-Schult 2011). Specifically, Pollmann-Schult (2011), analyzing panel data from Germany, and Gupta (1999) and Hersch and Stratton (2000), using data from the United States, concluded that marriage increases women's housework time but not men's housework. Having analyzed panel data from the United Kingdom, the United States, and Australia using fixed effects models, Borra, Browning, and Sevilla (2017) found that marriage increases the time spent on housework much more for women than for men.

Impacts of parenthood on time use

Research has unanimously suggested that motherhood dramatically increases women's unpaid work time and, accordingly, reduces their paid work time (Argyrous, Craig, and Rahman 2017; Baxter, Hewitt, and Haynes 2008; Kühhirt 2012; Lu, Wang, and Han 2017). The impact of parenthood on time use is more modest for men (Craig and Mullan 2010; Dermott 2006; Killewald and García-Manglano 2016; Koslowski 2011; Schober 2013). Research employing analyses of longitudinal data has provided evidence on the impacts of parenthood on time use: Baxter, Hewitt, and Haynes (2008) used Australian data; Aassve et al. (2006), Dermott (2006), and Schober (2013) used British data; Lu, Wang, and Han (2017) and Killewald, Gracia-Manglano (2016) used US data; Kühhirt (2012) and Langner (2015) used German data.

Most of the studies above are based on conventional, individual fixed-effects models: they have accounted for the potential selection of individuals with different time-use levels for marriage and parenthood (e.g., Kühhirt 2012; Schober 2013). However, this model assumes no selection of individuals with different time-use trajectories occurs in family formation—an assumption that may be incorrect. Indeed, regarding men's wage growth, several studies have shown that men with a steeper wage growth are more likely to marry (Ludwig and Brüderl 2018; Rüttenauer and Ludwig 2020); moreover, people's experience of unemployment, particularly men's, lowers the likelihood of having children (Alderotti et al. 2021; Vignoli, Drefahl, and De Santis 2012). Drawing insights from these studies, both time-use levels and longitudinal changes in time use are likely associated with the probability of getting married and having children. Hence, conventional fixed-effect models overlook the trajectories of time use and thus overestimate the impacts of marriage and family on people's time use. To address this problem and obtain a more robust assessment of the effects of marriage and parenthood, we thus employ a novel fixed-effects regression model with individual constants and individual slopes (more details are presented in the section *Analytical Strategies*).

Based on the analysis of cross-sectional data, time-use research has provided insights into how the gender gap in time use varies across countries and longitudinally. For example, Neilson and Standfors (2014) compared the gender division of labor according to parenthood status between the 1990s and 2000s in Germany, Italy, and Canada. They found that in Italy, parenthood reinforced the traditional gender division of labor between the 1990s and the 2000s. In comparison, fathers in Germany and Canada began participating more in housework on weekends in the 2000s. Dribe and Standfors (2009) compared how the relationship between parenthood and time use changed between 1990 and 2000 in Sweden and concluded that the traditionalizing effect of parenthood on the gender division of labor was weakened in 2000. Finally, Zhou and Kan (2019) found that in the United Kingdom, the proportion of heterosexual couples making a similar contribution to household income increased from 31 percent to 41 percent between 1991 and 2016, and the gender division of labor among parents has become more egalitarian. However, to our knowledge, no research has yet examined how the causal relationship between family formation and time use has changed over time. The impacts of marriage and parenthood on time use are likely to have changed since the 1990s, as many studies reported that the progress of gender equality in both the public and the private spheres has slowed.

Hypotheses

In light of findings from previous studies on the gendered impacts of marriage and parenthood, we expect to find that

Hypothesis 1. People, especially women, increase their housework time and decrease their paid work time following marriage and parenthood.

As the gender revolution has continued and more gender-friendly family policies have been introduced in the United Kingdom in recent years, the traditionalizing effects of partnership and parenthood should have been declining.

Hypothesis 2. Women's increase in housework time and decrease in paid work time following marriage and parenthood have declined over the last three decades.

Per the gender revolution framework, if the gender revolution has entered the second phase, in which men start to increase their participation in domestic work, we expect to find that

Hypothesis 3a. Men have been spending more time on housework following marriage and parenthood over the last three decades.

However, if the gender revolution has slowed or stalled, as reported in most recent research on gendered time-use trends (Kan et al. 2022), we expect to find that

Hypothesis 3b. Men's change in time use following marriage and parenthood has remained modest over the last three decades.

Data, variables, and methods

Data and sample

We analyzed harmonized data from all 18 waves of *BHPS* and the first 10 waves of the *Understanding Society* (UKHLS) study, cumulatively spanning from 1991 to 2019.¹ The two surveys follow the same sampling design and are longitudinal studies. All adult household members (i.e., 16 years old and above) were interviewed yearly unless they permanently left the panel. Interviews were typically carried out face-to-face in respondents' homes.

For *BHPS*, a nationally representative sample of 5,500 households from Great Britain was recruited in 1991. About 10,000 individual interviews were conducted in the first wave. In 2009 and 2010, a nationally representative sample of over 40,000 households across the United Kingdom was redrawn to constitute the first wave of UKHLS samples. The previous 1991 *BHPS* sample was also included in the second wave of UKHLS. This long-term and consistent data-collection design allows us to compare samples drawn in the early 1990s and early 2010s, allowing us to identify and compare period-specific associations between family formation and time use.

TABLE 1 Sample selection procedures

		Number of individuals	Number of person-waves
	Raw Great Britain sample	94,323	594,394
Step 1	Select surveys collecting housework information	82,274	395,045
Step 2	Select women aged 20 to 45 years and men aged 20 to 50 years	43,916	178,348
Step 3	Remove the sample with missing values	42,862	171,602
Step 4	Remove observations recording partnership dissolution or children leaving home	42,862	142,870
Step 5	Select individuals with repeated observations	27,062	127,070
Step 6	Select individuals observed for at least three times	18,353	109,652

Excluding waves in which no housework information was collected, our observation period spanned from 1992 to 2019.² We excluded the Northern Ireland samples because they were not collected before 2001. Individuals of prime working and childbearing age were selected: women aged 20–45 and men aged 20–50 (43,916 individuals). After excluding observations with missing values in variables, our sample totaled 42,862 individuals with 171,602 person-wave records.

This study focuses on the process of family formation. Therefore, we excluded 28,732 person-waves of 8,045 individuals indicating partnership dissolution or reduction in the number of children, as these transitions are outside the scope of this paper. This restriction did not bias our sample because these individuals remained in the sample (the same 42,862 individuals were included). Rather, only the person-waves recording a marriage dissolution or children moving out of the parental home and person-waves after these events are dropped.

Among these individuals, 63 percent had repeated observations, and 43 percent had three or more person-wave records. Individuals with repeated observations could be used for conventional fixed-effect regressions, and those with three or more person-wave records were selected for the fixed-effects model with individual constants and individual slope regressions to meet the data requirement of this model. Therefore, we restricted our final sample to 18,353 individuals with 109,652 person-wave records (see online Appendix Table A1 for the sample statistics). There is no evidence that our results are biased due to the selection of individuals interviewed in at least three waves.³ Table 1 shows the sample selection procedures.

Variables

Key variables. Paid work hours, the first key variable, was measured by the sum of normal working hours and the overtime hours worked in a typical week. The records of persons not in employment (16.8 percent) had a value of 0. Another key variable was weekly housework hours, collected by asking, "About how many hours do you spend on housework in an average week, such as time spent cooking, cleaning, and doing the laundry?" Responses most likely reflect their time spent on routine housework. Although stylized or questionnaire-based estimates are not as accurate as diary-based estimates of housework time, the panel nature of the surveys allowed us to track changes in housework time and a person's marital and fertility history. Research has also shown that the measurement errors in stylized time-use data are random rather than systematic (Kan 2008; Schulz and Grunow 2012).

To capture the transition into partnership, we refer to the marital status variable, classified as single, cohabiting, or married. Respondents recorded as divorced/separated/widowed in the first wave of the survey are classified as single and comprise 2.6 percent of the single category. Not including these respondents does not change the results.

To capture the transition to parenthood, we refer to the variable measuring the number of respondents' children aged 16 or under in the household. This variable has three categories: zero children (reference), one child, and two or more children.

We aimed to examine how the associations between partnership, parenthood, and time use vary across different phases of the gender revolution. Therefore, we created period dummies, using 1992 to 2000 (the 1990s) as a reference, the second category is 2001 to 2008 (the 2000s), and the third category is 2009 to 2019 (the 2010s). In 1992 and 2009, the two surveys used a nationally representative sample. This classification ensures enough observations in each period, consistency in the data sampling, and follow-up strategies across the two surveys, and a nearly equal number of years in each period.

Control variables. As time spent on paid work and housework has a curvilinear relationship with age, this study's control variables include age and its squared term (Bünning and Pollmann-Schult 2016; Leopold, Skopek, and Schulz 2018). Respondents' health status correlates with their time use and family formation behavior and is thus included. Health status is a 4-point self-rating score for "Excellent" (reference), "Good," "Fair," and "Poor."

Analytical strategies

Using two fixed-effect regression models, we first examined the impacts of partnership and parenthood on time use.

Conventional fixed-effect linear regression. We used fixed-effect (FE) regressions to identify the relationship between time use and family formation. This approach compared the weekly hours spent on paid work and housework by the same individual with different marital or parenthood statuses. This method fully accounted for time-constant individual characteristics that correlated with family status and time use.

The baseline model, represented by Equation (1), relates the weekly hours spent on paid work and housework to individuals with different family statuses:

$$\begin{aligned} Hour_{it} = & \beta_1 Cohabit_{it} + \beta_2 Married_{it} + \gamma_1 OneChild_{it} \\ & + \gamma_2 \geq TwoChild_{it} + \lambda_1 Age_{it} + \lambda_2 Age_{it}^2 \\ & + \lambda_3 GoodHealth_{it} + \lambda_3 FairHealth_{it} + \lambda_3 PoorHealth_{it} \\ & + \delta_3 2000sPeriod_{it} + \delta_3 2010sPeriod_{it} + \vartheta_i + \varepsilon_{it}, \end{aligned} \quad (1)$$

where index it denotes person i at time point t , and $Hour_{it}$ is the weekly working hours or weekly housework hours observed for person i at time point t . $Cohabit_{it}$ and $Married_{it}$ are the marital status dummies for a given person-wave record. $OneChild_{it}$ and $TwoChild_{it}$ represent the number of children in the household. This equation includes period dummies, age and its squared term, and self-reported health conditions. ϑ_i and ε_{it} are the two error terms: ϑ_i represents the person-specific fixed effect, simultaneously capturing the time-invariant characteristics associated with the dependent and independent variables, and ε_{it} is the random variation for each person-wave.

This model exploits within-individual variation by *demeaning* the dependent and independent variables from the person-specific means, thereby deleting ϑ_i . Therefore, the FE model cancels out the selection effect due to the time-constant person-specific characteristics. Note also that this model controls for time-constant heterogeneity. For example, the effect of gender on time use or the difference in time use between women and men is assumed to be the same over time, such that the gender component in ϑ_i can be wholly eliminated by demeaning it.

In addition, this demeaning method reduces the risk of inconsistent ordinary least squares (OLS) estimates resulting from highly skewed dependent variables. Although time spent on paid work and housework does not often have a normal distribution, within-individual changes in these variables do.

Fixed-effects model with individual constants and individual slopes. The conventional FE model requires a “parallel trend” assumption. That is, the trend in time use for individuals in the treatment group (e.g., get married) and in the control group (e.g., stay single) is the same (Goodman-Bacon 2021; Rüttenauer and Ludwig 2023). However, the trajectories of women’s and men’s paid work hours are related to the likelihood that they will marry or have children (Alderotti et al. 2021; Ludwig and Brüderl 2018). To relax this “parallel trend” assumption, we further employ a *detrending* method introduced by Wooldridge, “the fixed-effects model with individual constants and individual slopes” (FEIS) (Wooldridge 2010), later incorporated into Stata by Correia (Correia 2017) (Stata package: *reghdfe*) and Ludwig (Ludwig 2019) (Stata package: *xtfeis*). This model further controls for “heterogeneous slopes in addition to time-constant heterogeneity,” thereby relaxing the parallel slopes assumption (Rüttenauer and Ludwig 2023).

Studies on wage changes associated with fatherhood have used the FEIS model to consider both the selection of wage level and its growth trajectory into fatherhood. This model has provided a more robust estimation of the fatherhood wage premium than earlier work using the conventional fixed effects model (Ludwig and Brüderl 2018; Mari 2019) and challenged the view that marriage enhances men’s labor market performance. Per this literature, we allow the person-specific fixed effect ϑ_i to vary over time by forming a product with age and age square (presented as $\mathbf{W}'_{it} \vartheta_i$ in Equation 2):

$$\begin{aligned}
 Hour_{it} = & \beta_1 Cohabit_{it} + \beta_2 Married_{it} + \gamma_1 OneChild_{it} \\
 & + \gamma_2 \geq TwoChild_{it} + \lambda_1 Age_{it} + \lambda_2 Age_{it}^2 \\
 & + \lambda_3 GoodHealth_{it} + \lambda_3 FairHealth_{it} + \lambda_3 PoorHealth_{it} \\
 & + \delta_3 2000sPeriod_{it} + \delta_3 2010sPeriod_{it} + \mathbf{W}'_{it} \vartheta_i + \varepsilon_{it}.
 \end{aligned}
 \tag{2}$$

By considering both the time-varying effects of person-specific characteristics (heterogeneous slopes) and the time-constant effects of person-specific characteristics (time-constant heterogeneity), we offer less biased and more robust estimations about the impact of marriage and parenthood on time use.

We further analyze the long-term impact of family formation on time use by including partnership duration and age of the youngest child (Equation 3).⁴ Single people’s marital duration is set as zero. For childless people, we set the age of children as zero.

$$\begin{aligned}
 Hour_{it} = & \beta_1 Cohabit_{it} + \beta_2 Married_{it} + \beta_3 MaritalDuration_{it} \\
 & + \beta_4 MaritalDuration_{it}^2 + \gamma_1 OneChild_{it} + \gamma_2 \geq TwoChild_{it} \\
 & + \gamma_3 ChidAge_{it} + \gamma_4 ChildAge_{it}^2 + \lambda_1 Age_{it} + \lambda_2 Age_{it}^2 \\
 & + \lambda_3 GoodHealth_{it} + \lambda_3 FairHealth_{it} + \lambda_3 PoorHealth_{it} \\
 & + \delta_3 2000sPeriod_{it} + \delta_3 2010sPeriod_{it} + \mathbf{W}'_{it} \vartheta_i + \varepsilon_{it}.
 \end{aligned}
 \tag{3}$$

All models do not include variables related to employment, such as whether there are job changes. We believe those changes will likely be on the causal path between marriage/parenthood and paid work time, especially for women. For similar reasons, we do not further control income or paid work hours when predicting housework hours. In this study, we focus on the overall relationship between marital status and time use, and including these potential mediators could undermine this goal.

Results

We first present descriptive statistics on paid work and housework hours by partnership status and parental status for men and women, demonstrating how these figures changed between the 1990s and the 2010s. We then present the estimated coefficients of the two FE models that examine changes in paid work and housework time following partnership and parental status changes. We also include a plot of the seven-year curve of time-use change after forming a partnership and the curve after the birth of a child.

Descriptive statistics

Table 2 shows the average weekly paid work hours and housework hours by partnership and parenthood status in the 1990s, 2000s, and 2010s. In calculating the time use of single, partnered, and married individuals, those without a child under age 16 in the household were selected. When calculating the time use for individuals with no child, one child, and two children, we selected individuals with a partner to focus on differences due to parenthood.

Childless women's weekly paid work hours in all groups were almost the same in the 1990s, ranging from 35.6 to 37.5 hours. Over time, paid work hours of single women declined, and the gap between them and partnered women widened. Partnered women spent longer on housework than single women, but this gap decreased over time. In the 1990s, partnered women spent 3.5–5.7 hours more per week on housework than single women. In the 2010s, the difference narrowed to 1.4–2.5 hours. In the 1990s, partnered men worked 5.3–6.5 hours more per week than single men. In the 2010s, the difference grew, reflecting a faster decline in paid work hours for single men. Men spent 4.4–6.1 hours doing housework. Men in a cohabiting relationship had the longest housework time.

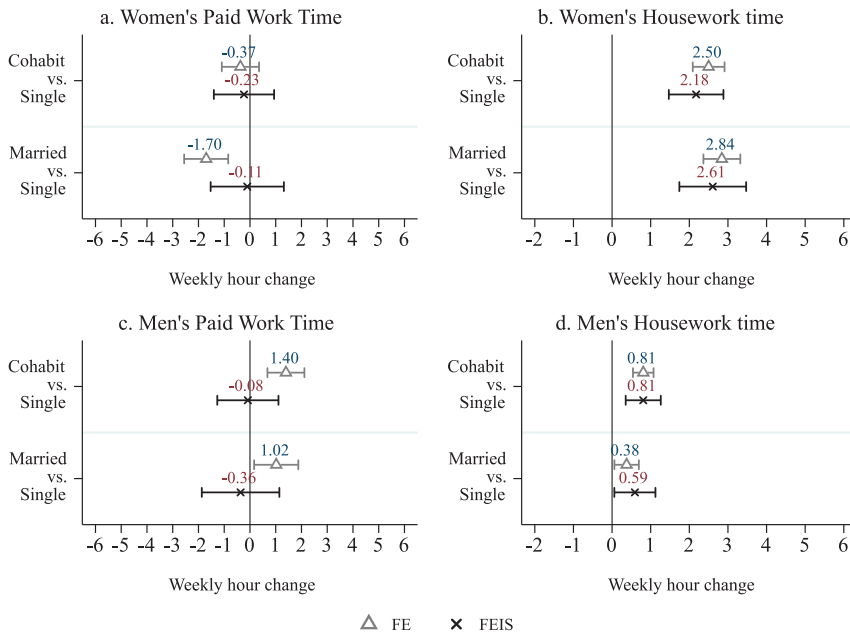
Partnered childless women and partnered mothers had different paid work and housework hours. In the 1990s, compared with partnered childless women, partnered mothers with one child spent 15.4 hours less per week on paid work, and those with two or more children spent 20.9 hours less. The differences narrowed to 11.1 and 16.9 hours in the 2010s. In the

TABLE 2 Weekly paid work and housework hours by family status and period

	Women					
	Weekly paid work hours			Weekly housework hours		
	1990s	2000s	2010s	1990s	2000s	2010s
Marital status (nonparent)						
Single	35.6 (15.6)	34.8 (15.5)	31.8 (17.8)	6.0 (6.2)	5.8 (5.3)	6.5 (6.8)
Cohabiting	37.5 (12.5)	37.2 (13.3)	37.2 (14.3)	9.5 (6.8)	8.5 (5.5)	7.9 (5.1)
Married	35.6 (14.7)	35.8 (13.1)	35.3 (16.5)	11.7 (8.0)	9.7 (6.0)	9.0 (6.7)
Parenthood status (in a partnership)						
No child	36.4 (13.9)	36.5 (13.2)	36.2 (15.5)	10.8 (7.6)	9.0 (5.7)	8.5 (6.0)
Having one child	21.0 (17.1)	23.4 (16.3)	25.1 (16.6)	17.4 (11.4)	14.6 (8.7)	13.1 (8.8)
Having two or more children	15.5 (16.0)	17.8 (15.8)	19.3 (16.6)	23.7 (14.3)	19.3 (11.1)	16.8 (10.6)
	Men					
	Weekly paid work hours			Weekly housework hours		
	1990s	2000s	2010s	1990s	2000s	2010s
Marital status (nonparent)						
Single	36.8 (19.0)	34.7 (18.5)	31.3 (19.7)	4.6 (5.1)	4.4 (4.6)	5.4 (5.3)
Cohabiting	42.1 (15.5)	40.7 (14.7)	39.6 (15.2)	5.7 (4.6)	5.6 (4.4)	6.1 (4.5)
Married	43.3 (15.7)	42.5 (14.5)	40.5 (15.6)	5.1 (5.1)	5.2 (4.4)	5.9 (4.9)
Parenthood status (in a partnership)						
No child	42.9 (15.6)	41.6 (14.6)	40.1 (15.4)	5.3 (4.9)	5.4 (4.4)	6.0 (4.7)
Having one child	42.2 (18.1)	41.5 (15.4)	41.0 (14.6)	5.3 (5.9)	5.6 (5.3)	6.0 (5.0)
Having two or more children	41.7 (18.9)	42.3 (15.7)	40.0 (15.4)	5.8 (6.7)	5.7 (5.5)	6.4 (5.8)

NOTE: Standard deviations are in brackets.

1990s, partnered mothers with one child spent 6.6 hours more per week on housework than partnered childless women; those with two children spent 12.9 hours more on housework. Partnered women spent less time on housework in the later period, regardless of their parental status. There were few differences in paid work time and housework time between partnered childless men and partnered fathers. Regardless of partnership and parental status, men spent slightly more time on housework in the later periods.

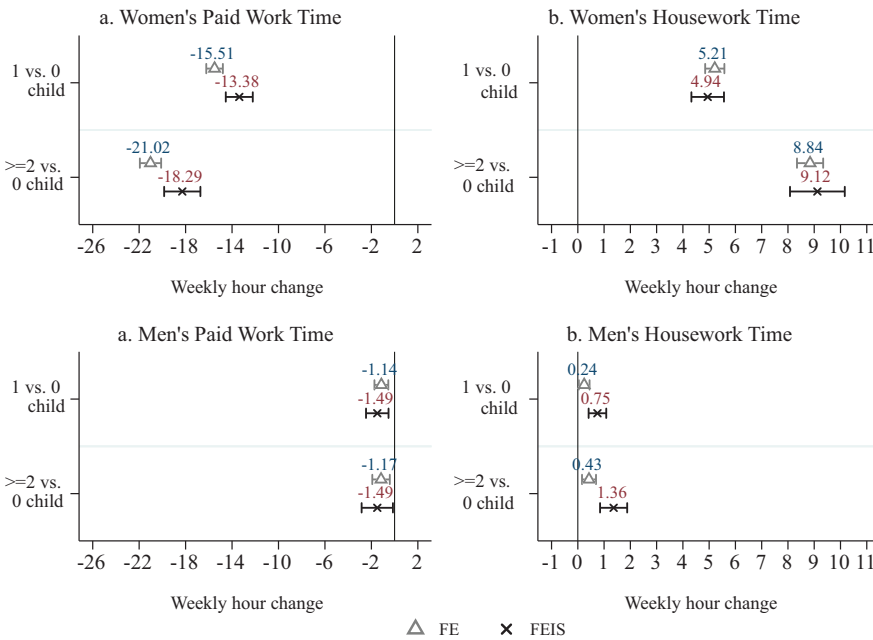
FIGURE 1 The association between time use and partnership formation

The effects of partnership and parenthood on time use

Age and health status are related to both time use and family status. In the following regressions, we included these factors using FE regression models. First, we report the estimated coefficients of the baseline model, which evaluated the effects of marriage and parenthood on time use. Figures 1 and 2 show the results of the conventional FE model and the FEIS model (complete lists of estimated coefficients are presented in online Appendix Table A2).

Figure 1 shows the estimated coefficients of partnership formation on time use. Comparing the results of the FEIS model and those of the FE model, we observe that the FE model overestimated the negative effects of marriage on women's paid work time and the positive effects of marriage on men's paid work time. Compared to single women, married women, as shown in the FE model, work 1.70 hours ($p < 0.001$) less per week, but they work only 0.11 hours less per week ($p = 0.885$) according to the FEIS model. Compared to single men, married men work 1.02 hours ($p = 0.020$) more per week per the FE model, but they work only 0.36 hours less ($p = 0.635$) per the FEIS model. These results suggest that partnership is selected based on person-specific characteristics associated with a slower growth (or a steeper reduction) in paid work time for women and a steeper growth (or a slower reduction) in paid work time for men. The design of person-specific slopes in the FEIS models accounted for these possible differences

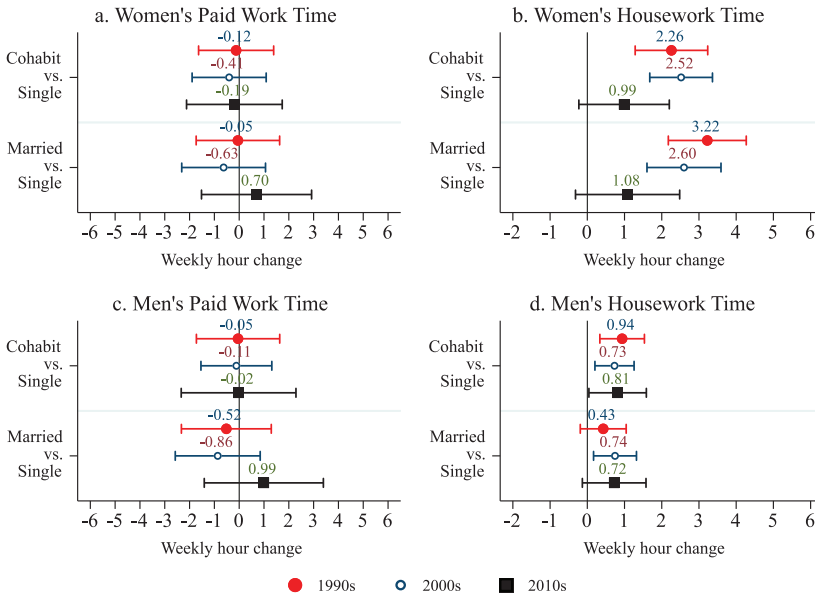
FIGURE 2 The association between time use and parenthood



in time use slopes between single people and partnered people. For both women and men, no evidence showed that paid work hours are associated with marital status.

For both women and men, the predicted housework hours estimated from the FE and the FEIS models are similar, suggesting that partnership is only slightly selected based on the changes in housework over time. For women, getting married was associated with an increase in housework of about 2.84 (FE model) or 2.61 (FEIS model) hours ($p < 0.001$). Men’s housework hours rose by about 0.59 hours after getting married ($p = 0.029$).

Figure 2 shows the associations between parenthood and time use. Comparing the results of the FEIS model and those of the FE model, we observe that the FE models overestimate the extent to which women reduce their paid work hours after the birth of a child by two hours per week. While women reduced their weekly paid work time by more than 13.38 hours ($p < 0.001$) after the first childbirth, men only reduced theirs by only 1.49 hours ($p = 0.003$). This negative impact on men’s paid work time was larger under the FEIS model than under the FE model. These findings suggest a selection into parenthood on person-specific characteristics—one associated with a steeper reduction (or a slower growth) in paid work time for women and a weak selection on slower reduction (or a steeper growth) in paid work time for men. The design of person-specific slopes in FEIS models

FIGURE 3 Period-specific association between time use and partnership formation

accounted for these possible differences in time use slopes between parents and nonparents.

Unsurprisingly, mothers spend much more time on housework after having children. Compared with childless women, women with one child and those with two or more children spend 4.94 ($p < 0.001$) and 9.12 ($p < 0.001$) hours more on housework per week, respectively. Men also increase their housework time by 0.75 hours ($p < 0.001$) and 1.36 hours ($p < 0.001$) per week, respectively, after they have one child and at least two children. The FE models tend to underestimate the increase in men's housework time following childbirth, indicating that there is selection into parenthood based on person-specific characteristics associated with a slower reduction (or a steeper growth) in housework time. Specification tests confirmed that the estimates from FEIS and FE models are inconsistent, and FEIS models are preferred (see online Appendix A6 for more details).

Changing impacts of partnership on time use

Figure 3 illustrates the changes in partnership impacts over the last three decades. The interaction of time-varying variables with time indicators was used to test whether the effects of these variables remained consistent over the years (Allison 2009).⁵ To assess whether partnership estimates differ across years, we included interactions between the marital status variable (single, cohabitation, marriage) with the period variables (the 1990s, 2000s,

and 2010s) in the FEIS models. We report the key estimates in Figure 3 (complete lists of estimated coefficients are presented in online Appendix Table A3).

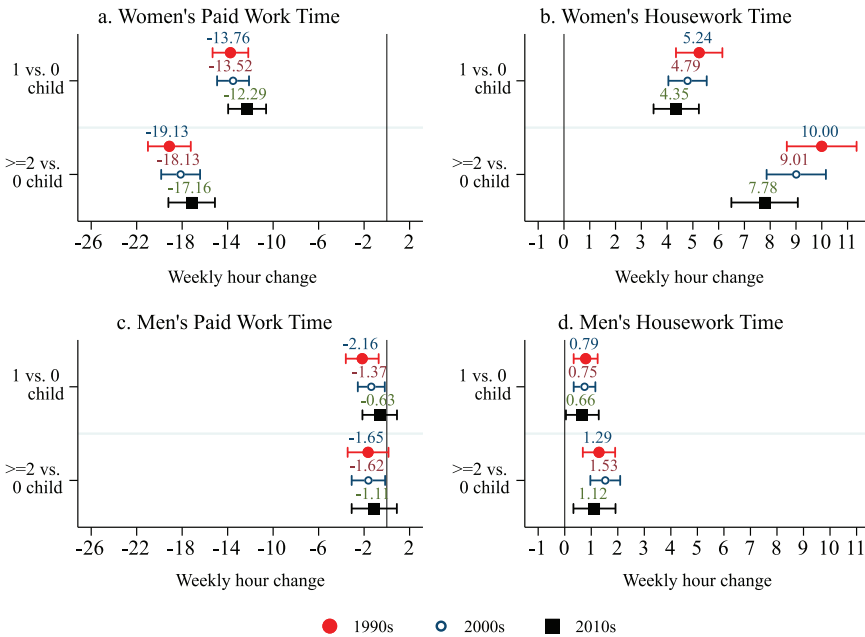
For all periods, the impacts of cohabitation and marriage on women's and men's paid work hours are close to zero (Figure 3). In other words, partnership formation per se does not lead to specialization in paid work between spouses. For women in the 1990s, weekly housework hours increased by more than 2.26 hours ($p < 0.001$) and 3.22 hours ($p < 0.001$) after entering a cohabiting relationship or marriage, respectively. In the 2010s, the difference between married and single women's paid work time was 1.08 hours per week ($p = 0.130$). Notably, men's increase in housework time after entering a partnership was 0.72 hours per week ($p = 0.098$).

Overall, the findings support Hypothesis 1: Before the 2010s, the change in housework hours associated with partnership was larger for women than for men. However, there was little change in paid work hours after cohabitation or marriage for both men and women. Over the last three decades, marriage per se was not associated with gender specialization in paid work time. The findings also support Hypothesis 2: The positive impact of partnership formation on women's housework time has decreased. In the 2010s, partnership formation increased women's and men's housework time by a similarly modest amount. In the 2010s, marriage per se was no longer linked with a move toward a more traditionally gendered use of time. The effects of partnership formation on men's time use go against Hypothesis 3a but support Hypothesis 3b: The increase in men's weekly housework hours has remained modest over the three decades.

Changing impacts of parenthood on time use

We likewise include the interactions between the parenthood variable (no child, one child, two and more children) and the period variables to test the period-specific effect of parenthood. Figure 4 shows the key estimates (complete lists of estimated coefficients are available in online Appendix Table A3).

In the 1990s, women's weekly paid work hours decreased by 13.76 ($p < 0.001$) after their first child's birth. In the 2010s, the figure dropped to 12.29 hours ($p < 0.001$). However, we should note that these estimates do not significantly differ over the three periods. For women with two or more children, their weekly paid work hours decreased by 19.13 ($p < 0.001$) following childbirth in the 1990s. The corresponding figure is 17.16 in the 2010s. However, we should again acknowledge that these parameter estimates do not significantly differ over the three periods. That is, over the last three decades, the negative impact of childbirth on women's paid work hours has changed little.

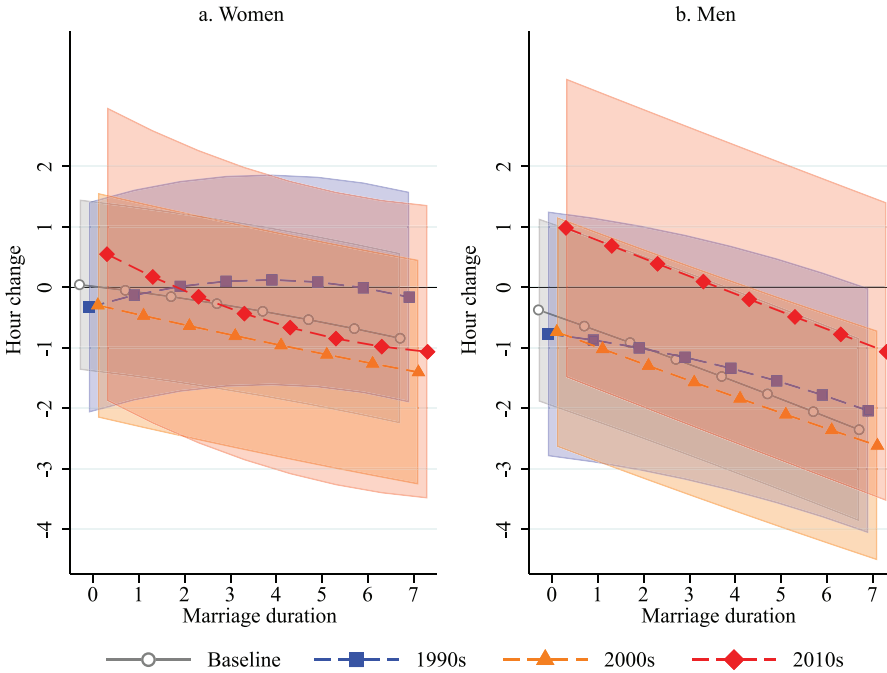
FIGURE 4 Period-specific association between time use and parenthood

Regarding men, in the 1990s, they reduced their paid work time by 2.16 hours ($p = 0.003$) per week after the birth of their first child. The figure dropped to a nonsignificant 0.63 hours in the 2010s ($p = 0.419$). However, the estimated effects of childbirth on men's paid work time do not significantly differ over the three periods. In other words, the reduction in men's paid work time following childbirth has remained modest and largely stable over the last three decades.

The positive impacts of childbirth on women's housework hours have been reduced over the past three decades. In the 1990s, women increased their housework time by 5.24 hours per week ($p < 0.001$). The corresponding figures are 4.79 in the 2000s and 4.35 in the 2010s. Women with two or more children increased their housework time by 10.00 hours per week ($p < 0.001$) in the 1990s; this figure dropped to 7.78 in the 2010s. For men, the increase in housework time following childbirth has remained modest and stable over the past three decades.

Overall, changes in women's paid work and housework time following childbirth are much larger than those for men. Only the increase in women's housework time post-childbirth was reduced over the last three decades. Conversely, the sharp decline in women's paid work time due to motherhood has remained unchanged over time. Over the last three decades, the change in men's time use after childbirth has remained modest.

FIGURE 5 Changes in weekly working hours as marriage forms and continues



Trajectories of time use following partnership and parenthood

How long do the impacts of transitions into partnership and parenthood last? The following models examine how time use changes in the seven years following partnership formation and childbirth (see Equation 3). We included interactions of the marital status, parental status, and period variables to examine whether the changes in paid work hours and housework in the seven years following the family events have changed over the last three decades.

To illustrate the period-specific effects, we plotted estimates of marriage and parents with two or more children (since most British parents have at least two children), as shown in Figures 5–8 (complete lists of estimated coefficients are reported in online Appendix Tables A4 and A5). For example, only 18 percent of women born in the early 1970s had one child (Office for National Statistics 2022).

Figure 5 plots the changes in paid work time in the seven years after people were married. Immediately after marriage, women and men increased their paid work time slightly and gradually reduced their paid work time in the following seven years in the 2010s. However, these effects are not statistically significant from zero, as shown by the small size of the estimates and the large confidence intervals.

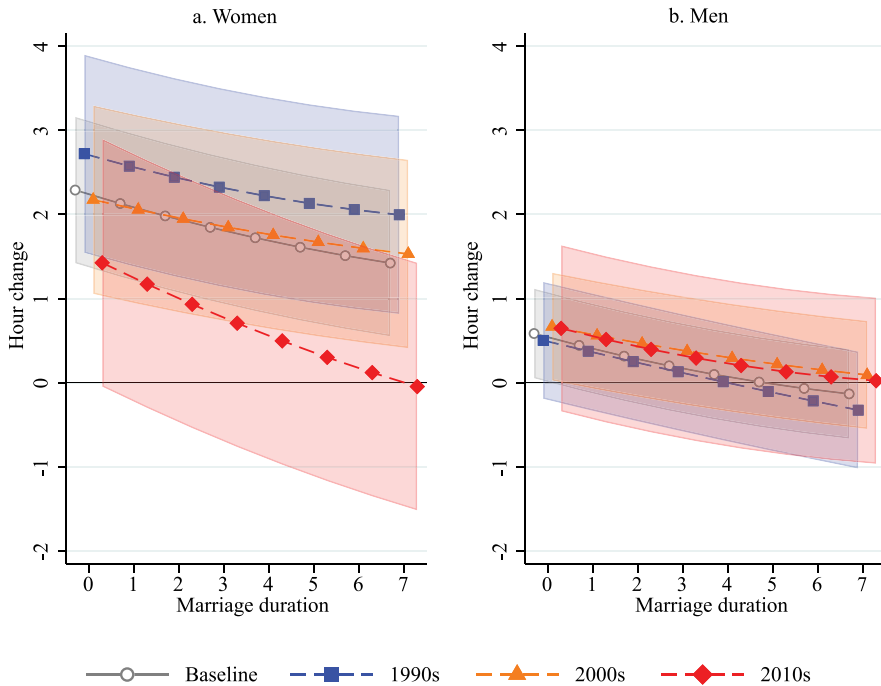
FIGURE 6 Changes in weekly housework hours as marriage forms and continues

Figure 6 depicts the changes in housework time in the seven years after marriage. Immediately following marriage, women's hours devoted to housework increased substantially. The increase in housework hours just after marriage has declined over the last three decades; in the 1990s, women's housework time increased by about three hours a week immediately after marriage. In the 2010s, the corresponding increase fell to approximately 1.4 hours and declined further as the marriage progressed. In the 2010s, the overall effect of marriage on housework time was very similar for women and men, and it nearly disappeared by the seventh year of marriage.

As Figure 7 shows, the changes in women's paid work time in the seven years following motherhood have remarkably remained nearly identical over the past three decades. Even when the youngest child is at least seven years old, the difference in weekly paid work hours between mothers and childless women is still as much as around 14 hours. Men's paid work hours in the seven years after fatherhood bounced back slightly faster in the 2010s than in the 1990s. Overall, the change in paid work hours due to parenthood over the last three decades has consistently been substantial for women and modest for men.

As shown in Figure 8, of the three examined periods, the initial increase in mothers' housework hours post-childbirth was the smallest in the

FIGURE 7 Changes in weekly paid work hours following childbirth

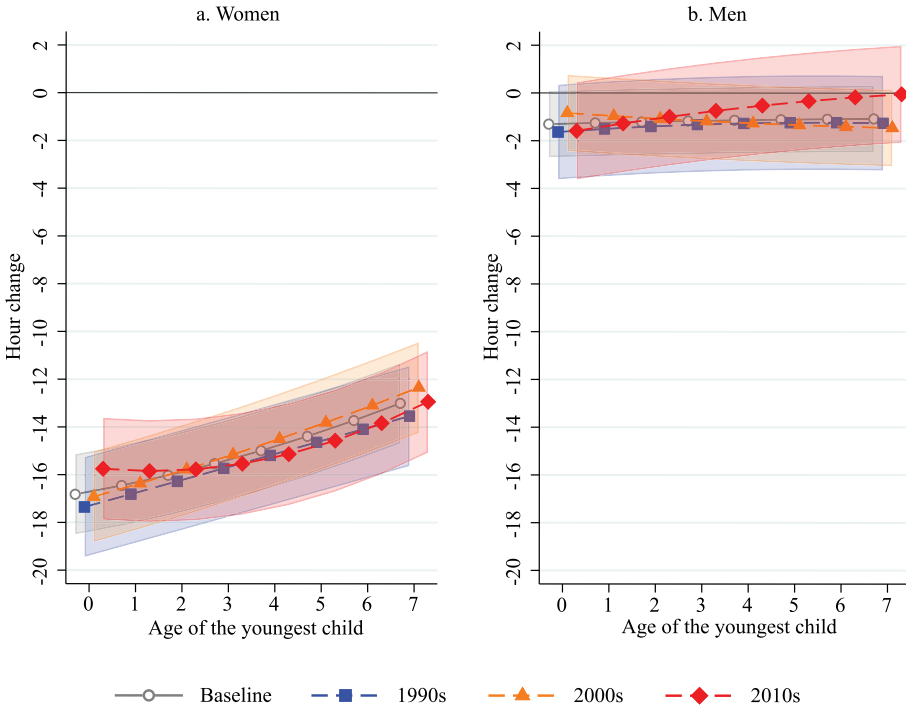
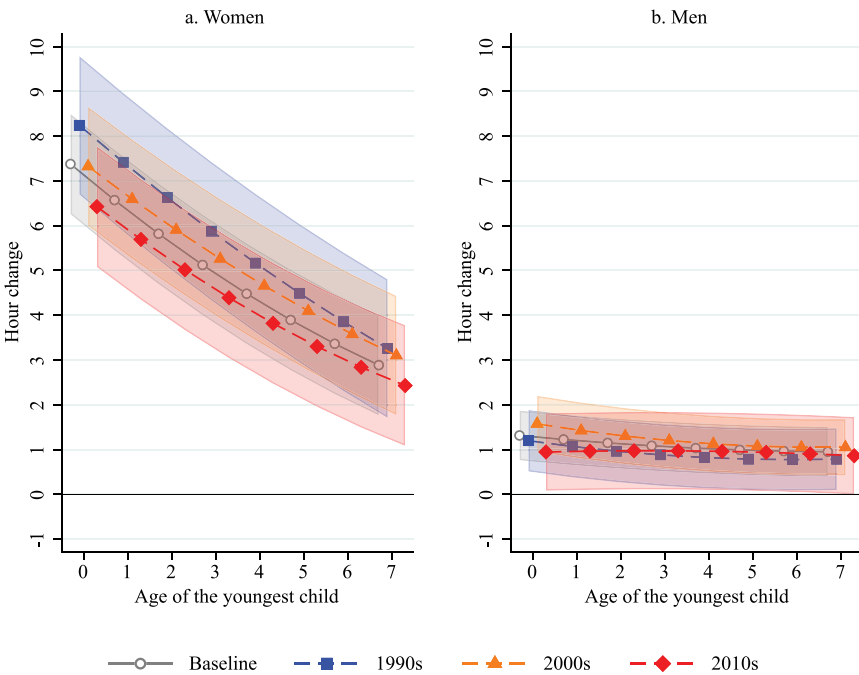


FIGURE 8 Changes in weekly housework hours following childbirth



2010s. In the 1990s, having at least two children was associated with an increase in weekly housework of more than eight hours; for the 2010s, the increase was only 6.5 hours. Nevertheless, across all periods, when mothers' youngest children reach age seven, a difference of three to four hours of housework remains between them and childless women. Over the previous three decades, the corresponding increase in housework performed by men has remained at one hour.

The above findings provide new insights into the impacts of marriage and parenthood on time use. We observed a downward trend in paid work time and housework time for both women and men when marriage progresses. Two factors contribute significantly to the gender gap in paid work time: the substantial decrease in paid work time immediately after the birth of a child and the slow recovery of women's paid work hours. Marriage and parenthood have made lesser impacts only on women's housework time use. The longer-term impacts of marriage and parenthood on women's paid work time have remained almost the same over the preceding three decades.

Discussion and conclusions

This paper presents a detailed and robust examination of the impacts of cohabitation, marriage, and parenthood on the gender division of labor in Great Britain from 1992 to 2019. We applied both conventional FE and novel FEIS models in our analyses, which controlled for the selection effects in cohabitation and parenthood more effectively than in previous studies. In addition, we analyzed whether the effects of partnership and parenthood on time use have changed over the past three decades. Finally, we examined the trajectory of time use over the seven years after partnership and parenthood to better understand the longer-term impacts of partnership and parenthood on time use. Here, we highlight several relevant findings.

First, concerning paid work time, women and men do not alter their paid work hours after they cohabit or marry. Such findings echo the earlier understanding that FE models overestimate the positive impacts of marriage on men's labor income (Rüttenauer and Ludwig 2020). Crucially, this conventional model still overestimates the negative effects of marriage and childbirth on women's paid work time. We also find that men reduce their paid work hours when they become fathers. We thus argue that our analyses surpass previous studies, which neglected the selection effects of trajectories of paid work time on marriage and parenthood.

Second, concerning housework time, women and men alike increase their housework time after cohabitating or marrying. While the increase in women's housework hours after marriage declined by about two hours to one hour per week from the 1990s to the 2010s, men's increase in housework time after marriage remained at one hour per week. In other words,

our findings demonstrate that the gender-traditionalizing effects of marriage on housework time have disappeared since the 2010s: Marriage no longer increases the gender gap in housework time. Our results differ from previous studies that ignored the time-varying effect of marriage on housework and those that did not consider the selection effects of time-use trajectories on marriage. For example, employing the conventional FE models on the same data used in this study, Borra et al. (2017) reported a 1.84-hour increase in housework per week for women and a 0.76-hour *drop* for men since attaining partnership.

Third, our findings have shown that parenthood, rather than marriage or cohabitation, is the primary cause of the gender specialization of paid work and housework. For example, the gap in weekly paid work hours between mothers with at least two children and childless women is 18.4 hours, while the corresponding figure is only 1.6 hours for men. Furthermore, motherhood has shown long-term negative impacts on women's paid work hours. In the seventh year after childbirth, the difference in paid work time between mothers and childless women remains large—about 14 hours a week, and remained unchanged over the last three decades.

Our study echoes recent findings from research on stagnation in the closing of gender gaps in paid work and domestic work (Kan et al. 2022). Specifically, our findings suggest that the gender revolution in the division of labor in Britain remains in the first phase: women adjust their time use after life-course events, but men have not increased their participation in housework over the years. Overall, our findings indicate that the realization of gender equality in the division of labor is slow in Britain. Although the immediate traditionalizing effects of marriage and parenthood on women's time use have been decreasing over time, the longer-term impacts of these events have remained stable over the previous three decades.

There are certain limitations inherent in this study that may impact the scope and accuracy of the findings. First, the measurement of housework from the utilized data focuses mainly on routine household chores like cleaning or cooking. Time-use research has shown that men perform nonroutine household chores more often, such as home improvement and grocery shopping (Dotti Sani and Treas 2016; Sullivan, Billari, and Altintas 2014). Second, the data do not contain information on the usual hours of care work performed, so future research should include care work and nonroutine housework in the analytical framework as data become available. Despite these limitations, we trust the robustness of our conclusion about stagnation in men's time use; recent research based on cross-sectional time diary data has shown that British fathers' parenting time has remained stable since 2000 (Henz 2019). Third, our estimates based on the FEIS model offer a more conservative estimation regarding the impact of family formation than those from the FE model. If the model "overcontrols" mediating or colliding variables, a FEIS model may potentially "absorb" part

of the treatment effect (Goodman-Bacon 2021; Rüttenauer and Ludwig 2023) and thus underestimate the impact of partnership and parenthood. Nevertheless, our model's design is orderly and straightforward, with only age and age-squared terms included to account for the trajectory term. Accordingly, the issue of "over-controlling" individual slopes should be minor. Finally, our models may have missed some time-varying factors affecting family formation and time use. This issue of omitted variables is common in models assessing causal relationships based on observational data (Bärnighausen et al. 2017); it cannot be solved using FE or FEIS models.

In light of the above limitations and to uncover more broadly generalizable findings, we recommend that future studies explore how the impacts of marriage and parenthood on the gender division of labor may have changed over time in countries where the social contexts and family policies differ from Great Britain. For example, previous studies showed that the impacts of motherhood on time use in the United Kingdom are smaller than those in Germany but more extensive than those in the United States (Kimmel and Connelly 2007; Kühhirt 2012).

Finally, our findings have noteworthy policy implications, as parenthood is a major obstacle to gender equality in the division of labor. The family policies introduced in the United Kingdom in the 2010s, such as the increase in annual free childcare subsidies and shared parental leave, have not effectively improved gender equality. Women, rather than men, still juggle the demands of household and work and adjust their time use accordingly. The gender revolution has made little progress in lessening the vast reduction in women's paid work time due to motherhood. Policymakers should develop proactive policies that address gender norms around parenthood and women as the primary caregivers in society. In this regard, some studies have shown that men increased their participation in care and housework substantially during the United Kingdom's lockdown periods of the COVID-19 pandemic (Zhou and Kan 2021). Such findings suggest that family-friendly policies, including those encouraging work from home and flexible working time, will increase men's participation in domestic work. Following the COVID-19 pandemic, many UK firms have introduced a four-day workweek policy. The government should work closely with the public and private sectors to introduce family-friendly policies along such lines.

Data availability statement

Data are available at the University of Essex, Institute for Social and Economic Research. (2022). Understanding Society: Waves 1–11, 2009–2020 and Harmonised BHPS: Waves 1–18, 1991–2009: Special Licence Access. [data collection]. 15th Edition. UK Data Service. SN: 6931, <https://doi.org/10.5255/UKDA-SN-6931-14>

Notes

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1 University of Essex, Institute for Social and Economic Research. (2022). *Understanding Society: Waves 1–11, 2009–2020 and Harmonised BHPS: Waves 1–18, 1991–2009: Special Licence Access*. [data collection]. 15th Edition. UK Data Service. SN: 6931, <https://doi.org/10.5255/UKDA-SN-6931-14>

2 The first wave (1991) of the BHPS and the one-third, fifth, seventh, ninth, and 11th waves of the UKHLS do not have housework time information. Furthermore, housework information was not collected for individuals interviewed between January and June 2009 in the first wave of UKHLS.

3 The conclusion is not biased by sample restriction. We used random-effects models that utilize a sample while including individuals with only one observation. These models produced similar results to FE mod-

els. However, the estimates do not pass the Hausman test, indicating unobserved time-constant factors correlated with the dependent and independent variables. FE models with individuals with more than one person-waves were also analyzed and produced almost the same results as FE models using at least three-person waves.

4 The partnership duration is the number of years in the current partnership, including the number of years of cohabitation if they married after cohabiting with the same person. Durations are top-coded at eight years after cohabiting, marriage, or having children because of the few records that have followed for more than eight years following a family status change.

5 Instead of using interactions, we ran the same baseline model for each period separately. We followed the same selection procedure reported in the "Data and sample" section for the 1990s, 2000s, and 2010s observational period and constructed three samples. The results of the separate analysis and the interaction approach were almost identical. However, running models in separate samples would allow period-specific effects in other variables such as age, health condition, and even person-fixed characteristics. For this reason, we preferred the interaction models.

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