

Biological influences on household time use

Jane Wakeford

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2000 Word Abstract

It seems hard to imagine that there can finally be equality in the labour market outcomes of males and females without equality in the division of non-paid work in the home. I offer a new explanation for large differences in decisions regarding time-use in the household, that of biological constraints. I source data from the Household, Income and Labour Dynamics in Australia Survey (HILDA), 2001-2019. HILDA presents statements related to time use where respondents can rank their agreement or disagreement on a 7-point Likert scale. Examples include, ‘It is a man’s role to earn the money and the woman’s role to care for the home and family’, ‘If both partners in a couple work, they should share equally in the housework and care of children’ and ‘It is bad for a relationship for the woman to earn more than the man’. Overwhelmingly, for the years 2001-2019, it is the norm in Australian society to *believe* in gender equality. Yet the reality of how people currently behave tells a different story. Household time use is still very gendered; for couples, the average male partner works 37.34 (s.d.=17.62) hours in paid work and performs 27.86 (s.d.=24.52) hours of non-paid work whilst the average female partner works 21.86 (s.d.=18.40) hours in paid work and performs 37.71 (s.d.=30.53) hours in non-paid work. A progressive society is evolving, but it has not yet arrived. My theoretical model of parenting and empirical results provide evidence of how society is currently evolving.

The article has four main parts. First, I develop a theoretical model of parenting, where the utility of parents is a function of the utility of their children, which in turn depends on how their parents specialise in non-market work. This theoretical model provides a cohesive explanation for the empirical results that follow. The first stage of my empirical analysis involves the ‘natural experiment’ of the sex of a person’s first child. The sex of a first child is a random shock; I analyse how having a male first child, rather than a female first child, affects household time use. The second stage of

my empirical analysis involves utilising a new concept from biological anthropology, gendered fitness interest (GFI), which is an index reflecting if a person's genes are more likely to be passed on through females or males. In a qualitative sense, the effect of having male-biased GFI, rather than female-biased GFI, has the same effect on household time use as having a first-born child who is male, rather than female. The third part of my empirical analysis involves empirically demonstrating the main mechanism in my theoretical model, that of gender attitudes. I show that those with a first-born child who is male/male-biased GFI are more likely to internalise traditional attitudes, and those with a first-born child who is female/female-biased GFI are more likely to internalise progressive gender attitudes. To sum up, I show that the more likely a parents' genes are to be passed on through females, rather than males, they will demonstrate a much more equal division of non-paid work, which is beneficial for their kin.

HILDA is a rich panel data set, longitudinally following almost 10 000 households. It is intended to be representative of the Australian population. Importantly for this article, it provides detailed data on household time use (separately recorded as childcare, care of disabled non-residents/elder care, household errands, outdoor tasks, general housework such as cleaning and cooking and the non-paid care of other people's children¹); stated gender attitudes; and the ages and sexes of all resident and non-resident children.

Several researchers have noted that parents are influenced by their children's sex in workplace decision making, yet there is a literature gap for how the sex of descendants affect household time use. Prokos, Baird, and Keene (2010) found that having daughters and no sons increased employed mothers support for affirmative action. The sexes of one's children has even been found to influence law making. Washington (2008) found that each daughter a person has increases a congressperson's tendency to vote liberally, particularly on reproductive rights issues.

There is emerging research that the parents of daughters are improving the labour market outcomes of females at the top of the income distribution. Dasgupta et al. (2018) studied 100 S&P firms and found that CEOs with a daughter were more likely to hire new women to their board of directors than CEOs without a daughter. Gompers and Wang (2017) found that parenting more daughters led to an increased propensity to hire female partners by venture capital firms. Further, Cronqvist and Yu (2017) found that when a firm's chief executive officer has a daughter the corporate social responsibility of the firm—particularly with respect to diversity, the environment and

1. For all seven forms of non-paid work, females in general perform more on average, except for outdoor tasks

employee relations—is about 9.1% higher, compared to a median firm.

It is a reasonable hypothesis that a person would “display gender” in a way that would prioritise their descendant’s needs, particularly if these descendants are more likely to propagate one’s genes. With respect to studying the gender pay gap, Blau, Kahn, and Lawrence (2017) write that “although considerable evidence supports the importance of traditional economic variables in explaining labor-market behavior and outcomes, there is almost always a sizeable component of any behavior that is not explained by these variables, leading researchers to reach out beyond the confines of traditional economic models for explanations” (p. 836). Biological anthropology can expand the explanatory power of economic models.

The theoretical model of parenting I propose is consistent with a recent, growing literature showing that preferences and non-cognitive skills can be moulded from early childhood (see Doepke and Zilibotti 2017 and Agostinelli et al. 2021 for an overview). In my basic model, parents are altruistic. They are altruistic to the extent that their utility is a function of their child’s utility, so they want their child to be ‘happy’. Parents display behaviour that is advantageous to the sex of their kin, hoping that their kin will internalise behavioural expectations and thus find benefits as an adult. My model predicts that parents of primarily daughters display progressive gender attitudes: they divide non-paid work so that the mother does less non-paid work and the father does more non-paid work. Parents of sons don’t have an incentive to display progressive gender attitudes, and instead display traditional gender attitudes: they divide non-paid work so that the mother does more non-paid work and the father less non-paid work.

First, I estimate a differences-in-differences model where the ‘treatment’ is when a person’s first child is a son and the ‘control’ is when a person’s first child is a daughter. I follow parents five years pre-parenthood to five years post-parenthood. I have three dependent variables: couples’ non-paid work gap, mothers non-paid work and fathers non-paid work. Couples’ non-paid work gap is defined as female non-paid work hours minus male non-paid work hours. If a couple have a daughter, their non-paid work hours gap increases 10.30 % ($p < .0001$) upon parenthood. If a couple have a son, their non-paid work hours gap increases 22.6% ($p < .0001$) upon parenthood. These changes are the result of both mothers and fathers changing their non-paid work hours based on the sex of the first child. Similar results are evident in both standard OLS and fixed effect regression; I also control for parents having additional children during the estimation window, as well as age-in-year fixed effects for both parents and year fixed effects. The exogenous shock of the sex of a person’s first child causes parents to display behaviour consistent with traditional gender attitudes if their first child is a son and

progressive gender attitudes if their first child is a daughter.

Brooks and Blake (2021) present the idea of ‘gendered fitness interests’. A person’s gendered fitness interest (GFI) is derived from their own sex and chance of reproductive success, as well as the number of their kin, the sexes of their kin and their kin’s chance of reproductive success. The likelihood a person’s genes are passed on through either fatherhood or motherhood is rarely a neutral balance. A person’s GFI may be male-biased or female-biased. After the birth of a first child, parents may have more children that are the same or different sex. This may cause their preference to model traditional/progressive gender attitudes to be re-enforced, or they may chose to model different gender attitudes to prioritise the majority of their kin, rather than simply the first child.

Gendered fitness interest can be calculated in the following way. Relatedness expresses the likelihood a person shares genetic alleles with another person. For an individual or a monozygotic twin, this value is $r = 1$. For a person’s children, this value is $r = 0.5^2$. In my simple model, I use the average reproductive lifespan for each sex as a proxy for residual reproductive value. Both sexes are assumed to become capable of reproducing at age 15 ($n_i = 1.00$), with females n_i decreasing monotonically until age 45 (i.e. at a rate of $n_i = .033$ per year) and with males n_i decreasing monotonically until age 60 (i.e. at a rate of $n_i = .022$ per year). Following the work of Brooks and Blake (2021), the inclusive fitness effects, k , of all y kin of sex x can be summed as:

$$k_x = \sum_{i=1}^y n_i r_i \quad (1)$$

where n_i is the expected future reproductive success of descendent i of sex x and r_i is their respective relatedness. If a male is of reproductive age, his residual reproductive fitness is added to k_m of Equation 1 whilst if a female is of reproductive age her residual reproductive fitness is added to k_f of Equation 1. A person’s GFI is then defined as:

$$GFI = k_m - k_f \quad (2)$$

Hence, $GFI = 0$ reflects gendered fitness interests that are unbiased, negative GFI indicates bias towards female interests, and positive GFI indicates bias towards male interests.

In both standard and fixed effects OLS regression, I have the key predictor variables of male partner GFI and female partner GFI predicting fathers’

2. Half siblings, grandparents, uncles and aunties have $r = .25$, first cousins have $r = 0.125$ etc.

non-paid work hours and mothers' non-paid work hours. Strikingly, female partner GFI is more influential of male non-paid work than males' own GFI and male GFI is more influential of female non-paid work than females own GFI. In terms of displaying "correct" gender roles for children to internalise, this is intuitive. It is arguably more important for a father with predominantly daughters to ensure his wife does less housework, rather than himself doing more. It is arguably more important for a mother with predominantly daughters to ensure her husband does more housework, rather than her doing less. I test these models with eight different specifications of control variables for robustness checks, yet the key GFI variables barely change. All specifications include cubics in age of both partners (as the GFI variable is regressing towards the mean after a person's fertile years have passed), as well as a control of the total number of children alive for each partner, as a person is more likely to have an extreme GFI variable the more children that they have. A female or male with a GFI value at the 10th percentile, rather than the 90th percentile, can explain up to a 15 hour difference in non-paid work of their partner.

Turning to the empirical testing of mechanisms, I study how gender attitudes change: first with my natural experiment method of the birth a first child, and second with the key predictor variable of GFI. It has been puzzling thus far why progressive gender attitudes seem to favour the needs of females, and traditional gender attitudes seem to favour the needs of males, but the sexes do not differ greatly in their reported gender attitudes. This has been found by Lizotte (2015), Eagly et al. (2004), and Hyde (2005). I also find very similar gender attitudes between males and females using HILDA. A person's gendered fitness interest, usually male-biased or female-biased, may not be the same as their sex. I find that females with male-biased gender fitness interests or a first born child who is male are more likely to favour traditional gender attitudes, whilst males with female-biased fitness interests or a first born child who is female are more likely to favour progressive gender attitudes. A person's gendered fitness interests, as well as their own sex, influences the gender attitudes they internalise.

This article does not have policy implications. However, hopefully it will encourage readers to live with *intentionality*. If a father is performing 15 less hours of housework simply because he has three sons, rather than three daughters, perhaps he would like to reflect on this. I provide a theoretical model that explains a mechanism for why most adults in Australia say they have progressive gender attitudes but rarely do couples' fully exhibit these values. However, change is gradually occurring via altruistic parents caring to model progressive gender attitudes if their descendants are primarily females. Parents recognise the importance of equal division of non-paid work if their

descendants are primarily female. In contrast, parents of predominantly sons are less pre-occupied with modelling progressive gender attitudes, because it does not directly benefit their kin. I provide empirical support for this theoretical model through the natural experiment of the sex of a person's first child, as well as using a new concept from biological anthropology, Gendered Fitness Interest.

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