

Educational Gradients of Housework and Childcare Time in East Asian and Anglophone Countries from the 1980s to the 2020s

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Abstract

The past half-century witnessed substantial changes in both behaviours and ideologies concerning the division of labour and child-rearing. This study aims to examine how educational attainment is associated with housework and childcare time for both men and women, how these patterns have evolved from the 1980s to the 2020s, and whether the evolution differs between East Asian and Anglophone countries. Using time-diary data from two East Asian countries (Japan and Korea) and three Anglophone countries (the USA, the UK, and Canada), our analyses reveal that (a) education promotes gender convergence in housework contributions; (b) higher-educated parents generally spend more time on childcare; (c) educational gaps in housework are relatively stable over time, while educational gaps in childcare increase over time; (d) the trends differ between East Asian and Anglophone countries in terms of the evolution stage. These findings are discussed regarding the implications for gender revolution and intergenerational stratification.

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INTRODUCTION

The past half-century has witnessed substantial changes in the gendered division of labour. As the public acceptance of egalitarian ideologies grows and women's access to the labour market expands (Lesthaeghe, 2010), married women spend less time on housework than before, while married men have increased their housework contributions (Craig, 2006; Hook, 2006; Kan et al., 2022; Kan, Sullivan, and Gershuny, 2011). However, this gender convergence appears to have stalled or slowed in recent years (Altintas and Sullivan, 2016; England, 2010; Goldin, 2006). In contrast to housework, both mothers and fathers have significantly increased their time spent on childcare, as norms surrounding intensive parenting and scientific childrearing have become more prominent (Craig, 2006; Dotti Sani and Treas, 2016; Sayer, Bianchi, and Robinson, 2004).

Existing literature provides valuable insights into these changing patterns of housework and childcare time. A widely noted claim is that changes in time use vary across socio-economic groups, especially by educational levels (e.g., Sayer et al., 2004; Sullivan, 2010; Sullivan, Billari, and Altintas 2014), which not only reflect socio-economic resources and earning capacity but also embody cultural beliefs and ideologies (Craig, 2006; Dotti Sani and Treas, 2016; Inglehart and Norris, 2003; Sullivan, 2010). Educational gradients in family work are therefore not merely descriptive differences between high- and low-educated groups. They reveal whether broader transformations in gender relations and parenting cultures are shared across social groups or concentrated among those with greater resources and stronger exposure to new cultural norms. At the same time, these gradients should not be assumed to remain stable. The "changing differences" perspective draws attention to the possibility that gaps between social groups may themselves evolve over time (Sullivan, 2010). This temporal question is especially important because gender convergence in domestic labour has remained slow and incomplete, with persistent gender segregation in domestic tasks despite long-term changes in women's and men's paid and unpaid work (Kan, Sullivan and Gershuny, 2011). More recent work further shows that family work remains patterned by gender, education, employment, and cultural background, reinforcing the need to understand domestic labour as socially structured rather than reducible to time availability or household efficiency alone (Kan and Laurie, 2018).

Building on this debate, this study extends existing research in four ways. First, we extend Sullivan's (2010) "changing differences" analysis of fathers' domestic labour and childcare by examining educational gradients among both men and women. Second, we compare housework and childcare, two forms of unpaid work that may follow different logics: housework is closely tied to gender convergence in domestic labour, whereas childcare is also linked to intensive parenting and intergenerational stratification. Third, we examine change over a longer historical period, from the 1980s to the 2020s. Fourth, we compare East Asian and Anglophone countries, allowing us to consider whether educationally stratified changes in family work follow similar patterns across different cultural and institutional contexts. We therefore ask: (a) How are educational levels associated with individual time use in housework and childcare for both men and women? (b) How do these patterns change between the 1980s and the 2020s? (c) Do the trends differ between East Asian and Anglophone countries?

To answer these questions, we use time-diary survey data from two East Asian countries (Japan and South Korea) and three Anglophone countries (the USA, the UK, and Canada). Our results show that (a) On average, men's educational levels are positively associated with their housework time, whereas the association is negative for women; (b) Parental educational levels

are positively associated with childcare time, and the positive gradient is more pronounced on the mother's side; (c) In terms of the change over time, for men, we fail to find a significant change in the educational gradients of housework in the region-pooled sample, but we find that the educational gradients of childcare become significantly larger over time; (d) Finally, there are significant differences in how the educational gradients change over time between East Asian and Anglophone countries. These results offer important implications for gender convergence in the division of labour and intergenerational stratification.

THEORIES AND HYPOTHESES

Education and Housework Time

Human capital theory provides a foundation for predicting how education may be associated with housework time (Becker, 1964; Mincer and Polachek, 1974). Central to this perspective is the concept of opportunity cost, which posits a trade-off between productive activities (e.g., schooling, market work) and non-productive activities (e.g., housework, leisure), implying a zero-sum relationship. Higher education enhances individuals' marketable skills and earning potential, thereby increasing the opportunity cost of non-productive time. From this perspective, when well-educated individuals reduce their paid work time in favour of housework, their opportunity costs are higher than those of less-educated individuals (Becker, 1981). Rationally, then, higher-educated individuals may reduce their own housework time by spending more time in paid work, outsourcing domestic tasks, lowering the amount of housework they consider necessary, or relying on other household members whose opportunity costs are lower (Becker, 1985; Cohen, 1998). Considered on its own, this opportunity-cost mechanism leads to the expectation that education is negatively associated with housework time.

> Hypothesis 1a (H1a): From an opportunity-cost perspective, educational attainment is negatively associated with individual housework time.

However, education also has ideological consequences. Numerous studies suggest that higher education is positively associated with egalitarian gender ideologies (Craig, 2006; England, 2010; Inglehart and Norris, 2003; Ji et al., 2017; Sullivan, 2010). These ideological consequences are especially important for housework because domestic labour remains strongly gendered. According to the traditional "male-breadwinner, female-homemaker" model, women's homemaker role is more taken for granted, and their participation in domestic labour is viewed as default; by contrast, men's participation in domestic labour is more optional and characteristic of helping their wives (Coltrane, 1996). Education may therefore have different implications for men's and women's housework. For men, the egalitarian ideology associated with higher education may encourage greater participation in housework by weakening adherence to the breadwinner model. For women, the same ideological orientation may reduce housework time by weakening the taken-for-granted association between femininity and domestic responsibility.

These two mechanisms imply that the relationship between education and housework should not be understood as the result of either opportunity costs or ideology alone. In particular, we do not assume that the human-capital mechanism necessarily outweighs the ideological mechanism. For men, opportunity costs may pull housework time downward, while egalitarian ideology may pull it upward. As a result, the educational gradient among men is theoretically ambiguous and may be negative, null, or positive, depending on the relative strength of these countervailing mechanisms. For women, by contrast, opportunity costs and egalitarian ideology are more likely to work in the same direction, both weakening women's expected responsibility for housework. The observed educational gradient in housework should

therefore be understood as gendered: it is expected to be more negative among women, while being less negative, null, or positive among men.

> Hypothesis 1b (H1b): The educational gradient in housework is expected to differ by gender: it should be more negative for women and less negative, null, or positive for men.

Education and Childcare Time

On the surface, childcare resembles housework, but the parenting literature conceptually distinguishes between the two. Scientific knowledge about parenting has reshaped the definition of "good parenting" and influenced dominant ideologies. The broad consensus in the literature is that parents should invest significant time and financial resources to nurture "high-quality" children (Bradley and Corwyn, 2002; Davis-Kean, Tighe, and Waters, 2021; Harding, Morris, and Hughes, 2015; Hays, 1996; McLanahan, 2004). Central to this new child-rearing ideology is the belief that "explicit goals of child-rearing were centred on the good of the family and the nation" (Hays, 1996:45). Within this ideology, a "good mother" is expected to devote considerable time, energy, and money to fostering a child's development. She is characterised by her constant emotional, physical, and mental availability (Hays, 1996). The concept of intensive mothering is defined as "child-centered, expert-guided, emotionally absorbing, labour-intensive, and financially expensive" (Hays, 1996:54). While mothers continue to serve as primary caregivers (Bradley and Corwyn, 2002; Harding, Morris, and Hughes, 2015), the modern ideology also redefines fatherhood, promoting the idea of "new fatherhood" (Dotti Sani and Treas, 2016). A "good father" is no longer one who simply provides financially; rather, he should actively participate in everyday caregiving and family life, offer hands-on care, engage in one-on-one interactions, and build emotional connections with their children (Altintas, 2016; Coltrane, 1996; Hook and Wolfe, 2013; Wall and Arnold, 2007).

Highly educated parents are thought to be early adopters of this new child-rearing ideology, and several mechanisms—each rooted in class—have been proposed to explain this. The most well-known is Lareau's (2003) model, which distinguishes between two parenting strategies based on class: "concerted cultivation" (used by high/middle-class parents) and "natural growth" (used by working-class/poor parents). Concerted cultivation involves actively managing and structuring children's activities to promote development and future success. In contrast, natural growth implies minimal parental involvement in shaping children's time, allowing them more autonomy (Lareau, 2003). Both class-related cultural beliefs and the financial capacity to afford time-intensive, costly parenting contribute to this divide (Altintas, 2016; Lareau, 2003; Weininger, Lareau, and Conley, 2015). Here, educational attainment serves as a proxy for both cultural norms and material resources.

There are also several alternative suggested mechanisms for intensive parenting. Dotti Sani and Treas (2016), following Rogers's (1962) innovation diffusion theory, argue that higher-status groups are typically the first to adopt new cultural practices, and thus, educated elites are the earliest adopters of intensive parenting. Personal experiences and daily routines may also play a role: Highly educated parents, given their own backgrounds and greater exposure to written and professional media, are often more attuned to discourses of moral panic surrounding child development (Craig, 2006; Sullivan, 2010). Moral convictions, in turn, are widely believed to shape caregiving behaviours (Craig, 2006). Finally, because highly educated parents tend to have higher standards for child-rearing, they may be less willing to outsource caregiving responsibilities (Dotti Sani and Treas, 2016; Sayer et al., 2004).

Taken together, prior literature suggests that highly educated parents spend more time on childcare than their less educated counterparts: Not only are they more attuned to the importance of intensive parenting, but they are also better equipped to enact it. Hence, we hypothesise that:

> Hypothesis 2a (H2a): Educational attainment is positively associated with parents' childcare time.

Although the logic of intensive parenting applies to both mothers and fathers, we expect the educational gradient in childcare to be more pronounced among mothers. This expectation rests not simply on mothers' higher average childcare time (Sayer et al., 2004), but on the gendered moral organisation of parenting. Intensive parenting has historically been articulated most strongly through ideals of "good mothering," in which mothers are expected to be continuously attentive to children's emotional, physical, and developmental needs (Altintas, 2016; Hays, 1996). Higher-educated mothers may therefore be especially likely to translate expert-guided parenting norms into time-intensive childcare practices. By contrast, although norms of involved fatherhood have become more salient, fathers' childcare remains less strongly institutionalised as an obligatory measure of good parenting (Altintas, 2016; Sullivan et al., 2014; Wall and Arnold, 2007). One alternative possibility is that educational gradients are stronger among fathers because fathers' childcare time has a lower mean and greater variability. However, variability alone does not imply that education is the primary source of this variation. Taken together, we therefore expect the positive association between education and childcare time to be stronger among mothers than among fathers.

> Hypothesis 2b (H2b): The positive association in H2a is more pronounced for mothers than for fathers.

Educational Gaps Over Time and Across Regions

According to the gender revolution framework, gender equality in the division of labour will be achieved through two major stages: In the first stage, as the result of obtaining higher educational attainment and having more job opportunities, women increase their paid labour but reduce their unpaid domestic labour; in the second stage, as the result of obtaining higher educational attainment and accepting more egalitarian gender ideology, men increase their domestic labour participation (e.g., England, 2010; Goldscheider, Bernhardt, and Lappegård, 2015; Kan et al., 2022; Sullivan, Gershuny, and Robinson, 2018). While there has been a gradual convergence in women's and men's paid work time and unpaid work time (Altintas and Sullivan, 2016; Kan et al., 2022, 2011), the convergence is mainly driven by the shift of women's roles, namely the first stage. Accordingly, men's increase in domestic contribution holds the key to the continuous progress of gender revolution (England, 2010; Esping-Andersen and Billari, 2015; Goldscheider et al., 2015).

According to the gender revolution framework, we expect the highly educated men to be the pioneers, who will lead the continuous gender convergence of housework. Since there is still a huge gender gap in domestic labour and the completion of the revolution is still far away (England, 2010; Kan et al., 2022), we expect the educational gaps of housework to become larger over time.

For childcare, we follow the innovation diffusion theory, which posits that higher-status groups are typically the first to adopt new cultural practices, leading the trend, until the cultural practices become prevalent and normative in different classes (Dotti Sani and Treas, 2016; Rogers, 1962). Prior literature suggests that intensive parenting is still highly class-based and

has not yet become normative across parents with different socioeconomic statuses (Altintas, 2016; Hays, 1996; Lareau, 2003; Weininger et al., 2015). This is particularly true on the father's side, as "new fatherhood" is still emerging, compared to the established "intensive mothering" (Altintas, 2016; Coltrane, 1996; Dotti Sani and Treas, 2016; Hook and Wolfe, 2013; Wall and Arnold, 2007). Taken together, we hypothesise that:

> Hypothesis 3 (H3): Among men, the associations between educational attainment and men's housework time will increase over time.
>
> Hypothesis 4 (H4): Among men, the associations between educational attainment and men's childcare time will increase over time.

While the gender revolution framework has often been developed with reference to Western contexts, recent comparative research suggests that gender convergence in domestic labour has progressed more slowly in East Asian societies than in Anglophone societies (Kan et al., 2022). Japan and South Korea are especially relevant cases in this respect. Both are advanced East Asian economies that have experienced rapid educational expansion and rising female employment, yet domestic labour and care responsibilities remain strongly gendered. Their family systems have also been shaped by Confucian cultural legacies, developmental state traditions, and kinship-based caring provision, which may reinforce women's responsibility for household management and childrearing and discourage men's participation in unpaid domestic work (Brinton and Oh, 2019; Hertog and Kan, 2021; Kan and Zhou, 2022; Raymo et al., 2015). These conditions suggest that educationally stratified changes in housework and childcare may follow a later or different trajectory in East Asian countries than in Anglophone countries. If higher-educated men are among the earlier adopters of more egalitarian domestic practices and more intensive parenting practices, we would expect educational gradients among men to emerge earlier, stabilise, or narrow in Anglophone countries, but to continue developing in East Asian countries. Hence, we raise:

> Hypothesis 5 (H5): There is a difference between East Asian and Anglophone countries in terms of how men's educational gradients in housework change over time.
>
> Hypothesis 6 (H6): There is a difference between East Asian and Anglophone countries in terms of how men's educational gradients in childcare change over time.

DATA AND METHODS

Data and Sample

This study draws on time-diary data from five countries: the United States (US), the United Kingdom (UK), Canada, Japan, and South Korea. The country selection rests on two major considerations. First, to enable meaningful regional comparisons, we include two groups of countries in which members share broadly similar cultural and institutional contexts. We use "East Asian countries" as a shorthand for Japan and South Korea, the two East Asian cases included in this study, and "Anglophone countries" to refer to the US, UK, and Canada. As discussed above, these two groups provide contrasting contexts for examining educationally stratified changes in housework and childcare. Second, the analysis requires comparable time-use data spanning at least three decades, together with harmonisable information on education, gender, employment, children, and household composition. These requirements constrain the selection to countries with long-term comparable time-use datasets within each country group.

In time-diary surveys, respondents are asked to self-record, in sequence, the activities they performed during the previous 24 hours (or on a sampled day; for a review of time-diary methodology, see Bartlett and Milligan, 2015). For the USA, UK, and Canada, we use data from the Multinational Time Use Study (MTUS) (https://www.timeuse.org/mtus). To ensure comparability, we harmonised the East Asian data from the Japan Survey of Time Use and Leisure Activities (https://www.stat.go.jp/english/data/shakai/index.html) and the Korean Time Use Survey (http://kostat.go.kr/portal/eng/index.action).

Given our interest in labour division and childcare, we applied several sample restrictions. We selected diarists who were married or cohabiting and limited the sample to households with at least one child under the age of 18, thus ensuring the relevance of childcare responsibilities. This restriction means that the analysis focuses on partnered diarists living in households with dependent children, rather than lone-adult households. We also restricted the sample to diarists aged between 18 and 55 to focus on working-age adults. These criteria collectively aim to capture the population of parents within the household (see Altintas, 2016; Sullivan et al., 2014 for similar practices). We have a total sample of 518,543 diaries.

We categorised periods into three decades: before 2000, 2000–2009, and after 2009, using the years 2000 and 2009 as cut-off points. As survey years vary across countries, this approach leads to a staggered data structure, summarised in Table 1. To mitigate the influence of imbalanced sample sizes across periods, we weighted the sample within each country so that each period contributed equally to the analysis.

Table 1. Survey Waves Nested in Periods, by Country

Country	Period 1 (Before 2000)	Period 2 (2000-2009)	Period 3 (After 2009)
Canada	1992, 1998	2005	2010, 2015
US	1985, 1994, 1998	2003-2009	2010-2022
UK	1987, 1995	2000, 2005	2015
Japan	1991, 1996	2001, 2006	2011, 2016
Korea	1999	2004, 2009	2014, 2019

Variables

Our dependent variables are time use in housework and childcare. They were constructed by aggregating individual activities from the Main 25 Activities in the MTUS Codebook (De Grignon Pérez, 2025). Housework comprises food preparation, cleaning, laundry, home and vehicle maintenance, shopping, use of personal services, and pet care. Childcare encompasses physical, medical, routine, and developmental care. In line with previous studies (e.g., Sullivan et al., 2014), we focus only on primary activities; time spent on secondary activities performed simultaneously with a primary one is not included.

The primary independent variable is educational attainment. Following MTUS conventions, we harmonised education data into three categories: (1) below secondary, (2) completed secondary, and (3) above secondary. This variable is treated as a three-level categorical variable. The second key independent variable is gender. Another key independent variable is the survey period, as outlined above. Although some studies model the period as a continuous variable to examine the evolution of educational gradients (e.g., Sullivan et al., 2014), we opted for a categorical specification to allow for potential non-linear patterns over time. The final key

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independent variable is region: the Anglophone (UK, US, and Canada) and East Asian countries (Japan and South Korea).

We include several control variables known to affect time-use behaviour. These include the diarist's age (as a continuous measure), diary day (weekday versus weekend), employment status (unemployed, part-time, or full-time), the number of children in the household, and the age of the youngest child. These controls are drawn from prior literature (Dotti Sani and Treas, 2016; Sullivan et al., 2014). Additionally, diary day is used to generate sample weights that maintain a 5:2 weekday-to-weekend ratio within each country and period. Table 2 presents the summary statistics of the variables.

One limitation of the harmonised comparative design is that partners' education cannot be consistently identified and harmonised across all countries and survey waves. We therefore focus on the diarist's own educational attainment, following the broader time-use literature on educational gradients in domestic labour and childcare (Sullivan, 2010; Dotti Sani and Treas, 2016; Altintas, 2016). The estimates should accordingly be interpreted as individual educational gradients among partnered diarists in households with children, rather than as effects of own education net of partner education or couple-level educational composition.

Table 2. Summary of Variable Statistics

Variable	N	mean/ %	mean_w /%_w	sd_w	min	max
Housework time (minutes per day)		156.76	150.82	153.51	0	1260
Childcare time (minutes per day)		50.63	66.16	108.13	0	1215
Age		40.23	39.09	7.22	18	55
No. of children		1.85	1.79	0.82	1	11
Education						
Low-educated (below secondary)	55988	10.8	12.46			
Medium-educated (completed secondary)	239015	46.09	39.58			
High-educated (above secondary)	223540	43.11	47.96			
Sex						
Men	271757	52.41	52.6			
Women	246786	47.59	47.4			
Day						
Weekend	289391	55.81	28.57			
Weekday	229152	44.19	71.43			
Employment status						
Unemployed	103782	20.01	20.57			
Part-time	115302	22.24	17.31			
Full-time	299459	57.75	62.12			
Young person's age						
Aged 0-4	173422	33.44	38.19			
Aged 5-12	204263	39.39	38.42			
Aged 13-17	140858	27.16	23.38			

Period				
	Before 2000	169182	32.63	33.33
	2000-2009	181542	35.01	33.33
	After 2009	167819	32.36	33.33
Country				
	US	67442	13.01	20
	UK	10561	2.04	20
	Canada	17441	3.36	20
	Japan	350064	67.51	20
	South Korea	73035	14.08	20

Note: mean_w = weighted mean; %_w = weighted percentage; sd_w = weighted standard deviation

Analytic Strategies

Following prior studies on educational gradients in time use (e.g., Altintas and Sullivan, 2016; Craig, Powell, and Brown, 2016; Dotti Sani and Treas, 2016), we adopt pooled data and apply mixed-effects models with random intercepts and slopes.

To examine hypotheses H1a and H2a, which predict the relationship between educational attainment and individual housework or childcare time, we use equation (1) below.

For each individual *i* in country *j={1,…,5}*:

Eq. (1) $$Y_{ij} = \alpha_0 + \boldsymbol{\beta_1^T edcat}_{ij} + \boldsymbol{\beta_2^T X}_{ij} + \boldsymbol{\beta_3^T period}_{ij} + u_{0j} + \boldsymbol{u_{ij}^T edcat}_{ij} + v_i + \varepsilon_{ij}$$

Y_{ij} is time spent on housework or childcare in minutes, $\boldsymbol{\beta_1^T}$ are fixed-effect coefficients for the vector of education-category dummy variables, $\boldsymbol{edcat}$, $\boldsymbol{\beta_2^T}$ are fixed-effect coefficients for vector of controls, $\boldsymbol{X}$, $\boldsymbol{\beta_3^T}$ are fixed-effect coefficients for the vector of survey-periods, $\boldsymbol{period}$. u_{0j} is the country-specific random effect, $\boldsymbol{u}_{1j}$ is the vector of random slopes for the education categories, v_i is the individual-level random intercept, and ε_{ij} is the residual error. We allow for random intercepts and slopes for the coefficients on education by country. u_{0j} and $\boldsymbol{u}_{1j}$ are thus allowed to be correlated.

To answer H1a and H2a, we quantify pairwise education differences across the coefficients. We compute estimated marginal means (EMMs) for each education contrast: (low-educated) below secondary versus (medium-educated) completed secondary, (low-educated) below secondary versus (high-educated) above secondary, (low-educated) completed secondary versus (high-educated) above secondary, with Tukey adjustment, and report family-wise 95% confidence intervals.

To examine hypotheses H1b and H2b, which predict the associations between education and housework or childcare time by gender, we estimate Equation (2) below, which extends Equation (1) by including the interaction between the vector of education-category dummy variables and sex, with corresponding coefficient $\boldsymbol{\gamma_1^T}$. We test the joint significance of the interaction terms using a Type-III ANOVA test.

Eq. (2) $$Y_{ij} = \alpha_0 + \boldsymbol{\beta_1^T edcat}_{ij} + \boldsymbol{\beta_2^T X}_{ij} + \boldsymbol{\beta_3^T period}_{ij} + \boldsymbol{\gamma_1^T}(\boldsymbol{edcat}_{ij} \times sex_{ij}) + u_{0j} + \boldsymbol{u_{ij}^T edcat}_{ij} + v_i + \varepsilon_{ij}$$

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To examine H3 and H4, which relate to men's educational gradients and their housework or childcare time over periods, we take three steps: First, we estimate the mixed-effect model as Equation 3 illustrates, separately for housework and childcare time, extending Equation (1) by including an interaction between education and period, $\boldsymbol{\delta_1^T}$. As before, we compute EMMs for each education contrast using Tukey-adjusted pairwise adjustment. Second, we assess the joint significance of the education-by-period interaction terms using a Type-III ANOVA test. Third, we test whether there are significant changes over the period for each education contrast with Post-Hoc Analysis with Tukey's Test.

Eq. (3) $$Y_{ij} = \alpha_0 + \boldsymbol{\beta_1^T edcat}_{ij} + \boldsymbol{\beta_2^T X}_{ij} + \boldsymbol{\beta_3^T period}_{ij} + \boldsymbol{\delta_1^T}(\boldsymbol{edcat}_{ij} \times \boldsymbol{period}_{ij}) + u_{0j} + \boldsymbol{u_{ij}^T edcat}_{ij} + v_i + \varepsilon_{ij}$$

Finally, H5 and H6 predict a difference between East Asia and the Anglophone countries in terms of how men's educational gaps in housework and childcare change over time. We adapt Equation 3 in two ways: We replace country (j=*1,…,5*) with regions (r=*1,2*) and extend the education-by-period interaction to a three-way interactive term, $\boldsymbol{\theta_1^T}$, as seen in Equation 4. As in Equation (3), we assess the joint significance of the interaction terms using a Type III ANOVA test and conduct Tukey-adjusted post hoc pairwise comparisons.

Eq. (4) $$Y_{ir} = \alpha_0 + \boldsymbol{\beta_1^T edcat}_{ir} + \boldsymbol{\beta_2^T X}_{ir} + \boldsymbol{\beta_3^T period}_{ir} + \boldsymbol{\theta_1^T}(\boldsymbol{edcat}_{ir} \times \boldsymbol{period}_{ir} \times region_{ir}) + u_{0r} + \boldsymbol{u_{ir}^T edcat}_{ir} + v_i + \varepsilon_{ir}$$

For all the analyses, we employ the same weighting strategy: All countries contribute equally; each period contributes equally within the country, no matter how many waves in the period; each wave has a 5-2 weekday-weekend ratio.

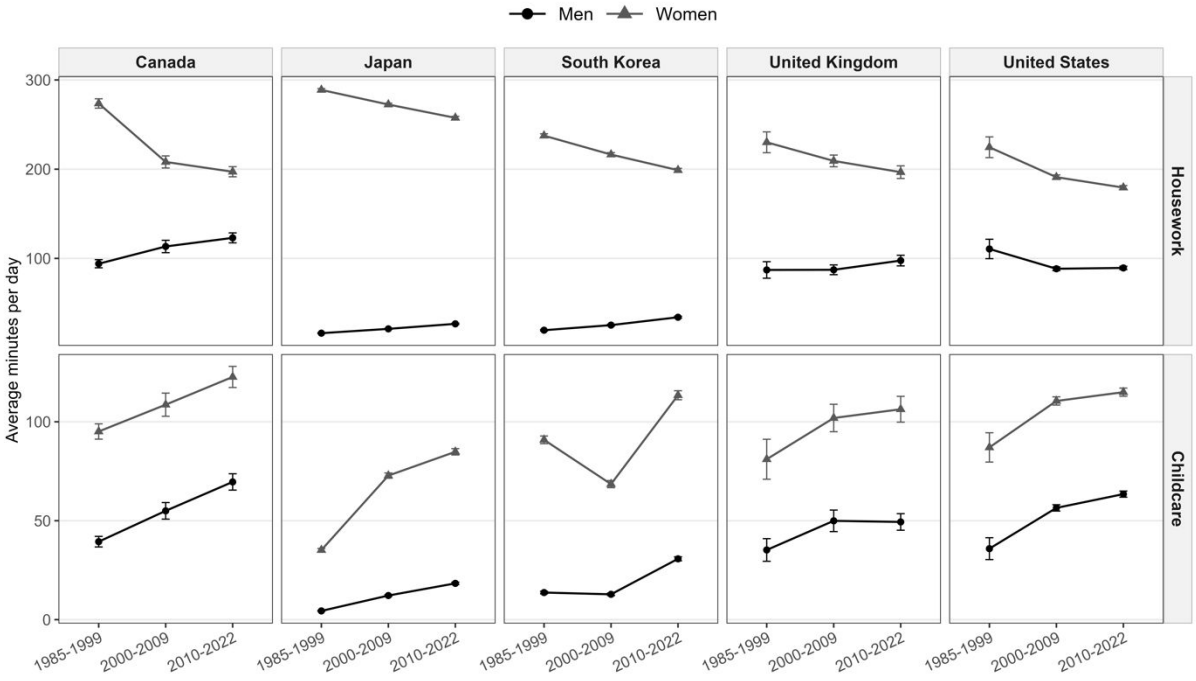
Because the analysis involves higher-order interactions among education, gender, period, and region, the full set of regression coefficients, model tests, and pairwise education contrasts is too extensive to report in the main text without reducing readability. In the Results section, we therefore focus on the substantive patterns shown in the figures, which present estimated marginal mean differences between educational groups and their 95% confidence intervals. The supporting regression output, Wald tests, and detailed education contrasts are reported in Appendices A–E.

RESULTS

Descriptive Analysis

Figure 1 presents the average time use of housework and childcare for men and women in different periods and countries. First, we see that the gender gaps in housework time are converging in all five countries, and this is driven more by women's reduced housework time instead of men's increased housework time. Second, the gender gaps in housework time are much larger in East Asia than in the three Anglophone countries, mainly because men contribute much less to the housework in East Asia than their counterparts. Third, unlike housework, there is no sign that the gender gaps in childcare time are converging, but instead, the gaps are either stable (e.g., Canada, the USA) or enlarge (e.g., Japan, the UK). The divergent trajectories of housework and childcare suggest that distinct theoretical frameworks are needed to analyse these activities—though both are situated under the broader umbrella of unpaid domestic work—as discussed earlier.

Figure 1. Average Housework and Childcare Time by Gender, Period, and Country



Note: Spikes represent 95% Confidence Intervals.

Educational Gradients in Housework

We first examine whether education is associated with housework time. Figure 2, left panel, shows little evidence of a clear educational gradient when men and women are pooled together. The estimated differences between educational groups are small, and the confidence intervals overlap zero. In substantive terms, higher education is not associated with a straightforward increase or decrease in housework time across the whole sample. H1a is therefore not supported in this pooled specification.

This overall pattern masks distinct gendered associations. Figure 3, housework panels, shows that higher education is associated with more housework among men but less housework among women. Among men, the high-educated group spends about 22 minutes more per day on housework than the low-educated group, and about 20 minutes more than the medium-educated group. Among women, the pattern runs in the opposite direction: the high-educated group spends about 28 minutes less per day on housework than the low-educated group, and about 25 minutes less than the medium-educated group. This gendered pattern supports H1b.

We then examine whether men's educational gradient in housework changes over time. Figure 4, housework panel, shows that medium- and high-educated men consistently spend more time on housework than low-educated men, but these gaps do not clearly widen across periods. The medium-versus-low gap remains around 5–8 minutes per day, while the high-versus-low gap remains around 10–13 minutes per day. These differences fluctuate modestly rather than following a clear pattern of growth. The model test for whether educational gradients vary by period also does not provide strong evidence of temporal change, $\chi^2(4) = 7.93$, $p = .094$. Overall, men's educational gradient in housework is present but relatively stable over time. H3 is therefore not supported in the pooled analysis.

The pooled pattern, however, conceals country-group differences. Figure 5, housework panel, shows that men's educational gradient in housework develops differently in the Anglophone

and East Asian regions. In the Anglophone countries, the high-versus-low gap is already large in the earliest period, at about 18 minutes per day, and does not increase thereafter. In the East Asian countries, by contrast, the corresponding gap grows from about 4 minutes in the earliest period to about 12 minutes in the most recent period. The medium-versus-low gap follows a similar direction, increasing gradually in East Asia while showing no clear growth in the Anglophone countries. The model test for whether these period patterns differ by country group supports this regional difference, $\chi^2(9) = 114.21$, $p < .001$. Thus, although men's educational gradient in housework is relatively stable in the pooled analysis, it appears earlier in the Anglophone countries and develops later in the East Asian countries. This pattern supports H5.

The corresponding patterns for women provide additional context. Figure 4, housework panel, shows no clear temporal change in women's educational gradients in the pooled analysis, but Figure 6, housework panel, shows that this pooled pattern again masks country-group differences. In the Anglophone countries, higher-educated women consistently spend less time on housework than lower-educated women, although the gap is largest in the earliest period. In the East Asian countries, the pattern is initially reversed: higher-educated women spend more time on housework than lower-educated women, but this positive gradient weakens over time. These supplementary results reinforce the conclusion that educational gradients in housework are strongly gendered and develop differently across country groups.

Educational Gradients in Childcare

We next turn to childcare. Figure 2, right panel, shows a clearer educational gradient than for housework: higher-educated parents spend more time on childcare than lower-educated parents. The high-versus-low gap is about 20 minutes per day, while the high-versus-medium gap is about 12 minutes. The medium-versus-low contrast is smaller (about 8 minutes) and is only marginally significant, but points in the same positive direction. These results support H2a, which predicted a positive association between education and childcare time.

The positive childcare gradient is especially pronounced among women. Figure 3, childcare panel, shows that highly educated women spend about 31 minutes more per day on childcare than low-educated women, and about 18 minutes more than medium-educated women. Among men, the corresponding gaps are smaller in magnitude and statistically insignificant. The model test for whether educational gradients differ by gender supports this pattern, $\chi^2(2) = 534.22$, $p < .001$. These findings support H2b: the positive association between education and childcare time is stronger among women than among men.

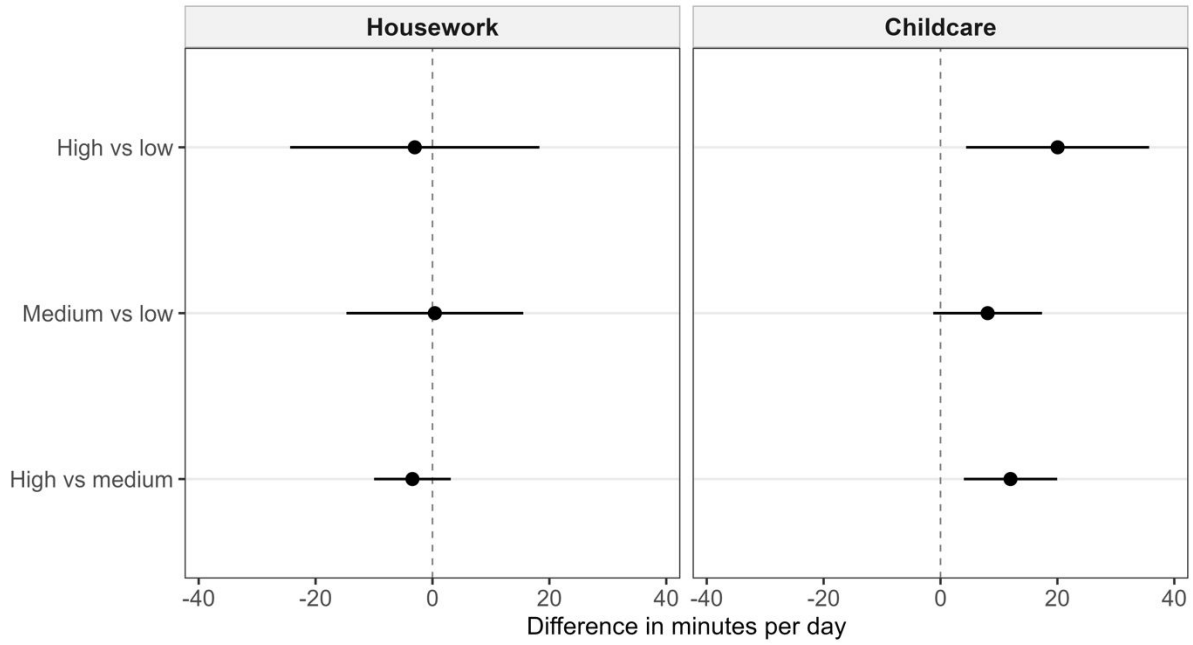
We then examine whether men's educational gradient in childcare changes over time. Figure 4, childcare panel, shows that the gradient is weak in the earliest period but becomes clearly visible by the second period. Highly educated men spend about 6 minutes more per day on childcare than low-educated men in the first period, but this gap increases to about 18 minutes in the second period and about 21 minutes in the third period. The medium-versus-low and high-versus-medium gaps show a similar pattern of growth between the first and second periods, followed by relative stability. The model test for whether men's educational gradients vary by period supports this temporal change, $\chi^2(4) = 136.93$, $p < .001$. Hypothesis 4 is therefore supported.

Finally, we examine whether this temporal pattern differs by country group. Figure 5, childcare panel, shows that men's childcare gradients emerge earlier in the Anglophone countries and later in the East Asian countries. In the Anglophone countries, the high-versus-low gap is already about 12 minutes per day in the earliest period and rises to about 31 minutes in the later

periods. In the East Asian countries, by contrast, the high-versus-low contrast is slightly negative in the earliest period, but becomes positive in the second period and increases further in the third period. The model test for whether these period patterns differ by country group supports this regional difference, $\chi^2(9) = 40.49$, $p < .001$. These results support Hypothesis 6 by showing that the growth of men's educational gradients in childcare follows different timing in the Anglophone and East Asian country groups.

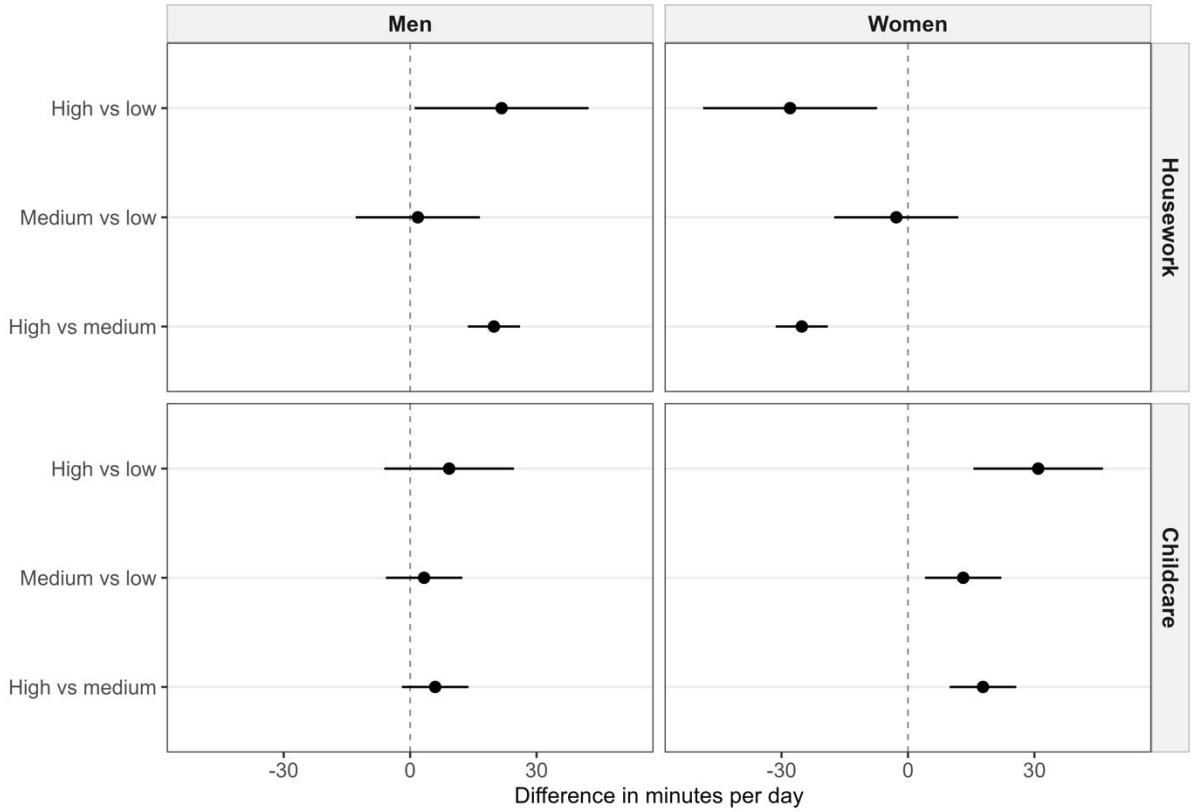
The corresponding patterns for women point in a similar direction. Figure 4, childcare panel, shows that women's educational gradients in childcare also become more pronounced after the earliest period. Figure 6, childcare panel, shows that this temporal pattern differs by country group. In the Anglophone countries, higher-educated women already spend more time on childcare than lower-educated women in the earliest period, and the gap becomes substantially larger in the second and third periods. In the East Asian countries, the early high-versus-low contrast is close to zero, but a positive gradient emerges in the later periods. These supplementary results reinforce the conclusion that educationally stratified childcare investment appears earlier in the Anglophone countries and later in the East Asian countries.

Figure 2. Time Use Differences in Housework and Childcare, by Pairwise Contrasts of Educational Levels



Note: Points represent education-group differences estimated from model-based estimated marginal means. Spikes represent 95% confidence intervals.

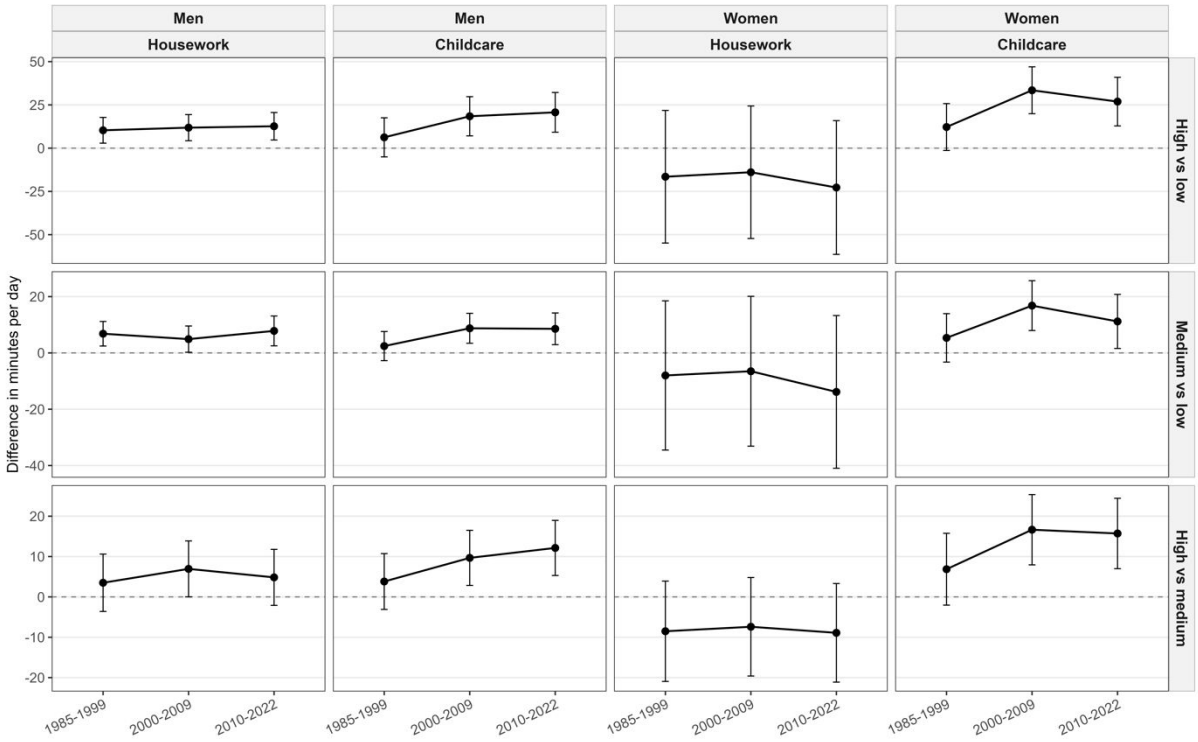
Figure 3. Time Use Differences in Housework and Childcare, by Gender and Pairwise Contrasts of Educational Levels



Note: Points represent education-group differences estimated from model-based estimated marginal means. Spikes represent 95% confidence intervals.

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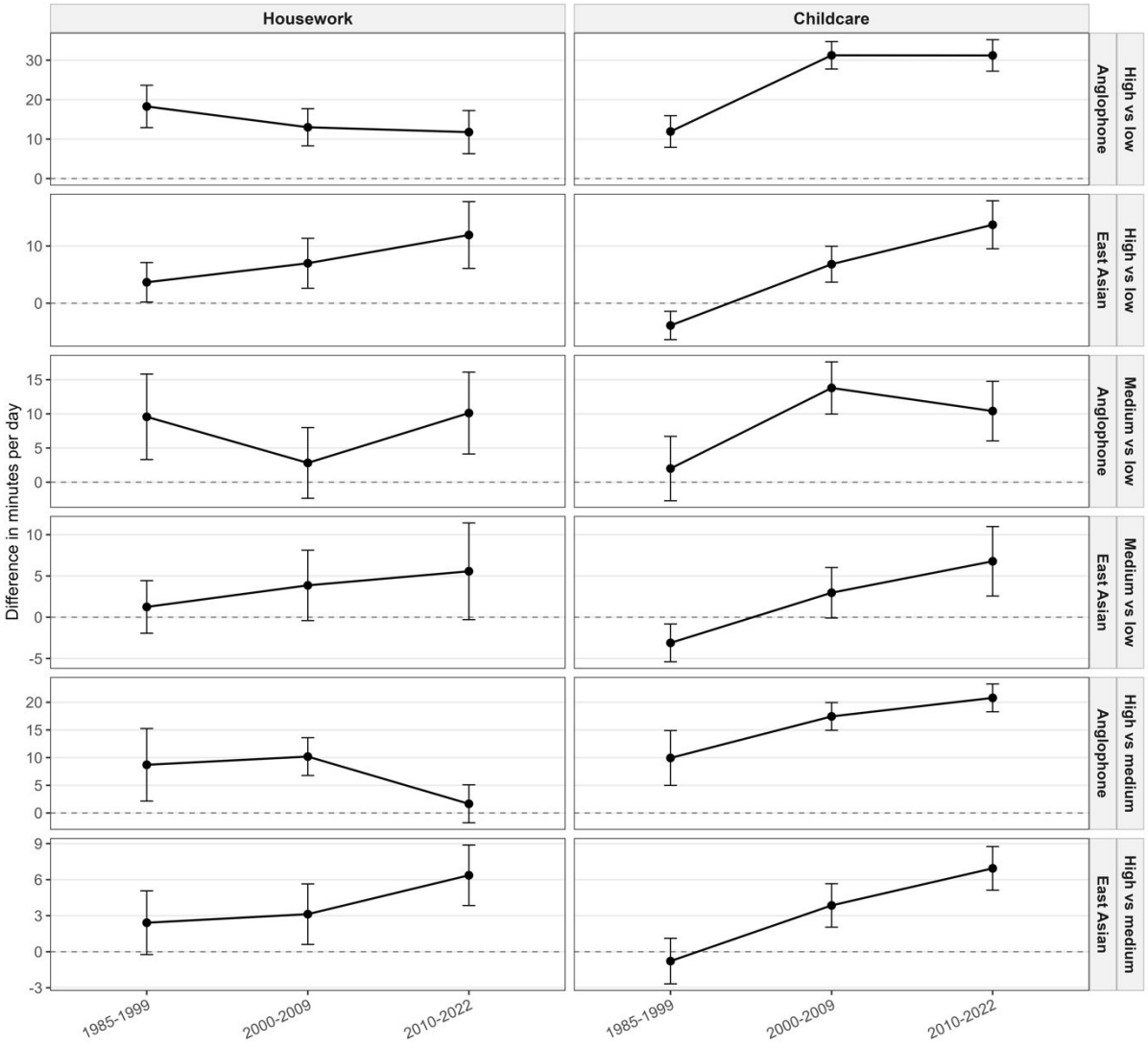
Figure 4. Time Use Differences in Housework and Childcare over Periods, by Gender and Pairwise Contrasts of Educational Levels



Note: Points represent education-group differences estimated from model-based estimated marginal means. Spikes represent 95% confidence intervals.

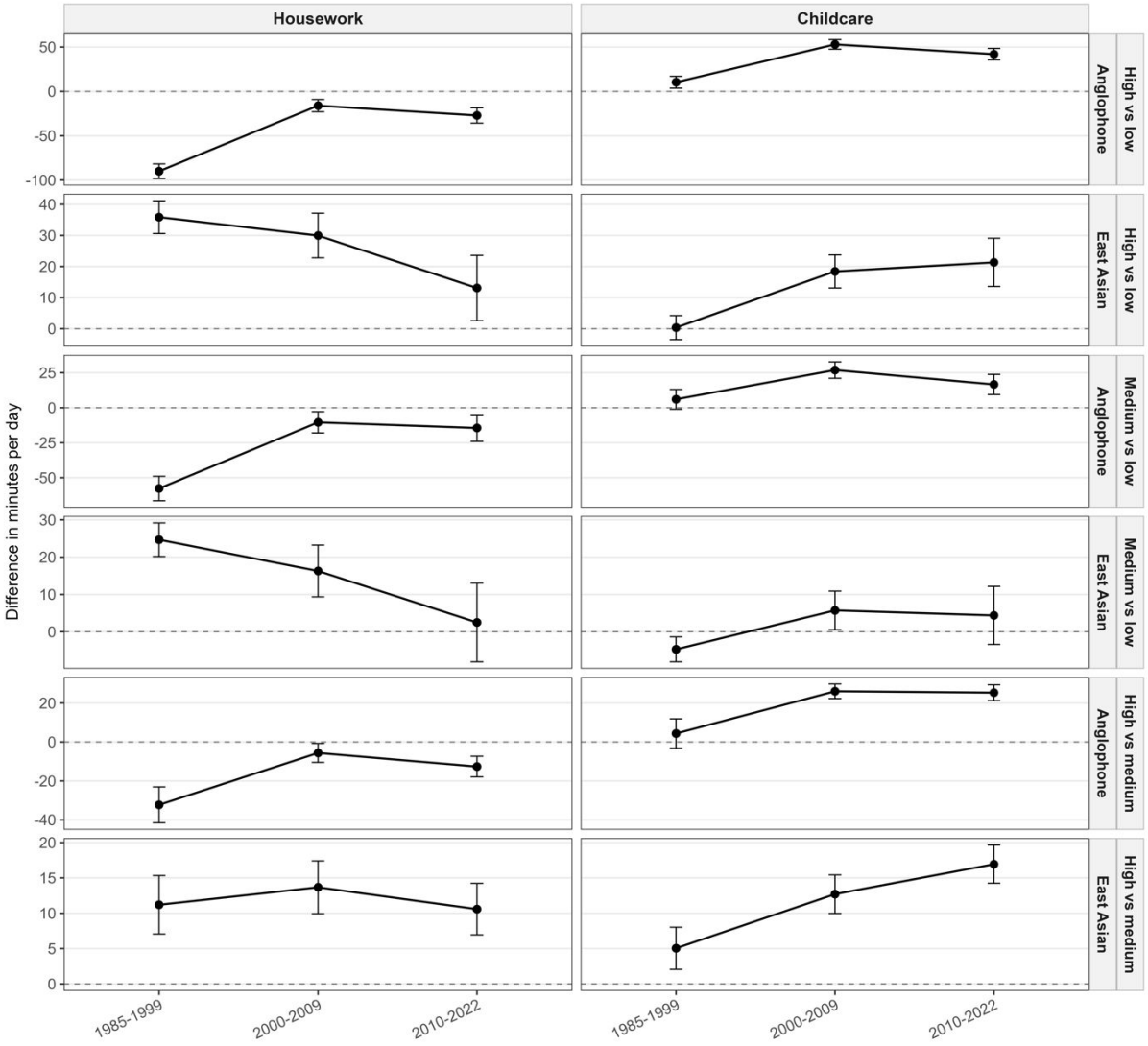
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Figure 5. Men's Time Use Differences in Housework and Childcare over Periods and between Regions, by Pairwise Contrasts of Educational Levels



Note: Points represent education-group differences estimated from model-based estimated marginal means. Spikes represent 95% confidence intervals.

Figure 6. Women's Time Use Differences in Housework and Childcare over Periods and between Regions, by Pairwise Contrasts of Educational Levels



Note: Points represent education-group differences estimated from model-based estimated marginal means. Spikes represent 95% confidence intervals.

Robustness

We conducted four robustness checks to assess the sensitivity of the main findings. First, because the data identify diarists living in households with children rather than parents directly, we re-estimated the analyses using a younger subsample aged 42 or below, the median age in the analytic sample. This restriction reduces the likelihood that reported childcare time reflects care for grandchildren rather than one's own children. The results produce highly consistent patterns with the main analysis (Appendix F). Second, because the education contrasts reported in the main analysis are based on EMMs, we replicated the analyses using average marginal effects (AMEs). The estimates are nearly identical, indicating that the conclusions are not sensitive to this choice of marginal-estimation approach (Appendix G). Third, we re-estimated the core models using age-category dummies instead of continuous age, replacing age with six categories: under 30, 30–34, 35–39, 40–44, 45–49, and 50+. The substantive conclusions remain unchanged (Appendix H). Finally, although our main specifications use pooled

interaction models to test the focal differences in educational gradients directly, we also estimated more flexible models separately by region, gender, and period. These models allow the control-variable associations to vary across analytic groups and produce results that are highly consistent with the main findings (Appendix I).

DISCUSSIONS AND CONCLUSIONS

Educational gradients in unpaid family work matter because they reveal how broader transformations in gender relations and parenting cultures are socially distributed. When education is associated with different patterns of housework and childcare, it should be understood not only as an individual attribute, but as a stratifying axis through which changing domestic practices are unevenly organised. This study contributes to debates on slow and incomplete gender convergence, changing differences, and the social patterning of domestic labour by showing that the relationship between education and family work is gendered, activity-specific, historically changing and contextually patterned (Sullivan, 2010; Kan, Sullivan and Gershuny, 2011; Kan and Laurie, 2018). The findings suggest that education is associated with greater gender convergence in housework, but with larger parental investments in childcare. They also show that educational gradients do not evolve uniformly across periods or between East Asian and Anglophone countries. Family-work change, therefore, should not be understood as a simple movement towards equality, but as an uneven process in which education shapes who participates in changing domestic and parenting practices, when, and in which contexts.

Empirically, this argument is supported by three main findings. First, education is associated with housework and childcare in different ways. For housework, the average association is not significant until gender is accounted: higher education is associated with more housework among men, but less housework among women. For childcare, by contrast, the educational gradient is positive overall and is especially pronounced among women. Second, the educational gradients are not static. Among men, educational gaps in housework remain relatively stable over time, whereas educational gaps in childcare grow, especially from the first to the second period; women's gradients also change over time, particularly for childcare. Third, these temporal patterns vary across country contexts. The Anglophone countries generally show earlier growth followed by stability or narrowing in some gradients, whereas East Asian countries show later or continuing growth, especially in men's educational gradients in housework and childcare.

These findings have two main implications: one for gender convergence in domestic labour, and the other for intergenerational stratification through childcare investment. First, the housework findings speak to debates on gender convergence in domestic labour. Previous research has shown that convergence in women's and men's domestic work has been slow and incomplete, with persistent gender segregation in domestic tasks (Kan, Sullivan and Gershuny, 2011). Our results suggest that education is one axis along which this incomplete convergence is socially organised: higher education is associated with more housework among men but less housework among women, pointing to more gender-convergent housework patterns among the higher educated. At the same time, the temporal patterns caution against a simple diffusion story. Educational gradients in men's housework do not uniformly widen over time, and their evolution differs between East Asian and Anglophone countries. In this sense, the findings extend the "changing differences" perspective by showing that educational gaps in housework may persist, narrow, or grow, depending on historical period and country context (Sullivan, 2010). They also reinforce the broader point that housework is socially structured by gender,

education, employment, and cultural background, rather than reducible to time availability or household efficiency alone (Kan and Laurie, 2018). These inequalities have broader implications beyond domestic time use, because unequal housework and caring burdens are connected to paid-work participation, career progression, financial security, work–life balance, and wellbeing (Warren and Torres, 2025). Education, therefore, helps identify not only whether gender convergence is occurring, but also among whom, where, and under what social conditions.

Second, the childcare findings carry a different implication for intergenerational stratification. Childcare time is not equivalent to child development, but it is an important form of parental investment through which family resources, cultural orientations, and developmental expectations may be transmitted to children. The positive educational gradients in childcare are consistent with research on intensive parenting, which emphasises the moralised expectation that good parenting requires substantial time, attention, and developmental engagement (Hays, 1996; Lareau, 2003; Shirani, Henwood and Coltart, 2012). They also align with broader parenting literature and themes of diverging destinies, which suggest that parental education shapes the resources and practices through which children's opportunities are structured (Bradley and Corwyn, 2002; Davis-Kean et al., 2021; Harding et al., 2015; McLanahan, 2004; Altintas, 2016). From this perspective, the positive educational gradients in childcare suggest that children of higher-educated parents may receive more parental time investment, potentially contributing to intergenerational stratification. The temporal pattern strengthens this implication: because educational gaps in childcare grow over time, inequalities in parental time investment appear not only to persist, but to become more pronounced across periods, consistent with the "changing differences" perspective (Sullivan, 2010).

The regional comparison further qualifies both implications by showing that educational gradients unfold at different stages across contexts. In the Anglophone countries, educational gradients appear to have emerged earlier and then stabilised or narrowed, whereas in East Asian countries, some gradients—especially men's gradients in housework and childcare—continue to grow across later periods. The supplementary analyses for women point in a similar comparative direction. These patterns are consistent with a broad stage-based interpretation of the gender revolution, in which changes in gendered domestic labour and parenting practices unfold earlier in Anglophone countries and later in East Asian countries. At the same time, this should not be read as a mechanically identical pathway across all contexts. Rather, the findings suggest a shared direction of change but context-specific timing and form, unfolding in societies marked by different gender norms, labour-market arrangements, and family-care regimes. Education, in this sense, helps identify the groups through which gender convergence and intensive parenting practices advance first, stabilise, or continue to expand across different societies.

As with any study, our research has certain limitations and leaves room for future studies. First, due to varying survey practices and data availability, we focus on aggregated activities of housework and childcare. Future studies, when focusing on one or certain regions, could examine different types of childcare or housework. We expect that the educational gradients to be more pronounced in routine housework and developmental childcare than in non-routine housework and physical childcare, respectively. Second, our analysis focuses on individual diarists, limiting insight into household bargaining and educational assortative matching. The estimated association between the diarist's own education and time use may partly capture household-level educational composition, including the resources, gender ideologies, outsourcing capacity, and parenting norms associated with the couple as a unit. We therefore

interpret the estimates as individual educational gradients among partnered diarists, rather than as effects of own education net of partner education. Finally, future research could broaden the comparative analysis by including additional countries and diverse regimes beyond East Asian and Anglophone contexts.

In conclusion, this article has examined educational gradients in housework and childcare as a way of understanding how family change is socially distributed. The findings show that education is associated with more gender-convergent patterns of housework, but also with larger parental time investments in childcare. They further show that these educational gradients are not fixed: they evolve across historical periods and differ between East Asian and Anglophone countries. The broader implication is that changes in unpaid family work are simultaneously processes of gender convergence and intergenerational stratification, stratified by education, differentiated by activity type, and conditioned by historical and comparative context. By foregrounding these changing differences, the article shows how education can simultaneously organise movement towards gender convergence in one domain of family life and structure intergenerational stratification in another.

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APPENDICES

Appendix A. Main Effects and Gender Interaction Effects on Housework and Childcare Time

Table A1. Mixed-Effects Linear Regression Predicting Time Use in Housework and Childcare, Gender Interaction Effect

Variable	Housework	Housework	Childcare	Childcare
(Intercept)	113.17***	99.33***	158.71***	166.23***
	(13.15)	(13.33)	(5.29)	(5.23)
Education				
Ref: low-educated				
medium-educated	0.40	1.82	8.06*	3.31
	(6.33)	(6.17)	(3.90)	(3.80)
high-educated	-3.03	21.71*	20.04**	9.25
	(8.93)	(8.64)	(6.56)	(6.44)
Female (Yes=1)	148.99***	174.72***	33.27***	18.89***
	(0.53)	(1.30)	(0.39)	(0.98)
Age	1.30***	1.30***	-1.25***	-1.25***
	(0.04)	(0.04)	(0.03)	(0.03)
Weekday (Yes=1)	-29.83***	-29.85***	-0.64***	-0.63***
	(0.30)	(0.30)	(0.19)	(0.19)
Employment status				
Ref: unemployed				
Part-time	-67.37***	-67.45***	-51.23***	-51.24***
	(0.71)	(0.71)	(0.52)	(0.52)
Full-time	-109.42***	-108.44***	-54.77***	-55.03***
	(0.65)	(0.65)	(0.48)	(0.48)
No. Children	7.13***	7.02***	2.57***	2.60***
	(0.27)	(0.27)	(0.20)	(0.20)
Age of youngest kid				
Ref: aged 0-4				
Aged 5-12	11.03***	10.81***	-71.26***	-71.21***
	(0.58)	(0.58)	(0.43)	(0.43)
Aged 13-17	10.66***	10.01***	-80.52***	-80.32***
	(0.77)	(0.76)	(0.57)	(0.57)
Period				
Ref: first				
Second	-11.92***	-11.18***	10.22***	9.97***
	(0.60)	(0.60)	(0.44)	(0.44)
Third	-15.41***	-14.13***	19.94***	19.54***
	(0.62)	(0.62)	(0.46)	(0.46)
Medium-educated × Female		-4.60**		9.79***
		(1.44)		(1.07)

For Review Only

High-educated × Female		-49.68***		21.65***
		(1.42)		(1.06)
AIC	6566200.26	6563391.61	6139063.12	6138511.54
BIC	6566434.59	6563648.26	6139297.45	6138768.19
Log Likelihood	-3283079.13	-3281672.80	-3069510.56	-3069232.77
Num. obs.	518543	518543	518543	518543
Num. groups: diarist	302258	302258	302258	302258
Num. groups: country	5	5	5	5
Var: diarist (Intercept)	8875.35	8747.72	5744.24	5730.96
Var: country (Intercept)	849.00	870.14	131.27	126.88
Var: country medium-educated	196.89	183.99	73.38	68.25
Var: country high-educated	394.18	366.27	212.30	203.19
Cov: country (Intercept) medium-educated	-331.94	-334.41	-25.53	-20.10
Cov: country (Intercept) high-educated	-499.12	-478.33	-90.43	-86.40
Cov: country medium-educated high-educated	277.37	259.54	115.71	109.34
Var: Residual	3927.59	3926.68	1330.27	1330.14

Note: Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001
Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

Table A2. Time Use Differences in Housework between Educational Levels

Contrast	**Estimate**	**SE**	**95% CI (LCL, UCL)**	**z**	**p-value**
High-educated vs low-educated	−3.03	8.93	−23.95, 17.90	−0.34	0.9386
Medium-educated vs low-educated	0.41	6.33	−14.44, 15.20	0.06	0.9978
High-educated vs medium-educated	−3.43	2.74	−9.86, 3.00	−1.25	0.4235

Note: Results are averaged over the listed covariates; degrees-of-freedom method is asymptotic; confidence intervals and p-values are Tukey-adjusted.

Table A3. Time Use Differences in Housework between Educational Levels by Gender

Contrast	**Estimate**	**SE**	**95% CI (LCL, UCL)**	**z**	**p-value**
Men					
High-educated vs low-educated	21.71	8.66	1.41, 42.00	2.51	0.0327
Medium-educated vs low-educated	1.82	6.18	−12.67, 16.31	0.29	0.9532
High-educated vs medium-educated	19.88	2.60	13.78, 25.98	7.64	<0.0001

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Women					
High-educated vs low-educated	−27.97	8.66	−48.27, −7.68	−3.23	0.0035
Medium-educated vs low-educated	−2.77	6.18	−17.25, 11.70	−0.45	0.8948
High-educated vs medium-educated	−25.20	2.60	−31.28, −19.11	−9.71	<0.0001

Note: Results are averaged over the levels of weekday, employment, age of youngest kid, and period
Degrees-of-freedom method: asymptotic
Conf-level adjustment: Tukey method for comparing a family of 3 estimates
P-value adjustment: Tukey method for comparing a family of 3 estimates

Table A4. Time Use Differences in Childcare between Educational Levels

Contrast	**Estimate**	**SE**	**95% CI (LCL, UCL)**	**z**	**p-value**
High-educated vs low-educated	20.04	6.56	4.66, 35.40	3.05	0.0064
Medium-educated vs low-educated	8.06	3.90	−1.08, 17.20	2.07	0.0967
High-educated vs medium-educated	11.98	3.34	4.14, 19.80	3.58	0.0010

Note: Results are averaged over the levels of sex, weekday, employment, age of youngest kid, and period
Degrees-of-freedom method: asymptotic
Conf-level adjustment: Tukey method for comparing a family of 3 estimates
P-value adjustment: Tukey method for comparing a family of 3 estimates

Table A5. Time Use Differences in Childcare between Educational Levels by Gender

Contrast	**Estimate**	**SE**	**95% CI (LCL, UCL)**	**z**	**p-value**
Men					
High-educated vs low-educated	9.25	6.44	−5.85, 24.35	1.44	0.3221
Medium-educated vs low-educated	3.31	3.80	−5.59, 12.21	0.87	0.6583
High-educated vs medium-educated	5.94	3.31	−1.82, 13.71	1.79	0.1717
Women					
High-educated vs low-educated	30.90	6.44	15.80, 46.00	4.80	<0.0001
Medium-educated vs low-educated	13.10	3.79	4.21, 22.00	3.45	0.0016
High-educated vs medium-educated	17.80	3.31	10.04, 25.56	5.38	<0.0001

Note: Results are averaged over the levels of weekday, employment, age of youngest kid, and period
Degrees-of-freedom method: asymptotic
Conf-level adjustment: Tukey method for comparing a family of 3 estimates
P-value adjustment: Tukey method for comparing a family of 3 estimates

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Appendix B. Educational Gradients of Housework Over Periods

Table B1. Type III Wald Chi-Square Tests for Educational Gradients of Housework Over Periods

Effect	χ^2	df	p-value	Sig.
Sample: Men				
Intercept	77.93	1	< 0.001	***
Education	18.28	2	< 0.001	***
Period	28.14	2	< 0.001	***
Age	61.96	1	< 0.001	***
Weekday	17990.30	1	< 0.001	***
Employment status	2197.94	2	< 0.001	***
Number of children	7.20	1	0.007	**
Age of youngest child	15.18	2	< 0.001	***
Education × Period	7.94	4	0.094	.
Sample: Women				
Intercept	226.56	1	< 0.001	***
Education	7.15	2	0.028	*
Period	118.43	2	< 0.001	***
Age	1420.50	1	< 0.001	***
Weekday	1337.76	1	< 0.001	***
Employment status	21287.00	2	< 0.001	***
Number of children	931.76	1	< 0.001	***
Age of youngest child	629.00	2	< 0.001	***
Education × Period	6.54	4	0.162	

Note: Significance codes: *** p < .001; ** p < .01; * p < .05; · p < .10.
Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

Table B2. Estimated Educational Gaps in Housework by Period

Contrast	Estimate	SE	95% CI (LCL, UCL)	z	p-value
Men					
Period 1					
High-educated vs low-educated	10.32	3.11	4.22, 16.42	3.31	0.0009
Medium-educated vs low-educated	6.82	1.83	3.23, 10.40	3.73	0.0002
High-educated vs medium-educated	3.50	2.98	−2.33, 9.34	1.18	0.2393
Period 2					
High-educated vs low-educated	11.84	3.17	5.64, 18.05	3.74	0.0002
Medium-educated vs low-educated	4.90	1.95	1.07, 8.73	2.51	0.0121
High-educated vs medium-educated	6.94	2.90	1.25, 12.63	2.39	0.0168

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Period 3					
High-educated vs low-educated	12.65	3.33	6.14, 19.17	3.81	0.0001
Medium-educated vs low-educated	7.81	2.22	3.46, 12.17	3.52	0.0004
High-educated vs medium-educated	4.84	2.91	−0.86, 10.53	1.67	0.0958
Women					
Period 1					
High-educated vs low-educated	−16.52	16.00	−48.00, 14.93	−1.03	0.3033
Medium-educated vs low-educated	−8.01	11.10	−29.80, 13.75	−0.72	0.4708
High-educated vs medium-educated	−8.51	5.21	−18.70, 1.69	−1.64	0.1021
Period 2					
High-educated vs low-educated	−13.91	16.00	−45.30, 17.51	−0.87	0.3856
Medium-educated vs low-educated	−6.51	11.10	−28.40, 15.33	−0.58	0.5592
High-educated vs medium-educated	−7.40	5.11	−17.40, 2.61	−1.45	0.1475
Period 3					
High-educated vs low-educated	−22.75	16.20	−54.50, 8.97	−1.41	0.1598
Medium-educated vs low-educated	−13.85	11.40	−36.10, 8.41	−1.22	0.2228
High-educated vs medium-educated	−8.90	5.12	−18.90, 1.13	−1.74	0.0819

Note: Results are averaged over the listed covariates; degrees-of-freedom method is asymptotic; confidence intervals and p-values are Tukey-adjusted.

Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

Table B3. Changes in Educational Gaps in Housework Across Periods, Men Sample

Contrast	**Period Comparison**	**Estimate**	**SE**	**95% CI (LCL, UCL)**	**z**	**p-value**
High-educated vs low-educated						
	First − Second	−1.53	1.84	−5.84, 2.79	−0.83	0.6857
	First − Third	−2.34	2.10	−7.26, 2.59	−1.11	0.5065
	Second − Third	−0.81	2.14	−5.83, 4.21	−0.38	0.9241
Medium-educated vs low-educated						
	First − Second	1.91	1.78	−2.25, 6.08	1.08	0.5288
	First − Third	−1.00	2.07	−5.86, 3.86	−0.48	0.8799
	Second − Third	−2.91	2.19	−8.05, 2.22	−1.33	0.3784
High-educated vs medium-educated						
	First − Second	−3.44	1.34	−6.58, −0.30	−2.57	0.0274

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	First − Third	−1.34	1.34	−4.48, 1.81	−1.00	0.5796
	Second − Third	2.10	1.16	−0.62, 4.83	1.81	0.1662

Note: Results are averaged over the levels of weekday, employment, and age of youngest kid
Degrees-of-freedom method: asymptotic
Conf-level adjustment: Tukey method for comparing a family of 3 estimates
P-value adjustment: Tukey method for comparing a family of 3 estimates
Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

Table B4. Changes in Educational Gaps in Housework Across Periods, Women Sample

Contrast	**Period Comparison**	**Estimate**	**SE**	**95% CI (LCL, UCL)**	**z**	**p-value**
High-educated vs low-educated						
	First − Second	−2.61	3.11	−9.89, 4.68	−0.84	0.6789
	First − Third	6.23	3.71	−2.48, 14.93	1.68	0.2141
	Second − Third	8.84	3.53	0.56, 17.11	2.50	0.0331
Medium-educated vs low-educated						
	First − Second	−1.50	2.88	−8.25, 5.26	−0.52	0.8619
	First − Third	5.84	3.57	−2.53, 14.21	1.64	0.2306
	Second − Third	7.34	3.60	−1.09, 15.77	2.04	0.1028
High-educated vs medium-educated						
	First − Second	−1.11	1.95	−5.69, 3.47	−0.57	0.8368
	First − Third	0.39	1.97	−4.22, 5.00	0.20	0.9788
	Second − Third	1.50	1.66	−2.40, 5.40	0.90	0.6397

Note: Results are averaged over the listed covariates; degrees-of-freedom method is asymptotic; confidence intervals and p-values are Tukey-adjusted.
Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

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Appendix C. Educational Gradients of Childcare Over Periods

Table C1. Type III Wald Chi-Square Tests for Educational Gradients of Childcare Over Periods

Effect	χ^2	df	p-value	Sig.
Sample: Men				
Intercept	495.72	1	< 0.001	***
Education	1.78	2	0.410	
Period	16.63	2	< 0.001	***
Age	69.87	1	< 0.001	***
Weekday	4489.10	1	< 0.001	***
Employment status	999.52	2	< 0.001	***
Number of children	172.57	1	< 0.001	***
Age of youngest child	7290.04	2	< 0.001	***
Education × Period	139.67	4	< 0.001	***
Sample: Women				
Intercept	1693.90	1	< 0.001	***
Education	4.70	2	0.096	.
Period	62.40	2	< 0.001	***
Age	2053.82	1	< 0.001	***
Weekday	1905.84	1	< 0.001	***
Employment status	7132.73	2	< 0.001	***
Number of children	19.73	1	< 0.001	***
Age of youngest child	25753.66	2	< 0.001	***
Education × Period	97.45	4	< 0.001	***

Note: Significance codes: *** p < .001; ** p < .01; * p < .05; p < .10.

Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

Table C2. Estimated Educational Gaps in Childcare by Period

Contrast	Estimate	SE	95% CI (LCL, UCL)	z	p-value
Men					
Period 1					
High-educated vs low-educated	6.24	4.73	−3.03, 15.51	1.32	0.1868
Medium-educated vs low-educated	2.43	2.17	−1.82, 6.68	1.12	0.2628
High-educated vs medium-educated	3.82	2.89	−1.86, 9.49	1.32	0.1874
Period 2					
High-educated vs low-educated	18.42	4.74	9.13, 27.71	3.89	0.0001
Medium-educated vs low-educated	8.75	2.22	4.39, 13.11	3.93	0.0001
High-educated vs medium-educated	9.67	2.86	4.07, 15.27	3.39	0.0007

For Review Only

Period 3					
High-educated vs low-educated	20.69	4.81	11.27, 30.11	4.31	<0.0001
Medium-educated vs low-educated	8.56	2.36	3.94, 13.18	3.63	0.0003
High-educated vs medium-educated	12.13	2.86	6.53, 17.74	4.24	<0.0001
Women					
Period 1					
High-educated vs low-educated	12.21	5.67	1.09, 23.30	2.15	0.0314
Medium-educated vs low-educated	5.34	3.60	−1.72, 12.40	1.48	0.1380
High-educated vs medium-educated	6.86	3.73	−0.44, 14.20	1.84	0.0656
Period 2					
High-educated vs low-educated	33.45	5.67	22.34, 44.60	5.90	<0.0001
Medium-educated vs low-educated	16.80	3.71	9.54, 24.10	4.53	<0.0001
High-educated vs medium-educated	16.65	3.65	9.50, 23.80	4.57	<0.0001
Period 3					
High-educated vs low-educated	26.90	5.89	15.36, 38.40	4.57	<0.0001
Medium-educated vs low-educated	11.18	4.02	3.30, 19.10	2.78	0.0054
High-educated vs medium-educated	15.71	3.65	8.55, 22.90	4.30	<0.0001

Note: Results are averaged over the listed covariates; degrees-of-freedom method is asymptotic; confidence intervals and p-values are Tukey-adjusted.

Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

Table C3. Changes in Educational Gaps in Childcare Across Periods, Men Sample

Contrast	**Period Comparison**	**Estimate**	**SE**	**95% CI (LCL, UCL)**	**z**	**p-value**
High-educated vs low-educated						
	First − Second	−12.18	1.37	−15.38, −8.97	−8.90	<0.0001
	First − Third	−14.45	1.56	−18.10, −10.79	−9.26	<0.0001
	Second − Third	−2.27	1.56	−5.92, 1.38	−1.46	0.3114
Medium-educated vs low-educated						
	First − Second	−6.32	1.31	−9.38, −3.26	−4.84	<0.0001
	First − Third	−6.13	1.52	−9.70, −2.57	−4.03	0.0002
	Second − Third	0.19	1.59	−3.54, 3.92	0.12	0.9923
High-educated vs medium-educated						
	First − Second	−5.86	0.97	−8.12, −3.59	−6.07	<0.0001

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	First − Third	−8.32	0.97	−10.59, −6.04	−8.57	<0.0001
	Second − Third	−2.46	0.84	−4.43, −0.49	−2.92	0.0098

Note:
Results are averaged over the levels of weekday, employment, and age of youngest kid
Degrees-of-freedom method: asymptotic
Conf-level adjustment: Tukey method for comparing a family of 3 estimates
P-value adjustment: Tukey method for comparing a family of 3 estimates
Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

Table C4. Changes in Educational Gaps in Childcare Across Periods, Women Sample

Contrast	**Period Comparison**	**Estimate**	**SE**	**95% CI (LCL, UCL)**	**z**	**p-value**
High-educated vs low-educated						
	First − Second	−21.24	2.30	−26.63, −15.85	−9.24	<0.0001
	First − Third	−14.69	2.73	−21.08, −8.30	−5.39	<0.0001
	Second − Third	6.55	2.65	0.34, 12.76	2.47	0.0358
Medium-educated vs low-educated						
	First − Second	−11.45	2.11	−16.40, −6.51	−5.43	<0.0001
	First − Third	−5.84	2.60	−11.93, 0.25	−2.25	0.0634
	Second − Third	5.62	2.70	−0.71, 11.94	2.08	0.0936
High-educated vs medium-educated						
	First − Second	−9.79	1.46	−13.22, −6.35	−6.68	<0.0001
	First − Third	−8.85	1.48	−12.32, −5.38	−5.98	<0.0001
	Second − Third	0.93	1.25	−2.01, 3.87	0.74	0.7370

Note: Results are averaged over the listed covariates; degrees-of-freedom method is asymptotic; confidence intervals and p-values are Tukey-adjusted.
Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

For Review Only

Appendix D. Educational Gradients of Housework Over Periods between Regions

Table D1. Type III Wald Chi-Square Tests for Educational Gradients of Housework Over Periods and Between Regions

Effect	χ^2	df	p-value	Sig.
Sample: Men				
Intercept	1470.17	1	< 0.001	***
Education	7.60	2	0.022	*
Period	5.21	2	0.074	.
Region	1248.44	1	< 0.001	***
Age	60.67	1	< 0.001	***
Weekday	17811.60	1	< 0.001	***
Employment status	2235.60	2	< 0.001	***
Number of children	0.72	1	0.395	
Age of youngest child	19.23	2	< 0.001	***
Education × Period	13.46	4	0.009	**
Education × Region	30.20	2	< 0.001	***
Period × Region	0.73	2	0.696	
Education × Period × Region	34.05	4	< 0.001	***
Sample: Women				
Intercept	3913.90	1	< 0.001	***
Education	274.66	2	< 0.001	***
Period	30.17	2	< 0.001	***
Region	800.60	1	< 0.001	***
Age	1602.70	1	< 0.001	***
Weekday	1400.66	1	< 0.001	***
Employment status	21055.40	2	< 0.001	***
Number of children	1296.69	1	< 0.001	***
Age of youngest child	622.91	2	< 0.001	***
Education × Period	26.81	4	< 0.001	***
Education × Region	981.28	2	< 0.001	***
Period × Region	432.83	2	< 0.001	***
Education × Period × Region	242.97	4	< 0.001	***

Note: Significance codes: *** p < .001; ** p < .01; * p < .05; p < .10.

Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

Table D2. Within-Cell Educational Gaps in Housework by Region and Period

Period	Contrast	Estimate	SE	95% CI (LCL, UCL)	z	p-value
Men						
Anglophone						
First	High-educated vs low-educated	18.28	2.25	13.87, 22.68	8.13	<0.0001

For Review Only

	Medium-educated vs low-educated	9.57	2.62	4.43, 14.71	3.65	0.0003
	High-educated vs medium-educated	8.71	2.75	3.33, 14.09	3.17	0.0015
Second	High-educated vs low-educated	13.00	1.97	9.14, 16.87	6.59	<0.0001
	Medium-educated vs low-educated	2.82	2.17	−1.44, 7.07	1.30	0.1943
	High-educated vs medium-educated	10.19	1.43	7.38, 12.99	7.12	<0.0001
Third	High-educated vs low-educated	11.77	2.29	7.28, 16.26	5.14	<0.0001
	Medium-educated vs low-educated	10.12	2.51	5.20, 15.03	4.03	0.0001
	High-educated vs medium-educated	1.65	1.44	−1.17, 4.47	1.15	0.2510
East Asian						
First	High-educated vs low-educated	3.66	1.45	0.83, 6.49	2.53	0.0113
	Medium-educated vs low-educated	1.25	1.33	−1.37, 3.86	0.94	0.3492
	High-educated vs medium-educated	2.41	1.11	0.24, 4.59	2.17	0.0298
Second	High-educated vs low-educated	6.98	1.83	3.40, 10.57	3.82	0.0001
	Medium-educated vs low-educated	3.86	1.79	0.36, 7.36	2.16	0.0307
	High-educated vs medium-educated	3.13	1.06	1.06, 5.19	2.96	0.0030
Third	High-educated vs low-educated	11.93	2.44	7.14, 16.72	4.88	<0.0001
	Medium-educated vs low-educated	5.56	2.45	0.76, 10.37	2.27	0.0233
	High-educated vs medium-educated	6.36	1.05	4.30, 8.43	6.04	<0.0001
Women						
Anglophone						
First	High-educated vs low-educated	−89.98	3.47	−96.78, −83.19	−25.96	<0.0001
	Medium-educated vs low-educated	−57.68	3.65	−64.84, −50.52	−15.79	<0.0001
	High-educated vs medium-educated	−32.30	3.87	−39.88, −24.73	−8.36	<0.0001
Second	High-educated vs low-educated	−16.05	2.89	−21.71, −10.39	−5.56	<0.0001
	Medium-educated vs low-educated	−10.42	3.18	−16.65, −4.19	−3.28	0.0010

For Review Only

	High-educated vs medium-educated	−5.63	2.04	−9.63, −1.63	−2.76	0.0058
Third	High-educated vs low-educated	−27.08	3.60	−34.14, −20.01	−7.51	<0.0001
	Medium-educated vs low-educated	−14.45	4.00	−22.28, −6.61	−3.62	0.0003
	High-educated vs medium-educated	−12.63	2.22	−16.99, −8.27	−5.68	<0.0001
East Asian						
First	High-educated vs low-educated	35.87	2.21	31.54, 40.20	16.24	<0.0001
	Medium-educated vs low-educated	24.67	1.88	20.98, 28.36	13.10	<0.0001
	High-educated vs medium-educated	11.20	1.73	7.81, 14.59	6.47	<0.0001
Second	High-educated vs low-educated	29.96	3.00	24.07, 35.85	9.97	<0.0001
	Medium-educated vs low-educated	16.29	2.91	10.59, 21.99	5.61	<0.0001
	High-educated vs medium-educated	13.67	1.57	10.60, 16.74	8.74	<0.0001
Third	High-educated vs low-educated	13.09	4.40	4.46, 21.71	2.97	0.0029
	Medium-educated vs low-educated	2.50	4.41	−6.15, 11.15	0.57	0.5706
	High-educated vs medium-educated	10.58	1.52	7.60, 13.57	6.94	<0.0001

Note: Results are averaged over the listed covariates; degrees-of-freedom method is asymptotic; confidence intervals and p-values are Tukey-adjusted.

Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

Table D3. Changes in Educational Gaps in Housework Across Periods by Region, Men Sample

Contrast	**Period Comparison**	**Estimate**	**SE**	**95% CI (LCL, UCL)**	**z**	**p-value**
Anglophone						
High-educated vs low-educated						
	First − Second	5.271	2.99	−1.73, 12.28	1.76	0.1819
	First − Third	6.508	3.21	−1.01, 14.02	2.03	0.1053
	Second − Third	1.236	3.02	−5.83, 8.30	0.41	0.9115
Medium-educated vs low-educated						
	First − Second	6.751	3.40	−1.23, 14.73	1.98	0.1162
	First − Third	−0.548	3.63	−9.05, 7.96	−0.15	0.9875
	Second − Third	−7.299	3.32	−15.07, 0.47	−2.20	0.0708
High-educated vs medium-educated						
	First − Second	−1.480	3.09	−8.73, 5.77	−0.48	0.8816
	First − Third	7.056	3.10	−0.21, 14.32	2.28	0.0590
	Second − Third	8.536	2.02	3.79, 13.28	4.22	0.0001

For Review Only

East Asian						
High-educated vs low-educated						
	First − Second	−3.323	2.32	−8.77, 2.12	−1.43	0.3248
	First − Third	−8.266	2.84	−14.91, −1.62	−2.92	0.0100
	Second − Third	−4.943	3.04	−12.08, 2.19	−1.62	0.2357
Medium-educated vs low-educated						
	First − Second	−2.611	2.22	−7.82, 2.60	−1.17	0.4688
	First − Third	−4.316	2.79	−10.86, 2.23	−1.55	0.2695
	Second − Third	−1.706	3.03	−8.81, 5.40	−0.56	0.8397
High-educated vs medium-educated						
	First − Second	−0.713	1.53	−4.30, 2.87	−0.47	0.8872
	First − Third	−3.950	1.53	−7.53, −0.37	−2.59	0.0264
	Second − Third	−3.237	1.49	−6.73, 0.26	−2.17	0.0759

Note:
Results are averaged over the levels of weekday, employment, and age of youngest kid
Degrees-of-freedom method: asymptotic
Conf-level adjustment: Tukey method for comparing a family of 3 estimates
P-value adjustment: Tukey method for comparing a family of 3 estimates
Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

Table D4. Changes in Educational Gaps in Housework Across Periods by Region, Women Sample

Contrast	**Period Comparison**	**Estimate**	**SE**	**95% CI (LCL, UCL)**	**z**	**p-value**
Anglophone High-educated vs low-educated						
	First − Second	−73.93	4.50	−84.48, −63.38	−16.43	<0.0001
	First − Third	−62.90	4.99	−74.60, −51.21	−12.61	<0.0001
	Second − Third	11.03	4.60	0.25, 21.80	2.40	0.0435
Medium-educated vs low-educated						
	First − Second	−47.26	4.84	−58.60, −35.91	−9.76	<0.0001
	First − Third	−43.23	5.41	−55.92, −30.55	−7.99	<0.0001
	Second − Third	4.02	5.10	−7.93, 15.97	0.79	0.7097
High-educated vs medium-educated						
	First − Second	−26.68	4.37	−36.91, −16.44	−6.11	<0.0001
	First − Third	−19.67	4.46	−30.11, −9.23	−4.42	<0.0001
	Second − Third	7.01	3.01	−0.05, 14.06	2.33	0.0521
East Asian High-educated vs low-educated						
	First − Second	5.91	3.71	−2.80, 14.61	1.59	0.2495
	First − Third	22.78	4.93	11.24, 34.33	4.63	<0.0001
	Second − Third	16.88	5.33	4.38, 29.37	3.17	0.0044

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Medium-educated vs low-educated						
	First − Second	8.38	3.46	0.28, 16.48	2.43	0.0405
	First − Third	22.17	4.80	10.91, 33.43	4.62	<0.0001
	Second − Third	13.79	5.29	1.40, 26.18	2.61	0.0247
High-educated vs medium-educated						
	First − Second	−2.47	2.33	−7.93, 2.98	−1.06	0.5371
	First − Third	0.61	2.30	−4.78, 6.01	0.27	0.9615
	Second − Third	3.09	2.18	−2.02, 8.20	1.42	0.3325

Note: Results are averaged over the listed covariates; degrees-of-freedom method is asymptotic; confidence intervals and p-values are Tukey-adjusted.

Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

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Appendix E. Educational Gradients of Childcare Over Periods between Regions

Table E1. Type III Wald Chi-Square Tests for Educational Gradients of Childcare Over Periods and Between Regions

Effect	χ^2	df	p-value	Sig.
Sample: Men				
Intercept	2342.79	1	< 0.001	***
Education	14.91	2	< 0.001	**
Period	3.33	2	0.189	
Region	157.90	1	< 0.001	***
Age	71.25	1	< 0.001	***
Weekday	4437.79	1	< 0.001	***
Employment status	1037.25	2	< 0.001	***
Number of children	130.57	1	< 0.001	***
Age of youngest child	7308.11	2	< 0.001	***
Education × Period	107.82	4	< 0.001	***
Education × Region	66.08	2	< 0.001	***
Period × Region	2.58	2	0.275	
Education × Period × Region	11.15	4	0.025	*
Sample: Women				
Intercept	12809.28	1	< 0.001	***
Education	22.20	2	< 0.001	***
Period	33.13	2	< 0.001	***
Region	81.97	1	< 0.001	***
Age	2174.99	1	< 0.001	***
Weekday	1988.21	1	< 0.001	***
Employment status	7328.65	2	< 0.001	***
Number of children	4.33	1	0.038	*
Age of youngest child	25562.49	2	< 0.001	***
Education × Period	85.00	4	< 0.001	***
Education × Region	13.98	2	< 0.001	**
Period × Region	105.56	2	< 0.001	***
Education × Period × Region	32.52	4	< 0.001	***

Note: Significance codes: *** p < .001; ** p < .01; * p < .05; p < .10.
Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

Table E2. Within-Cell Educational Gaps in Childcare by Region and Period

Period	Contrast	Estimate	SE	95% CI (LCL, UCL)	z	p-value
Men						
Anglophone						
First	High-educated vs low-educated	11.94	1.68	8.64, 15.23	7.10	<0.0001

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	Medium-educated vs low-educated	1.99	1.97	−1.87, 5.86	1.01	0.3122
	High-educated vs medium-educated	9.94	2.07	5.88, 14.00	4.80	<0.0001
Second	High-educated vs low-educated	31.24	1.45	28.39, 34.09	21.48	<0.0001
	Medium-educated vs low-educated	13.80	1.60	10.66, 16.93	8.63	<0.0001
	High-educated vs medium-educated	17.45	1.05	15.39, 19.51	16.61	<0.0001
Third	High-educated vs low-educated	31.21	1.67	27.94, 34.48	18.72	<0.0001
	Medium-educated vs low-educated	10.41	1.83	6.83, 13.99	5.70	<0.0001
	High-educated vs medium-educated	20.80	1.05	18.74, 22.86	19.77	<0.0001
East Asian						
First	High-educated vs low-educated	−3.89	1.04	−5.92, −1.86	−3.75	0.0002
	Medium-educated vs low-educated	−3.11	0.96	−4.99, −1.23	−3.25	0.0012
	High-educated vs medium-educated	−0.78	0.80	−2.34, 0.78	−0.98	0.3269
Second	High-educated vs low-educated	6.82	1.31	4.25, 9.39	5.20	<0.0001
	Medium-educated vs low-educated	2.97	1.28	0.45, 5.48	2.31	0.0207
	High-educated vs medium-educated	3.85	0.76	2.37, 5.34	5.09	<0.0001
Third	High-educated vs low-educated	13.71	1.75	10.28, 17.15	7.82	<0.0001
	Medium-educated vs low-educated	6.77	1.76	3.32, 10.23	3.85	0.0001
	High-educated vs medium-educated	6.94	0.76	5.45, 8.43	9.11	<0.0001
Women						
Anglophone						
First	High-educated vs low-educated	10.37	2.81	4.86, 15.88	3.69	0.0002
	Medium-educated vs low-educated	6.02	2.96	0.23, 11.82	2.04	0.0417
	High-educated vs medium-educated	4.35	3.15	−1.83, 10.53	1.38	0.1680
Second	High-educated vs low-educated	52.97	2.24	48.58, 57.35	23.65	<0.0001
	Medium-educated vs low-educated	26.92	2.46	22.09, 31.75	10.92	<0.0001
	High-educated vs medium-educated	26.05	1.57	22.97, 29.13	16.57	<0.0001
Third	High-educated vs low-educated	41.98	2.71	36.66, 47.30	15.46	<0.0001
	Medium-educated vs low-educated	16.65	3.02	10.74, 22.56	5.52	<0.0001
	High-educated vs medium-educated	25.34	1.69	22.01, 28.66	14.95	<0.0001
East Asian						

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First	High-educated vs low-educated	0.34	1.62	−2.84, 3.52	0.21	0.8327
	Medium-educated vs low-educated	−4.70	1.40	−7.44, −1.97	−3.37	0.0008
	High-educated vs medium-educated	5.05	1.25	2.60, 7.49	4.04	0.0001
Second	High-educated vs low-educated	18.42	2.23	14.05, 22.79	8.25	<0.0001
	Medium-educated vs low-educated	5.72	2.17	1.48, 9.97	2.64	0.0083
	High-educated vs medium-educated	12.70	1.14	10.46, 14.94	11.12	<0.0001
Third	High-educated vs low-educated	21.33	3.25	14.96, 27.70	6.56	<0.0001
	Medium-educated vs low-educated	4.39	3.26	−2.01, 10.78	1.34	0.1789
	High-educated vs medium-educated	16.94	1.13	14.72, 19.17	14.94	<0.0001

Note: Results are averaged over the listed covariates; degrees-of-freedom method is asymptotic; confidence intervals and p-values are Tukey-adjusted.

Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

Table E3. Changes in Educational Gaps in Childcare Across Periods by Region, Men Sample

Contrast	**Period Comparison**	**Estimate**	**SE**	**95% CI (LCL, UCL)**	**z**	**p-value**
Anglophone						
High-educated vs low-educated						
	First − Second	−19.308	2.22	−24.51, −14.10	−8.69	<0.0001
	First − Third	−19.272	2.37	−24.82, −13.73	−8.15	<0.0001
	Second − Third	0.036	2.21	−5.13, 5.21	0.02	0.9999
Medium-educated vs low-educated						
	First − Second	−11.802	2.54	−17.75, −5.85	−4.65	<0.0001
	First − Third	−8.416	2.69	−14.72, −2.11	−3.13	0.0050
	Second − Third	3.386	2.43	−2.30, 9.07	1.40	0.3433
High-educated vs medium-educated						
	First − Second	−7.506	2.32	−12.95, −2.06	−3.23	0.0035
	First − Third	−10.856	2.32	−16.30, −5.41	−4.67	<0.0001
	Second − Third	−3.350	1.48	−6.83, 0.13	−2.26	0.0618
East Asian						
High-educated vs low-educated						
	First − Second	−10.708	1.67	−14.61, −6.80	−6.42	<0.0001
	First − Third	−17.603	2.04	−22.38, −12.83	−8.64	<0.0001
	Second − Third	−6.895	2.19	−12.02, −1.77	−3.16	0.0046
Medium-educated vs low-educated						
	First − Second	−6.075	1.60	−9.82, −2.33	−3.80	0.0004
	First − Third	−9.884	2.01	−14.58, −5.18	−4.93	<0.0001
	Second − Third	−3.809	2.18	−8.91, 1.29	−1.75	0.1864
High-educated vs medium-educated						
	First − Second	−4.633	1.10	−7.20, −2.06	−4.23	0.0001
	First − Third	−7.719	1.10	−10.30, −5.14	−7.02	<0.0001

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	Second − Third	−3.086	1.07	−5.60, −0.57	−2.88	0.0113

Note:

Results are averaged over the levels of weekday, employment, and age of youngest kid

Degrees-of-freedom method: asymptotic

Conf-level adjustment: Tukey method for comparing a family of 3 estimates

P-value adjustment: Tukey method for comparing a family of 3 estimates

Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

Table E4. Changes in Educational Gaps in Childcare Across Periods by Region, Women Sample

Contrast	**Period Comparison**	**Estimate**	**SE**	**95% CI (LCL, UCL)**	**z**	**p-value**
Anglophone						
High-educated vs low-educated						
	First − Second	−42.59	3.59	−51.00, −34.19	−11.88	<0.0001
	First − Third	−31.61	3.90	−40.75, −22.47	−8.11	<0.0001
	Second − Third	10.98	3.50	2.77, 19.19	3.13	0.0049
Medium-educated vs low-educated						
	First − Second	−20.90	3.85	−29.91, −11.88	−5.43	<0.0001
	First − Third	−10.63	4.22	−20.52, −0.73	−2.52	0.0318
	Second − Third	10.27	3.89	1.15, 19.39	2.64	0.0226
High-educated vs medium-educated						
	First − Second	−21.70	3.52	−29.95, −13.45	−6.16	<0.0001
	First − Third	−20.99	3.58	−29.37, −12.60	−5.87	<0.0001
	Second − Third	0.71	2.31	−4.69, 6.12	0.31	0.9487
East Asian						
High-educated vs low-educated						
	First − Second	−18.08	2.75	−24.52, −11.64	−6.58	<0.0001
	First − Third	−20.99	3.63	−29.50, −12.47	−5.78	<0.0001
	Second − Third	−2.91	3.94	−12.15, 6.34	−0.74	0.7413
Medium-educated vs low-educated						
	First − Second	−10.42	2.57	−16.45, −4.40	−4.05	0.0001
	First − Third	−9.09	3.55	−17.41, −0.76	−2.56	0.0283
	Second − Third	1.34	3.92	−7.85, 10.52	0.34	0.9379
High-educated vs medium-educated						
	First − Second	−7.66	1.69	−11.61, −3.70	−4.54	<0.0001
	First − Third	−11.90	1.68	−15.84, −7.96	−7.07	<0.0001
	Second − Third	−4.24	1.61	−8.01, −0.48	−2.64	0.0225

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Note: Results are averaged over the listed covariates; degrees-of-freedom method is asymptotic; confidence intervals and p-values are Tukey-adjusted.
Period note: Period 1 / first period = before 2000 (1985-1999 in these data); Period 2 / second period = 2000-2009; Period 3 / third period = after 2009 (2010-2022 in these data).

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Appendix F. Robustness Check: Aged <=42 only

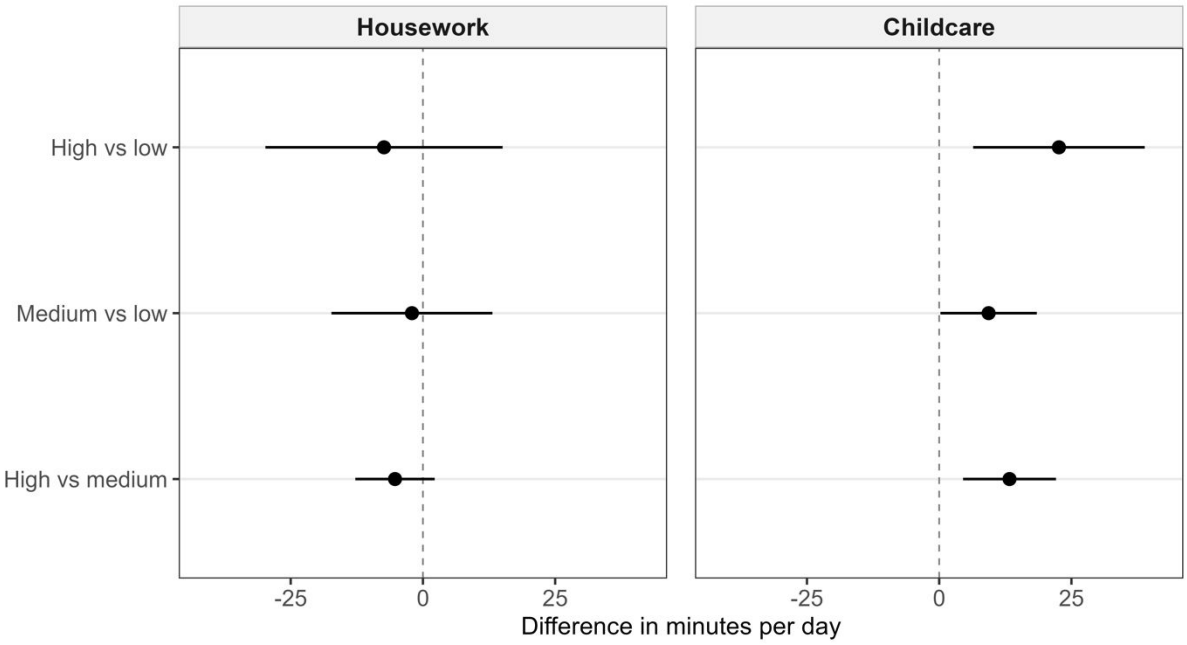


Figure F1. Time Use Differences in Housework and Childcare, by Pairwise Contrasts of Educational Levels, Young Couples Only

Note: Points represent education-group differences estimated from model-based estimated marginal means. Spikes represent 95% confidence intervals.

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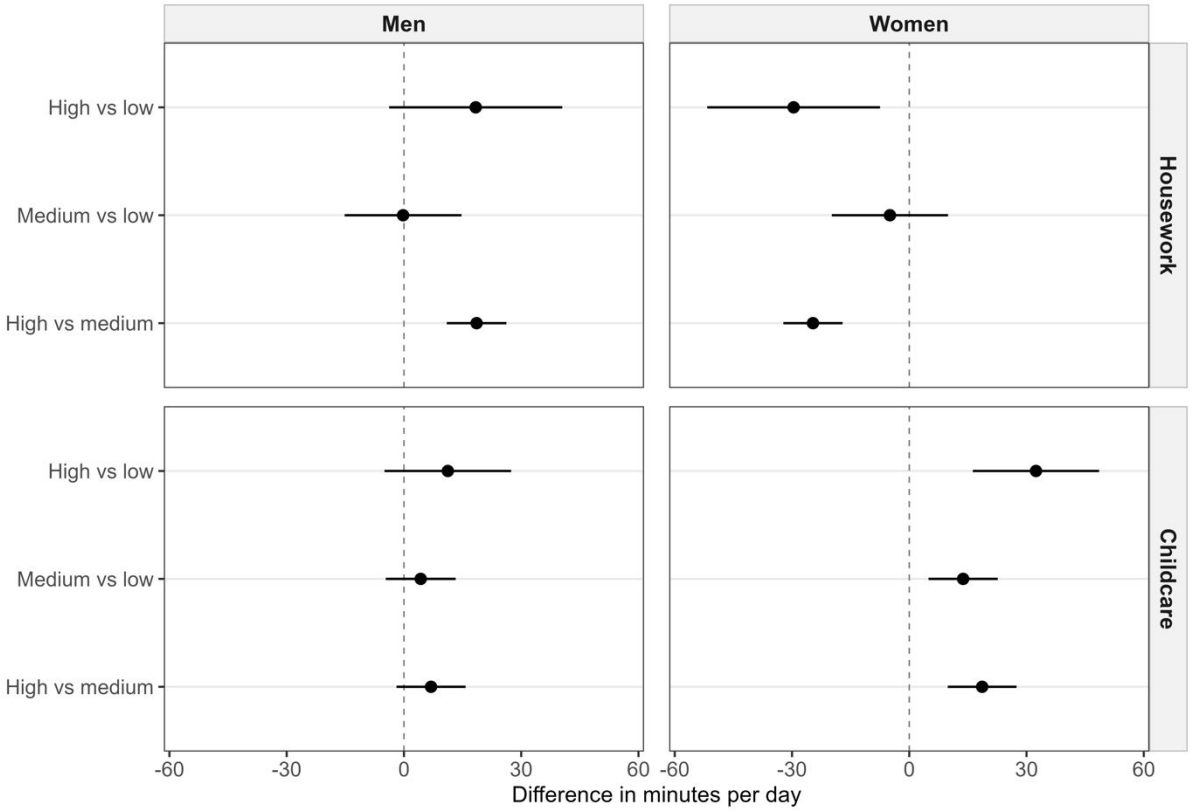


Figure F2. Time Use Differences in Housework and Childcare, by Gender and Pairwise Contrasts of Educational Levels, Young Couples Only

Note: Points represent education-group differences estimated from model-based estimated marginal means. Spikes represent 95% confidence intervals.

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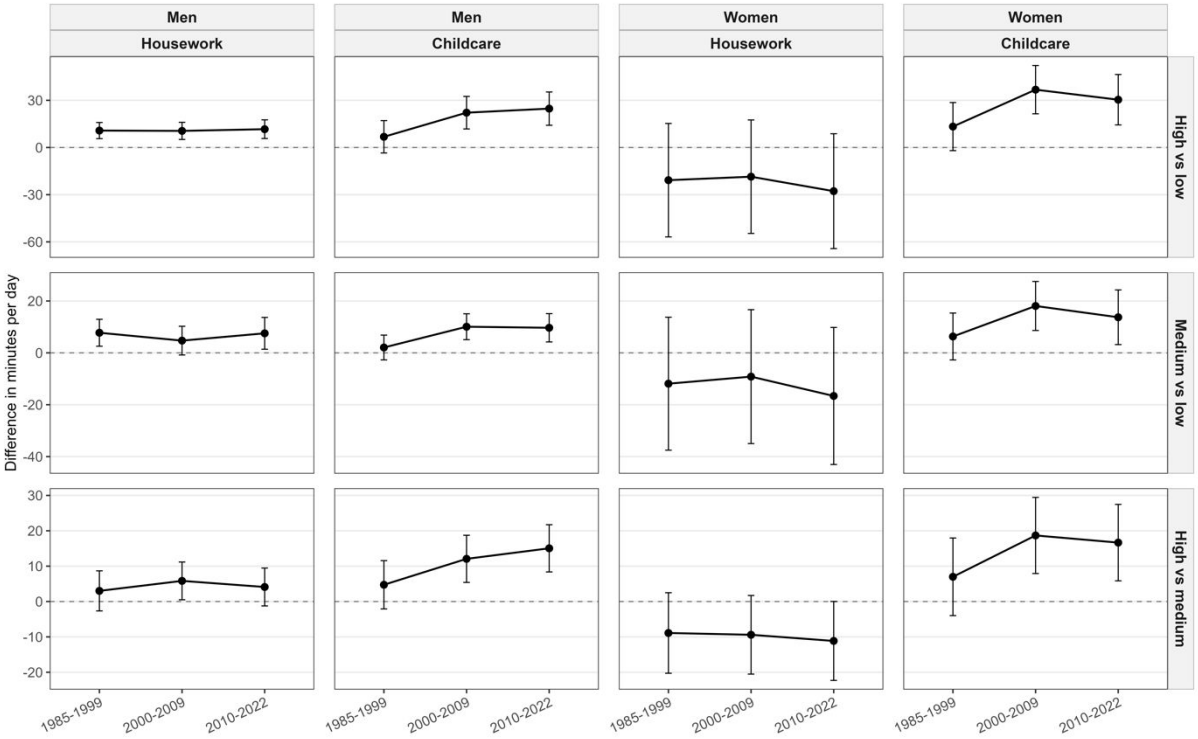


Figure F3. Time Use Differences in Housework and Childcare over Periods, by Gender and Pairwise Contrasts of Educational Levels, Young Couples Only

Note: Points represent education-group differences estimated from model-based estimated marginal means. Spikes represent 95% confidence intervals.

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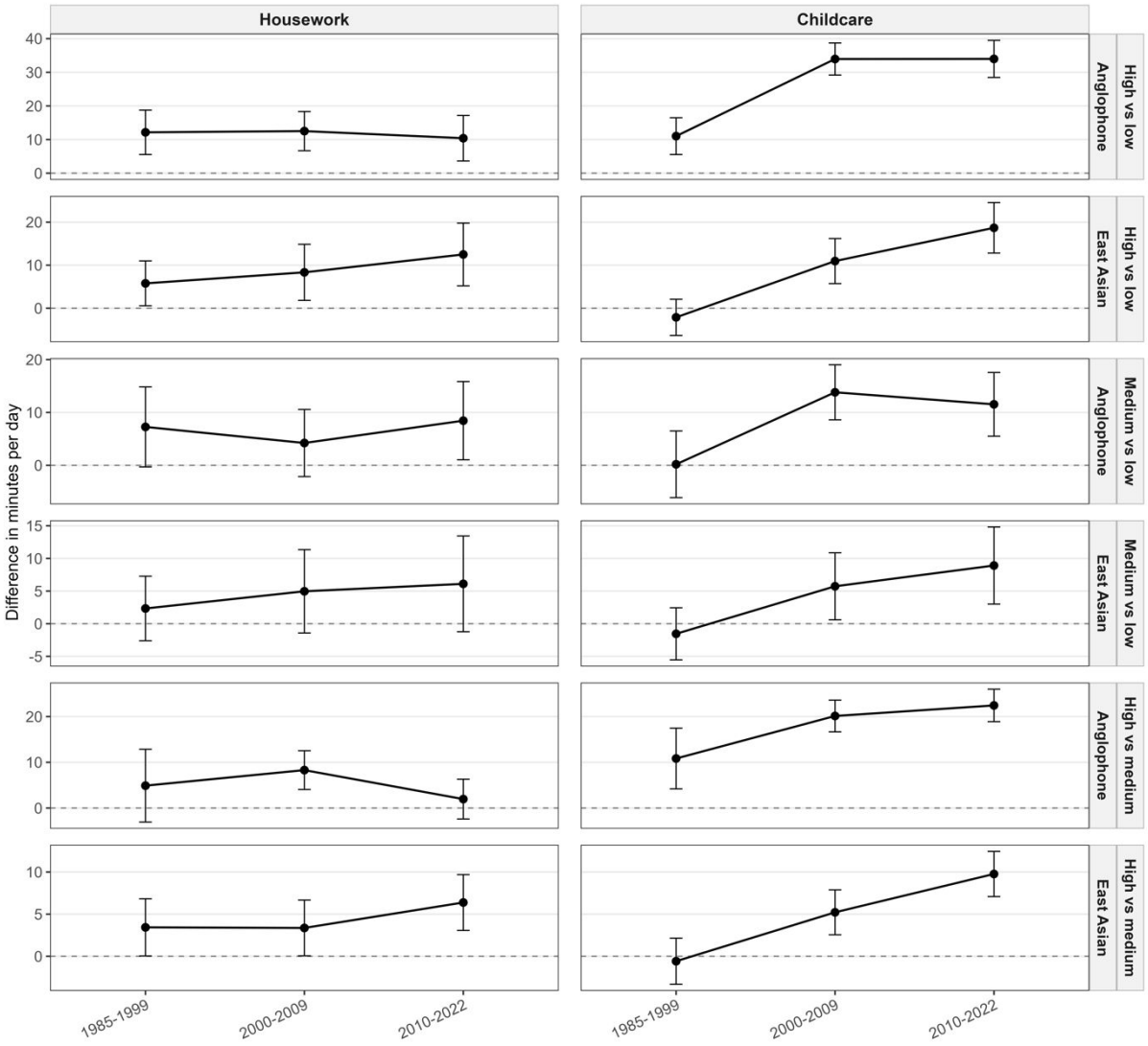


Figure F4. Men's Time Use Differences in Housework and Childcare over Periods and between Regions, by Pairwise Contrasts of Educational Levels

Note: Points represent education-group differences estimated from model-based estimated marginal means. Spikes represent 95% confidence intervals.

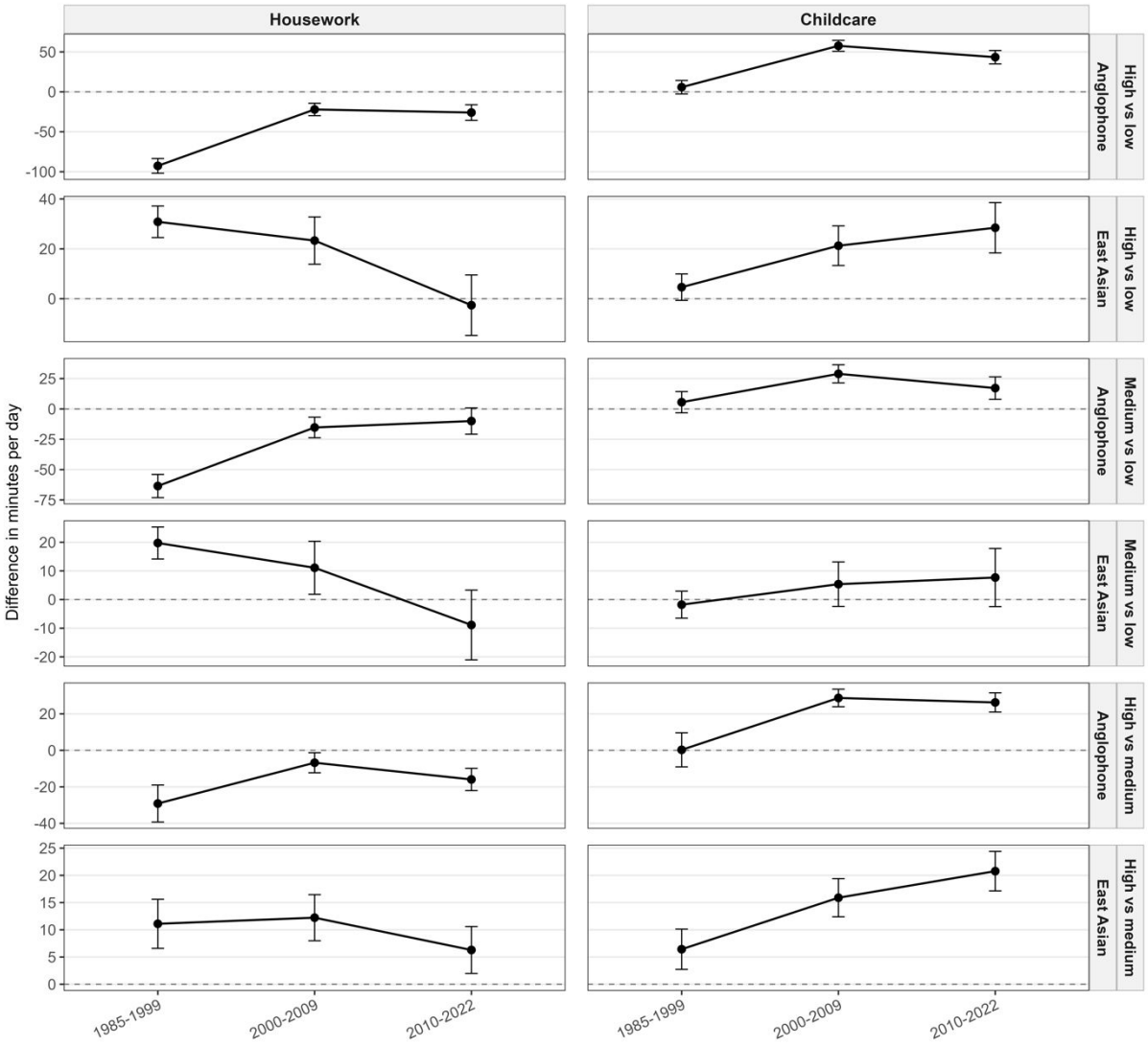


Figure F5. Women's Time Use Differences in Housework and Childcare over Periods and between Regions, by Pairwise Contrasts of Educational Levels

Note: Points represent education-group differences estimated from model-based estimated marginal means. Spikes represent 95% confidence intervals.

Appendix G. Comparison of Estimated Marginal Means and Design-Weighted Average Marginal Effects

This appendix compares the education contrasts used in the main analysis and Appendix A–E, which were originally calculated from model-reference-grid estimated marginal means (EMMs), with design-weighted average marginal effects (AMEs). For the AME specification, counterfactual fixed-effect predictions were generated for each respondent under each education category, averaged over the observed sample using the design weights, and then differenced to obtain pairwise education contrasts.

The comparison is based on the 126 education contrasts reported in the main analysis and Appendix A–E. Education contrast labels use low-, medium-, and high-educated groups rather than numerical education codes.

Table G1. Summary of the EMM-AME comparison

Diagnostic	Value
Matched EMM/AME contrasts	126
Maximum absolute difference between EMM and AME estimates	0.0054 minutes
Direction changes in estimates	0
Significance-status changes at $p < .05$	1

Note: EMM = estimated marginal mean; AME = average marginal effect. The original manuscript p-values are often Tukey-adjusted, whereas the AME p-values are Wald z-tests from the AME calculation. Differences in significance status should therefore be interpreted as diagnostic rather than as like-for-like comparisons of multiplicity-adjusted tests.

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Table G2. Contrast with changed statistical-significance status under the AME specification

Source table	Outcome	Gender	Period	Country group	Education contrast	EMM estimate	EMM p	AME estimate	AME p
Table A4	Childcare	All	All	All	Medium-educated vs low-educated	8.06	0.0967	8.06	0.0386

Note: This is the only contrast that crosses the conventional p < .05 threshold when design-weighted AMEs are used. The point estimate is unchanged at manuscript precision; the difference reflects the use of Tukey-adjusted p-values for the original EMMs and Wald z-tests for the AMEs.

Table G3. Full comparison of reported EMM estimates and design-weighted AME estimates

Source table	Outcome	Gender	Country group	Period	Education contrast	EMM estimate	EMM p	AME estimate	AME p	AME-EMM
Table A2	Housework	All	All	All	Medium-educated vs low-educated	0.41	0.9978	0.40	0.9490	-0.0051
Table A2	Housework	All	All	All	High-educated vs low-educated	-3.03	0.9386	-3.03	0.7348	0.0041
Table A2	Housework	All	All	All	High-educated vs medium-educated	-3.43	0.4235	-3.43	0.2117	-0.0008
Table A3	Housework	Women	All	All	Medium-educated vs low-educated	-2.77	0.8948	-2.77	0.6528	-0.0034
Table A3	Housework	Women	All	All	High-educated vs low-educated	-27.97	0.0035	-27.97	0.0012	-0.0046
Table A3	Housework	Women	All	All	High-educated vs medium-educated	-25.20	<0.0001	-25.20	<0.0001	-0.0012
Table A3	Housework	Men	All	All	Medium-educated vs low-educated	1.82	0.9532	1.82	0.7674	0.0047
Table A3	Housework	Men	All	All	High-educated vs low-educated	21.71	0.0327	21.71	0.0120	-0.0044
Table A3	Housework	Men	All	All	High-educated vs medium-educated	19.88	<0.0001	19.88	<0.0001	0.0009
Table A4	Childcare	All	All	All	Medium-educated vs low-educated	8.06	0.0967	8.06	0.0386	0.0018
Table A4	Childcare	All	All	All	High-educated vs low-educated	20.04	0.0064	20.04	0.0023	-0.0025
Table A4	Childcare	All	All	All	High-educated vs medium-educated	11.98	0.0010	11.98	0.0003	-0.0043

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Table A5	Childcare	Women	All	All	Medium-educated vs low-educated	13.10	0.0016	13.10	0.0006	0.0022
Table A5	Childcare	Women	All	All	High-educated vs low-educated	30.90	<0.0001	30.90	<0.0001	-0.0006
Table A5	Childcare	Women	All	All	High-educated vs medium-educated	17.80	<0.0001	17.80	<0.0001	-0.0028
Table A5	Childcare	Men	All	All	Medium-educated vs low-educated	3.31	0.6583	3.31	0.3834	0.0001
Table A5	Childcare	Men	All	All	High-educated vs low-educated	9.25	0.3221	9.25	0.1508	0.0030
Table A5	Childcare	Men	All	All	High-educated vs medium-educated	5.94	0.1717	5.94	0.0728	0.0029
Table B2	Housework	Men	All	first	Medium-educated vs low-educated	6.82	0.0002	6.82	0.0002	-0.0048
Table B2	Housework	Men	All	first	High-educated vs low-educated	10.32	0.0009	10.32	0.0009	-0.0022
Table B2	Housework	Men	All	first	High-educated vs medium-educated	3.50	0.2393	3.50	0.2393	0.0026
Table B2	Housework	Men	All	second	Medium-educated vs low-educated	4.90	0.0121	4.90	0.0121	0.0014
Table B2	Housework	Men	All	second	High-educated vs low-educated	11.84	0.0002	11.84	0.0002	0.0037
Table B2	Housework	Men	All	second	High-educated vs medium-educated	6.94	0.0168	6.94	0.0168	0.0023
Table B2	Housework	Men	All	third	Medium-educated vs low-educated	7.81	0.0004	7.81	0.0004	0.0046
Table B2	Housework	Men	All	third	High-educated vs low-educated	12.65	0.0001	12.65	0.0001	0.0044
Table B2	Housework	Men	All	third	High-educated vs medium-educated	4.84	0.0958	4.84	0.0958	-0.0002
Table B2	Housework	Women	All	first	Medium-educated vs low-educated	-8.01	0.4708	-8.01	0.4708	0.0046
Table B2	Housework	Women	All	first	High-educated vs low-educated	-16.52	0.3033	-16.52	0.3033	0.0020

For Review Only

Table B2	Housework	Women	All	first	High-educated vs medium-educated	-8.51	0.1021	-8.51	0.1021	-0.0026
Table B2	Housework	Women	All	second	Medium-educated vs low-educated	-6.51	0.5592	-6.51	0.5592	0.0010
Table B2	Housework	Women	All	second	High-educated vs low-educated	-13.91	0.3856	-13.91	0.3856	-0.0007
Table B2	Housework	Women	All	second	High-educated vs medium-educated	-7.40	0.1475	-7.40	0.1475	-0.0016
Table B2	Housework	Women	All	third	Medium-educated vs low-educated	-13.85	0.2228	-13.85	0.2228	0.0037
Table B2	Housework	Women	All	third	High-educated vs low-educated	-22.75	0.1598	-22.75	0.1598	0.0038
Table B2	Housework	Women	All	third	High-educated vs medium-educated	-8.90	0.0819	-8.90	0.0819	0.0001
Table C2	Childcare	Men	All	first	Medium-educated vs low-educated	2.43	0.2628	2.43	0.2628	-0.0027
Table C2	Childcare	Men	All	first	High-educated vs low-educated	6.24	0.1868	6.24	0.1868	0.0036
Table C2	Childcare	Men	All	first	High-educated vs medium-educated	3.82	0.1874	3.82	0.1874	-0.0037
Table C2	Childcare	Men	All	second	Medium-educated vs low-educated	8.75	0.0001	8.75	<0.0001	-0.0021
Table C2	Childcare	Men	All	second	High-educated vs low-educated	18.42	0.0001	18.42	0.0001	-0.0003
Table C2	Childcare	Men	All	second	High-educated vs medium-educated	9.67	0.0007	9.67	0.0007	0.0018
Table C2	Childcare	Men	All	third	Medium-educated vs low-educated	8.56	0.0003	8.56	0.0003	-0.0012
Table C2	Childcare	Men	All	third	High-educated vs low-educated	20.69	<0.0001	20.69	<0.0001	0.0004
Table C2	Childcare	Men	All	third	High-educated vs medium-educated	12.13	<0.0001	12.13	<0.0001	0.0016
Table C2	Childcare	Women	All	first	Medium-educated vs low-educated	5.34	0.1380	5.34	0.1380	0.0043

For Review Only

Table C2	Childcare	Women	All	first	High-educated vs low-educated	12.21	0.0314	12.21	0.0314	-0.0033
Table C2	Childcare	Women	All	first	High-educated vs medium-educated	6.86	0.0656	6.86	0.0656	0.0024
Table C2	Childcare	Women	All	second	Medium-educated vs low-educated	16.80	<0.0001	16.80	<0.0001	-0.0012
Table C2	Childcare	Women	All	second	High-educated vs low-educated	33.45	<0.0001	33.45	<0.0001	-0.0028
Table C2	Childcare	Women	All	second	High-educated vs medium-educated	16.65	<0.0001	16.65	<0.0001	-0.0015
Table C2	Childcare	Women	All	third	Medium-educated vs low-educated	11.18	0.0054	11.18	0.0054	0.0041
Table C2	Childcare	Women	All	third	High-educated vs low-educated	26.90	<0.0001	26.90	<0.0001	-0.0014
Table C2	Childcare	Women	All	third	High-educated vs medium-educated	15.71	<0.0001	15.71	<0.0001	0.0045
Table D2	Housework	Men	Anglophone	first	Medium-educated vs low-educated	9.57	0.0003	9.57	0.0003	-0.0026
Table D2	Housework	Men	Anglophone	first	High-educated vs low-educated	18.28	<0.0001	18.28	<0.0001	-0.0039
Table D2	Housework	Men	Anglophone	first	High-educated vs medium-educated	8.71	0.0015	8.71	0.0015	-0.0013
Table D2	Housework	Men	Anglophone	second	Medium-educated vs low-educated	2.82	0.1943	2.82	0.1943	-0.0037
Table D2	Housework	Men	Anglophone	second	High-educated vs low-educated	13.00	<0.0001	13.00	<0.0001	0.0047
Table D2	Housework	Men	Anglophone	second	High-educated vs medium-educated	10.19	<0.0001	10.19	<0.0001	-0.0016
Table D2	Housework	Men	Anglophone	third	Medium-educated vs low-educated	10.12	0.0001	10.12	<0.0001	-0.0042
Table D2	Housework	Men	Anglophone	third	High-educated vs low-educated	11.77	<0.0001	11.77	<0.0001	-0.0016
Table D2	Housework	Men	Anglophone	third	High-educated vs medium-educated	1.65	0.2510	1.65	0.2510	0.0026

For Review Only

Table D2	Housework	Men	East Asian	first	Medium-educated vs low-educated	1.25	0.3492	1.25	0.3492	-0.0023
Table D2	Housework	Men	East Asian	first	High-educated vs low-educated	3.66	0.0113	3.66	0.0113	0.0011
Table D2	Housework	Men	East Asian	first	High-educated vs medium-educated	2.41	0.0298	2.41	0.0298	0.0034
Table D2	Housework	Men	East Asian	second	Medium-educated vs low-educated	3.86	0.0307	3.86	0.0307	-0.0016
Table D2	Housework	Men	East Asian	second	High-educated vs low-educated	6.98	0.0001	6.98	0.0001	0.0046
Table D2	Housework	Men	East Asian	second	High-educated vs medium-educated	3.13	0.0030	3.13	0.0030	-0.0038
Table D2	Housework	Men	East Asian	third	Medium-educated vs low-educated	5.56	0.0233	5.56	0.0233	0.0042
Table D2	Housework	Men	East Asian	third	High-educated vs low-educated	11.93	<0.0001	11.93	<0.0001	-0.0028
Table D2	Housework	Men	East Asian	third	High-educated vs medium-educated	6.36	<0.0001	6.36	<0.0001	0.0031
Table D2	Housework	Women	Anglophone	first	Medium-educated vs low-educated	-57.68	<0.0001	-57.68	<0.0001	0.0019
Table D2	Housework	Women	Anglophone	first	High-educated vs low-educated	-89.98	<0.0001	-89.98	<0.0001	-0.0019
Table D2	Housework	Women	Anglophone	first	High-educated vs medium-educated	-32.30	<0.0001	-32.30	<0.0001	-0.0038
Table D2	Housework	Women	Anglophone	second	Medium-educated vs low-educated	-10.42	0.0010	-10.42	0.0010	-0.0024
Table D2	Housework	Women	Anglophone	second	High-educated vs low-educated	-16.05	<0.0001	-16.05	<0.0001	-0.0007
Table D2	Housework	Women	Anglophone	second	High-educated vs medium-educated	-5.63	0.0058	-5.63	0.0058	0.0017
Table D2	Housework	Women	Anglophone	third	Medium-educated vs low-educated	-14.45	0.0003	-14.45	0.0003	0.0048
Table D2	Housework	Women	Anglophone	third	High-educated vs low-educated	-27.08	<0.0001	-27.08	<0.0001	0.0018

For Review Only

Table D2	Housework	Women	Anglophone	third	High-educated vs medium-educated	-12.63	<0.0001	-12.63	<0.0001	-0.0030
Table D2	Housework	Women	East Asian	first	Medium-educated vs low-educated	24.67	<0.0001	24.67	<0.0001	0.0023
Table D2	Housework	Women	East Asian	first	High-educated vs low-educated	35.87	<0.0001	35.87	<0.0001	0.0002
Table D2	Housework	Women	East Asian	first	High-educated vs medium-educated	11.20	<0.0001	11.20	<0.0001	-0.0021
Table D2	Housework	Women	East Asian	second	Medium-educated vs low-educated	16.29	<0.0001	16.29	<0.0001	-0.0003
Table D2	Housework	Women	East Asian	second	High-educated vs low-educated	29.96	<0.0001	29.96	<0.0001	0.0019
Table D2	Housework	Women	East Asian	second	High-educated vs medium-educated	13.67	<0.0001	13.67	<0.0001	0.0022
Table D2	Housework	Women	East Asian	third	Medium-educated vs low-educated	2.50	0.5706	2.50	0.5706	0.0032
Table D2	Housework	Women	East Asian	third	High-educated vs low-educated	13.09	0.0029	13.09	0.0029	-0.0031
Table D2	Housework	Women	East Asian	third	High-educated vs medium-educated	10.58	<0.0001	10.58	<0.0001	0.0037
Table E2	Childcare	Men	Anglophone	first	Medium-educated vs low-educated	1.99	0.3122	1.99	0.3122	0.0039
Table E2	Childcare	Men	Anglophone	first	High-educated vs low-educated	11.94	<0.0001	11.94	<0.0001	-0.0046
Table E2	Childcare	Men	Anglophone	first	High-educated vs medium-educated	9.94	<0.0001	9.94	<0.0001	0.0015
Table E2	Childcare	Men	Anglophone	second	Medium-educated vs low-educated	13.80	<0.0001	13.80	<0.0001	-0.0042
Table E2	Childcare	Men	Anglophone	second	High-educated vs low-educated	31.24	<0.0001	31.24	<0.0001	0.0031
Table E2	Childcare	Men	Anglophone	second	High-educated vs medium-educated	17.45	<0.0001	17.45	<0.0001	-0.0026
Table E2	Childcare	Men	Anglophone	third	Medium-educated vs low-educated	10.41	<0.0001	10.41	<0.0001	-0.0002

For Review Only

Table E2	Childcare	Men	Anglophone	third	High-educated vs low-educated	31.21	<0.0001	31.21	<0.0001	-0.0026
Table E2	Childcare	Men	Anglophone	third	High-educated vs medium-educated	20.80	<0.0001	20.80	<0.0001	-0.0024
Table E2	Childcare	Men	East Asian	first	Medium-educated vs low-educated	-3.11	0.0012	-3.11	0.0012	0.0004
Table E2	Childcare	Men	East Asian	first	High-educated vs low-educated	-3.89	0.0002	-3.89	0.0002	0.0008
Table E2	Childcare	Men	East Asian	first	High-educated vs medium-educated	-0.78	0.3269	-0.78	0.3269	0.0004
Table E2	Childcare	Men	East Asian	second	Medium-educated vs low-educated	2.97	0.0207	2.97	0.0207	-0.0048
Table E2	Childcare	Men	East Asian	second	High-educated vs low-educated	6.82	<0.0001	6.82	<0.0001	-0.0011
Table E2	Childcare	Men	East Asian	second	High-educated vs medium-educated	3.85	<0.0001	3.85	<0.0001	0.0037
Table E2	Childcare	Men	East Asian	third	Medium-educated vs low-educated	6.77	0.0001	6.77	0.0001	0.0044
Table E2	Childcare	Men	East Asian	third	High-educated vs low-educated	13.71	<0.0001	13.71	<0.0001	0.0039
Table E2	Childcare	Men	East Asian	third	High-educated vs medium-educated	6.94	<0.0001	6.94	<0.0001	-0.0005
Table E2	Childcare	Women	Anglophone	first	Medium-educated vs low-educated	6.02	0.0417	6.02	0.0417	0.0011
Table E2	Childcare	Women	Anglophone	first	High-educated vs low-educated	10.37	0.0002	10.37	0.0002	0.0002
Table E2	Childcare	Women	Anglophone	first	High-educated vs medium-educated	4.35	0.1680	4.35	0.1680	-0.0009
Table E2	Childcare	Women	Anglophone	second	Medium-educated vs low-educated	26.92	<0.0001	26.92	<0.0001	-0.0036
Table E2	Childcare	Women	Anglophone	second	High-educated vs low-educated	52.97	<0.0001	52.96	<0.0001	-0.0053
Table E2	Childcare	Women	Anglophone	second	High-educated vs medium-educated	26.05	<0.0001	26.05	<0.0001	-0.0017

For Review Only

Table E2	Childcare	Women	Anglophone	third	Medium-educated vs low-educated	16.65	<0.0001	16.65	<0.0001	-0.0023
Table E2	Childcare	Women	Anglophone	third	High-educated vs low-educated	41.98	<0.0001	41.98	<0.0001	0.0032
Table E2	Childcare	Women	Anglophone	third	High-educated vs medium-educated	25.34	<0.0001	25.34	<0.0001	-0.0045
Table E2	Childcare	Women	East Asian	first	Medium-educated vs low-educated	-4.70	0.0008	-4.70	0.0008	-0.0020
Table E2	Childcare	Women	East Asian	first	High-educated vs low-educated	0.34	0.8327	0.34	0.8327	0.0026
Table E2	Childcare	Women	East Asian	first	High-educated vs medium-educated	5.05	0.0001	5.04	<0.0001	-0.0054
Table E2	Childcare	Women	East Asian	second	Medium-educated vs low-educated	5.72	0.0083	5.72	0.0083	0.0006
Table E2	Childcare	Women	East Asian	second	High-educated vs low-educated	18.42	<0.0001	18.42	<0.0001	0.0005
Table E2	Childcare	Women	East Asian	second	High-educated vs medium-educated	12.70	<0.0001	12.70	<0.0001	-0.0001
Table E2	Childcare	Women	East Asian	third	Medium-educated vs low-educated	4.39	0.1789	4.38	0.1789	-0.0051
Table E2	Childcare	Women	East Asian	third	High-educated vs low-educated	21.33	<0.0001	21.33	<0.0001	-0.0024
Table E2	Childcare	Women	East Asian	third	High-educated vs medium-educated	16.94	<0.0001	16.94	<0.0001	0.0027

Note: Estimates are differences in minutes. “All” indicates that the contrast is not disaggregated by gender, period, or country group in the relevant model. “AME-EMM” reports the difference between the AME estimate and the reported EMM estimate.

For Review Only

Appendix H. Robustness Check Using Age-Category Controls

This appendix reports a robustness check that re-estimates the core models by replacing the continuous age control used in the main specification with categorical age controls. The purpose is to assess whether the substantive conclusions depend on assuming a linear association between age and housework or childcare time.

The robustness specification uses six age categories: under 30, 30-34, 35-39, 40-44, 45-49, and 50+. All other aspects of the model specification and post-estimation comparisons follow the main analysis. Estimates are expressed in minutes.

The results are substantively unchanged. Across 126 matched education contrasts, the maximum absolute difference between the continuous-age and age-category specifications is 1.22 minutes. The main pairwise housework contrasts remain small and nonsignificant, the main childcare contrasts remain positive, the gender-specific patterns remain the same, and the period and country-group interaction patterns are preserved. Seven contrasts change statistical-significance status at the $p < .05$ threshold, but these changes are small, threshold-adjacent, and do not alter the substantive interpretation.

Table H1. Summary of the age-category robustness check

Item	Result
Age specification in main models	Age entered as a continuous control
Robustness specification	Age replaced with six age-category dummies
Age categories	Under 30; 30-34; 35-39; 40-44; 45-49; 50+
Matched education contrasts compared	126
Maximum absolute estimate difference	1.22 minutes
Direction changes	1
Significance-status changes at $p < .05$	7
Overall interpretation	Substantive conclusions unchanged

Note: The comparison is between the original continuous-age specification and the robustness specification using age-category dummies.

For Review Only

Table H2. Main and gender-specific education contrasts under continuous-age and age-category specifications

Outcome	Model	Group	Contrast	Continuous age: est.	Continuous age: p	Age categories: est.	Age categories: p	Difference
Housework	Main model	All	Medium-educated vs low-educated	0.41	0.9978	-0.05	1.0000	-0.4632
Housework	Main model	All	High-educated vs low-educated	-3.03	0.9386	-4.06	0.9551	-1.0319
Housework	Main model	All	High-educated vs medium-educated	-3.43	0.4235	-4.01	0.4079	-0.5787
Childcare	Main model	All	Medium-educated vs low-educated	8.06	0.0967	8.29	0.0903	0.2318
Childcare	Main model	All	High-educated vs low-educated	20.04	0.0064	20.55	0.0054	0.5123
Childcare	Main model	All	High-educated vs medium-educated	11.98	0.0010	12.26	0.0008	0.2805
Housework	Gender-specific model	Men	Medium-educated vs low-educated	1.82	0.9532	1.30	0.9947	-0.5161
Housework	Gender-specific model	Men	High-educated vs low-educated	21.71	0.0327	20.49	0.0469	-1.2177
Housework	Gender-specific model	Men	High-educated vs medium-educated	19.88	<0.0001	19.19	<0.0001	-0.6916
Housework	Gender-specific model	Women	Medium-educated vs low-educated	-2.77	0.8948	-3.14	0.9344	-0.3682
Housework	Gender-specific model	Women	High-educated vs low-educated	-27.97	0.0035	-28.78	0.0021	-0.8068
Housework	Gender-specific model	Women	High-educated vs medium-educated	-25.20	<0.0001	-25.64	<0.0001	-0.4386
Childcare	Gender-specific model	Men	Medium-educated vs low-educated	3.31	0.6583	3.63	0.7034	0.3175
Childcare	Gender-specific model	Men	High-educated vs low-educated	9.25	0.3221	9.96	0.3266	0.7080
Childcare	Gender-specific model	Men	High-educated vs medium-educated	5.94	0.1717	6.33	0.1615	0.3905

For Review Only

Childcare	Gender-specific model	Women	Medium-educated vs low-educated	13.10	0.0016	13.24	0.0012	0.1420
Childcare	Gender-specific model	Women	High-educated vs low-educated	30.90	<0.0001	31.20	<0.0001	0.2988
Childcare	Gender-specific model	Women	High-educated vs medium-educated	17.80	<0.0001	17.96	<0.0001	0.1568

Note: Estimates are in minutes. Contrast labels refer to educational groups: low = low-educated (below secondary), medium = medium-educated (completed secondary), and high = high-educated (above secondary). Difference = age-category estimate minus continuous-age estimate.

For Review Only

Table H3. Model-level tests from the age-category robustness specification

Model test	Chi-square	df	p
Men housework: education x period	7.93	4	0.0942
Men childcare: education x period	136.93	4	<0.0001
Men housework: education x period x country group	114.21	9	<0.0001
Men childcare: education x period x country group	40.49	9	<0.0001
Women housework: education x period	6.55	4	0.1619
Women childcare: education x period	94.93	4	<0.0001
Women housework: education x period x country group	562.85	9	<0.0001
Women childcare: education x period x country group	376.29	9	<0.0001
Main housework model: education	11.73	2	0.0028
Main housework model: age categories	1536.16	5	<0.0001
Main childcare model: education	13.48	2	0.0012
Main childcare model: age categories	2239.32	5	<0.0001
Gender interaction housework model: education	355.21	2	<0.0001
Gender interaction housework model: age categories	1524.04	5	<0.0001
Gender interaction housework model: education:sex	2794.56	2	<0.0001
Gender interaction childcare model: education	3.79	2	0.1502
Gender interaction childcare model: age categories	2226.48	5	<0.0001
Gender interaction childcare model: education:sex	534.22	2	<0.0001

Note: Tests are from the age-category robustness specification. The table reports chi-square tests for the corresponding terms in the re-estimated models.

For Review Only

Table H4. Education contrasts whose statistical-significance status changes at p < .05

Outcome	Model	Group	Period	Country group	Contrast	Continuous age: est.	Continuous age: p	Age categories: est.	Age categories: p
Housework	Men: education x period	Men	second		High-educated vs medium-educated	6.94	0.0168	6.87	0.0510
Childcare	Women: education x period	Women	first		High-educated vs low-educated	12.21	0.0314	11.73	0.1055
Housework	Men: education x period x country group	Men	first	East Asian	High-educated vs medium-educated	2.41	0.0298	2.38	0.0928
Housework	Men: education x period x country group	Men	second	East Asian	Medium-educated vs low-educated	3.86	0.0307	3.57	0.1307
Housework	Men: education x period x country group	Men	third	East Asian	Medium-educated vs low-educated	5.56	0.0233	5.47	0.0753
Childcare	Men: education x period x country group	Men	second	East Asian	Medium-educated vs low-educated	2.97	0.0207	2.57	0.1283
Childcare	Women: education x period x country group	Women	first	Anglophone	Medium-educated vs low-educated	6.02	0.0417	6.23	0.1017

Note: Estimates are in minutes. This table lists the seven contrasts whose p < .05 status differs between the continuous-age and age-category specifications. These threshold changes do not alter the substantive conclusions of the study.

For Review Only

Appendix I. Robustness Check Using Region-Specific Control-Variable Slopes

This appendix reports robustness checks that relax the common-control-slope assumption in the main pooled interaction models. The main specifications use pooled interaction models because they directly test whether educational gradients vary by gender, period, and region. The checks reported here assess whether the same substantive patterns remain visible when the associations between control variables and time use are allowed to vary across analytic groups. Three sets of robustness models are estimated. First, region-specific pooled-gender models are estimated separately for the Anglophone and East Asian groups. These models include education, gender, age, weekday/weekend, employment status, number of children, age of youngest child, and period, with random intercepts for country and person where estimable. Second, region-by-sex models are estimated separately by regional group and gender, allowing gender-specific education gradients and all control-variable coefficients to vary across the two regions. Third, region-period-sex models are estimated separately for each regional group, period, and gender; in these models, period and gender are handled by subsetting rather than by covariates. This provides the most flexible diagnostic check, because the associations of the control variables with housework and childcare are allowed to vary across region, period, and gender cells.

The tables below focus on high-versus-low education gaps, because this contrast is the clearest summary of the educational gradient.

Table I1 presents the pooled-gender region-specific models. These models estimate the Anglophone and East Asian samples separately, allowing the associations between the control variables and each outcome to differ by region. The childcare gradient is positive in both regions, whereas the pooled housework gradient differs by region: it is negative in the Anglophone countries and positive in the East Asian countries. This pattern is consistent with the main analysis, which shows a more uniform positive educational gradient for childcare and more region-specific gradients for housework.

Table I1. High-versus-low education gaps from region-specific pooled-gender models

Outcome	Region	High-educated vs low-educated gap	95% CI	p-value
Housework	Anglophone	-15.74	[-19.47, -12.01]	< .001
Housework	East Asian	17.58	[15.72, 19.43]	< .001
Childcare	Anglophone	30.64	[27.98, 33.30]	< .001
Childcare	East Asian	8.89	[7.39, 10.39]	< .001

Note: Estimates are differences in minutes per day between the high-educated and low-educated groups. Positive values indicate that the high-educated group spends more time on the activity.

Table I2 reports the corresponding region-by-sex models. These models further relax the specification by estimating all coefficients separately for men and women within each regional group. The gender-specific results again show positive childcare gradients for both men and women in both regions. For housework, men's high-versus-low education gaps are positive in both regions, while women's gradients differ sharply by region: negative in the Anglophone countries but positive in the East Asian countries. The purpose of this check is not to replace the main interaction models, but to show that the main substantive conclusions remain recognisable when control-variable slopes are allowed to vary by region and gender.

For Review Only

Table I2. High-versus-low education gaps from region-by-sex models

Outcome	Gender	Region	High-educated vs low-educated gap	95% CI	p-value
Housework	Men	Anglophone	18.60	[13.80, 23.40]	< .001
Housework	Men	East Asian	4.34	[3.08, 5.60]	< .001
Housework	Women	Anglophone	-50.06	[-55.60, -44.52]	< .001
Housework	Women	East Asian	22.05	[18.71, 25.39]	< .001
Childcare	Men	Anglophone	23.48	[20.27, 26.69]	< .001
Childcare	Men	East Asian	4.56	[3.47, 5.65]	< .001
Childcare	Women	Anglophone	36.34	[32.26, 40.43]	< .001
Childcare	Women	East Asian	11.39	[8.83, 13.95]	< .001

Note: Estimates are differences in minutes per day between the high-educated and low-educated groups. These models allow all coefficients to vary by region and gender.

Region-period-sex models

Tables I3 and I4 present the period-cell robustness checks. These models are not intended to replace the main interaction models, because they do not provide the same formal cross-period tests. They are diagnostic checks of whether the main substantive patterns remain visible when control-variable associations are allowed to vary across region, period, and gender cells.

Table I3 reports the high-versus-low education gaps for childcare from the region-period-sex models. The results are highly consistent with the main analysis. The high-versus-low childcare gradient is positive in every region-period-sex cell, and the gradients generally become larger after the first period. This supports the conclusion that educationally stratified childcare investment is robust to allowing control-variable associations to vary across regions, periods, and gender groups.

Table I3. High-versus-low childcare gaps from region-period-sex models

Gender	Period	Anglophone estimate [95% CI]	Anglophone p-value	East Asian estimate [95% CI]	East Asian p-value
Men	1985-1999	15.61 [9.96, 21.26]	< .001	2.06 [1.00, 3.13]	< .001
Men	2000-2009	29.95 [24.88, 35.02]	< .001	6.99 [5.25, 8.72]	< .001
Men	2010-2022	30.94 [24.23, 37.65]	< .001	11.42 [7.92, 14.92]	< .001
Women	1985-1999	14.08 [6.51, 21.64]	< .001	9.04 [6.07, 12.00]	< .001
Women	2000-2009	49.54 [43.23, 55.86]	< .001	21.21 [16.40, 26.03]	< .001
Women	2010-2022	43.10 [34.45, 51.75]	< .001	23.89 [15.62, 32.16]	< .001

Note: Cells report estimated high-versus-low education gaps in childcare minutes per day, with 95% confidence intervals in brackets. Positive values indicate more childcare time among the high-educated group.

Table I4 reports the corresponding high-versus-low education gaps for housework from the region-period-sex models. These models provide a demanding diagnostic check because the control-variable coefficients are estimated separately within each region-period-sex cell. The results are consistent with the main analysis in showing that housework gradients are more region-specific than childcare gradients. Among men, the high-versus-low gradient is positive

For Review Only

in both regions and all three periods, but the timing differs: in the Anglophone region, the gap is already sizeable in the first period and is smaller but still positive in later periods; in the East Asian region, the gap starts small and increases across periods. Among women, the regional difference is sharper. The high-versus-low gradient is negative in the Anglophone region in all three periods, whereas it is positive in the East Asian region but weakens from about 25 minutes in the first period to about 18 minutes in the second period and about 12 minutes in the third period. These patterns correspond to the main analysis: men's housework gradients are generally positive, but their temporal development differs by region, while women's housework gradients remain strongly region-specific and show a weakening positive gradient in East Asia.

Table I4. High-versus-low housework gaps from region-period-sex models

Gender	Period	Anglophone estimate [95% CI]	Anglophone p-value	East Asian estimate [95% CI]	East Asian p-value
Men	1985-1999	19.14 [8.17, 30.12]	< .001	1.77 [0.17, 3.38]	.025
Men	2000-2009	11.75 [4.20, 19.30]	< .001	4.66 [2.48, 6.83]	< .001
Men	2010-2022	11.97 [2.92, 21.02]	.005	9.83 [6.29, 13.38]	< .001
Women	1985-1999	-80.12 [-93.36, -66.87]	< .001	25.35 [20.59, 30.10]	< .001
Women	2000-2009	-24.33 [-32.80, -15.86]	< .001	18.19 [11.95, 24.42]	< .001
Women	2010-2022	-41.58 [-52.55, -30.61]	< .001	11.58 [2.07, 21.09]	.011

Note: Cells report estimated high-versus-low education gaps in housework minutes per day, with 95% confidence intervals in brackets. Positive values indicate more housework time among the high-educated group; negative values indicate less housework time among the high-educated group.

Summary

Taken together, the region-period-sex models do not replace the main interaction models, which provide the formal tests of temporal and regional differences. Rather, they serve as a robustness check for the reviewer's concern about common control-variable slopes. When the associations of the control variables are allowed to vary across region, period, and gender cells, the substantive patterns are highly consistent with the main analysis: childcare gradients are consistently positive and become larger after the first period, whereas housework gradients remain more context-dependent, especially among women.

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