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Exploring the link between gendered division of labour and reproductive decision-making in high-income countries.

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STATEMENT OF OWN WORK

I, Alyce Gabrielle Raybould, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

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ABSTRACT

In high-income countries, the existence of a 'fertility gap' between stated ideal and actual family size suggests there are impediments to women achieving their childbearing goals. Previous studies suggest that one potential impediment to childbearing could be female domestic burden: when women are expected to perform both paid and unpaid labour responsibilities without additional support, continued childbearing becomes challenging. This thesis explores whether division of domestic labour could help explain the fertility gap by evaluating its association with individual's reproductive intentions, their fulfilment and eventual birth outcomes over time. To do so I examine how the theory, measurement and operationalisation of reproductive decision-making and gendered division of labour matters for the conclusions one can draw for this question.

In this thesis I use a combination of theories from Demography, Sociology, Psychology and Evolutionary Anthropology. In Chapter 2, I outline how these theories can be combined and implemented into fertility research to improve our understanding of how and why gendered division of labour can affect reproductive decision-making. I then perform a systematic review of the literature on gender equity in the household and fertility in high-income countries (Chapter 3). The review highlights that the existing literature would benefit from more standardised data collection and analysis informed by theories of reproductive decision-making. To support this goal, I tested a new set of questions measuring reproductive decision-making using Miller's Traits-Desires-Intentions-Behaviour framework. Chapters 4 and 5 discuss whether the questions adequately measure the underlying theoretical framework using short motives scales. I also report on qualitative findings about factors important to respondents' decision-making. I draw conclusions from this about what might be missing from current theories and data collection on reproductive decision-making.

A further issue that my systematic review highlights is that existing studies on the fertility gap at the individual level (i.e. exploring whether an intention or an ideal for children is realised), do not always consider how changes in reproductive decision-making over the life course may lead to erroneous conclusions about the causes for the fertility gap. I therefore explore how expectations for children change around first birth among women who only ever have one child in the USA and UK (Chapter 6). I find that these women expect closer to the normative ideal of two children prior to first birth and then revise downwards towards an expectation for one child in the five years after first birth. Extending from this work, Chapter 7 explores how division of household labour changes across the transition to first birth using Australian data. In doing so, I clarify how demographic characteristics, changing division of labour at first birth and future childbearing interconnect. The work presented in

this thesis therefore has theoretical, practical, and substantive contributions to the study of gender equity and fertility, the fertility gap, and reproductive decision-making.

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1 INTRODUCTION

In almost all high-income countries, the existence of a ‘fertility gap’ between the number of children individuals want, and the number that they have, suggests there are impediments to achieving childbearing goals (Beaujouan and Berghammer, 2019). Previous studies have suggested that women’s ‘dual burden’ could be a potential impediment to childbearing: when women are expected to perform both paid and unpaid labour responsibilities without additional support, having children becomes challenging (Goldscheider, Bernhardt and Lappegård, 2015). This thesis explores whether women’s dual burden could help explain the fertility gap by evaluating its association with reproductive intentions, their fulfilment and eventual birth outcomes. To do so I grapple with how the theory, measurement, and operationalisation of reproductive decision-making and gendered division of labour matters for the conclusions one can draw for this question. I draw from different disciplinary perspectives to answer these questions, using data from the UK, USA and Australia. In this introduction, I summarise previous empirical findings and theoretical stances that motivated the creation of this thesis. Following this, I outline the structure, aims and objectives.

1.1 BACKGROUND

1.1.1 Low Fertility and The Fertility Gap

This thesis explores the reasons for low fertility and the fertility gap in high-income contexts.

Countries that fall into this categorisation include those in Europe, North America, East Asia, as well as Australia and New Zealand. In these countries, period total fertility rates (TFR) have consistently fallen to below replacement levels over the last century (2.1 children per woman). Similarly, the cohort fertility levels (CFR), which are regarded as more indicative of long term trends as they are not distorted by tempo effects, have also dropped to below 1.75 children per woman, a threshold for ‘very low fertility’ (Myrskylä, Goldstein and Cheng, 2013; Zeman *et al.*, 2018). Birth cohorts of the 1940s averaged between 1.9 to 2.5 children across most European countries, and even higher in English speaking countries like Australia and the UK. The cohort fertility rates of 1970s birth cohorts by comparison, only exceeded 2.1 in Australia, New Zealand, the USA and a handful of European countries like Norway and France (Zeman *et al.*, 2018).

The timing, pace, and parity-specific nature of changes in family behaviour have been diverse across high-income settings (Zeman *et al.*, 2018). For example, whilst cohort fertility declined steadily in Southern Europe, other countries have seen U-shaped trends (USA) or a more stable plateau around 2 (Sweden). Broadly, the driving force for these changes is a near universal childbearing postponement to older ages (Kohler, Billari and Ortega, 2002; Billari and Kohler, 2004; Frejka and

Sardon, 2007), first in Nordic and Western Europe in the late 1960s followed by Southern Europe in the late 1970s (Sobotka, 2008). As a result of changing childbearing behaviour, the number of large families has declined among successive cohorts (3 or more children) (Frejka and Sardon, 2007; Frejka, 2008). This was most important in leading early decreases in the CFR among European cohorts born in 1940s and 50s (Frejka and Sardon, 2007). There is also an increasing proportion of women with no children (Frejka, 2008; Sobotka, 2017; Beaujouan and Sobotka, 2018), or one child (Frejka and Sardon, 2007; Frejka, 2008). This change has become increasingly important for driving cohort fertility to low levels among 1960s to 70s birth cohorts, particularly in Southern, Central and Eastern Europe (Billari and Kohler, 2004; Frejka and Gietel-Basten, 2016). Germany is an exception to this rule, instead experiencing initial declines in the CFR as a result of fewer second births in East Germany, and fewer first births in West Germany (Sobotka, 2011). In sum, however, these changes in childbearing behaviour have resulted in an average of below 2 children in nearly all high-income contexts.

Through the processes of social learning and socialization, experiencing an environment of increasingly smaller family sizes should theoretically make individuals also want to have smaller families, and change perceived societal norms for childbearing (Lutz, 2007). However, across high-income countries in the last 50 years, a mean ideal family size (MIFS) of 2 has remained remarkably persistent (Testa, 2007; Sobotka and Beaujouan, 2014). Mean ideal family size is an average measure of the number of children an individual considers ideal or desirable for a family to have. The majority of European individuals (50-60%) stated 2 as their preferred number of children in 2012 (Sobotka and Beaujouan, 2014) rather than fewer (11%) or more (28%), suggesting a very strong 2 child-family norm across Europe.

This difference between aggregated ideal and achieved fertility is commonly referred to as the 'fertility gap' or an 'unmet need for children' (Chesnais, 2000; Lutz, 2007; Philipov, 2009; Testa, 2012b; Harknett and Hartnett, 2014; Beaujouan and Berghammer, 2019). The term is coined based on findings from aggregated population data (Harknett and Hartnett, 2014; Beaujouan and Berghammer, 2019), although there have also been some individual-level studies on likelihood of achieving childbearing ideals over time (Quesnel-Vallee and Morgan, 2003; Morgan and Rackin, 2010; Gemmill and Hartnett, 2020). Some have used the fertility gap at the population level as a call for policy intervention, as the gap implies individuals are experiencing obstacles to achieving their family goals (Philipov, 2009). Bongaarts (2001) suggested that the major obstacles were rising age at first childbirth, involuntary infertility (whether individuals have a partner and whether they are able to conceive), and competing preferences such as social, economic or health goals. Similarly, Morgan

and Rackin (2010) hypothesised that achieved number of children is a function of intended childbearing interacting with four types of obstacles: fecundity impairments, unwanted pregnancies, partnership status and competing goals accounting for the potential costs of childbearing. While the fertility gap phenomenon was originally observed using aggregate data, I define and operationalise the 'gap' in this thesis on the individual level. I justify the reasoning for this at the end of the introduction. The individual-level perspective means I examine how individual desires and intentions stated earlier in life are met, or change, over the life course. Within this, I explore whether women's 'dual burden' can be a potential obstacle to the realisation of their childbearing goals.

1.1.1.1 A note on the use of replacement, very low and ultra-low fertility.

Replacement fertility is a threshold widely defined as a TFR of 2.1, hypothetically equating to the number of children needed to sustain the population in equilibrium (a stationary population) (Gietel-Basten and Scherbov, 2020). Two other commonly used terms to talk about fertility in high-income settings are 'very low fertility', meaning a TFR below 1.5 (McDonald, 2007) and 'ultra-low fertility' below 1.3 (sometimes referred to as 'lowest low fertility') (Kohler, Billari and Ortega, 2002). A CFR estimate of 1.75 is categorised as the cohort threshold for 'very low' fertility (Zeman *et al.*, 2018). While terms like 'low fertility' and 'replacement fertility' are used in this thesis to correspond with previously used terminology, their labels should not be interpreted as signifying that low fertility is inherently a problem. The concept of replacement fertility has been used by some to argue fertility needs be raised to counteract the potential repercussions of ageing populations (Demeny, 2003), particularly in the media (Stark and Kohler, 2002) and in right-wing political discourse (e.g. Buchanan's 'The Death of the West' (2002)). However, the extent to which low fertility results in socio-economic strain depends on other factors like migration, population productivity, education, and population health (Striessnig and Lutz, 2013; Lee *et al.*, 2014; Lutz, 2014). Further, the replacement fertility rate of a population is not immutably set at 2.1 children, and will be higher in contexts with higher mortality rates for women at reproductive age and skewed sex ratios (Gietel-Basten and Scherbov, 2020). The concern in this thesis related to sub-replacement fertility, is instead motivated by the apparent mismatch between ideal and actual fertility, suggesting that constraining factors may be preventing people from having the children that they want.

1.1.2 Complementary divisions of labour and Fertility

Labour division strategies of paid work (employed labour, typically occurring outside the household) and unpaid work (domestic and caring labour, occurring inside the household) between opposite-sex couples in high-income countries tend to follow a consistent pattern: despite a widespread norm of dual-earner couples in high-income settings developing over the last 50 years (OECD, 2011; Cory and Stirling, 2015; Oláh, 2015; Dai, 2016), cross-national statistics show that women tend to perform the

majority of unpaid domestic tasks such as cooking, housework (e.g. cleaning and laundry), grocery shopping, paying bills, transporting family members and caring responsibilities, regardless of their income and paid labour commitments (Fuwa, 2004; Cloin, 2012; Grunow, Schulz and Blossfeld, 2012; Tanturri, 2012). This broad-brush summary hides variation in exactly how gendered this division is among different couples, countries, types of unpaid tasks and over time. For example, it ignores that there has been a considerable increase in men's time contribution to domestic tasks since the 1960s (Altintas and Sullivan, 2016) and that some tasks are more often done by men such as managing finances (Sheehan, Domingue and Crimmins, 2019). However, the overall pattern is still clear: women tend to do more overall unpaid work than men.

Several sociological-demographic theories connect this mainly female provision of domestic labour to declines in fertility across high-income countries (McDonald, 2000b; Esping-Andersen and Billari, 2015). McDonald's 'gender equity theory' (2000a, 2000b) first posited that lowest fertility will exist where institutions have not adapted to allow women to both work and care. For example, policies such as school hours, state-provided childcare, allocation of parental leave and shop opening times, which are all designed around the assumption of mother-provided childcare. This means mothers can experience a 'time bind' where they must balance their paid work with a 'second shift' of domestic work at home (Hochschild, 1989). Inadequate support for families leads to an inability for women to manage both their career and family desires, ultimately resulting in sacrifices to fertility intentions and outcomes. Macro-level fertility over time will therefore follow a U-shape, with fertility first falling in response to these institutional restrictions, and then rising in response to institutional reform. 'Equity' in the title of the theory is defined by Neyer et al. (and across much of the demographic literature) as self-perceived fairness in division of tasks, and is distinct from the term 'equality', which is defined as fairness in the time spent by each member of the couple on domestic tasks (Neyer, Lappegård and Vignoli, 2013). While I explore both concepts in this thesis (satisfaction and actual time division), I prefer to use gender equity as a general description of my research topic because it appreciates that work does not necessarily have to be divided exactly evenly to be acceptable to couples (Neyer, Lappegård and Vignoli, 2013). Indeed, as I explore below and argue in Chapter 3, it is not how labour is divided exactly that appears most important for low fertility (i.e. whether it is a total specialisation of the partners into paid or unpaid work, or a division of both types of work between them), but rather whether the division of labour between the partners is non-complementary, resulting in one partner doing overall more paid *and* unpaid work than the other (typically women). The original rationale for McDonald's theory stems from Becker's new home economics theory (Becker, 1981). The theory posits that household role specialisation, with women as homemakers and men as breadwinners, results from the need to create efficiency

within the home. Such efficiency results in the ability for couples to have the number of children that they want. Within this framework, the decline in fertility can be explained by a conflict between paid labour and childrearing duties for working women, resulting in sacrifices to childbearing intentions. Furthermore, there is a trade-off between the 'quantity and quality' of children couples wish to have, with couples favouring the latter given a decline in infant mortality and a high cost of childrearing.

Although this theory could be gender neutral, as either partner can specialize in the two areas of paid and unpaid labour, Becker adds a biological assumption that women are more efficient homemakers due to a long history as such. A more thorough examination of history, however, undermines both Becker's biological assumption and the subsequent explanation for low fertility. Women throughout human history have contributed productive labour to society (Ahnert, 2006; Giuliano, 2015), and conversely, men also sometimes perform a considerable amount of caring and domestic tasks in both high-income and low-income settings (Hewlett, 1992).

However, it is true that women most often perform the domestic labour within the household across a diversity of current day and historical contexts, but this cannot be explained by evolved preferences. More plausibly, it results from rigid gender norms which strongly deter couple deviance (Lachance-Grzela and Bouchard, 2010). Norms are defined as social rules and expectations that maintain social systems. In this case they relate to binary gender (men and women). Gender became a popularised term by 1970s feminist scholars to "distinguish those aspects of male and female roles, behaviours and preferences that were socially constructed rather than a function of biology." (Cislaghi and Heise, 2020, p. 4). Further, separating gender from sex counteracted the idea that differences between men and women are 'natural'. Gender is a social system that affects the allocation of resources, roles, and power in a hierarchy. Norms are one part of this system and relate to how men and women should 'perform' their gender in society. In relation to this thesis, I am interested in gender norms which dictate gender roles (which tasks men and women should perform). Culturally constructed gender roles in high income settings have been heavily influenced by the male-breadwinner family model, prevalent in the 1950s. These gender roles dictate that femininity is confirmed by performing housework, whereas the performance of masculinity is done through avoiding it (Berk, 1985; Mason, 1997). The norms connected to these roles are so strong that couples would rather conform to this division than fight constantly against institutional barriers that assume a male-breadwinner family model. The importance of gender ideology in determining gendered division of labour has been found to be highly significant across low-fertility, high-income settings, with factors like relative resources, time availability and economic dependency between

partners having a more inconsistent effect in how unpaid labour is divided (Coltrane, 2004; Aassve, Fuochi and Mencarini, 2014; Davis and Wills, 2014).

In terms of where rigid gender norms about division of labour come from, in Western-Europe they are connected with the rising prevalence of the male-breadwinner family model after the industrial revolution (Van Poppel, Van Dalen and Walhout, 2009). The industrial revolution meant increasing employment prospects outside the home, and this may have resulted in the bifurcation of labour into two spheres: labour in the home, and labour outside the home (Fortunato, 2017). It is at this point that women begin to exclusively specialise in the former type of labour, and men the latter. However, the diffusion of gendered division of labour along these lines varies between social classes, with women of lower socio-economic status continuing to work throughout the 19th and 20th centuries despite growing prevalence of the male-breadwinner family (Van Poppel, Van Dalen and Walhout, 2009). A norm for middle-class women without children to engage in paid work developed in these settings during the 1960s and 70s, and by the 1980s and 90s it was also typical for middle-class women with children to work (Walby, 1997; Crompton, Lewis and Lyonette, 2007). This re-entry of women into the workforce in much of Europe and North America has been linked to the decline of heavy industry and consequential growth of service sector jobs, the development of efficient contraception, increasing opportunities to work part time, increasing prevalence of divorce (and thus precarity in assuming a male-breadwinner financial arrangement) and 'second wave feminism' altering attitudes and preferences relating to gender roles (Creighton, 1999; Crompton, Lewis and Lyonette, 2007).

Gender revolution theory (Goldscheider, Bernhardt and Lappegård, 2015) recognises the role of restrictive male-breadwinner family norms in its explanation for low fertility. The theory outlines how fertility rates will fall and then rise, in response to two gender revolutions. The first gender revolution occurs in the public sphere. During this phase, fertility will fall as women increasingly engage in paid work, compared with the predominantly male-breadwinner–female-homemaker model of the mid-twentieth century. However, men do not contribute more at home, owing to gender norms in favour of a male-breadwinner–female-homemaker family model. This can result in working women experiencing a dual burden of paid and unpaid work. According to the Gender Revolution Theory, fertility will only rise again when there is a second gender revolution at the family level, as men increasingly engage in unpaid labour responsibilities, alleviating this dual burden. In sum, the trend outlined gives the same U-shaped pattern noted by McDonald, with the highest fertility for both male-breadwinner–female-homemaker couples (prior to the gender revolutions) and couples that share both paid and unpaid work (after both gender revolutions). The

lowest fertility will be among those who have only experienced the first phase of the two gender revolutions.

Esping-Andersen and Billari (2015) redefine this U-shape in an empirical model over time. Fertility behaviour will remain stable (in equilibrium) as long as expectations about childbearing and gender norms are maintained. When exogenous shocks that question prevailing norms arise, the cost-benefit ratio of still conforming will be altered and drive the growth of a new normative standard in the population. The authors list the rise of birth control and household technologies that decreased domestic time burden as the exogenous shocks leading to the first gender revolution in the public sphere, with women investing more in their marketable skills during the last half of the 20th century. As women became more emancipated in the public sphere, this resulted in an 'unstable equilibrium' where conflicting norms coexist. In this case, emancipation of women in the public, but not private, spheres. This normative conflict results in low fertility and partnership instability. According to Esping-Andersen and Billari's model, creating gender equity in the private sphere will then be inevitable to restore norms back to an equilibrium. As a result, fertility and marital stability react favourably, completing the U-shaped trend. However, the authors do not predict what the effect size of changing gender roles on fertility would be, or a potential time frame for completing the gender revolution. Nonetheless, the authors are very clear that they predicted low fertility to be transitory and there would be, "a return to "more family" as gender egalitarianism gains increasingly dominant normative status" (Esping-Andersen and Billari, 2015, p. 3).

Hakim's preference theory (2002) also to some extent reflects these three categories of labour division as determinants of fertility. However, unlike the previous theories, preference theory is specific to explaining individual rather than macro-level fertility. Further, unlike the dynamic assumption of Esping-Andersen and Billari's model, Hakim sees these groupings as immovable preference categories. The theory outlines that women can be categorised into three family-work preference groups: 1) 'home-centred women' who highly value family and prefer not to work, 2) 'adaptive women' who prefer to balance work and family commitments and 3) 'work-centred women' who value work over family. Hakim theorises that these preference groups determine fertility outcomes, with lowest fertility among the work-centred women, and highest among the family-centred women. The theory has been highly critiqued however, which I explore in more detail in Chapter 7.

There are widespread empirical findings from 2000-2010 that find equity and equality in gendered division of labour to be highly relevant in determining macro-level fertility patterns (e.g. Alonso 2004; Testa 2007; Brinton and Lee 2016; Frejka et al. 2018; Doepke and Kindermann 2019).

However, these findings are becoming increasingly critiqued. The first concern is that the idea of the U-shaped gender revolution curve was overly determined by Nordic countries in regression modelling, where relatively high fertility and gender equality were combined, pulling the right hand tail of the regression up into a U (Lesthaeghe, 2020). Falling fertility across Nordic countries over the last decade has called into question the relevance of gender equity theories for predicting fertility (Hellstrand *et al.*, 2020). Secondly, that U-shaped theories relied too strongly on cross-sectional empirical evidence and subsequent longitudinal studies have failed to replicate the U-shape (Kolk, 2019). Finally, that U-shape theories (i.e. McDonald's theory, Gender Revolution theory and Esping-Andersen and Billari's theory) overly rely on a single explanatory factor that cannot provide sufficient explanation for current fertility trends without more consideration of structural and ideational factors (Lesthaeghe, 2020). I reflect on these critiques in the discussion of this thesis; however, I conclude they do not invalidate the focus of this thesis. Indeed, even if gender equity cannot entirely explain current fertility trends, this does not mean it may not still be an important partial explanatory factor. The growing area of interest amongst demographers for explaining current low fertility patterns relates to fear of the future and uncertainty (Aassve, Le Moglie and Mencarini, 2021; Balbo and Ivanova, 2021; Comolli and Vignoli, 2021), with gender equity explanations becoming less popular. However, the exploration of micro-level gender equity and fertility in evolutionary studies remains robust and of contemporary interest (Sear *et al.*, 2016; Schaffnit and Sear, 2017a).

Evolutionary theory assumes that humans, like other animals, behave to maximise their reproductive success and representation of genes among future generations. To meet this goal, conscious and unconscious psychological mechanisms have been shaped through natural selection. These genetically controlled mechanisms respond flexibly to an individual's environment to maximise reproductive success. Variation in human behaviour is therefore understood as a product of gene-environment interactions (Sear, 2015).

In relation to variation in childbearing, evolutionary theory assumes that people who experience higher levels of support will, all else being equal, experience fewer physiological and psychological costs to reproduction and thus have more children than those with lower levels of support. Human mothers have a finite amount of energy that can be allocated to competing biological processes (known as life history traits), such as continued childbearing. Looking after children is very energetically consuming, particularly as human children, compared to other mammals, have a long period of childhood development post-weaning. This can lead to the mother providing care to multiple children. Receiving support with childrearing (a cooperative breeding strategy) can

therefore alleviate the energetic burden of childcare, meaning that mothers to continue childbearing without incurring costs to their health or the survival of their existing children (Hrdy, 2009). This hypothesis is supported by studies demonstrating that in high-fertility settings, when women do have emotional and practical support for childrearing, their fertility increases (Sear and Coall, 2011; Mathews and Sear, 2013).

However, in high-income countries where low fertility and childlessness are prevalent, the use of evolutionary perspectives has been questioned, given that individuals no longer act in a way that optimizes their reproductive fitness (Goodman, Koupil and Lawson, 2012), i.e. individuals choose to forego childbearing despite circumstances that would support having children. Nonetheless, evolutionary theories suggest that humans have evolved to recognise environmental cues that imply the alleviation of reproductive costs and lead to 'fitness-enhancing behaviour' through increased fertility (Stulp, Sear and Barrett, 2016). Support, or the knowledge of available support, for domestic responsibilities could act as one of these cues to promote both intentions for children, and the fulfilment of those intentions. Sources of support can include kin and the partner, who gain direct fitness from investing in childcare (Park, Cho and Choi, 2010; Sear and Coall, 2011; Schaffnit and Sear, 2017b), paid childcare services (Luci-Greulich and Thévenon, 2013), family policies (Duvander, Lappegård and Andersson, 2010; Lee, Duvander and Zarit, 2016) and the parents' social network (Park, 2012).

There are obvious links between evolutionary-anthropological theories of support, particularly the cooperative breeding hypothesis, and the sociological theories outlining how lack of support for women in managing a dual burden leads to decreased fertility desires and outcomes. Broadly speaking, both conclude that women need considerable support from others (including partners) to raise children, and that complementary labour division strategies between partners can help women combine childcare with other types of productive labour. However, the two theoretical stances also bring their own perspectives. For evolutionary theories, like the cooperative breeding hypothesis, the major strength of the theory compared to the sociological theories is an appreciation of context (particularly support environment) for determining reproductive behaviour. For demographic-feminist theories it is the explicit consideration of how gender norms and gender as a cultural system plays a role in determining fertility trends. This is not to say evolutionary theories do not consider gender systems as part of their explanation; however, when they are considered, they tend to be explored in terms of how they were generated from the environment and context in which they exist. These similarities and differences between evolutionary and gender revolution

explanations for low fertility, and the evidence to support their predictions, is discussed in more detail in Chapter 3.

1.1.3 Critiquing the Fertility Gap

A non-complementary labour division between partners, as theorised in both demographic and evolutionary theories of low fertility, therefore seems a plausible explanation for why individuals, particularly women, may not be able to have the number of children they would like. However, there is another explanation for why the aggregate fertility gap exists: that it is also the result of measurement fallacy. The first concern is that ideal fertility (as measured by mean ideal family size) is highly reflective of societal family norms (Trent, 1980; Philipov and Bernardi, 2011), and does not always translate to the individual's personal desire for children (the number they would like to have in the presence of no obstacles), or the number they expect to have (the number they would like accounting for potential obstacles) (Quesnel-Vallee and Morgan, 2003). Therefore, comparing achieved fertility to a mean ideal family size may only be equal to comparing achieved fertility against a norm, rather than a personal goal. Similar to this, the fertility gap has been criticised as misleading for comparing lifetime ideals with period measures of fertility (Sobotka and Lutz, 2011; Beaujouan and Berghammer, 2019). Macro-level analyses like this can create ecological fallacy and should not be used to indicate causal mechanisms on the individual (micro) level, as aggregate measures hide considerable heterogeneity in both ideals and achieved fertility (Harknett and Hartnett, 2014).

The final branch of criticism stems from issues about how reproductive decision-making is measured and operationalised. Psychosocial theories like Miller's Traits-Desires-Intentions-Behaviour framework of reproductive decision-making outline that the concepts of individual-level fertility motives, desires, expectations and intentions are theoretically distinct from one another (Miller, Severy and Pasta, 2004). A fertility motive is a disposition to feel more positively or negatively towards different aspects of childbearing (Miller, 2011). Generally, these dispositions are not conscious, but can be self-observed. They are also determined by early family experiences and genetics, meaning they should be measurable from adolescence and early adulthood, and while they can change, they are more stable over time than the other motivational constructs listed below. Conceptually they are close to the sociological construct of 'childbearing attitudes' or 'childbearing values' (Miller, 2011). Motives are distinct, but influential in determining fertility desires, which are defined as a general want to achieve an actionable goal (in this case having children), but no specific plan to act (Miller, 2011). Desires relate to other constructs such as an individual's ideal number of children (the number of children wanted in the presence of no obstacles) (Miller and Pasta, 1995a; Philipov and Bernardi, 2011). A fertility intention follows on from this desire as a 'plan of action' for

having children (Miller and Pasta, 1995a). Of all the psychological concepts listed, an intention is the most deterministic of behaviour, and the most influenced by external factors like the childbearing environment and partnership status. A similar related concept to intentions are 'childbearing expectations' which factor in the reality of achieving a goal, but do not include a plan to act (Miller, 2011). Each of these psychological concepts can relate to three different types of reproductive decision-making: deciding to becoming a parent, number of children wanted and timing of childbearing (Miller and Pasta, 1995b). Defining the fertility gap then using Miller's definitions of childbearing psychological constructs, the gap is occurring between the more conscious and verbalised child number desires stated from early adulthood (not the subconscious motives which are deeply rooted in early-life experiences) and completed childbearing later in life. This means there are two potential points where obstacles may inhibit the realisation of reproductive goals: first as an obstacle meaning the general 'want' for children is not translated into the more active 'intention' for children during the life course, and secondly should an intention be formed, an obstacle that means the intention is not ultimately acted upon or achieved. A dual burden of paid and unpaid work for women could be a potential obstacle at both of these points in the decision-making pathway.

However, the fertility level predicted by stated desires, expectations and intentions is very similar in empirical work, and survey respondents demonstrate a poor understanding of how these concepts are distinct (Philipov and Bernardi, 2011). This limits our ability to interpret commonly used measurements of fertility desires and intentions (Beaujouan, 2014). Depending on how the question is asked, a respondent could answer with the number of children they think is ideal for any person to have, how many they think would be ideal for them (fertility desire), or how many would be ideal given their life circumstances (fertility expectation) unless given clear instructions. Furthermore, those who are older and in stable partnerships are more likely to be realistic about their intended family size, than those who are younger, unpartnered and with competing intentions such as career or education goals (Westoff and Ryder, 1977; Philipov and Bernardi, 2011). Indeed, there is a plethora of findings showing childbearing goals are not fixed, and are altered across the life course (e.g. Liefbroer 2009; Iacovou and Tavares 2011).

A valid examination of the 'fertility gap' therefore requires a careful consideration of how consistent the measures of ideal and actual fertility are with one another, longitudinal data to see when and how decision-making changes, ensuring there is no mismatch between a longitudinal goal with cross-sectional outcomes, and finally a micro-level focus (i.e. individual measures over time, not societal-level measures) to eliminate ecological fallacy.

1.2 THESIS DEVELOPMENT AND STRUCTURE

The London School of Hygiene and Tropical Medicine allows the format of doctoral thesis to follow a book-style format, a research paper format, or a combination of the two. This thesis presents four research papers for publication, along with two supporting chapters (as in a book-style thesis) explaining the development of my work, how it links together and work which is not yet for publication. As a result, there is some overlap of content between the supporting chapters (including this introduction) with the content of the research papers which have to include the same information for publication. It is also why this introduction briefly introduces the context from which this thesis was generated, as I discuss relevant theories and previous research in much greater detail in following chapters. In this section, I will describe how each chapter and paper was developed, and the reasoning behind their inclusion in this thesis.

I began my PhD interested in how the division of labour within heterosexual partnerships affects the realisation of intentions for children. Further, I wanted to evaluate whether this could be an explanation for the fertility gap phenomenon. This motivated the first research paper presented in this thesis (Chapter 3), where I systematically review the literature on the topic of household division of labour and childbearing. This review confirmed previous critiques of the fertility gap phenomenon that I discussed in this introduction: that the literature looking at realising intentions for children and gendered division of labour was very limited and could be improved by more analytical rigour informed by theory.

Indeed, I noted that a practical guide on how to use theories of reproductive decision-making to inform analysis was lacking, both for studies of the fertility gap and more widely. While there have been important efforts to understand reproductive decision-making in its entirety across disciplines (e.g. Miller et al. 2004; Bachrach and Morgan 2013; McAllister et al. 2016; Brehm and Schneider 2019), I argue in Chapter 2 that these theories often do not lend themselves easily to measurement, potentially explaining why analysis exploring realising intentions is mired with conceptual confusions. Further, as I wished to combine many different theoretical perspectives in this thesis, I wanted to produce a conceptual framework that brought these approaches together. In Chapter 2, I present an overview of how I pieced together cross-disciplinary perspectives on reproductive behaviour (including psychological, demographic and evolutionary studies), and a practical way to combine these approaches to inform analysis. Throughout the thesis I continue to draw research questions from psychological and demographic theories. Evolutionary theories are primarily used in this thesis as a critical lens to better understand why gendered division of labour matters for fertility. I reflect more on why this transpired in the discussion.

Chapter 2 and Chapter 3 (research paper 1) form the first half of the thesis on theoretical perspectives. The second half of the thesis presents my empirical work, beginning with a chapter outlining the methodological development of the different papers (Chapter 4, research paper 2). A conclusion reached from both theoretical chapters presented in my thesis, is that the best theory to standardise data collection on reproductive decision-making for a better evaluation of the fertility gap is the Traits-Desires-Intentions-Behaviour (TDIB) framework (Miller, Severy and Pasta, 2004). I will introduce this theory in more detail in following chapters, but briefly, it is a psychosocial theory designed to explain reproductive decision-making. It was designed with clearly separated and defined components of reproductive decision-making and outlines how they link together in a pathway. In my opinion, the definitional clarity of the theory means it is best suited for disentangling the methodological confusions of the fertility gap. It also includes a longitudinal life-course perspective in the model, which is essential for a valid examination of the fertility gap at the individual level. The theory clearly outlines how each component of the pathway will directly influence the next motivational state in the pathway, whilst having indirect effects for the components downstream of it. The theory also states that motives (the starting construct of the pathway) are determined by early family experiences and genetic traits, making them more stable than the other motivational states which are more highly influenced by current context. The theory posits that motives should be measurable from early adulthood, predicting desires for children at a later age, and ultimately with changing context, indirectly influence intentions. Thus, the TDIB model provides the theoretical pathway needed to understand why an individual's desire for children either changes or becomes realised/unrealised over time, which is key to understanding the fertility gap.

During my PhD project, I co-authored a series of questions measuring reproductive decision-making as outlined in the TDIB model, with the aim of integrating these questions into the Generations and Gender Survey (GGS). The GGS is a cross-national, longitudinal survey exploring the causes and consequences of family change in high-income settings. The questions I co-wrote were tested in Poland and the UK, and I present findings in Chapters 4 and 5. In these chapters I detail how well the questions operationalised the components of the TDIB framework, as well as respondents' own explanations for their decision-making.

In my systematic review, I had identified a need for a more methodologically rigorous assessment of how gendered division of labour affected the probability of realising intentions. I therefore initially planned to test whether division of household labour affects the probability that women with one child in high-income, low-fertility settings go on to have a second child, if they state an intention to

do so in the next three years (as per the typical definition of an intention). I would then explore the implications of these findings as an explanation for the fertility gap. As discussed earlier, a valid examination of the fertility gap has specific requirements which I aimed to include in this analysis: to ensure the concepts of ideal and actual fertility were consistent with one another, to use longitudinal data sets and methods, and to use a micro-level analysis to avoid ecological fallacy. The focus on progression from one to two children was motivated by the persistent mean ideal family size of two noted in low fertility settings. This analysis, however, would have been subject to selection bias: if an individual states that they intend to have a child within the next three years, it is likely that they do not perceive any significant obstacles to achieving that goal. Therefore, women who may have wanted to ultimately have two children but perceive insurmountable obstacles to achieving that goal, would not state an intention for a second child and be excluded from the model sample. This is an important group of women to identify, should they exist, as it would contribute to our understanding of what exactly the fertility gap shows. My concerns about this analysis mirrored critiques about the methodological conceptualisation of the fertility gap, which I was becoming increasingly aware of: that reproductive intentions are imbued with considerable uncertainty and are known to be adjusted across the life course.

I therefore modified this analysis to take a step back in the chronology of decision-making and explore whether a revision of expectations for children is evident around the time of first birth. The onset of parenthood results in considerable changes, including in household division of labour. To address my original research questions regarding whether gendered division of labour is an explanation for the fertility gap, I needed to explore separately whether and when division of labour and expectations for children change around first birth before conducting any causal analysis. The third research paper presented in this thesis explores whether and how fertility expectations change around first birth in the UK and USA for those who only ever have one child (Chapter 6, research paper 3). The fourth research paper explores whether there are typical changes in labour division around the time of first birth in Australia, and whether these changes are associated with particular demographic characteristics and likelihood of a second child (Chapter 7, research paper 4). I then close the thesis with a discussion linking my chapters together and reflecting on the implications. All references are included in one bibliography at the end of the thesis, rather than separately for each paper.

1.2.1 Aims and Research Questions

In conclusion, this thesis aims to explore the role women's 'dual burden' plays in determining reproductive decision-making and eventual childbearing outcomes in high-income settings. Specifically, I explore whether a lack of complementary roles between partners is an obstacle to

realising childbearing goals, as suggested by the fertility gap phenomenon, and hypothesised by both evolutionary-anthropological and gender revolution theories. This thesis also explores how changing reproductive intentions over the life course and their measurement may impact the conclusions one can draw for the main aim. In particular, I use the conceptual clarity and individual life-course perspective of Miller's TDIB model to critique existing measurements and operationalisation of reproductive decision-making. The empirical work presented in this thesis focuses on a subset of high-income, low-fertility countries (the UK, USA, Australia and Poland). I summarise the aims and research questions below:

AIM 1: To establish whether a lack of complementary partner roles in the household is an explanation for why individuals fail to realise their childbearing goals.

Research questions for aim 1:

- 1) What is the current evidence for a link between complementary roles in the household affecting reproductive decision-making and outcomes? (Chapter 3)
- 2) What can uniting different disciplinary perspectives from evolutionary anthropology, psychology, demography and sociology on gendered division of labour and reproductive decision-making bring to further our understanding of the link between the two? (Chapter 3 and Chapter 7)
- 3) Are there typical trajectories in paid and unpaid labour at the onset of parenthood, and are these associated with individual's demographic characteristics and progression to second birth in Australia? (Chapter 7)

AIM 2: To examine how the measurement of reproductive decision-making influences our understanding of the link between gendered division of labour and the fulfilment of childbearing goals.

Research questions for aim 2:

- 1) How can theoretical perspectives on reproductive decision-making be summarised for analytical use to avoid further methodological confusions in analysis on the fertility gap? (Chapter 2)
- 2) How can Miller's TDIB framework improve and standardise data collection on reproductive decision-making to provide a better understanding of the fertility gap? (Chapters 3, 4 and 5)
- 3) Can Miller's TDIB framework be operationalised accurately using a short scale of positive and negative motives for children in the UK and Poland? (Chapter 4 and 5)
- 4) How do UK individuals rationalise their childbearing decision-making in their own words, and what does this suggest may be missing from current data collection and analyses on reproductive intentions and their fulfilment? (Chapter 4)
- 5) To what extent does reproductive decision-making change over time for those who have fewer than the normative two children in the USA and UK, and what implications does this have for our interpretation of the fertility gap as a product of obstacles to childbearing in high-income settings? (Chapter 6)

2 REPRODUCTIVE DECISION-MAKING AND BEHAVIOUR: HOW TO IMPLEMENT THEORY INTO ANALYSIS.

2.1 INTRODUCTION

Demographic research has many commendable strengths. For example, work in the discipline is underpinned with high quality data and quantitative methods, resulting in important descriptive contributions to the study of human populations. However, a common criticism of demography as a discipline is that it lacks a theoretical basis of its own (Vance, 1952), if one does not include mathematical population models as a type of theory (Burch, 2003). Instead, demographers must borrow theories from other disciplines, such as sociology and economics, to understand demographic phenomena from macro and micro perspectives. For example, Becker was an economist, and gender equity theories of fertility build on sociological theories relating to gender systems. There are some notable exceptions to this lack of theory in the area of fertility research, such as Bongaarts' 'proximate determinants of fertility', and the Easterlin-Crimmins 'supply-demand' frameworks (Easterlin, 1975; Bongaarts, 1978). These frameworks aim to understand fertility in its entirety, incorporating both physiological (e.g. postpartum infecundability) and behavioural factors (e.g. wider socio-cultural influences) that influence fertility. In contemporary, low fertility societies, physiological determinants of fertility have become less important while behavioural factors have become more prominent in explaining fertility levels. It is therefore perhaps surprising that, so far, demographic research on fertility outcomes has not drawn much on psychology, nor given great consideration to how individuals' cognitive processes generate behaviour which leads to demographic outcomes. Understanding the reproductive decision-making pathway in detail, from forming intentions to act through to the act of attempting or avoiding a conception, should give us better insight into the supposed 'fertility gap' between ideal and actual fertility emerging in low-fertility settings (Lutz, 2007; Philipov, 2009; Testa, 2012b; Harknett and Hartnett, 2014; Beaujouan and Berghammer, 2019). While the use of theoretical frameworks of any kind is not widespread in empirical analyses of fertility, some demographers have developed theories from behavioural and cognitive science to understand the childbearing process more fully.

In this chapter I will outline the behavioural theoretical frameworks demographers have used and developed to study fertility intentions and behaviour. I will then categorise these theories into groups that form a step by step guide for generating hypotheses and analysis informed by behavioural theory.

2.2 THEORETICAL FRAMEWORKS OF REPRODUCTIVE DECISION-MAKING

Psychosocial or cognitive theories find their roots in traditional rational choice models of behaviour, which typically consider an individual as a rational actor, consciously or unconsciously weighing up the perceived costs and benefits of a particular action in order to maximise a particular utility like health, wealth or happiness.

The 'Theory of Planned Behaviour' or the TPB (Ajzen, 1991) was the first such psychosocial theory to be applied to childbearing behaviour (Vinokur-Kaplan, 1978), building on rational choice models of behaviour. Compared to other frameworks, this theory is relatively frequently used (e.g. Billari, Philipov, & Testa, 2009; Dommermuth, Klobas, & Lappegård, 2011), tested (e.g. Ajzen & Klobas, 2013) and discussed (e.g. Vienna Yearbook of Population 2011 special issue on reproductive decision-making) by demographers. There are three components to the model: attitudes (perceived costs and benefits of a behaviour); subjective norms that might affect behaviour; and the extent to which behaviour is perceived to be subject to individual control. These three factors are all influenced by the individual's background characteristics such as their age, education and employment. The three components combine to form a childbearing 'intention'. An intention is typically defined as a short-term 'plan of action' to have a child (Miller, 2011). The underlying rationale therefore is that an intention for a child will be indicative of subsequent behaviour, and therefore factors that influence intentions will also influence behaviour.

The TPB, however, has been criticised for two main reasons. Firstly, the original model treats behaviour as a product of conscious, reasoned thought, rather than from more automatic, non-conscious processes such as sensing stimuli and learning/storing new information. An alternative socio-psychological model developed independently of the TPB by Miller and Pasta (Miller, 1994; Miller, Severy and Pasta, 2004) incorporates these non-conscious processes by linking fertility intentions to behaviour through a pathway of motivations, desires and intentions. The model is thus commonly known as the TDIB (traits, desires, intentions, behaviour). The initial motivations are defined as biologically based and non-conscious traits or dispositions to feel, think and act in ways that affect childbearing (Miller, 2011). The motivations form desires for children, representing the ideal childbearing goal in the presence of no obstacles, which in turn are translated into intentions that consider the probability of their execution given contextual factors. The framework therefore explicitly appreciates that an intention for a child is distinct from the related concepts of a childbearing 'expectation', the number of children thought to be achievable in the presence of obstacles, independent of whether children are currently wanted, or 'desire', the ideal number of children wanted when there are no obstacles to childbearing (Miller, Severy and Pasta, 2004; Philipov and Bernardi, 2011). Intentions are implemented through instrumental behaviours such as

aiming to achieve or avoid conception. However, the framework also stresses the importance of an individual's partner's intentions, life course factors and fecundity issues for successfully achieving a birth. The authors also acknowledge that desires and intentions will change over time because of situational factors, such as the birth of each child and major life events like employment or partnership status changes. Several studies have tested and implemented the model (e.g. Wagner *et al.*, 2014; Mynarska and Rytel, 2018). The first study uses the model to examine how women living with HIV adjust their fertility plans, using the clear parts of the pathway to guide the selection of relevant predictors. The second uses the framework to explore pathways to voluntary and involuntary childlessness, and finds that childbearing motives are important for the childbearing desires and intentions of childless individuals who are of an age when a decision whether to become a parent has to be made.

The second major criticism of the TPB relates to its limited consideration of macro-level, or environmental, influences. The model originally only extended to micro, individual processes (for example a woman's domestic burden) and meso-influences (individual's family and social network). However, it is also important to appreciate the role of macro-processes in determining fertility behaviour (Billari, 2015), such as the wider societal norms or policies that influence childbearing. Furthermore, behaviour occurring on the micro-level can generate patterns of behaviour on the macro, and vice versa the macro-influences can provide downward effects in generating micro-behaviour (Billari, 2015).

The Cognitive-Social model of reproductive decision-making (C-S) better encapsulates macro-level influences whilst also incorporating automatic behavioural processes (Bachrach and Morgan, 2011). This theory, specifically formulated to make sense of existing demographic indicators and data on fertility intentions, outlines that humans view the world through 'schemas', which are mental structures for processing information. These inform an individual about what to expect given prior or informed experience, such as how one should act in a given context (e.g. using contraception), or how we expect others to act based on what we know about them (e.g. gender roles). Most schemas are formed based on lived experience, but some may be innate. Related schemas are connected by neural pathways. In the example of childbearing, for instance, schemas related to gender roles, motherhood and provision of care will be closely connected. These schemas are also imbued with a sense of feeling, influencing the way in which we might act. For example, a 'baby' schema could for one person elicit a warm, happy reaction whereas for another it could bring about feelings of stress or irritation. These feelings can become tied into a sense of self-identity and dictate our actions. Continuing with the above example, the former group would more likely envisage themselves as

parents than those who did not have positive feelings towards babies. These schemas, along with macro-structural factors such as the socio-cultural environment and its norms, form intentions whereby the individual is motivated to act. The model has been tested by one study (Rackin and Bachrach, 2016) which found support for the model in terms of how it conceptualised and operationalised fertility intentions.

The Model of Dyadic Pathways (Brehm and Schneider, 2019) also incorporates macro-level influences into its model of reproductive decision-making. The model is similar to the TDIB model, but instead of including 'desires' in the pathway, the framework expands the 'motivations' component to incorporate the motives of both partners. The conjoined interaction between these motives leads to the couple's intention for a child. However, the model also outlines that motives can directly influence behaviour, rather than indirectly as in Miller's model. This modification better accounts for ambivalent pregnancies (i.e. when a child is neither intended nor unintended). The pathway from motives to behaviour sits conceptually within the intertwined life courses of both the individual and the couple, which in turn sits within societal influences on decision-making and behaviour. The theory then describes how different combinations of societal influences, life course influences and indirect or direct influences of the decision-making pathway can result in 14 types of decision-making trajectories. The theory has not yet, however, been empirically modelled and validated.

Separately from the psycho-sociological literature, evolutionary theory also offers a perspective on reproductive decision-making. Although the theory is not psychosocial like the others above, I have incorporated insights from the theory into my work for three reasons. Firstly, evolutionary theory is already starting to be implemented by demographers studying childbearing intentions (Park, 2012; Schaffnit and Sear, 2017a; Liu and Lummaa, 2018), and outlines how behaviour can be generated. Secondly, a major strength of the theory is its clear consideration of how the environment can drive behaviours, which is a criticism of the TPB. Evolutionary models assume that conscious and unconscious psychological mechanisms respond flexibly to an individual's environment to optimise inclusive fitness. Inclusive fitness is a measure of genetic representation in subsequent generations achieved through both an individual's own reproduction and helping relatives' reproduction. The insight that human behaviour and physiology have evolved to respond to environmental cues in order to maximise reproductive success can lead to a better understanding of behaviour, especially in cases where we do not appear to be maximising well-being or economic success, as other social sciences tend to assume (Stulp, Sear and Barrett, 2016).

A further major strength of evolutionary theory is its ability to provide an ultimate level of explanation for why humans continue to have children despite high potential morbidity and mortality costs. The significant risks of childbearing mean that 'rational actor' models of decision-making cannot explain voluntary childbearing sufficiently (Keyfitz, 1986; Schoen *et al.*, 1997; Holton, Fisher and Rowe, 2011). A more holistic understanding of the reason why people have children is because children have intrinsic, rather than instrumental, value to their parents. For example, having children has emotional benefits for parents (Morgan and King, 2001), although some studies suggest this may be short-lived or specific to a gender of parity (Pollmann-Schult, 2014; Kohler and Mencarini, 2016). Children's intrinsic value is therefore likely to be compounded by the social costs of not childbearing, driven by pro-natal social norms. The existence of these pro-natal norms and the intrinsic value of children is likely to be ultimately linked to natural selection designing human psychology and physiology to maximise reproductive success, as well as the processes of cultural evolution and social preferences that reinforce these evolved processes.

2.3 HOW CAN THESE THEORIES BE USED TO INFORM ANALYSES?

Having described different theories used by demographers to study reproductive decision-making, I will now conceptualise these frameworks so as to inform the design and interpretation of fertility studies, such as my own study of the fertility gap and gender equity in the household. Note that these frameworks are not necessarily mutually exclusive, nor will there be a discussion which of these theories is the 'best' for describing the decision-making processes as I consider they all have something to offer demographers interested in understanding fertility (see following references for more detailed debate: Ajzen, 2011; Barber, 2011; Liefbroer, 2011; Morgan & Bachrach, 2011). This is also not a comprehensive study of all theories of fertility, and there may be other theories that demographers wish to use and incorporate. The primary focus of this exercise is to outline a practical way to inform the conceptual framework of an analysis from a diversity of theoretical perspectives. When conceptualising this guide for the empirical work in this thesis, I found it helpful to split theories of reproductive decision-making and fertility into three different categories that form steps in the process of generating hypotheses (see Figure 2.1):

- 1) Heuristic frameworks that outline how behaviour is generated (the TPB, C-S model and evolutionary theory).
- 2) Theories which provide 'content' to feed into heuristic frameworks and the decision-making pathway (such as gender revolution theory as detailed in the introduction of this thesis), which can be combined with the first level to generate hypotheses.

- 3) The decision-making pathway as outlined in the TDIB framework that provides specific reference points for testing the generated hypotheses.

The first reason for separating the theoretical frameworks of decision-making in this way lies in how theories and frameworks are defined. In the social sciences, a theory is “a set of concepts and/or statements which specify how phenomena relate to each other, providing an organizing description of a system that accounts for what is known, and explains and predicts phenomena” (Davis et al. 2015, p. 327). Furthermore, it provides an idea of how the theory can be operationalised to prove or falsify it within a given temporal context. Heuristic frameworks share features similar to theories, in that they detail how concepts may relate to one another, but they are deemed to be less ‘optimal’ or ‘perfect’ compared to theories (Abend, 2008). Instead of being directly testable like theories, their primary purpose is to guide researchers to consider how concepts may interrelate and act as a heuristic for creating lines of inquiry. Others have already argued that the TPB is better considered as a heuristic framework than a theory (Liefbroer, 2011), on the grounds that it is difficult to falsify, and broadly outlines how three factors (attitudes, norms and constraints), with the addition of behavioural control, combine to create intentions. The C-S model, I would argue, is also better considered as a heuristic framework than a theory, in that it broadly highlights how structure, situation and cognition combine to produce behaviour. Furthermore, it lacks a clear outline of how to operationalise the theory in research, making it more suitable as a framework (Liefbroer, 2011). Evolutionary theory is also useful heuristically. The stance of the theory is that humans behave to maximise reproductive fitness, but some further focus is needed to hypothesise the ways in which this might be achievable in a particular context (Sear, 2015), or to understand why an apparently ‘maladaptive’ behaviour like low fertility would arise. It is worth noting, however, that this definition of theories and frameworks is not shared across all disciplines. In Biology, for example, a theory is an overarching framework from which hypotheses are derived and then tested against data. In this instance, it is the hypothesis which is falsified, rather than the theory that it was generated from. From a biological perspective, evolutionary theory would therefore classify as a theory, whereas from a social science perspective it is a heuristic framework. Similarly, some disciplines and demographers also treat modelling as a kind of theory (Burch, 2003).

Earlier in this section, I also described the rational choice, economic theory of decision-making. Rational choice theory would also classify as a heuristic framework in that it outlines broadly how ‘costs’ and ‘benefits’ can generate behaviour. However, I have not included it in Figure 2.1 as many of its prepositions are included in the evolutionary model of behaviour already present (e.g. cost and benefit maximisation). I also prefer the evolutionary model over the economic model, as it addresses that humans seek to maximise both proximate (health, wealth, happiness) and ultimate

(reproductive success) utilities. The TDIB framework is also a heuristic framework. Miller et al. commented that their work should be referred to as a framework because “it suggests an overview that leaves room for the inclusion and testing of particular theories within our broad theoretical structure.” (Miller et al. 2004, page 194). I, however, use this framework in the third stage of the conceptual framework, as I will explain.

The theories listed above are also better considered as heuristic frameworks as they are ‘content-free’, meaning that in order to apply them, we must use empirical information (‘content’) or empirically-informed theories from elsewhere (Liefbroer, 2011). Without ‘content’, we would not be able to generate research questions and testable predictions. For example, knowing that attitudes and norms (as outlined in the TPB model) influence fertility behaviour is less helpful in analysing fertility than hypothesising about which kinds of attitudes or norms might be important. ‘Content theories’ therefore form the second step in this guide for generating hypotheses. Suitable examples of ‘content’ theories might be the second demographic transition model (Lesthaeghe and van de Kaa, 1986) or the gender revolution theory (Goldscheider, Bernhardt and Lappegård, 2015), which predict and explain fertility change by drawing a relationship between a particular predictor variable and changing fertility behaviour. ‘Content’ theories can also include those drawn from the evolutionary perspective which make concrete predictions, such as Life History Theory (not to be confused with life course theory). Life History Theory predicts how energy will be allocated to different competing traits (like growth or reproduction) over the life course.

It must be acknowledged that the distinctions between the stages of this guide to using theory are not entirely clear-cut. Some heuristic models have been developed with some content in mind. For example, the TDIB model suggests three factors that lead to unrealised intentions for children (partner’s intentions, life course factors and fecundity issues). Nonetheless, the heuristic models and the TDIB can be used conceptually, in the absence of content, and need more content than was originally included in their development.

The division so far into heuristic and content theories bears some resemblance to the definitions of deductive (generating hypotheses from theory which are tested against data, ‘top-down approach’) and inductive (generating hypotheses and theories from data, ‘bottom up approach’) approaches to research. However, the heuristic frameworks classified in this chapter have been developed in light of data and knowledge from psychological studies about how decisions are made, so are not entirely top-down. Conversely, not all content theories on the second level have been generated by a bottom-up, data driven approach (e.g. life history theory is a deductive-style theory). The division presented in this chapter instead aims to fill the broad, content-free heuristic frameworks with a

focus that makes them testable, as well as outlining how the underlying behaviour of the 'content' level theories is generated. The alternative theories suggested within these first and second steps are not mutually exclusive to one another but do offer different ways of looking at fertility behaviour.

The third and final stage of this guide contains the TDIB model. The unique contribution of this theory is to outline the stages on the decision-making pathway in operationally clear components: from motives for children, to desires, then intentions, and finally behaviour, thus delineating three distinct transitions in decision-making. Demographers can then use these three stages to hypothesise and test how interrelating concepts in the heuristic framework combined with 'content' can explain each phase (Figure 2.1, row three). For example, analysing which factors are most important for forming childbearing desires (the first stage of the pathway) is a distinct line of inquiry from analysing the factors which result in desires becoming more realistic intentions (the second stage of the pathway), or which impediments are considered most important in determining why intentions are unrealised (the third stage of the pathway). The clear definitions that accompany each component of the TDIB framework is a major benefit of the model compared to the other heuristic frameworks. Whilst the others each have valuable insights, the components of the models are more abstract (e.g. 'perceived behavioural control' in the TPB) and difficult to operationalise (e.g. 'automatic cognition' in the C-S model). Moreover, the TDIB model was specifically designed (like the C-S model) to explain the unique features reproductive decision-making rather than as a general theory of behaviour. Using the theory as the final stage in this process therefore ensures the questions generated are appropriately focused on the behaviour of interest. I therefore chose the TDIB as the pathway to enact hypotheses on, to ensure clarity and consistency in how analytical predictions are made in my work.

Given the considerable overlap between the TDIB and the model of dyadic pathways, one could choose to substitute one for the other. However, as the model of dyadic pathways is yet to be fully tested and operationalised, I am hesitant to do this myself. In particular, the metamorphosing of the framework into the different 'types' of pathways seems confusing and not supported by a clear theoretical guide, which may simply add to conceptual confusion rather than improve it.

Furthermore, the integration of the individual and couple's life courses within societal influences in the framework is not well specified in an operational sense, beyond stating that they interact with one another. The model may therefore be better classified with the other heuristic frameworks in the first stage of this guide, to be filled with 'content' about how the life course operates. For example, one could use Bernardi et al's 'life course cube' framework as the 'content' theory

(Bernardi, Huinink and Settersten, 2019). For the time being, I therefore do not include the model of dyadic pathways in Figure 2.1.

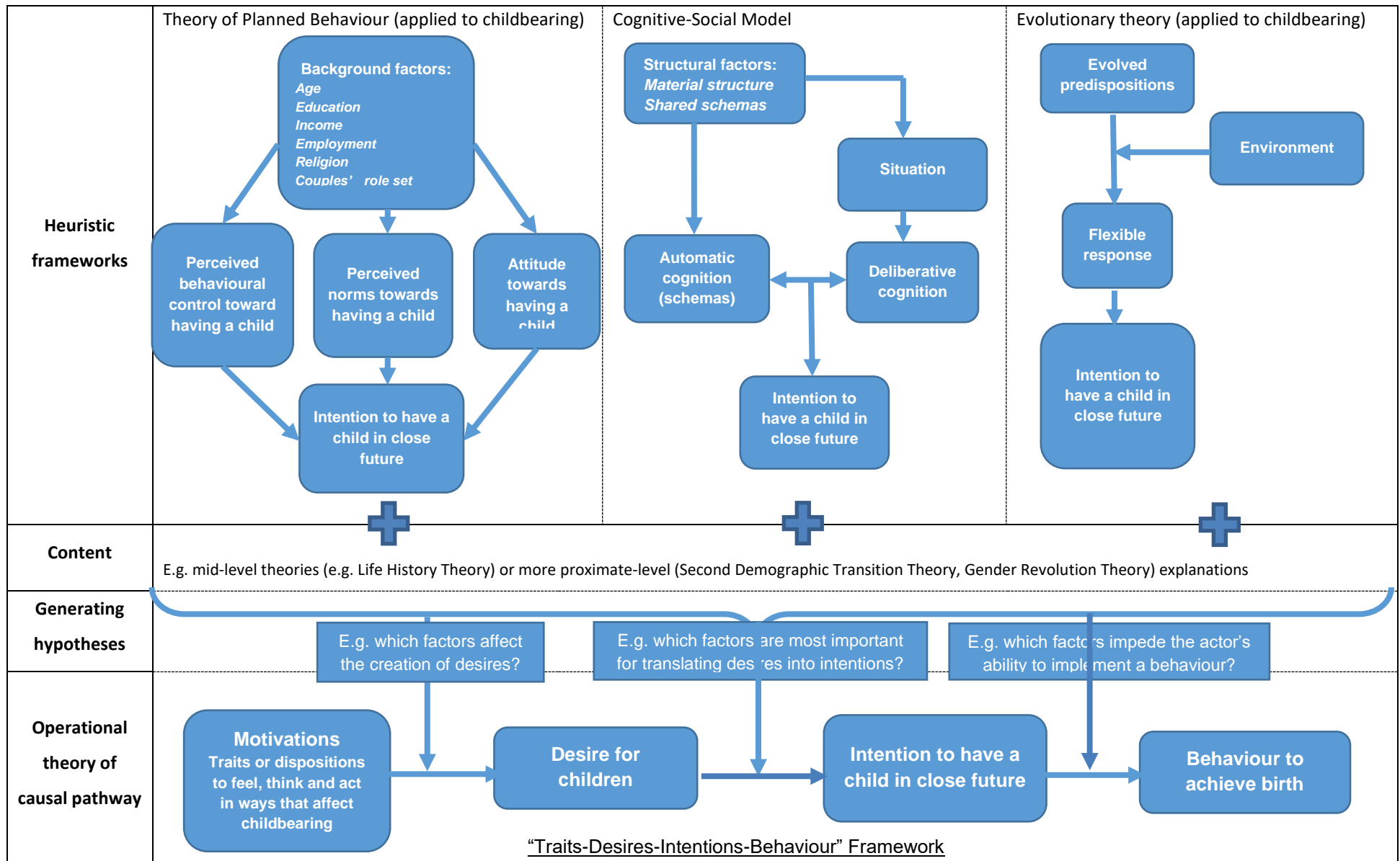


Figure 2.1: Categorising reproductive decision-making theories to generate analytical frameworks for empirical studies

2.4 APPLICATION TO THE STUDY OF GENDER EQUITY IN THE HOUSEHOLD AND THE FERTILITY GAP.

To illustrate how this categorisation of theoretical frameworks in Figure 2.1 can be used in practice, I will show an application to the topic of interest to this thesis: whether gender equity in the household can provide an explanation for the fertility gap. In this illustration, I use evolutionary theory as the first, heuristic layer of explanation, and the gender revolution theory as the second 'content' level. The heuristic from evolutionary theory is that humans have evolved dispositions that allow them to recognise environmental cues that imply the alleviation of reproductive costs. As in all animals, human mothers have a finite amount of energy that can be allocated to competing life history traits, such as continued childbearing (Burkart, Van Schaik and Griesser, 2017). Helpers who are not the mother, known as 'allomothers', can alleviate this energetic burden by distributing the costs of childrearing between them (i.e. the contribution of the male partner to domestic work). Partners and the social network therefore become a vital source of support for mothers in order to raise children 'successfully' to survive into adulthood (Hrdy, 2009; Kaptijn *et al.*, 2010; Sear and Coall, 2011; Waynforth, 2012). Using gender revolution theory as the content refocuses the attention to partners as a source of support, particularly given the rise of the male breadwinner-female homemaker nuclear family model after the Industrial Revolution. The gender norms associated with the male breadwinner nuclear family model mean that partners may provide economic support but little support for domestic labour, meaning that women who engage in paid work also perform the majority of domestic work. Such women should therefore desire, intend and have fewer children because of this 'double shift' and the relative lack of support from other alloparents which may characterise nuclear family focused societies. From this combination of heuristic framework and content, we can generate questions which can be asked in relation to the three distinct phases of the TDIB framework. For example, how does male investment in domestic life affect women's ideal family size, the formation of intentions for childrearing, and ultimately their realisation of fertility intentions? A further question for each step on the pathway might be: does it matter where support comes from in terms of alleviating reproductive costs to ensure the realisation of intentions i.e. from the male partner or other alloparents?

Another example is to use the TPB as the heuristic framework in combination with the gender revolution theory as 'content', switching the focus to the idea that attitudes, perceived norms, and behavioural control are important determinants of childbearing behaviour. Using the gender revolution theory as 'content', we can now hypothesise which attitudes and norms are important for fertility and how they influence behavioural control. We could generate testable questions such as:

does the expectation of adding a significantly increased domestic burden to labour market commitments, as implied by the rigid norms of the male breadwinner-female homemaker family model, actively deter women from having children (attitudes to childbearing)? Is a lack of flexible work arrangements, which could alleviate some of the dual-burden women face, actively perceived as a constraint to childbearing (perceived behavioural control)? As before, these combinations can then be applied to different points in the TDIB pathway, tailoring the questions to the specific outcome of interest. These questions are not mutually exclusive to the ones derived in the first example using the evolutionary framework, and it is possible to combine the frameworks and theories to derive testable questions.

2.5 APPLICATION TO OTHER DEMOGRAPHIC BEHAVIOURS.

The categorisation of the above theories has been targeted at demographers studying fertility behaviour, as this is the topic of interest in this thesis. However, it can also be useful for other areas of demography. In demographic studies of behaviour relevant to health and mortality, for example, heuristic frameworks which explain the generation of health-related behaviour could form the first stage in this guide, with the second 'content' step comprising theories that offer biologically plausible explanations relating exposure and outcome variables, usually generated from observable data. The third and final step, instead of the TDIB model, could then relate testable hypotheses to the steps of the causal pathway between the predicted exposure and outcome variables.

In terms of which heuristic frameworks to use, health psychology already has a rich seam of theories to draw from, rooted in the understanding that stronger theoretical frameworks improve the quality of research aimed at tackling policy concerns (Davis *et al.*, 2015). Indeed, according to a systematic review of theories used in behaviour change research, there are over 80 theories of behaviour used in psychology, sociology, anthropology and economics related to health behaviour (Davis *et al.*, 2015). Some well-known theories from this area include the ecological model of health and the COM-B ('capability', 'opportunity', 'motivation' and 'behaviour') model. Versions of the ecological model have been around for some time (e.g McLeroy, Bibeau, Steckler, & Glanz, 1988), but they all focus on the environment (or ecology) as an important cause of behavioural variation. The complexity of human environments is described like an onion, with multiple different layers of environmental influence. This is similar to the social determinants of health framework, which also describes multiple layers of influence on health (Dahlgren and Whitehead, 1991; IOM, 2000). The environment is divided into macro- (society-level factors that dictate behavioural norms), meso- (community influences), micro- (direct engagement with specific individuals and places) and individual-level (personal experiences and attributes) influences on health behaviour. The Evo-Eco

model is a recent version of an ecological model, developed by Auger and Curtis, which explicitly aims to unite ecological influences on behaviour with an understanding of how behaviour is generated through our evolved cognitive and physiological mechanisms (Auger and Curtis, 2014).

In the second model mentioned, the COM-B model, there are three necessary factors to bring about a change in behaviour: capability, motivation and opportunity. Capability refers to an individual's psychological (knowledge and skills) and physical ability to perform a behaviour. Motivation is defined as all brain processes important for producing a behaviour, including both reflective processes (evaluation and plans) and automatic ones (habitual processes, emotional responses, associative learning). Opportunity refers to the contextual factors surrounding an individual that could potentially encourage or discourage a behaviour. The three then act to influence behaviour and, in turn, behaviour can also alter these processes. The model is reminiscent of both the TPB and Coale's 'Ready-Willing-Able' theory of fertility decline used in demography (Coale, 1973). The latter theory postulates that for fertility behaviour to change women must be ready (the benefits of behaving this way outweigh the costs, similar to 'motivation' in COM-B), willing (the behaviour is normatively acceptable, similar to 'capability') and able (the new behaviour is accessible, similar to 'opportunity'). The similarities between these models clearly illustrates the potential for exploring the theoretical overlap between demography and other disciplines studying behaviour.

2.6 CONCLUSION

In this chapter, I have outlined the steps I took to make sense of the plethora of theories that can be used to understand reproductive decision-making to inform my empirical work. This was motivated by the critique that theoretical rigour must be at the heart of any empirical analysis looking at the realisation of fertility intentions (Philipov and Bernardi, 2011). Furthermore, I wanted to write this chapter with the aim of providing a guide to the wider demographic community for how to integrate behavioural theory into analysis. I also wanted to illustrate the potential for more nuanced and interdisciplinary approaches to the study of reproductive decision-making beyond the typically used psychosocial theories. In particular, evolutionary theories contribute to our understanding of reproductive behaviour by focusing on the role of the environment, compared to many demographic theories of fertility behaviour which typically focus more on intrinsic factors such as education and socio-economic status.

I have grouped the different theories into three stages, forming a step-by-step process for theoretically guided hypotheses generation. This grouping largely stemmed from definitions of theory and frameworks in the social sciences, as well as the need for some theories to be filled with 'content' to make them useful. I then used the TDIB framework separately as the final stage of

hypothesis generation because of its clear definitions for operationalisation, meaning that some consistency can be brought to analysis on reproductive decision-making. Additionally, the TDIB framework is of value to my research interest in the fertility gap, as it clearly outlines a pathway for why different goals may change or become unrealised.

In the following chapter (research paper 1), I build from this conceptualisation of behavioural theories. This paper systematically reviewed the literature on gender equity in the household and fertility in high-income, low-fertility settings. I combined evolutionary (step one in this guide), gender revolution (step two) and TDIB (step 3) theories in this research paper to guide my evaluation of the literature.

**3 CHILDREN OF THE (GENDER) REVOLUTION: A
THEORETICAL AND EMPIRICAL SYNTHESIS OF HOW
GENDERED DIVISION OF LABOUR INFLUENCES
FERTILITY**

RESEARCH PAPER COVER SHEET

Please note that a cover sheet must be completed for each research paper included within a thesis.

SECTION A – Student Details

Student ID Number	lsh1408068	Title	Ms
First Name(s)	Alyce		
Surname/Family Name	Raybould		
Thesis Title	Disentangling the “fertility gap”: exploring the link between gendered division of labour and reproductive decision-making in high-income countries		
Primary Supervisor	Rebecca Sear		

If the Research Paper has previously been published please complete Section B, if not please move to Section C.

SECTION B – Paper already published

Where was the work published?	Population Studies		
When was the work published?	December 2020		
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion			
Have you retained the copyright for the work?*	Yes	Was the work subject to academic peer review?	Yes

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Stage of publication	Choose an item.
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SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	I performed the systematic review and wrote the paper. My supervisor provided comments and helped with editing the writing.
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SECTION E

Student Signature	A.G.Raybould
Date	17/05/2021

Supervisor Signature	Rebecca Sear
Date	17/05/2021

ABSTRACT

Gender equity theories of fertility broadly predict that the lowest fertility in high-income settings will be seen in women facing a 'dual burden' of both paid and unpaid labour responsibilities, but that fertility will increase when male partners share domestic labour. Here we provide a critique of some gender equity theories of fertility in demography, and restate the hypothesis in terms of complementarity between partners. Further, we suggest authors use an interdisciplinary approach, such as integrating perspectives from evolutionary theory and the 'Traits-Desires-Intentions-Behaviour' framework, to provide some consistency to this diverse literature. Building on this theoretical synthesis, we perform a systematic review of 95 pieces of analysis. This broadly supports the idea that fertility will be low where women face a dual burden, which is particularly evident among macro-level studies, micro-level analyses investigating progression to subsequent children, and studies which do not use gender role attitudes as an independent variable.

3.1 INTRODUCTION

Gender equity has been proposed as a possible determinant of fertility in both higher- and lower-fertility contexts. One idea is that an incomplete 'gender revolution' in higher-income countries results in very low fertility (Goldscheider, Bernhardt and Lappegård, 2015). This hypothesis predicts a U-shaped relationship between fertility and gender equity at the national level. Fertility will be high where gender equity is very low, before the onset of the revolution, but fertility will fall to very low levels at moderate levels of gender equity, where women experience equity in public institutions, but not in family institutions. Fertility will then increase as the gender revolution completes and women gain equity in both public and private institutions as men contribute more at home. The rationale of the theory is that when women are emancipated in the public but not private sphere, they will experience a 'dual burden': labour market activity outside the home while also bearing the brunt of domestic responsibilities. The difficulty women experience managing both their paid and unpaid labour responsibilities leads to the desire for fewer children, who would only exacerbate this burden.

Here, we conduct a systematic review of empirical work exploring the association between gender equity in the household and fertility. A previous review summarizing relevant fertility intentions literature was published relatively recently (Neyer, Lappegård and Vignoli, 2013). The review concluded that there was no uniform effect of gender equity on fertility intentions, but that there was variation by parity and gender. It also recommended that a stronger theoretical distinction between gender equality (fairness in share of labour) and gender equity (perceived fairness) was needed to understand this literature. However, that review only focused on intentions literature and included multiple measures of gender equality/equity aside from the division of household labour. Furthermore, the number of papers on the topic has doubled since that review was published, indicating both considerable contemporary interest in the topic and the need to continue evaluating evidence for gender revolution arguments.

In this paper, we start by reviewing different formulations of arguments which relate gender equity to fertility. We then consider how research on gender equity in the household and fertility, as well as demographic research more generally, would be strengthened if more attention were paid to theoretical motivations for empirical analysis. Further, we suggest that demographers draw more explicitly on multiple theories from different disciplines. We demonstrate how this might be done, by using theoretical frameworks in two different ways in our discussion of gender equity and fertility. Firstly, we draw on evolutionary theory to strengthen and broaden the theoretical framework that suggests *why* gender equity should be associated with fertility. Secondly, we consider theoretical frameworks which demographers have used to understand the reproductive

decision-making process; in other words, *how* variation in fertility is produced. Here we use the ‘Traits-Desires-Intentions-Behaviour’ (TDIB) framework to illustrate how such theories can help restate and direct empirical analysis on gender equity in the household and fertility. In outlining the strengths of these theories, we hope to offer guidance for standardizing this area of fertility research; this will also aid our interpretation of the systematic review findings, which span such a wide diversity of studies and measures of fertility. Finally, in our systematic review we assess the evidence that gender equity in the household affects different parts of the reproductive decision-making pathway.

3.2 GENDER EQUITY THEORIES AND FERTILITY

3.2.1 Gender equity and the demographic transition

Several authors have argued that changes in gender equity, in terms of women’s decision-making power, help explain the initial stages of the fertility transition from high to low fertility. Fertility began to fall when women became empowered to exercise control over their own reproductive lives, choosing to invest in opportunities in education and wage labour, and having fewer children (Folbre, 1983; McDonald, 2000b; Campbell, Prata and Potts, 2013). However, such an explanation seems to assume a remarkably homogenous lack of women’s autonomy in the pre-transition period, as well as a universal desire for smaller family sizes among women (Mackinnon, 1995; Janssens, 2007b). These assumptions appear unlikely to be realistic, given the cultural and ecological heterogeneity otherwise observed across human societies, both contemporary and pre-transition (Hewlett, 2000; Gray and Anderson, 2010). This is not to say that there was necessarily *more* gender equity in all pre-transition societies, but rather not a universal dearth as these theories seem to imply. Empirical evidence has also rarely and inconsistently found a link between gender equity and the onset of the demographic transition (Coale and Watkins, 1986; McDonald, 2000b; Bhat, 2002; Campbell, Prata and Potts, 2013; Duvendack and Palmer-Jones, 2017).

Moreover, Basu has argued that it was actually a ‘clamping down’ on women’s autonomy, rather than women’s empowerment, that provided the impetus for the early stages of fertility decline, through the emergence of a restrictive male-breadwinner–female-homemaker nuclear family model (Basu, 2002, 2017). There is empirical evidence supporting this argument (Amin and Lloyd, 2002; Morgan *et al.*, 2002). The norms accompanying a male-breadwinner–female-homemaker nuclear family model encourage women to sacrifice their leisure time for their husbands and children, making children more of a time burden for women and thus less desirable. Men also adjust their fertility preferences downwards, given the substantial burden involved in single-handedly providing for a large family (Janssens, 2007a). The theoretical foundation and empirical evidence for a link

between gender equity and the initial stages of the demographic transition therefore remain limited, and may be more likely to support an association between *decreasing* gender equity and early fertility decline.

3.2.2 Gender equity and very low fertility

Empirical studies have also focused on the role of gender equity in determining a fall from moderate to very low levels of fertility in high-income countries over the latter half of the twentieth century. These studies have tended to focus not only on women's decision-making power, but also on gendered division of labour. McDonald (2000a, 2000b) first developed the argument that insufficient support for women to fulfil their responsibilities both in public institutions and at the family level has led to declines in fertility to sub-replacement levels across high-income countries. This will lead to a U-shaped relationship between levels of gender equity and fertility over time, with declining fertility until women receive sufficient support to cause fertility to increase again.

The original rationale for this explanation stems from Becker's (1981) 'new home economics' theory. The theory posits that household role specialization, with women as homemakers and men as breadwinners, results from the goal of creating efficiency within the family. Couple members perform complementary roles to one another, and these roles result in the successful reproduction of the household through childbearing. Within this framework, the decline in fertility can be explained partly by a conflict between paid labour and child-rearing duties for working women. Efficiency within the family also encompasses child labour. In particular, childcare from older siblings is, and continues to be in some contexts, a very important motivating factor for childbearing (Kramer, 2005). During the demographic transition in high-income contexts, the utility of child work relative to parental labour decreased. This resulted in an increased investment in the 'quality' rather than 'quantity' of children, with couples having fewer children, substituting their labour with education (Becker, 1981; Willis, 1994). This leaves the present-day scenario where household labour is usually confined to parents, without support from other family members or children.

Although Becker's theory is in itself gender neutral, as either partner can specialize in the two areas of paid and unpaid labour, Becker added the assumption that women are more efficient homemakers due to a long history of specializing purely in this type of labour (although he placed less emphasis on this point in his later work (Becker, 1985)). This assumption is problematic, given that women throughout human history have contributed productively both inside and outside the home (Hewlett, 2000; Ahnert, 2006; Giuliano, 2015; Johnston *et al.*, 2018). Instead, the male-breadwinner–female-homemaker family form seems to have risen to its peak prevalence in Europe in the mid-twentieth-century post-war era, the time when Becker wrote his theory. It appears to

have grown in popularity owing to economic, social, and demographic changes that happened around the beginning of the demographic transition in Western Europe, establishing the construct of public and private spheres; the former largely the preserve of men, the latter the preserve of women (Van Poppel, Van Dalen and Walhout, 2009; Basu, 2017; Fortunato, 2017). The rise in popularity of the male-breadwinner–female-homemaker family as industrialization progresses is still evident globally, with high women’s labour force participation in countries with a low GDP per capita, which falls as countries industrialize and urbanize (World Bank, 2012). Women’s participation rises again as countries move to a service economy, with women engaging in tertiary sector work. The male-breadwinner–female-homemaker family form is therefore a relatively recent phenomenon, rather than being the ‘natural’ family form assumed in Becker’s earlier work (1981).

Becker was correct to note, however, that women most often perform most of the domestic labour within the household both in pre- and post-transition societies (Fuwa, 2004; Kramer, 2005; Gray and Anderson, 2010; Craig and Mullan, 2011; Cloïn, 2012; Tanturri, 2012; Craig and Powell, 2016). This is emphasized in the ‘gender revolution theory’ (Goldscheider, Bernhardt and Lappegård, 2015), which builds on the U-shaped relationship noted by McDonald by focusing on a gender norm explanation for falling fertility. Broadly speaking, a gender norm or role encompasses a behaviour or set of behaviours considered appropriate by society for a person of a particular gender to perform. In relation to division of housework in high-income countries, culturally constructed gender roles dictate that the act of being female is confirmed by performing housework, whereas the performance of masculinity is done through avoiding it (Berk 1985; Mason 1997). Gender revolution theory, in contrast to McDonald’s work, explicitly recognizes that male-breadwinner–female-homemaker social norms were largely a product of the industrial revolution, arising through the establishment of public and private spheres as productive labour became separated from family life.

Starting from the premise of a post-industrial-revolution worldview, gender revolution theory posits that fertility rates will fall and then rise, in response to two gender revolutions. The first gender revolution occurs in the public sphere. During this phase, fertility will fall as women increasingly engage in paid work, compared with the predominantly male-breadwinner–female-homemaker model of the mid-twentieth century. However, men do not contribute more at home, owing to gender norms in favour of a male-breadwinner–female-homemaker family model. This can result in a working woman experiencing a dual burden, where she must balance her paid work with a ‘second shift’ of domestic work, unsupported by her partner at home (Hochschild 1989). Fertility will only rise again when there is a second gender revolution at the family level, as men increasingly engage in unpaid labour responsibilities, alleviating this dual burden. In sum, the trend outlined gives the same

U-shaped pattern noted by McDonald, with the highest fertility for both male-breadwinner–female-homemaker and egalitarian couples, but the lowest among those who have only experienced the first phase of the two gender revolutions. To what extent, however, fertility will rise back to mid-twentieth century levels in response to this private sphere revolution has not been predicted as part of the theory (Lesthaeghe, 2020).

3.3 USING EVOLUTIONARY THEORY TO STRENGTHEN WHY GENDER EQUITY IN THE HOUSEHOLD SHOULD AFFECT FERTILITY

Demographers have borrowed theories from other disciplines, such as sociology and economics, in order to understand demographic phenomena from macro and micro perspectives. For example, Becker was an economist, and gender equity theories are built on sociological theories relating to gender systems. Evolutionary theory is another theory which can offer a perspective on why fertility varies, and in particular, why gender equity in the household may cause fertility to vary. While evolutionary theory is starting to be implemented by demographers studying childbearing intentions (Park, 2012; Schaffnit and Sear, 2017a), we urge more fertility scholars to engage with the insights the theory can bring, both generally and in relation to the topic of this review.

Firstly, a general major strength of the theory for the study of fertility is its clear consideration of how the environment can drive particular behaviours, rather than just individual differences as in many theories of fertility behaviour. Evolutionary models assume that conscious and unconscious psychological, biological, and behavioural mechanisms respond flexibly to an individual's environment in order to provide the best 'match' for optimizing survival and reproductive success (fitness). Specifically, these mechanisms have been shaped by natural selection to optimize 'inclusive fitness', which is a measure of genetic representation in subsequent generations, achieved both through an individual's own reproduction and by helping relatives reproduce. Through this framework, variation in human behaviour can be understood as a product of this gene–environment interaction (Sear, 2015).

In relation to reproductive behaviour, evolutionary theory outlines that humans have evolved dispositions to recognize environmental cues which imply the alleviation of reproductive costs. As in all animals, human mothers have a finite amount of energy that can be allocated to competing fitness-related characteristics, such as continued childbearing (Burkart, Van Schaik and Griesser, 2017). Unlike most other species, however, human mothers suffer a particularly high burden of childcare, given the extended childhood of our species, and relatively short interbirth intervals. This means that mothers must care for multiple dependent children at different developmental stages simultaneously. Helpers other than the mother, known as 'allomothers', can alleviate this energy

burden by distributing the costs of child-rearing between them (e.g. the contribution of the male partner to domestic work). Partners, the social network, and older children therefore become vital sources of support for mothers to be able to raise children 'successfully', that is, to survive into adulthood (Kramer, 2005; Hrdy, 2009). While it seems that individuals no longer always act in a way that optimizes their reproductive fitness (Goodman, Koupil and Lawson, 2012), the insight that human behaviour and physiology have evolved to respond to environmental cues in order to maximize reproductive success can lead to a better understanding of behaviour.

A second major strength of evolutionary theory is its ability to provide an ultimate level of explanation for why humans continue to have children despite high potential costs. There are few other behaviours performed so voluntarily by humans that incur such high risks of morbidity and mortality as pregnancy and childbirth. 'Rational actor' models of human decision-making cannot explain this well as a product of rational thought (Keyfitz, 1986; Schoen *et al.*, 1997; Holton, Fisher and Rowe, 2011). In order to understand why women continue to have children, it is necessary to understand the complex range of costs and benefits associated with childbearing, including an appreciation that children have an intrinsic, rather than instrumental, value to their parents—for example the emotional benefits or 'meaning' that parents get from children (Morgan and King, 2001). However, some evidence suggests any happiness gains from childbearing can be short-lived, or specific to the child's sex or parity (Pollmann-Schult, 2014; Kohler and Mencarini, 2016). Intrinsic value is therefore likely to be compounded by the social costs of not childbearing, given that social norms are typically pro-natal. Explanations of why these pro-natal social norms and emotional benefits from children exist, and by extension why most people choose to have children despite the high costs, must ultimately be linked to natural selection designing our physiology and psychology to produce offspring. In other words, it is important to recognize that the ultimate utility our behaviour seeks to maximize is not health, wealth, or happiness, but reproductive success (Wells *et al.*, 2017). Social preferences, cultural transmission, and evolutionary processes all contribute to the sustained intrinsic value of children to humans.

The focus of evolutionary theory on support with child-rearing to alleviate reproductive costs is particularly valuable to the literature on gender equity in the household and fertility. Firstly, it speaks to a strength of the gender revolution theory compared with other gender equity theories, acknowledging that the primary issue with the male-breadwinner–female-homemaker family model for childbearing is less about the division of labour and more about the gender norms that accompany it (Goldscheider, Bernhardt and Lappegård, 2015; Brinton and Lee, 2016). The male-breadwinner–female-homemaker family form can be deemed an efficient complementary labour

division strategy that alleviates reproductive costs, in that couples specialize in the two areas of labour. The issue for fertility arises when the 'public sphere revolution' encourages women to work, but the gender norms from the male-breadwinner–female-homemaker model remain. These strong essentialist gender norms result in a non-complementary labour division strategy, with women facing a second shift of domestic work alongside working in the labour market. A loosening of these gender roles (the 'private sphere revolution') is required before couples can move back to a more complementary labour division strategy.

Secondly, evolutionary theory provides a critical lens with which to highlight some prevailing assumptions in the literature on gendered division of labour and fertility. For example, in this paper, we choose to move away from the definitional dichotomy of 'traditional' (to refer to male-breadwinner–female-homemaker families) and 'egalitarian' attitudes typically used by other authors. We use 'rigid' (instead of traditional attitudes) and 'flexible' (instead of egalitarian attitudes). We opted for these terms because the problem with the male-breadwinner–female-homemaker model for fertility predominantly stems from the rigidity of the gender role system that accompanies it (Brinton and Lee, 2016). 'Egalitarian' is also a problematic term in that, a freely chosen male-breadwinner–female-homemaker family form could be considered both egalitarian and complementary, as couples specialize their division to alleviate reproductive costs. Most importantly, evidence from evolutionary anthropology has highlighted that there is nothing traditional about the male-breadwinner–female-homemaker model. Before the demographic transition, the sexual division of labour was typically such that men and women took complementary roles in both productive and domestic labour (Hewlett, 2000; Ahnert, 2006; Giuliano, 2015). Women were more easily able to combine productive and domestic labour because they received considerable help with childcare, typically from other kin (Sear and Mace, 2008; Hrdy, 2009), and because women usually took on tasks that could be combined with childcare. It should also be emphasized that the practice of fathers taking on a significant role in childcare is not a modern phenomenon: some fathers in pre-transition societies invest considerably in domestic labour, though not as heavily as mothers (Hewlett, 1992; Kramer, 2005; Gray and Anderson, 2010).

This broad-brush summary hides considerable variation between societies in exactly how men and women organize their time; nevertheless, data from subsistence societies suggest it is *complementary* labour division strategies which have defined families for most of human history. This is important to note, as it suggests that a complementary division of labour, with women combining work and family life, is the traditional family form which is likely to suit women's (and men's) evolved preferences. Furthermore, we also choose to use *equity* (perceived fairness), rather

than *equality* (fairness in the share of paid and unpaid work) throughout this paper in reference to the review topic. While our review does include papers that study both concepts, as actual share must be measured to establish types of division strategies, we believe that equity lends itself better to our theoretical stance. This is because complementary labour divisions do not necessarily conform to an absolutely equal division, but are nonetheless satisfactory and perceived as fair. Equity is also a more inclusive term, capturing a more complete idea of the complexities of family division strategies.

We rephrase the gender revolution hypothesis, then, in light of our terminology critique: fertility will be at moderate levels when the division of labour is *complementary* between mothers and fathers. In mid-twentieth century Western-Europe and North America, this was predominantly the male-breadwinner–female-homemaker model of labour division, which was accompanied by strong *rigid gender norms*. Fertility will drop to its lowest point in contemporary societies, where these *rigid gender norms* remain, but women take on paid labour that is not compatible with childcare (the public sphere revolution). Couples are now assuming *non-complementary* roles. As a result, fertility intentions are revised downwards as women endure a dual burden of labour. Finally, fertility will begin to rise again in contemporary societies as gender norms become more *flexible*, encouraging a *complementary* division of labour between mothers and fathers, where men take on an increasing share of domestic responsibilities (the private sphere revolution). We summarize our synthesis in Figure 3.1, with the caveat that the upward arm of the U-shape curve has no hypothesised end point and may not rise back exactly to mid-twentieth century fertility levels.

Rephrasing the gender revolution hypothesis in this way moves beyond the assumption that the post-war nuclear family is a historical norm, as well as engaging with evolutionary ideas on the role of the support environment in driving fertility behaviour. In highlighting the importance of complementary labour divisions, we also stress, as other authors have done, the central importance of gender role attitudes and their persistence in driving fertility trends (Goldscheider, Bernhardt and Lappegård, 2015; Brinton and Lee, 2016).

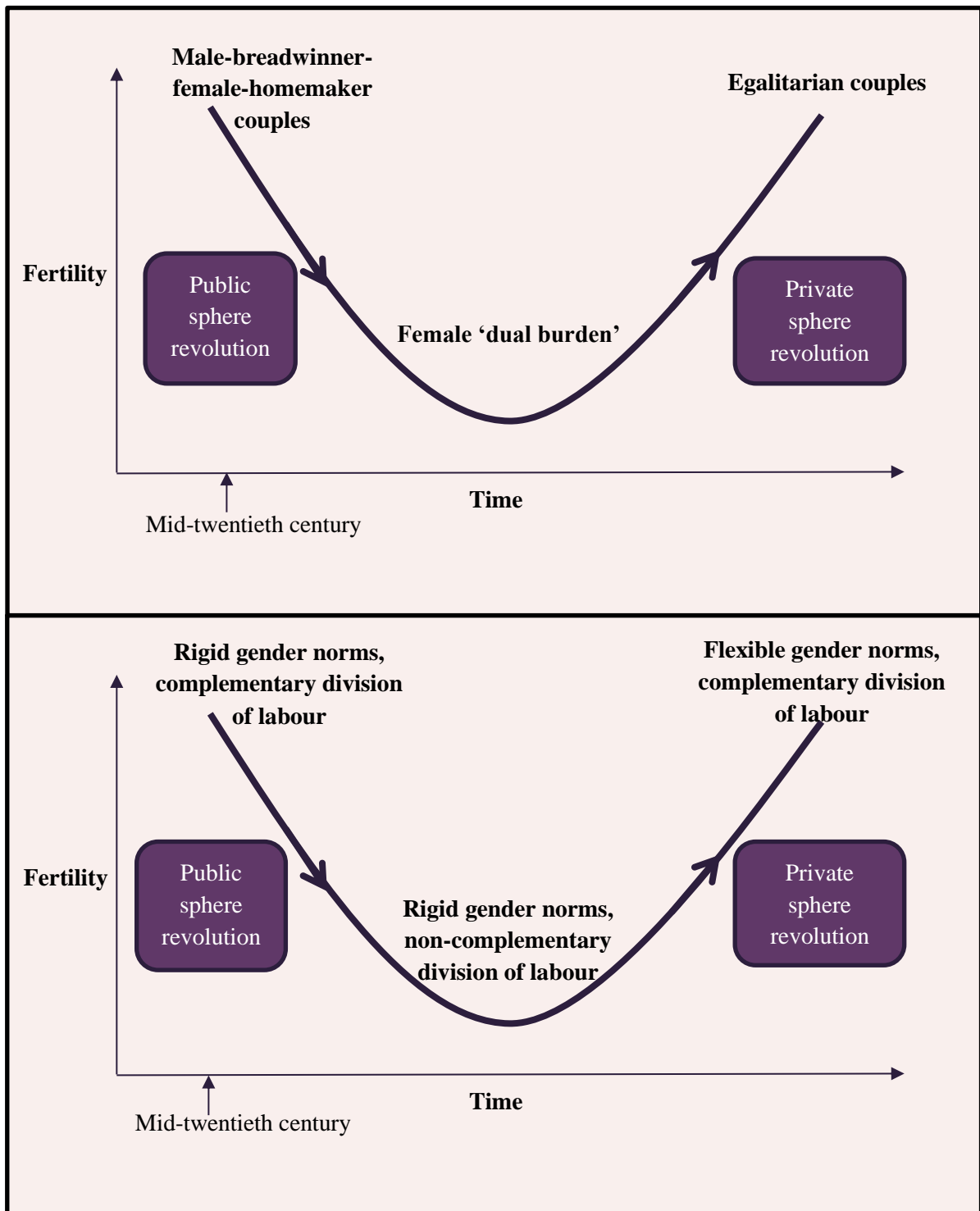


Figure 3.1: Diagram of the gender revolution theory (upper panel) and our rephrasing of it (lower panel)

3.4 USING THE TRAITS-DESIRES-INTENTIONS-BEHAVIOUR FRAMEWORK TO STRENGTHEN EMPIRICAL ANALYSIS ON HOW GENDER EQUITY AFFECTS FERTILITY

Despite the frequent recourse demographers have made to the theoretical frameworks of other disciplines, there are some 'home-grown' demographic theories in fertility research, such as the 'proximate determinants of fertility' (Bongaarts 1978), and the Easterlin–Crimmins 'supply–demand'

framework (Easterlin 1975). These frameworks aim to understand fertility in its entirety, by incorporating both physiological and behavioural factors which influence fertility. In contemporary low-fertility societies, physiological determinants of fertility have become less important and behavioural decisions more prominent in explaining fertility levels. Demographers have used and developed theories from behavioural and cognitive science to understand the childbearing process, and thus how factors like gender equity in the household could affect fertility. Psychosocial or cognitive theories find their roots in traditional rational choice models of behaviour, which typically consider an individual as a rational actor, weighing up (although not necessarily consciously) the perceived costs and benefits of a particular action in order to maximize a particular utility, such as health, wealth, or happiness.

The 'Theory of Planned Behaviour' or TPB (Ajzen, 1991) was the first such psychosocial theory to be applied to childbearing behaviour (Vinokur-Kaplan, 1978), building on rational choice models of behaviour (e.g. Billari et al. 2009; Dommermuth et al. 2011; Ajzen and Klobas 2013). There are three components to the model: attitudes (perceived costs and benefits of a behaviour); subjective norms that might affect behaviour; and the extent to which behaviour is perceived to be subject to individual control. These three factors are all influenced by the individual's background characteristics, such as their age, education, and employment. Combined, the three aspects form a childbearing 'intention'. An intention is typically defined in fertility research as a short-term 'plan of action' to have a child (Miller, Severy and Pasta, 2004). The underlying rationale, therefore, is that an intention for a child will be indicative of subsequent behaviour, and thus factors that influence intentions will also influence behaviour.

The TPB, however, has been criticized for two main reasons. The first is its limited consideration of macro-level, or environmental, influences. The model originally extended only to micro-level individual processes (e.g. a woman's domestic burden) and meso-influences (an individual's family and social network). However, it is also important to appreciate the role of macro processes in determining fertility behaviour (Billari, 2015), for example, the wider societal norms or policies that influence childbearing. Furthermore, behaviour occurring at the micro level can generate patterns of behaviour at the macro level and vice versa (Billari, 2015). The cognitive-social (C-S) model of fertility intentions (Bachrach and Morgan, 2011) better encapsulates macro-level influences, while also incorporating automatic behavioural processes (e.g. Rackin and Bachrach 2016). The theory, specifically formulated to make sense of existing demographic indicators and data on fertility intentions, outlines that humans view the world through 'schemas', which are mental structures for processing information. These inform an individual about what to expect given prior or informed

experience, such as how they should act in a given context (e.g. using contraception), or how we expect others to act, given what we know about them (e.g. gender roles). Most schemas are formed based on lived experience, but some may be innate. Related schemas are connected by neural pathways. These schemas are also imbued with a sense of feeling, influencing the way in which we might act. For example, a 'baby' schema could for one person elicit a warm, happy reaction, whereas for another, the same schema could bring about feelings of stress or irritation. These feelings can become tied into a sense of self-identity and dictate our actions. Continuing with the above example, the former group would more likely envisage themselves as parents than those without positive feelings towards babies. These schemas, along with macro-structural factors such as norms and the socio-cultural environment, form intentions whereby the individual is motivated to act.

The second major criticism of the original TPB model is that it treats behaviour as a product of conscious, reasoned thought, rather than of more automatic, non-conscious processes, such as sensing stimuli and learning new information. An alternative socio-psychological model developed independently of the TPB, by Miller and colleagues (Miller, 1994; Miller, Severy and Pasta, 2004), incorporates these non-conscious processes by linking fertility intentions to behaviour through a pathway (e.g. Wagner et al. 2014; Mynarska and Rytel 2018). The model is thus commonly known as the TDIB framework (Traits-Desires-Intentions-Behaviour). The initial motivations are defined as traits or dispositions to feel, think, and act in ways that affect childbearing, and are biologically based and non-conscious (Miller, 2011). The motivations form desires for children, which represent the ideal childbearing goal in the presence of no obstacles, and are then translated into intentions, which consider the probability of their execution given contextual factors. The framework therefore explicitly appreciates that an intention for a child is distinct from the related concepts of a childbearing 'expectation' (the number of children thought to be achievable in the presence of obstacles, but independent of whether children are currently wanted) or 'desire' (the ideal number of children wanted when there are no obstacles to childbearing) (Miller, Severy and Pasta, 2004; Philipov and Bernardi, 2011). Intentions are implemented through instrumental behaviours, such as aiming to achieve or avoid conception. However, the framework also stresses the importance of partners' intentions, life course factors, and fecundity issues for successfully achieving a birth. The authors also acknowledge that desires and intentions will change over time as a result of situational factors, such as the birth of each child and major life events, such as employment or partnership status.

It is the TDIB model that we urge further consideration of by fertility researchers. This is not to suggest that this is the 'best' psychosocial theory for describing the decision-making process, as we

consider that all the previous theories have something to offer demographers interested in understanding fertility (see following references for more detailed debate: Ajzen 2011; Barber 2011; Liefbroer 2011; Morgan and Bachrach 2011). However, the TDIB framework does explicitly acknowledge, unlike the TPB or C–S models, that fertility decision-making and behaviour operate within couples (Miller, Severy and Pasta, 2004). The incorporation of the couple dyad into the foundations of the framework has clear utility when creating an analysis looking at gender equity within partnerships. In addition, we wish to highlight the practical strengths of this theory for researchers, through its clear and intuitive definitions of the stages on the decision-making pathway. Demographers can operationalize these three stages from desires to action as clear and distinct measurements in their analysis, to better understand causal mechanisms. For example, analysing which factors are most important for forming childbearing desires (the first stage of the pathway) is a distinct line of enquiry from analysing the factors which result in desires becoming more realistic intentions (the second stage of the pathway), or which impediments are considered most important in determining why intentions are unrealized (the third stage of the pathway). The operational clarity of the framework gives a simple and practical way for researchers to standardize fertility measures in their data collection and analysis. Therefore, we use definitions coherent with the TDIB framework (Miller, 2011) to categorize the findings of our systematic review into five groups:

- 1) *Fertility desires*: Studies that deal with fertility preferences, likes, and ideals in the presence of no obstacles to achievement. Measurement is achieved through a stated wish to achieve a goal, such as ideal family size.
- 2) *General long-term intentions*: Studies whose dependent variable is a general decision-based commitment to pursue a goal with an implementation plan, for example, intentions to have a child or a particular number of children at some point in the future. Expectations for children (evaluating the likelihood of having children) were also included in this category, as they are a closely related concept (Miller, 2011).
- 3) *Short-term intentions*: Studies that also deal with commitments to pursue a goal, but with an implementation plan of under three years. We decided to separate these studies from the more general long-term plans of action, as it is reasonable to assume that plans of action with shorter time frames are more likely to be acted on, as contextual factors and obstacles are less likely to change in a short time frame than in an undefined time period (Philipov and Bernardi, 2011).
- 4) *Realizing intentions*: Studies in this group are those that measure both whether an individual intended to have a child, and whether they went on to do so (as the next stage of the behavioural pathway, after an intention is stated, is whether that intention becomes

realized). This section of the findings is most relevant to the study of the ‘fertility gap’ between ideal and actual childbearing in high-income settings.

- 5) *Outcomes*: Studies that examine only the fertility outcomes themselves, with no prior consideration of desires or intentions for children.

By enabling us to divide our review in this way, the TDIB framework provides us with validated categories from which we can draw conclusions.

3.5 INTERIM SUMMARY

The literature on gender equity in the household and fertility spans multiple contexts and analytical approaches. In order to evaluate this literature, strong theoretical underpinnings from different disciplines are needed to frame both our review and future research in this area. We propose that evolutionary theory and the TDIB framework can contribute to uniting this literature.

Firstly, we argue that both theories have considerable value by approaching the same question from distinct but complementary levels of explanation. Evolutionary theory brings an ultimate *why* level of explanation, explicitly addressing how support from others with child-rearing, given that humans are cooperative breeders, can alleviate reproductive costs. The TDIB framework instead explores *how* gender equity in the household affects fertility. Despite knowing that gender equity in the household affects fertility, it is difficult to explore empirically if we do not know the causal pathway of its influence. The contribution of the TDIB framework is its clear guidance for operationalizing this behavioural pathway, and thus it is a good basis from which to build more standardized data collection and analysis. The framework also provides us with an informed way to group the findings of our systematic review and evaluate the quality of how these studies have operationalized and measured their chosen dependent variable. To build a comprehensive review, we need to evaluate evidence for both *how* and *why* fertility and gender equity are linked.

Secondly, both theories have more specific utility for this area of literature. Evolutionary theory provides a critical lens for other theories of gender equity and fertility. Research from evolutionary anthropology refocuses the attention of gender equity theories in the household to the importance of complementary divisions of labour and the flexibility of gender norms for determining fertility. The TDIB framework also has additional value compared with other psychosocial theories because of its recognition of the partnership dyad in reproductive decision-making. Although couples’ decision-making is not the overall focus of this review, keeping couple-level processes at the heart of fertility behaviour has clear theoretical benefit for any research question exploring the effect of gender equity between partners on fertility.

3.6 SYSTEMATIC REVIEW

In the final section of this paper, we describe the results of our systematic review of the literature on the relationship between gender equity in the household and childbearing behaviour (the second, private sphere, gender revolution) in Europe, North America, Australia and East Asia. This is not a review of evidence for the gender revolution theory in its entirety. We aim to evaluate all papers that tested for a relationship between gender equity in the household and fertility, regardless of theoretical stance.

For each identified analysis, we classify the association between more flexible attitudes or divisions of labour and fertility intentions/outcomes as either: (1) positive; (2) negative; (3) curvilinear (where both male-breadwinner–female-homemaker couples and couples that divide both their paid and unpaid work have higher childbearing desires); (4) mixed (identified associations are significantly positive for some groups and negative for others); or (5) no association. As the majority of women across high-income settings engage in paid labour (OECD, 2018), we expect that most countries will have completed the first public sphere revolution and will now be positioned along the latter half of the U-shaped curve (Figure 3.1). We therefore expect most identified associations to be positive.

We assess the evidence the selected studies provide to explain behavioural variation in each phase of the TDIB framework. Furthermore, we evaluate whether authors have used theories of fertility behaviour to derive hypotheses and testable research questions.

3.6.1 Method

We implemented a three-stage process to identify relevant papers. Firstly, a document search was performed on the electronic database Scopus (www.scopus.com). Since the gender revolution theory was developed to explain fertility in low-fertility settings, the search was narrowed to include only high-income, low-fertility countries and relevant disciplines. The search terms and exclusion criteria are detailed in Appendix 3.1. This search yielded 1,037 results on 22 January 2020. Following the results of the document search, the second step was to use Scopus' citation tracker to check all papers that cited the papers found in stage one. Finally, the reference lists of all selected papers were manually searched to find other relevant papers. This addressed the issue of finding working papers or published papers that are not indexed in online databases. The identification stage of each paper is also detailed in Appendix 3.1.

Throughout the process, quantitative and qualitative empirical papers were selected if they explored gender equality (absolute fairness) or gender equity (perception of fairness) in relation to three factors: (1) the domestic share between partners or absolute hours of domestic labour carried out by each; (2) gender role attitudes (both relating to women's roles in the public sphere and men's

roles in the private sphere); or (3) work–family conflict on fertility intentions or outcomes, either at the micro or macro level. The first criterion was chosen because the gender revolution theory incorporates how men’s increasing contribution to household labour (the private sphere revolution) can alleviate the burden on women and increase childbearing (Goldscheider, Bernhardt and Lappegård, 2015). Thus, papers using actual time use data, approximations of participation (e.g. mostly male partner or mostly female partner), and satisfaction with the division were included. The second factor was included since it is the rigid gender norms accompanying the male-breadwinner–female-homemaker model that are so problematic for fertility. The final factor was included because the gender revolution theory suggests women who both work and provide the majority of home care will have the lowest fertility intentions and outcomes. Together these factors can be split into our six independent variables of interest (Figure 3.2) that demonstrate more flexible attitudes or division of labour: (1) consistency between gender role attitudes and division of labour; (2) more satisfaction with the division of labour or perception of fairness; (3) fewer domestic hours for a woman relative to other women; (4) more domestic hours for a man relative to other men; (5) more equal share of household labour; and (6) more flexible gender role attitudes.

The selection did not include papers exploring related topics, such as the financial cost of childcare, childcare service provision, parental leave use, women’s employment and wages without consideration of their unpaid labour, other measures of gender equity or equality (e.g. women’s political empowerment), family policies, gender policies, or the use of wider support networks to assist with child-rearing. These were excluded as they do not explicitly address the concept of domestic time allocation within the couple. Furthermore, papers were excluded if they were only theoretical, not written in English, or written before 2000 when the first U-shape theory was published. The reason for including or excluding each paper found by the Scopus search is reported in an excel spreadsheet labelled ‘appendix 2’ on the OSF page for this project (<https://osf.io/utxf/>) and in the published supplementary material.

The process produced a total of 83 papers (see Appendix 3.2) covering 95 pieces of analysis, which are summarized individually and collectively in Appendices 3.3 and 3.4. These 95 pieces of analysis reported 113 associations/non-associations between the independent variables of interest and fertility intentions/outcomes. This is because some analyses included more than one sample or independent variable.

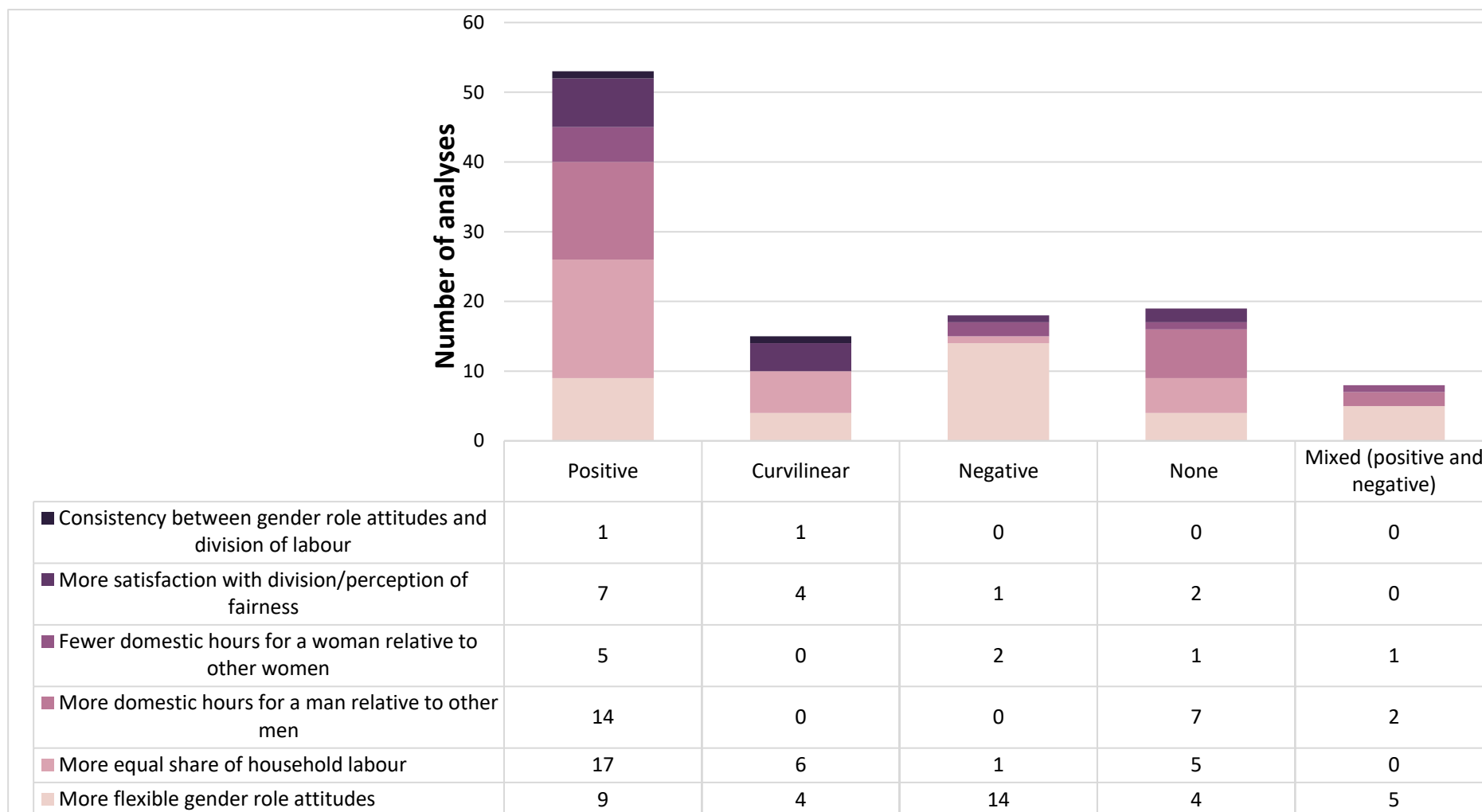


Figure 3.2: Type of significant association found between fertility indicators and gender equity, broken down by independent variable studied

Notes: ‘Positive’, ‘curvilinear’, and ‘negative’ refer to when these types of significant association were found in any group within a study. ‘None’ refers to studies where there was no significant association whatsoever found for that independent variable. ‘Mixed’ is when both significant positive and negative associations were present for different groups for the same independent variable within the study. *N* = 113 associations/non-associations found. Qualitative analyses were excluded due to no empirical test of association being available.

Source: See Appendix 3.2, supplementary material, for list of studies included.

3.6.2 Results

3.6.2.1 Fertility Desires

The search yielded six micro-level cross-sectional analyses and one macro-level analysis relating to desires for children (see Appendix 3.3, Tables 1 and 4). Our definition of a desire is consistent with that outlined in the TDIB model: a preference, like, or ideal for a child in the presence of no obstacles (e.g. 'What is your ideal family size?'). The micro-level papers presented a mixture of findings. Two found positive associations between their independent variables and fertility desires, one a curvilinear relationship, one a null association, and two negative associations. The two positive associations, however, were only found to hold in certain circumstances: Kan and Hertog (2017) found their positive association to hold only for men and not women, and Yang (2017) only for women's, not men's, hours of housework (Yang, 2017). Furthermore, Kato (2018) found mixed associations: flexible attitudes towards household task division were associated with decreased desire for children in Japan, but at the same time, men's preference for sharing childcare increased their desire (although no *p*-values were reported).

The macro-analysis (Testa, 2007) found a significant relationship between being in favour of an equal division of tasks and mean ideal family size at the national level.

3.6.2.2 General fertility intentions.

General fertility intentions are distinct from the desires literature, as there is now a commitment to achieve a particular goal but with no particular time period for implementation (e.g. 'Do you intend to have a/another child?' or 'Do you intend to have children in the future?'). We also included general expectations for children (perceived likelihood of having children) in this section as it is a closely related concept (Miller, 2011). The search produced 18 micro-level and two macro-level analyses (Appendix 3.3, Tables 2 and 4).

In contrast to studies exploring mean ideal family size, the most commonly found association between the independent variables of interest and general intentions was positive (11 of 24 associations), followed by null findings (7 of 24). However, the results were often nuanced, with three of the studies (all examining gender role attitudes) presenting mixed findings: Kaufman (2000) found that while flexible attitudes increased desire for children among American men, the opposite association was found for their female partners. This was also found in the UK by Okun and Raz-Yurovich (2019), and Li and Jiang (2019) found flexible attitudes to have opposite effects depending on which policy regime in China the study population belonged to. Similarly, a large number of the analyses reporting a positive association found it to be significant only for some groups within their sample, such as among those with specific parity desires (Pinnelli and Fiori, 2008; Chen and Yip,

2017), those performing specific tasks (Lee and Hwang, 2017), for women but not men (Okun and Raz-Yurovich, 2019), or vice versa (Tazi-Preve, Bichlbauer and Goujon, 2004; Miettinen, Basten and Rotkirch, 2011).

The macro-analysis by Alonso (2004) found a significant relationship between equal sharing of domestic labour between partners and intended number of children. However, Philipov (2008) found mixed results, with more flexible attitudes promoting intention to become a parent among men in some countries, but the opposite effect among women in other countries, and no effect at all on intentions for second or higher-order births.

3.6.2.3 *Short-term fertility intentions.*

This section contains eleven cross-sectional, micro-level analyses and one macro-level analysis (Doepke and Kindermann, 2019) that specifically measured short-term intentions for children (Appendix 3.3, Tables 3 and 4). This concept is widely accepted in the literature as a plan for a child in under three years (Philipov and Bernardi, 2011).

Nine positive associations between the independent variables and the likelihood of intending a child were found, along with three U-shaped associations, two negative associations, and one null finding. The macro-level analysis also found a positive association between dividing childcare tasks and the likelihood of a woman agreeing when asked if she wanted a/another baby now. However, similar to the general intentions analyses, authors of these studies found their associations to be significant only among certain groups: for example, for childcare division not housework division (Buber, 2002), satisfaction with division rather than actual division (Bernardi, Le Goff and Ryser, 2013; Neyer, Lappegård and Vignoli, 2013), intentions at specific parities (Cavalli and Rosina, 2011; Bernardi, Le Goff and Ryser, 2013; Harknett, Billari and Medalia, 2014), specific types of gender role attitudes (Lappegård, Neyer and Vignoli, 2015), specific countries, and working women only (Mills *et al.*, 2008).

3.6.2.4 *Realizing fertility intentions.*

The next stage on the behavioural pathway after the formation of intentions is whether they become realized. In order to examine this, we identified studies that measured both whether an individual intended to have a child, and whether they went on to do so.

Our search yielded four micro-level analyses, all focusing on the probability of fulfilling an intention for a second child over time (Appendix 3.3, Table 5). Seven qualitative papers were also included under this subsection; these have been split up into ten individual country analyses in the table in order to summarize the findings in more detail (Appendix 3.3, Table 6). The rationale for this is that qualitative studies exploring factors important to childbearing decisions link directly to explaining

why some intentions are realized and others are not. However, the associations they found are not included in the total summaries as they are not empirically tested.

Two of the empirical analyses found a positive relationship between the male partner's domestic contribution or flexible attitudes and the probability of fulfilling an intention for a second birth (Yoon, 2016; Kim, 2017). However, there is a temporal mismatch between measurement and conclusion. Both analyses used a general desire to have another child, but then observed subsequent births only over the next three years. One analysis (Rinesi *et al.*, 2011) found no association between domestic division of labour and probability of fulfilling intentions (although the direction of effect for the non-significant findings is positive), but used an independent variable not used by others in this review: the mother's perception of whether their partner increased or decreased his involvement in housework after the first birth. Although this is indicative of paternal investment in new family life, it does not measure how much domestic burden the woman personally experiences or whether she feels well supported. Another independent variable may have yielded a different result. The final analysis, in South Korea, found that those perceiving a fairer division of labour were more likely to have fewer children than desired at marriage (Lee and Hwang, 2019). However, again there are apparent temporal issues with this analysis, as 80 per cent of the sample members were under the age of 45 and thus many would not yet have achieved their ideal family size.

The qualitative papers all revealed findings generally supportive of the gender revolution theory, but differed subtly between the country contexts. In all seven countries, the authors found that the main reasons given by interviewed women for not having another child were taking time away from their jobs to care and balancing work and care responsibilities (Nosaka, 2012; Brinton *et al.*, 2018; Freeman *et al.*, 2018; Brinton and Oh, 2019; Bueno, 2019; Suwada, 2019). However, in Japan there was a strong acceptance of a 'female caregiver' norm, which may have resulted in the male partner's contribution being cited less frequently as a reason for having no more children (Nosaka, 2012; Brinton *et al.*, 2018). Furthermore, Spanish women most commonly cited job stability as their reason for not continuing childbearing (Brinton *et al.*, 2018), with little difference in fertility intentions among economically secure interviewees according to their gender role attitudes (Bueno and Brinton, 2019). Nonetheless, qualitative analysis across the last 30 years has shown that persisting gender inequity in the household has become an increasing issue for Spanish women with regard to continued childbearing (Bueno, 2019).

3.6.2.5 *Fertility outcomes.*

The search yielded 33 micro-level and nine macro-level pieces of analysis (Appendix 3.3, Tables 7 and 8, respectively). Most analyses explored progression to second birth, using longitudinal data sets. Progression to other parities, being a mother, number of children born, and mean number of children born between study groups were also studied. Among the macro-level analyses, three looked at mean family size and six at fertility rates.

The relationship the micro-level analyses present is nuanced. Nine null findings were reported, and eleven negative associations. However, most associations (15) between the independent variables and child outcomes were positive. However, a positive association again seems dependent on country (Brodmann, Esping-Andersen and Guell, 2007; Cooke, 2009), women's employment (Cooke, 2009; Schober, 2013; Nagase and Brinton, 2017), parity-specific outcomes (Mencarini and Tanturri, 2004; Nilsson, 2010; Komatsu, 2011; Goldscheider, Bernhardt and Brandén, 2013; Schober, 2013; Aassve *et al.*, 2015; Miettinen, Lainiala and Rotkirch, 2015), the importance of childcare rather than housework division (Cooke, 2004; Mencarini and Tanturri, 2004; Miettinen, Lainiala and Rotkirch, 2015; Dommermuth, Hohmann-Marriott and Lappegård, 2017), and gender—for men but not women (Kaufman, 2000; Bernhardt and Goldscheider, 2006; Brandén, Duvander and Ohlsson-Wijk, 2018) or vice versa (Goldscheider, Bernhardt and Brandén, 2013; Aassve *et al.*, 2015), and year (Zhou and Kan, 2019). The significance of ideal over actual division of labour in determining higher fertility outcomes is evident (Alonso, 2004; Torr and Short, 2004; Luppi, 2016), although one Australian study finds the opposite (Craig and Siminski, 2010). It is noteworthy, that as for the desires and intentions literature, a strongly significant positive relationship exists among the majority of macro studies testing association between domestic division of labour and national birth outcomes.

3.6.3 **Discussion**

Does our review provide supportive evidence for our rephrasing of the gender revolution theory: that both male-breadwinner–female-homemaker couples and couples that divide both their paid and unpaid work (i.e. with complementary division of labour) have more children than women experiencing a dual burden (a non-complementary division)? While some analyses across all groups found this U-shaped relationship, these studies were in the minority (14 of 113 associations). The studies which did find this association tended to be those that explored the variable which most accurately operationalized the hypothesis: the share of household labour between the partners (see Figure 3.3 for summary) (Oláh, 2003; Alonso, 2004; Torr and Short, 2004; Schober, 2013; Yoon, 2014; Luppi, 2016; Fukuda, 2017). This is because, by looking at *share*, this variable captured all couple types along the curve (male-breadwinner–female-homemaker couples, dual-burdened women, and couples who share both paid and unpaid work equally). This finding was not always consistent,

however, with studies looking at *share* also frequently reporting only positive associations. However, this may be because the samples studied had already undergone the public sphere revolution, and thus any recent changes in gender equity were likely to be in the private rather than public sphere.

In addition, studying satisfaction with division of household tasks also produced U-shaped findings, with both male-breadwinner–female-homemaker and couples that divide both their paid and unpaid labour having more children (Alonso, 2004; Cavalli and Rosina, 2011; Andrade and Bould, 2012; Luppi, 2016). These papers reiterate the need to distinguish between gender equality (absolute fairness) and gender equity (perceived fairness), as it may not be egalitarianism in itself that drives fertility into a ‘U’ shape, but the resulting dissatisfaction experienced by women when the second stage of the gender revolution is not completed (Neyer, Lappegård and Vignoli, 2013). This is in line with our rephrasing of the gender revolution theory, that it is a non-complementary division of labour, resulting from lingering rigid gender norms, that results in lower fertility.

The most common finding (53 of 113 associations) was a positive association between the independent variables of interest and childbearing. This is also congruent theoretically if we appreciate that these studies focus on only the *private sphere* revolution part of the theory (the latter half of the curve). For example, studies most likely to report a positive relationship were those that studied working or ‘career-orientated’ women and their intentions for children (Brodmann, Esping-Andersen and Guell, 2007; Mills *et al.*, 2008; Pinnelli and Fiori, 2008; Fiori, 2011; Park, 2012; Harknett, Billari and Medalia, 2014; Lee and Hwang, 2017) and those that studied the father’s absolute time contribution to domestic labour, rather than the couple’s share (Mencarini and Tanturri, 2004; Tazi-Preve, Bichlbauer and Goujon, 2004; Brodmann, Esping-Andersen and Guell, 2007; Mills *et al.*, 2008; Park, 2012; Testa, 2012a; Kan and Hertog, 2017; Kim, 2017). As the time men contribute to household labour increases, the increasingly complementary division of labour positively impacts childbearing by alleviating the excessive burden for working women. Apart from four pieces of analysis looking at gender role attitudes, all macro-level studies reported a significant positive relationship between the independent variables of interest and childbearing (see Appendix 3.4 ‘visual summaries’), although the relationship may be confounded. In nearly all high-income settings, the majority of women engage with paid labour (OECD, 2018) and, therefore, it is likely that most countries have completed their public sphere revolution, and now lie along the latter half of the U-shaped curve, at different stages of the private sphere revolution. Again, this is compatible with our rephrasing of the gender revolution theory.

Eighteen of 113 associations involved a negative relationship between the selected independent variables and childbearing, with only male-breadwinner–female-homemaker couples intending and

having the most children. Furthermore, another eight associations were classified as mixed. On a descriptive basis, analyses finding negative associations typically focus on first birth as the outcome (Kaufman, 2000; Bernhardt and Goldscheider, 2006; Bernhardt, Goldscheider and Turunen, 2016; Dommermuth, Hohmann-Marriott and Lappegård, 2017; Osiewalska, 2018). Progression to a second birth is well recognized as a critical decision point in low-fertility contexts, with many choosing to forego transitioning to a second child (Goldscheider, Bernhardt and Brandén, 2013; Aassve *et al.*, 2015). In light of this, gender equity in the household may be particularly important for transitions to higher-order births, rather than first births. Several studies in the review found that associations between their independent variable and higher-order parity intentions/outcomes disappeared when examining desire for or outcome of a first child, lending support to this theory (Park, Cho and Choi, 2010; Komatsu, 2011; Goldscheider, Bernhardt and Brandén, 2013; Harknett, Billari and Medalia, 2014; Lee and Hwang, 2017; Freeman *et al.*, 2018; Puur, Vseviov and Abuladze, 2018). This is logical, given that domestic load is known to increase with the presence of a child (Craig and Bittman, 2008), and that childcare is more likely to be performed by the woman, even if the couple had a gender equal distribution of domestic work before the birth (González *et al.*, 2018).

Another clear finding is that the majority of these analyses reporting a negative or mixed association used gender role attitudes as their explanatory variable (19 of 26). This can perhaps be explained by examining the type of gender role attitudes included in this analysis. Flexible attitudes regarding the role of women in society (e.g. disagreement with the statement 'On the whole, men make better political leaders than women do' or answering no to 'Does a woman have to have children to be fulfilled?') tend to be associated with lower fertility intentions. However, flexible attitudes related to the role of men in the family (e.g. agreement with the statement 'Family life suffers because men focus too much on their work') are broadly associated with higher intentions. These two groups of attitudes lie in two different halves of the fertility curve and, respectively, in the public and private sphere phases of the gender revolution (Goldscheider, Oláh and Puur, 2010). However, this result was not always consistent, with flexible private sphere attitudes sometimes being associated with only lower fertility or vice versa (Bernhardt and Goldscheider, 2006; Goldscheider, Bernhardt and Lappegård, 2015; Brinton and Lee, 2016). The variability of associations found with gender role attitudes also appears to be particularly determined by the gender of the participant. A recurring finding was that flexible attitudes among men are associated with higher fertility intentions and outcomes, while the opposite is true for women.

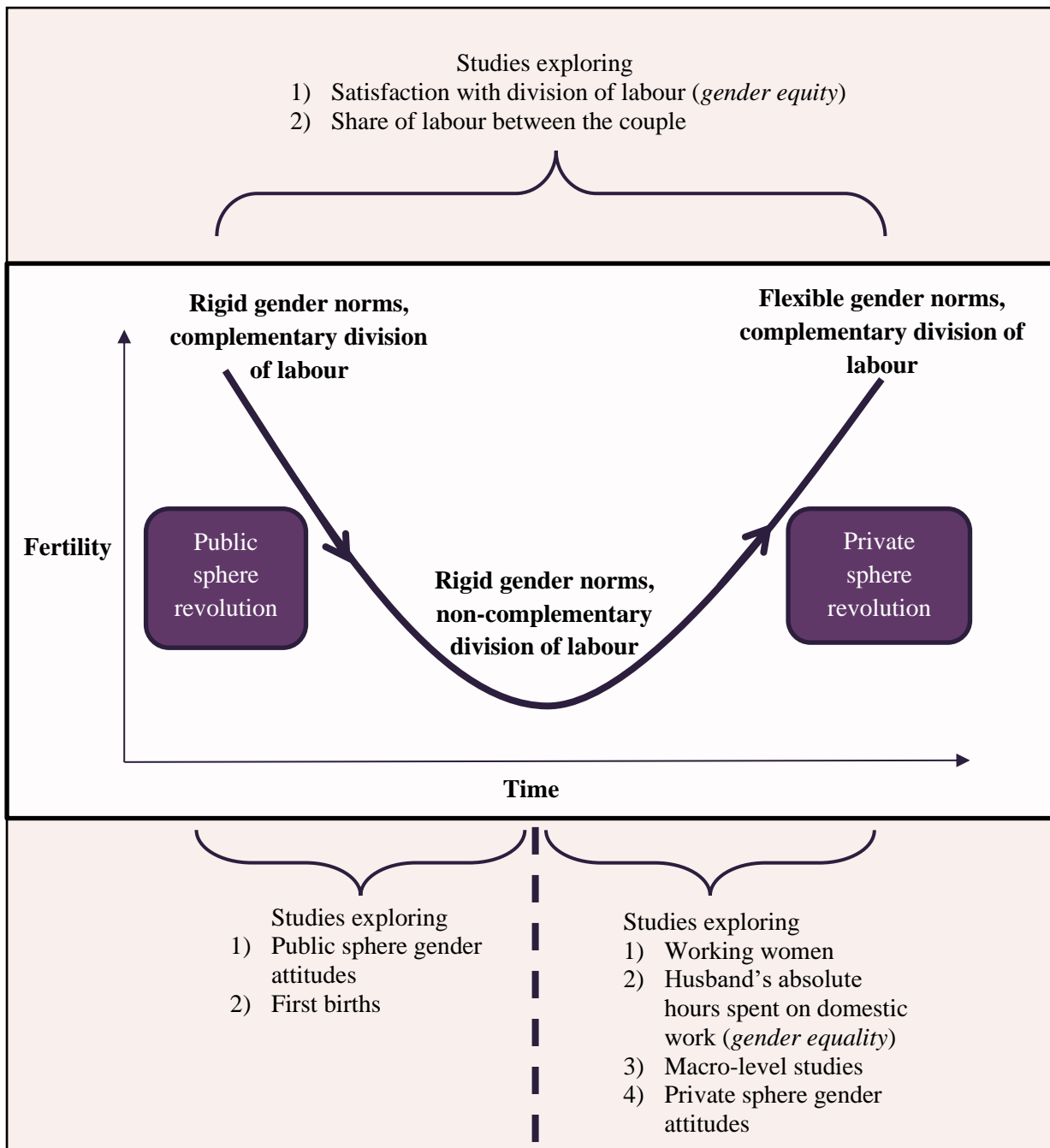


Figure 3.3: Matching study types to the part of the gender revolution U-shaped curve that they measure

Source: See Appendix 3.2, supplementary material, for list of studies included.

Partial associations were a very common finding from this review, with a large amount of subtle variation in findings reported within papers, often only for particular countries or samples. In light of this variability, and since our review is interpretive rather than a meta-analysis, we can only conclude with caution that there appears to be support for our rephrasing of the gender revolution theory. Particularly as our review does not focus on aspects of gender equity outside the domestic division of labour, our conclusions may overlook some key findings and alternative hypotheses for explaining the variation in fertility behaviour. For example, use of paternal leave (Duvander and

Andersson, 2006), provision of childcare services (Fukai, 2017), and support with child-rearing from the family network (Balbo and Mills, 2011; Schaffnit and Sear, 2017b) have all been shown to influence individuals' fertility behaviour but were not analysed in this review. Similarly, state-level measures of gender equity (including education, health, economic equality, and political empowerment) have been shown to be important determinants of fertility at the national level (Myrskylä, Kohler and Billari, 2013).

Regarding the quality of papers included in the review, there were many strengths to note. The majority of analyses employed multivariate techniques and had large sample sizes. Authors were often careful to define and operationalize concepts, such as the distinction between private and public sphere attitudes (Miettinen, Lainiala and Rotkirch, 2015). The diversity of findings, in particular the reporting of null results (20 of 113 associations), also suggests that publication bias has been minimized and that authors may not have been selectively reporting positive results. However, we also noted that findings were sometimes reported inaccurately in abstracts, for example, associations stated in abstracts did not always accurately reflect data and statistical results. This has led to a trend of mis-citation: some authors cited findings from previous publications that were not present in the original papers, presumably as a result of only reading abstracts. This issue is not new to academic writing (Mogull, 2017; Bishop, 2018), but we would like to reiterate to authors the importance of taking the time to consult original sources before comparing their findings with existing studies.

A notable observation which emerged from this review was that surprisingly few papers cited or used theories of reproductive decision-making (i.e. theories that can help explain how gender equity in the household affects fertility). None of the papers focusing only on fertility outcomes referenced these theories, perhaps because the authors were not focused on the decision-making process. However, as we argue in this paper, such theories could still be helpful in guiding the conceptual framework of these papers, even if they are not tested, so that there is a clear consideration of the causal pathway. Even among the other 48 papers that focused on fertility desires, intentions and their realisation, only 16 psychosocial theories of fertility behaviour (see Appendix 3.4 'general summary'). Furthermore, of these papers, most cited the theories only briefly without using them to guide their research design. Aside from one paper written by the authors of the TDIB model (Miller, Rodgers and Pasta, 2010), only two papers made explicit use of a decision-making theory to build their conceptual framework (Testa, 2012a; Lee and Hwang, 2019).

A lack of behavioural theory guiding the research questions and operationalization of variables in this literature reaffirms our championing the TDIB model for its practical clarity, and confirms that

too many studies focus overly on why and not how fertility varies in relation to gender equity in the household. If we are to believe that declining fertility rates are the result of a fertility gap between ideal and actual childbearing (Philipov, 2009), it is more important than ever to employ these frameworks and operationalize them correctly to understand how 'real' this gap is, and which factors lead to intentions remaining unrealized. Indeed, the papers exploring realization of intentions in our review particularly struggled without a clear conceptual framework, as they compared the number of children a respondent had at one point in time or within a three-year interval with their ideal family size, creating a censoring issue. Greater theoretical clarity would help improve consistency between definitions, measurement, and conclusions in the study of gender equity and fertility, and particularly the literature on realizing intentions (Goldscheider, Oláh and Puur, 2010; Neyer, Lappegård and Vignoli, 2013). Further hampering the production of definitive conclusions from this review is that a multitude of different predictor and outcomes variables were used across analyses, making it difficult to adequately compare across studies (and making formal meta-analyses impossible). To some extent authors are limited by the data available, but introducing more theoretical rigour into both data analyses and data collection exercises is likely to enhance the comparability of research by forcing researchers to think more carefully about the ideal methods for operationalizing concepts and testing hypotheses.

One final comment about the generalizability of results presented here: we limited our review to high-income, low-fertility societies in Europe, North America, Australia, or East Asia. A more thorough understanding of the associations between gender equity in the household and fertility would come from performing analyses across a much broader range of societies, including those still undergoing the first public sphere gender revolution. While we think such analyses are vital in fully understanding how gender equity links to fertility, we caution against assuming exactly the same relationships will be seen in all contexts. Gender revolution theory stems from observations made during the European fertility transition, and the causes and consequences of the fertility transition are somewhat different in other regions of the world.

3.7 CONCLUSION

The aim of this paper was to highlight how theories of gender equity in the household and fertility behaviour have been constructed and operationalized in empirical work, with a restated gender revolution theory as our preferred framework of explanation. We interpret our empirical overview of this literature, despite its heterogeneity, as providing some qualified evidence to support the assertion that those with complementary divisions of labour will have higher fertility intentions and outcomes. Support was most consistent at the macro level of analyses, in microanalyses looking at

subsequent, rather than first, births, and for studies using independent variables other than gender role attitudes.

Moreover, as an ode to the benefits of interdisciplinary approaches in demography, we aimed to establish some theoretical consistency across these empirical studies by integrating two theoretical perspectives: evolutionary theory and the TDIB framework. We argued that evolutionary theory can provide an ultimate level of explanation for why people have children and also a critical perspective to current gender equity theories of fertility. In particular, we used evolutionary ideas to rephrase some aspects of the gender revolution theory to make clear the joint roles of sexual division of labour and gender role norms in influencing fertility, and to move away from the assumption that the male-breadwinner–female-homemaker nuclear family is the ‘traditional’ family form. The focus of evolutionary theory aided the interpretation of our review findings. For example, we found that U-shaped associations were most common among studies looking at share of labour and satisfaction with that division. This fits well with our rephrasing to focus on *complementary* divisions of labour, and the need to move away from the problematic dichotomy of ‘egalitarian’ and ‘traditional’ labels. Moreover, it helps to explain why gender role attitudes in favour of the male-breadwinner–female-homemaker family model were consistently associated with higher fertility measures. By focusing on complementary roles, evolutionary theory emphasizes that it is not the gender role attitudes in themselves that are problematic for fertility, but the rigidity and persistence of these attitudes.

We also discussed the clarity the TDIB behavioural model can bring to the literature, including our review. However, we found limited evidence in our systematic review that the TDIB framework, or any behavioural theories, were being used to inform empirical analyses. As a result, there was some evidence of methodological confusion, such as measuring the probability of realizing intentions based on a stated desire, rather than an intention to act. Given growing interest in explaining the fertility gap (between ideal and actual childbearing), we recommend that future studies of gender equity in the household and fertility pay greater attention to behavioural frameworks of reproductive decision-making. In particular, more concerted attempts should be made to understand the realization, or not, of fertility intentions rather than simply studying fertility outcomes. This review also highlighted substantial variability in how the same hypothesis is operationalized and tested in different data sets. We therefore agree with the growing concern over ‘researcher degrees of freedom’ and how this influences which parts of an analysis the author chooses to publish (Stulp, Sear and Barrett, 2016; Schaffnit and Sear, 2017a), as well as how work is summarized and cited.

We conclude that a call towards greater standardization of data collection and analysis would aid a more fruitful comparison of studies exploring the association between household division of labour and fertility behaviour. The TDIB definitions of fertility measures and the critical lens of evolutionary theory offer an effective starting point for this process.

4 METHODS

Thus far, I have presented the theoretical and review-based parts of my PhD thesis. The remaining chapters contain three empirical research papers. These papers cover different research questions, data, and methods: two use secondary data sources, whilst the third uses primary data. This chapter discusses the methodological considerations of these papers, divided into secondary and primary data sources. For both sections, I introduce the different datasets, the rationale behind their use, and considerations for their use in the analyses.

4.1 SECONDARY DATA SETS AND METHODS

One of the key findings from my systematic review presented in Chapter 3, was that research on realising intentions for children could be improved by more careful operationalisation of reproductive decision-making. As a result, I concluded that the analysis I had planned on realising intentions for a second child would have selectively excluded women who may have wanted two children, but did not intend a second child because of perceived obstacles. I therefore changed the focus of my empirical work to explore how and why childbearing intentions are formed and adjusted during the life course.

In my first empirical paper, I explore changing childbearing expectations among a particular group: women in low-fertility settings who only have one child (Chapter 6). Specifically, I wanted to focus on the time around first birth as a catalyst for changing expectations. To see how generalisable my findings were, I was keen to add a comparison between countries with similar fertility profiles, to see whether women with one child have similar childbearing expectations in different settings. To address the aims of this paper, I required a methodology that captures the development of a factor over time. A linear growth curve model is a type of multilevel model that clusters observations over time within individuals, and thus identifies trajectories of change in those observations (Singer and Willett, 2003). I opted for a similar methodology, clustering observations within individuals, but using a Poisson distribution (i.e. a mixed-effect Poisson regression, implemented using the *xtmepoisson* command in STATA). This was done as expected number of children is a discrete outcome, so would not be appropriately modelled with a linear specification.

Multilevel models that cluster observations over time within individuals have data requirements to be successfully implemented. These include, preferably, a sample of at least 100 individuals, and at least three observations per person (Curran, Obeidat and Losardo, 2010). Having at least three observations ensures that the trajectory is identified (i.e. that there is more observed than estimated information). This means I need longitudinal datasets that follow individuals over time. I

used two datasets that met the criteria for this analysis in Chapter 6. The first is the National Longitudinal Survey of Youth 1979 (NLSY'79) (Bureau of Labor Statistics: U.S. Department of Labor, 2019). This survey follows a cohort aged 18-22 in 1979, initially yearly, and then every two years from 1994-2014. The second dataset used as a comparison to NLSY was the UK Household Longitudinal Survey (UKHLS) (University of Essex: Institute for Social and Economic Research, 2020). This dataset combines waves from both the British Household Panel Survey (BHPS) with Understanding Society. The BHPS ran yearly from 1991-2009, with six survey waves collecting information on childbearing expectations. Understanding Society began collecting yearly data in 2009, including some continuing BHPS respondents in the sample, and currently has three waves that collected information on childbearing expectations.

Extending from the analysis in Chapter 6, I then aimed to explore and describe the changes in paid and unpaid labour that also occur around first birth in high-income, low-fertility contexts (Chapter 7). The methodology for this analysis is a sequence analysis, implemented in STATA using the packages *SQ* (Kohler, Luniak and Brzinsky-Fay, 2006) and *SADI* (Halpin, 2017). This methodology is described in greater detail in Chapter 7, but broadly sequence analysis works by identifying trajectories over time between different states. The method computes 'distances' between one sequence of states and another, by calculating the number of changes needed to make the two sequences identical. 'States' refers to the classification of an individual at a given time. For example, whether an individual is single, married, divorced or widowed. In Chapter 7 the 'states' are classifications of paid and unpaid work. The distance between two sequences of states quantifies how close they are to one another. These distances are then used to group individuals together into clusters, based on how similar their trajectories are. I then test whether demographic characteristics are associated with belonging to the different clusters using a multinomial regression (STATA command *mlogit*), and whether individuals in the clusters vary in how quickly they progress to a second birth using discrete-time event history analysis (STATA command *logit*).

For sequence analysis to work, there are two data requirements. First, each individual must have a complete set of observations (i.e. no interval or right/left censoring). Secondly, those observations must be consistently spaced between individuals. In the case of my analysis, this refers to equally spaced observations for individuals relative to their first birth. I also require a data set with detailed information on time use, and a longitudinal component to detect change around first birth. I opted to use the Australian 'The Household, Income, Labour Dynamics in Australia' (HILDA) study, which is a panel study that has been running since 2001 (Department of Social Services; Melbourne Institute of Applied Economic and Social Research, 2020). The survey met my requirements for a longitudinal

dataset, with information on time use, with consistently spaced observations. However, some individuals were not consistently observed around the time of first birth, introducing censoring which is a problem for the sequence analysis. There are two analytical solutions to this problem: first, missing observations can be imputed using an estimation methodology. However, this may introduce bias into the data. Secondly, individuals without complete information can be dropped from the sample, but this can introduce selection bias. I opted for the second option which I explain in greater detail in Chapter 7.

4.1.1.1 Ethical approval and project authorisation

Ethical approval was obtained from the London School of Hygiene and Tropical Medicine Research Ethics Committee prior to commencing projects using these secondary data sets (Ref:14547).

Authorisation to use the UKHLS Special License Data Set (SN 6931) was obtained through the UK Data Service. Authorisation to use HILDA (General Release 19) was obtained through the Australian Data Archive.

4.1.1.2 Reproducibility

The STATA code for the analyses presented in Chapters 6 and 7 can be found on the Open Science Framework (<https://osf.io/ep62h/>).

4.1.2 Study designs

In the following sections, I will briefly describe the design of the data sets and how their designs influenced the analyses in this thesis. Detailed description of the sample design of NLSY'79, UKHLS and HILDA have been published by the data providers (Frankel, Mcwilliams and Spencer, 1983; Watson and Wooden, 2002; Lynn, 2009).

4.1.2.1 Sampling and Data Collection

The sample of the NLSY'79 was identified from screener interviews of a multi-stage area-stratified probability sample of United States dwellings in 1978. This included 75000 dwellings, in 1818 sample segments of 202 Primary Sampling Units (PSUs) selected from the NORC Master Probability Sample of the United States. The screening interviews covered the breadth of the 50 American States and had a response rate of 91.2%. During the interviews, all individuals aged 14-21 were identified and a sample invited to become the NLSY'79 cohort. The cohort consists of three independent probability samples: 1) a cross-sectional sample of non-institutionalised youth (n=6111), 2) a supplemental oversample of Hispanic, Black, and economically disadvantaged youth (n=5295), 3) a military sample of those aged 14-18 (n=1280). The first two samples were identified through the in-person screening interviews. The military sample was identified using Department of Defense records. Data for NLSY'79 was collected using paper and pencil interviews (PAPI) until 1989, following which they were conducted as computer-assisted personal interviews (CAPI). The move to CAPI improved

collected data quality as interviewer mistakes could be eliminated (e.g. missing questions) and there was no need for data transcription following interview (Olsen, 1992).

The UKHLS sample design is comprised of both BHPS (1991-2009) and Understanding Society samples (2009 to present). The BHPS initially surveyed a representative sample of households across Great Britain, with a response rate of 74% (n=5050 households). The survey used a stratified clustered design, consisting of 250 PSU. A booster sample for Scotland and Wales was added in 1999 (1500 households from each), and another for Northern Ireland in 2001 (1900 households). Understanding Society commenced in 2009 with a new representative sample of 40,000 UK households and an Ethnic Minority Booster sample. However, because of limited available waves measuring childbearing expectations, this sample is not used in this thesis. BHPS respondents were included into the Understanding Society sample from the second wave (2010), and their responses are included in presented analysis. All household members over 16 are asked to complete an individual questionnaire (with a self-complete component) and are followed up in subsequent waves. Originally the questionnaire was asked using PAPI until BHPS switched to CAPI in 1999.

HILDA also used a complex survey design. They began by stratifying the sample into major Australian regions, and then census collection districts (the PSUs) were systematically selected within each strata. Probability of selection was proportional to the number of households in each district. Households were selected randomly (7682 households), and all individuals were surveyed in that household (13,969 individuals). Initial household response rate was 66%, and the individual response rate was 61% (Watson and Wooden, 2012). Surveys have been conducted annually since 2001, and any new members to the household (e.g. children born) are added to the sample. The first eight waves (2001-2009) were collected using PAPI, and subsequent waves using CAPI. In addition to the main interview, each adult respondent also fills in a paper self-complete questionnaire. Incentives between 20-50 Australian dollars are given to each household that participates in a survey wave.

4.1.2.2 Sample Attrition

The retention of the NLSY'79 is very good: the retention rate from 1979 to 2018 is 69% (Bureau of Labor Statistics: U.S. Department of Labor, no date). The attrition of the BHPS is also low, with 70% participating after 12 years and 40% after 24 years (Lynn and Borkowska, 2018). Attrition was higher among younger people, men, those of black ethnicity, those with lower incomes, and respondents from the West Midlands (Lynn and Borkowska, 2018). HILDA reinterviews 90% of respondents at each wave, with 85-90% returning the self-complete questionnaire (Watson and Wooden, 2012).

4.1.2.3 Accounting for survey structure and weighting

NLSY'79 used PSUs and area strata in its sampling design, meaning that survey design will affect standard error estimates. Strata and clusters (PSUs) make the standard error estimates smaller than they should be, as those sampled within the clusters are more similar to one another (i.e. there is less variation in a survey using clusters than a survey with complete simple random sampling). However, to account for clustering, a separate geocoded data file must be used which is only available to US researchers. The standard errors of the regression coefficients in analysis presented in this thesis may therefore be underestimated, and this should be accounted for when interpreting differences between groups in the final part of the analysis. The UKHLS and HILDA both have PSU and strata as part of the sampling design, and include variables in the datasets to account for both. In HILDA, I accounted for the clustering and strata using the *svy* commands in STATA. For the analysis using UKHLS data, my sample size is very small (n=192) because of irregular survey waves measuring my outcome of interest. As a result of small sample size, there is very little clustering in my sample: of the 150 primary sampling units in my sample, only 31 (20%) contained 2 or more people. Robustness checks incorporating a third level cluster to the multilevel model (the primary sampling unit) made minimal difference to standard errors (adjustments of no more than 0.03) so was not incorporated into the presented models.

Sample weights for each survey are made available by the three data providers. Weights can be used to adjust point estimates to make them generalisable to the population the survey is representative of or adjust for attrition of the sample over time. The weights in the NLSY'79 involve three types of adjustment 1) probability of selection to first interview, 2) differential response at both screening and subsequent interviews, 3) correction for random variation associated with oversampling and coverage, to transform estimates to be generalisable to US population. The longitudinal weights provided by the NLSY to account for attrition do not make sense in the case of my analysis, as the time focus is observations around first birth, which can be different years for different individuals. There was also minimal attrition and drop out in the sample: 12% of all women who ever had a first child were not included in the analysis, and 10% of women who only had one child were not included. As part of robustness checks, I included weights for the second level of the model (for the respondent). The point weight used corresponded to weighting for the original 1979 sample. Adding weights made minimal differences to the regression estimates (see Appendix 4.1) and as representativeness of my findings to the cohort in the whole US population was not a priority in this paper, I did not use the weights in the presented regressions.

The UKHLS has premade longitudinal weights for each respondent, which can be used to make inference for those continuously resident in Great Britain/UK over time. However, these weights are

developed for annual attrition (i.e. a response needed in each consecutive waves). My analysis uses 7 unevenly spaced waves, so these weights are unsuitable. Furthermore, as the analysis centred on years around first birth rather than survey year, women entered the analysis at differing calendar years meaning I could not apply a baseline weight as in the US cohort study. The same reasoning applies for not using weights in the Australian analysis, as the panel structure mean members join the analytical sample at different calendar years, as again the analysis centres around time of first birth rather than survey year.

4.1.2.4 Approach to missingness

In each of the three national samples, there were cases of both unit (the individual at a time point) and item (for a particular variable) non-response. Unit non-response in Chapter 6 is not problematic, as the mixed-effect regression models are well suited to deal with missing responses as long as the respondent has at least three observations to identify a trajectory. In the case that the respondent did not have at least three observations, they were deleted from the sample. In terms of item non-response for added covariates, there were very minimal instances of this because derived variables with no missingness were nearly always used (e.g. age, highest education achieved, region). In the small number of cases with an item non-response, they were dropped from the regression sample.

In Chapter 7, a more substantial proportion of the sample had to be dropped (48%) because the sequence analysis required no missing time-use data. Item non-response for the covariates included in the multinomial regression were very minimal because these variables were derived.

In each chapter using secondary data, I have included a reflection on how the deletion of these individuals may have affected the interpretation of the findings (see appendices 6.1, 6.2 and 7.2 for a description of the dropped samples' characteristics). Overall, there were minimal differences between those dropped from the sample and those included in the two chapters, aside from in the Australian analysis where there were some differences by age and time use (Chapter 7).

4.2 PRIMARY DATA

Childbearing decision-making is quite different to the decision-making needed for many other behaviours. Childbearing decisions are imbued with considerably more uncertainty and in some cases ambivalence (Westoff and Ryder, 1977; Agadjanian, 2005; Bernardi, Mynarska and Rossier, 2015; Ní Bhrolcháin and Beaujouan, 2019). This may be a reason why more general behavioural frameworks (such as the Theory of Planned Behaviour) have not performed well when applied to the reproductive decision-making process. The 'Traits-Desires-Intentions-Behaviour (TDIB) framework' (Miller, 1994) was the first psycho-social framework created to specifically explain reproductive decision-making. The framework outlines that a reproductive outcome is the result of a motivational

sequence of four stages: motivational traits (dispositions to react favourably or unfavourably to different aspects of childbearing), desires (the childbearing an individual would like, but does not necessarily plan to do), intentions (the childbearing goal accounting for what can be achieved) and reproductive behaviour. The four concepts form a chronological pathway, with each concept influencing the proceeding concept. A major benefit of the framework is the very clear definitions of the different framework components, making them intuitive to understand and implement in data collection and analysis. The framework is also particularly good at capturing decision-making unique to childbearing, for example reproductive ambivalence and voluntary childlessness (Miller, Jones and Pasta, 2016; Mynarska and Rytel, 2020).

Inspired by the benefits of the TDIB model to fertility researchers, Dr Monika Mynarska and I wrote a set of questions that fully operationalised the model (see Appendix 4.2 for full questionnaire). The module was then submitted for consideration by the Generations and Gender Survey Questionnaire Task Force. The Generations and Gender Survey (GGG) is a cross-national panel survey, measuring topics related to the causes and consequences of family change. First waves of the survey were conducted in the early 2000s, and new data collection of an updated survey (GGG 2020) began over the last couple of years. Our question module was approved for further development by the Task Force in 2019, and following feedback and revisions, has now been piloted in Poland, UK and in Norway. In the following sections, I will describe our motivations for writing this module, the motivation for including this work in my thesis and how the questionnaire was written. I will then detail how the questionnaire was piloted, and some initial findings from the UK pilot that lie outside the research paper included in this thesis.

4.2.1.1 Ethical Approval

Prior to fielding the survey, ethical approval was obtained from the London School of Hygiene and Tropical Medicine Research Ethics Committee (Ref: 22682).

4.2.2 Motivation for operationalising the TDIB

The Theory of Planned Behaviour (Ajzen, 1991) (TPB) is a widely used psycho-social model of behaviour, which has been applied to the study of fertility. The model postulates that behaviour is the result of three components: attitudes towards childbearing (perceived costs and benefits), subjective norms about childbearing, and perceived behavioural control to achieve a reproductive goal (i.e. achieving or avoiding conception). These three components are preceded by demographic background factors that influence them, for example age and partnership status. Together the components then culminate in an intention for a child, which will lead to behaviour to achieve that intention. An 'intention' is broadly defined in the psycho-social literature as a plan to act within the near future (usually in the next 3 years) (Miller, 2011). The TPB has been widely used to inform empirical analysis

on childbearing in Demography (Billari, Philipov and Testa, 2009; Dommermuth, Klobas and Lappegård, 2011).

However, implementing and testing the model has proved challenging to demographers interested in its application to childbearing. First, studies have not yielded sufficient evidence on its validity (Klobas and Ajzen, 2015; Mencarini, Vignoli and Gottard, 2015). The TPB assumes that all childbearing intentions are formed by a combination of attitudes towards reproductive behaviour, subjective norms about childbearing and perceived behavioural control to achieve a goal. Background factors such as age or partnership status (which typically have gained a lot of attention from demographers to explain childbearing patterns) are considered to precede these three factors in formation of intentions. However, the mediation of background factors via attitudes, norms and perceived control has not been evidenced in empirical studies (Mencarini, Vignoli and Gottard, 2015). Secondly, the elements of the framework have proved difficult to operationalise (particularly 'perceived behavioural control') due to their abstract nature (Dommermuth, Klobas and Lappegård, 2011; Mencarini, Vignoli and Gottard, 2015). Perhaps as a result, detailed analysis on reproductive decision making has been difficult to achieve using existing family surveys, and terminological confusions and operationalisation of the theory is evident (Philipov and Bernardi, 2011; Raybould and Sear, 2021).

The Traits-Desires-Intentions-Behaviour framework (Miller, Severy and Pasta, 2004) offers an alternative to the TPB, conceptualising reproductive decision-making as a mediated pathway. The TDIB framework has several benefits for understanding reproductive decision-making. First, it is the only model designed within the field of psychology with the exclusive purpose of explaining reproductive decision-making (unlike the TPB which is a general behavioural model). Secondly, the framework has very clear, defined concepts that are easy to operationalise in comparison to other psycho-social models of fertility behaviour. Third, the framework lends itself particularly well to the study of the 'fertility gap' phenomenon, that individuals appear to have fewer children than they consider ideal in low-fertility settings (Beaujouan and Berghammer, 2019). The clearly defined pathway, from how intentions are formed through to behaviour means that disruptions within this process can be identified and help explain why the gap exists. For instance, is it that obstacles impede individuals from reaching their goals that results in the fertility gap? Or is it that the formation of intentions is altered across the life course, either by external factors or changing motives/desires? The framework also lends itself particularly well to two other research areas of contemporary interest: ambivalence to childbearing and voluntary childlessness. Ambivalence to childbearing is of particular interest to reproductive and sexual health researchers, as it is known to be associated with inconsistent use of contraception and risk of unplanned pregnancy (McQuillan, Greil and Shreffler, 2011; Higgins, Popkin

and Santelli, 2012; Yoo, Guzzo and Hayford, 2014; Higgins, 2017). The TDIB framework has also been used to look at ambivalence through desires (Miller, Barber and Gatny, 2013; Miller, Jones and Pasta, 2016; Miller, Barber and Schulz, 2017). However, as the TDIB divides motives for children into positive and negative dimensions, measuring motives can also identify those who are overall more or less pro-natal, as well as those who are ambivalent in the middle. Measuring ambivalence in this way has been done for studies in the US, Poland and Iran (Pezeshki, Zeighami and Miller, 2005; Mynarska, 2017; Miller *et al.*, 2021). The prospective measures of motives and desires in the TDIB also lends itself to the study of voluntary childlessness. Voluntary childlessness is becoming more prevalent in Europe (Sobotka, 2017), and is to an extent dictated by personal motivations for children which the TDIB explores (Avison and Furnham, 2015; Mynarska and Rytel, 2020).

4.2.3 Significance for my thesis

In research paper 1, a shortcoming identified in the current literature on gender equity in the household and fertility was that reproductive decision-making has not been measured and operationalised in a methodologically rigorous and consistent way. This makes evaluation of whether gender equity is a potential explanation for the fertility gap very challenging. I also argued that the TDIB framework offered an effective starting point for standardising data collection and analysis of reproductive decision-making, and by extension the fertility gap. The open call by the Generations and Gender Program for novel question modules was the perfect opportunity to put this argument into practice. In the following sections I will outline the development of the questionnaire and how it was piloted in the UK. The survey was also piloted in Poland by Dr Mynarska and colleagues, and I use this data in Chapter 5.

I have included the work on this module in my thesis for three reasons. First, the process of developing the questions required a thorough examination of previous theoretical and empirical work measuring reproductive decision-making. The development of the questions is detailed generally in the following section, and specifically in relation to childbearing motives in Chapter 5. This work directly inputs into my theoretical critique of the fertility gap relating to the measurement of childbearing preferences and eventual childbearing outcomes. Second, through my preliminary analysis of the UK pilot data, I begin to test whether these questions and the underlying theoretical framework are suitable for standardising future data collection on fertility, as I contended in Chapter 3. The first step of this evaluation is presented in Chapter 5, where I evaluate the performance of the most challenging component of the TDIB model to operationalise: childbearing motives. Finally, the pilot allowed me to collect some qualitative data on reproductive decision-making, which I present at the end of this chapter. This data contributes to my discussion on avenues for future research extending from my thesis.

4.2.4 Questionnaire Design

Before we began writing the questionnaire, we outlined five key assumptions to guide the design. First, that Miller's motivational sequence of the TDIB is the underlying theoretical framework for the module, and that each element of the sequence needed to be measured. Second, that we wanted the concepts to be measured on a numerical scale, except for 'behaviour' which can only be measured as having happened or not. The rationale for using numeric, rather than categorical, responses was to allow the mediation effects hypothesised within the TDIB to be studied using more sophisticated modelling methods (e.g. structural equation modelling). Third, we wanted to ensure the questions would not preclude researchers from exploring other psycho-social theories with overlapping components, like the cognitive social model (Bachrach and Morgan, 2013). Fourth, we would use questions based on items used in previous studies, with some adjustments. In particular, as these questions are designed to be part of the Generations and Gender Survey, we wanted to make sure the wording of the questions on desires and intentions would integrate with those previously used in the survey. Lastly, we wanted to begin the pilot survey with a few questions measuring background demographic characteristics. This would allow us to evaluate the performance of the survey pilot among different groups. I will now briefly describe the measures included in the survey, and our design of these items. More detail on this process can be found in **Error! Reference source not found.**, which is the concept note written for the Generations and Gender Survey Questionnaire Task Force in 2019. Further, we published a technical paper for the Generations and Gender Program, which details modifications made since the Task Force meeting (Mynarska and Raybould, 2020). Throughout the process of writing these questions, feedback was sought from the author of the TDIB framework, Professor Miller, as well as from other demographers and social statisticians.

4.2.4.1 Measuring demographic indicators

We included a set of questions about demographic background characteristics known to be associated with reproductive intentions and outcomes. These were included so that representativeness of the sample can be established, and so we could examine how different measures perform among different population sub-groups. The variables included were age, sex, employment status, partnership status, number of children and household size. In the UK pilot, partner's sex was also asked.

4.2.4.2 Measuring childbearing motives

Motives for children are defined as biologically based, and potentially genetically inherited, dispositions for or against having children (Miller, 1995). They are fairly broad in early life and are shaped by experiences in individual childhood and early adulthood. During this process, motives

then become more refined into a set of specific attitudes towards different aspects of childrearing and childbearing.

In line with this definition of motives, the aim of our questions is to ask respondents how important various costs and benefits of having children are to them. According to Miller's definition of motives, the questions should have an element of desirability, wanting or valuing certain outcomes. To capture this, we therefore opted to phrase the questions with emotionally loaded language. There is no universal classification of childbearing motives (Hoffman and Hoffman, 1973; Langdrige, Sheeran and Connolly, 2005; Nauck, 2014). However, they have previously been measured effectively by using two dimensions: positive and negative aspects of having children (Miller, 1995; Guedes *et al.*, 2015). However, which aspects are asked about has not been standardised. We therefore aimed to detect categories and items that are consistent across previously used categorisations. These sources include:

- 1) Miller's Childbearing Questionnaire (Miller, 1995), which itself is drawn from the Value of Children approach (Hoffman and Hoffman, 1973).
- 2) Guedes *et al.* (2015) who used a bottom-up approach (based on the literature and qualitative studies) to reveal key dimensions of positive and negative motives. There is considerable overlap between the Guedes *et al.* and Miller items.
- 3) Analysis of the Miller's Childbearing Questionnaire on childless Polish individuals (Mynarska and Rytel, 2018, 2020)
- 4) Analysis of questions on positive and negative childbearing consequences that were included experimentally in the second wave of the Polish Generations and Gender Survey, to verify the performance of different elements (Mynarska, 2015; Brzozowska and Mynarska, 2019).

Through this process we decided on 15 positive childbearing motives, and 14 negative childbearing motives. Chapter 5 in this thesis explores how these motives were selected and how they performed in the pilot study.

4.2.4.3 *Measuring desires and intentions*

When asking about desires and intentions, we wanted to be able to capture both a continuous measurement of wanting and intending, as well as capturing uncertainty in intentions. Uncertainty of childbearing intentions is an important but still developing area of research (Ní Bhrolcháin and Beaujouan, 2011, 2019; Bernardi, Mynarska and Rossier, 2015). We therefore opted to ask about desires and intentions both in a categorical way to capture uncertainty (i.e. through an 'unsure' response category), and a continuous measurement to capture what 'unsure' really means. In other

words, the two measurements allow us to compare simple yes/no/unsure responses against a continuous scale of measurement.

The continuous scale spans from 0-10. This scale has several advantages: it has a zero-point that appears natural to the respondents, allowing them to indicate no interest in having a child; it can be related to percentages: 5 would be equal to 50%, meaning that a person feels “in the middle”. Moreover, the 0-10 scale has been used previously in other studies like the GGS and HILDA. These scales also performed well in a Polish study based on the TDIB (Mynarska and Rytel, 2018, 2020).

As the GGS already has existing questions capturing intention to have a child in the next 3 years with categorical response and a question on intended number of children, we therefore included three new questions in our module: one on desire for a/another child (categorical), one on the strength of that desire (0-10) and one on intention strength (0-10). We also asked the same questions, but with regards to the partner (e.g. how much does your partner desire a/another child?). The responses to these questions will be approximations of the partner’s actual desires/intentions, as it is not possible to include both the respondent and their partner in the survey design. However, given the central importance of partners in childbearing decisions, we included this question as an approximation of partners’ intentions for the pilot.

4.2.4.4 Measuring reproductive behaviours

The GGS already includes several items that can capture the ‘behaviour’ part of the TDIB pathway. For example, contraceptive and proceptive instrumental behaviour (e.g. whether trying to get pregnant, contraception use), as well as retrospective information (e.g. when did you first start trying to become pregnant). In the pilot, we included two questions on trying to get pregnant/become a parent and whether the respondent is using any contraception.

4.2.5 Sampling and Data Collection

4.2.5.1 UK pilot

To produce an efficient and cost-effective pilot of the study questions in the UK, I used the company prolific (www.prolific.co) to source participants. Prolific recruit participants to form a participant database, which allowed this pilot study to be tested quickly. Participants were paid £7.50/hour for their time. The survey costs were covered using my Economic and Social Research Council studentship ‘Research Training and Support Grant’. The survey ran from 19-25th January 2021.

A sample size of 700 was sought so that the psychometric scales could be validated. A sample of 600 would have been sufficient, but I decided to oversample to account for a proportion of responses that may not be of high quality. Further, I requested a minimum of 200 individuals with no children,

200 with one child, 200 with two children, and 100 with three or more children. Previous surveys measuring childbearing motives have been critiqued for being overly focused on university samples, those who are pregnant, those who have trouble conceiving and those with no children (Guedes *et al.*, 2015). I was therefore keen to have reasonable sample sizes of individuals with different numbers of children. I made no requirements for numbers of men and women, as the participants on the database are 55% women, 45% men. I therefore assumed a roughly equal gender balance would be achieved. There were three restrictions on participants who were given the survey. Prolific collects background demographic information which allowed to me to send the survey to only those it was relevant to. Participants were required to be UK citizens, aged 18-49, and neither they nor their partner (if they had one) could be pregnant. The final exclusion criteria caused issues for data collection. The pre-filters regarding pregnancy were only asked to women by Prolific, meaning men were excluded from the first stage of data collection with childless respondents. Upon realising the mistake, an additional sample of 80 men with no children was collected to meet original target samples. The final sample therefore consisted of 281 individuals with no children, 200 with one, 200 with two, and 101 with three or more children.

The survey was hosted using the Online Survey platform (<https://www.onlinesurveys.ac.uk/>), and the URL was distributed to the prolific participants. Prolific do not store the findings from the surveys. Online Survey encrypt all the data received and have GDPR compliant security policies. Data received was fully anonymised as there was no information about participant's name, postal address or IP address. Data collected was stored securely on LSHTM servers. Participants were required to give consent on a landing page prior to filling out the survey. As I had committed, during ethical approval, to pay all participants regardless of the quality of their response, I included several 'attention check' questions throughout the questionnaire. These were simple questions (e.g. 'To check you're paying attention, please select option 0'), which I used during analysis to evaluate the quality of responses. Only two participants failed all three attention checks and were excluded from the analysis. No participants failed two checks, and 31 failed one check. I decided to keep these responses, as from exploration, the majority failed the check because they selected option 2 rather than -2 as the check dictated, and their answers were otherwise in line with expected answers. I therefore concluded these cases were likely to be an accidental misread.

4.2.5.2 Polish pilot

Data from the Polish pilot is used in comparison to the data I collected in the UK in Chapter 5. The Polish data was collected through a private research company IQS. Translation of the survey into Polish was done by Dr Mynaska and colleagues. Online data collection ran from 14-22nd September 2020. Participants gave their consent online before taking the survey. A representative sample of the

Polish population according to sex, age (18-49 only), education, and place of residence was quota sampled. The final sample consisted of 194 individuals with no children, 120 with one, 132 with two, and 54 with three or more children (n=500). There were some minor differences between the Polish and UK pilot. The Polish survey had an additional sample of 500 individuals who were given an alternative questionnaire wording to the version used in the UK. This wording did not prove as effective so was not used in the UK pilot. The UK pilot had some small modifications compared to the Polish pilot to make it suitable for same sex couples. These included inclusive question wording, a question about parenthood through adoption, surrogacy or gamete donation, and a question to establish the sex of the two partners.

4.2.6 Content in addition to the TDIB model in UK pilot

In addition to testing the TDIB module, the UK pilot also included an optional open text-box question to share thoughts and feedback. The open text box was included to give participants the opportunity to share their thoughts with us and help us consider avenues for improving the module before wider use.

4.2.6.1 Qualitative data findings

At the end of the survey, participants were invited to provide any thoughts or feedback about the survey. They were also prompted to tell us about anything important to them in relation to deciding whether to have children. We received 113 written responses by the participants. A preliminary thematic analysis identified some recurring themes from their feedback.

4.2.6.1.1 Some difficulty with 'motives' questions

Three participants commented that they found the part of the survey asking about motives for children confusing. One participant felt the setup of the question was too long. Similarly, another participant felt they had to reread the setup to the section multiple times to understand. The final comment found that the totally negative option (-2 'completely unimportant') did not make grammatical sense and would be better phrased as 'this reason is not applicable at all to me'. Difficulty interpreting the motives questions was also found in preliminary testing of the questions with friends and colleagues. Feedback suggested an issue in English to distinguish between 'neither important nor unimportant (0)' and 'completely unimportant (-2)', in that when things are neither important nor unimportant, they are per say, unimportant. This appears to be a problem specific to English language as there was not a problem distinguishing the concepts in the Polish trial. In order to help respondents understand the difference between options -2 and 0, advice was added that -2 should be selected when an individual had considered this motive before and deems it unimportant to them. 0 should be selected when an individual has never considered or cared about a particular motive before. Whilst

this hopefully helped respondents to answer the questionnaire, for some it clearly meant having to reread advice multiple times.

Another issue that arose in preliminary testing was that respondents struggled to answer the motives questions when they disagreed that the motive was true (i.e. how can something be unimportant/important to me if I do not agree that it is true). Following this feedback, the setup of the question was modified to the version asked in the pilot study. The modification altered the wording to stress that these motives were put forward as reasons for wanting/not wanting children by *other* people. To help this, we put each individual motive within quotation marks so that it would be read as coming from someone else. This circumvents the issue of not being able to state importance when disagreeing with a motive, as regardless of personal opinion, it is a factor important to someone else. It is then the respondent's task to deem whether it is also important to them or not. Again, however, adding these extra details and explanations may have made the setup of this question too long to be helpful for some respondents.

4.2.6.1.2 Aspects not covered by the survey

Several responses pointed to themes and items that could have been included in the survey:

4.2.6.1.2.1 *Having children not biologically with a partner*

The UK pilot included one motives question on having a child via adoption, surrogacy, or gamete donation. Further, the sex of the partner was asked to establish whether couples were same (8% of couples) or opposite sex partners (92%). However, sexuality of the whole sample was not asked. Five

"Some questions only asked about wanting children and didn't ask about methods. For example, I don't plan on having children any time soon, but would only do so through adoption or fostering."

Woman, 26, no children.

"If I were to have children in the future it would be via adoption or fostering. This didn't seem covered in this survey" **Woman, 32, no children.**

"I did not see more than one question regarding this, but I believe it is interesting to gauge one's openness, thoughts and interest in adopting over having a biologically related child. I think people are still quite unlikely to adopt but more and more are considering and I believe it is important for this to become more acceptable in the future." **Man, 25, no children.**

"So many bad things are happening to our world e.g. climate change, increase in population, and COVID-19 tips if off for me. It has made me think more about other options to adopt possibly in the future." **Woman, 21, no children.**

comments were received that more questions pertinent to same sex partnerships and having children not biologically with a partner would have made the survey more relevant to them. The comments also stressed that this should be explored not just because some can only have a child in this way (i.e. that having a same sex partner/fertility difficulties precludes the respondent from having a biological child with their partner), but also because some choose to have a child in this way. Choosing *how* to become a parent may therefore be an important line of inquiry to add to reproductive decision-making frameworks.

4.2.6.1.2.2 Concerns about age and health as major determinants of fertility decision-making

There were several pieces of feedback related to age, ability to have a child, and health in determining decision-making about children. Sometimes these factors were listed in isolation, but it was noteworthy that these factors were often combined and treated as interrelated in the participants' feedback. Some women referred only to difficulty having children in their comments. This included difficulty conceiving as well as carrying pregnancies to term:

"You could include questions on IVF" **Woman, 28, 1 child**

"I think health could [have] been an aspect to focus on a little more, or not being able to have children." **Woman, 25, no children**

"Myself and my husband have been trying unsuccessfully for 8 years to get pregnant. We've both been tested and have nothing wrong with either of us." **Woman, 42, 2 children**

"I have a 5 year old son, I did want more children but lost babies since having my son so that put me off trying again because it was just too hard to deal with after." **Woman, 37, 1 child**

"[My] uncertainty is due to previous fertility issues and the trauma involved with this rather than

However, others listed age, age linked to health, or age as a risk factor for the health of the baby as their reason for not wanting or being uncertain about having more children:

"My answers are largely related to my age." **Woman, 36, no children**

"My age is an issue, I am heading towards 40 and so that is a factor as to whether I have any more children." **Woman, 38, 2 children**

"My main reason for probably not wanting anymore children is that I feel I am too old and that the gap with my daughter would be too big." **Woman, 38, 1 child**

"Age and health are key considerations for me as well as the pandemic. I don't feel these were covered." **Woman, 40, 1 child**

"I did want more children but circumstances change. Besides I definitely feel that I'm past it age and health wise, wouldn't be fair" **Man, 45, 1 child**

"You missed out fear of the child having developmental disabilities if you're an older mother." **Woman, 44, 2 children**

"I wanted a 4th child but didn't have one for health reasons. I sometimes regret not doing so and still have that maternal instinct but am too old and still have health conditions" **Woman, 44, 3 children**

Age was asked in the survey, although not in relation to decision-making. The variable was, however, found to be strongly associated with reproductive desires and intentions in regression models (Chapter 5). Concerns about potential health risks of pregnancy were also asked about as a negative motive. However, concerns about not being able to get pregnant and carry a baby to term were not covered, nor were concerns about the health of the child related to mother's age. To include an item on these topics, we could draw from Miller's CBQ (for example 'Having a baby who is deformed' or 'Taking care of a sick child'). However, describing a child as 'deformed' or 'sick' is objectionable, so these items would need modifying. The second wave of the Polish Generations and Gender asked about 'fear that a child being born ill' as a motive for childbearing and found it correlated significantly with desires and intentions (Mynarska, 2015; Brzozowska and Mynarska, 2019). Separately, trauma surrounding inability to conceive and previous miscarriages seems a very important factor to ask about in future surveys of reproductive decision-making.

4.2.6.1.3 Validating question choices in our survey

It was rewarding that many of the reasons given for decision-making by respondents in their feedback were covered in our survey. For example, respondents discussed the cost of children and strong/lack of parental instinct as key motivating factors for their decisions. Two factors received particular attention, however. The first was climate change and population:

"Climate breakdown is the overarching reason. I couldn't bear to bring a person into this collapsing world" **Man, 26, no children**

"I think more about the effects of human life on the environment and if it is moral to bring another person into the world [than COVID-19]" **Woman, 25, no children**

"Also [COVID-19] is making me not want to bring up a child in this world because of so many bad things happening to our world eg. climate change, increase in population." **Woman, 21, no children**

"[COVID-19] Strengthened my will to not have children due to poor state of society and climate" **Man, 26, no children**

"I would never have another one now, I didn't want another before [the pandemic], as there's too many kids in the world" **Woman, 44, 2 children**

"I think everyone should follow "can't feed don't breed" mantra" **Woman, 47, 2 children**

The language used in these statements suggests that this is an issue of utmost importance to these individuals. For example, 'is it moral to bring another person into the world' and 'I couldn't bear to bring a person into this collapsing world' struck me as conveying huge personal responsibility in the decision to have a child for these respondents, both for society and for the child. The link respondents made between climate change and population was also interesting to me, given a policy link has never been made by official organisations like the UN, only by media figures and population concern groups.

The second factor that was frequently mentioned in the feedback was regarding the role of the respondent's partner in their decision to have a child:

"I am desperate to have another child but my husband does not want one. Therefore we are not 'intending' to have another child but I am hoping he will change his mind although this is very unlikely." **Woman, 34, 2 children**

"My partner would love a boy as we have two daughters, but we know we are lucky to already have children so will not be too disappointed if it's not meant to be." **Woman, 32, 2 children**

"I wanted a 4th child... I sometimes regret not doing so and still have that maternal instinct... My husband definitely doesn't want another one now." **Woman, 44, 3 children**

"[I] would like to state that my husband had a vasectomy after our 3rd baby and I am desperate for another baby. But he is adamant that we are done. He thinks home schooling has been very difficult and managing childcare for us both being keyworkers." **Woman, 31, 3 children**

"I have two children with my ex-partner and we would obviously never have any more children together (we split 3 years ago). I have a new partner now but it is early days. I know that she would like children but it is so early in the relationship that we wouldn't consider it just yet!" **Man, 43, 2 children**

The TDIB framework does explicitly acknowledge that fertility decision-making and behaviour operate within couples (Miller, Severy and Pasta, 2004). As a result, we therefore asked respondents to rate how much their partner (if they had one) desired and intended a/another child in our pilot. However, a more ideal survey structure to truly capture the dynamic of the couple dyad would be to survey both partners.

4.2.6.1.4 Reflection on survey reception and responses

Reflecting on this feedback, I have a couple of observations. The first was the strength of feeling in responses, and that some of them were a little gut-wrenching for me to read. However, this has led me to reflect on the strengths of our questionnaire. The TDIB framework emphasises that motives for children are emotive psychological constructs. During questionnaire development, we received feedback from Professor Miller that our motive questions at the time were too 'cognitive', and that they were not capturing the 'emotive' nature of childbearing motives. As a result, we revised the questionnaire to use more emotionally charged descriptions of each motive. Although purely my own reflection, seeing the strength of feeling in these responses validates our decision to make those changes, and reaffirms the strengths of the TDIB model for measuring childbearing decision-making.

The second observation I have was that several women commented they found the survey 'validating'. For some, this was an acknowledgement that the survey was useful to their thinking on this topic, for others, that the survey validated their decision to not have any more children. This was an

unanticipated outcome. While these responses mainly relate to how the questionnaire reaffirmed their decisions, they nonetheless raised further questions for me about how research can influence, or even change, behaviour.

“This survey interested me, as I have been thinking about if I want to have a child or not and what are better options to suit me.” **Woman, 21, no children**

“I enjoyed this survey as it related to my life at times.” **Woman, 40, 3 children**

“This survey only made my thinking of never having another child easier. I answered the questions promptly realising as I was doing this that my feelings over not having more children is very strong. Thank you.” **Woman, 31, 1 child**

“Very interesting survey, and validated for me even more, that I do not and would not have any more children, so thank you for including me in this study.” **Woman, 44, 2 children**

4.2.6.2 Summary of results and future research avenues

In this chapter I have presented qualitative feedback received about the questionnaire. The general qualitative findings pointed to some aspects of the survey that can be improved, such as the phrasing of the motives questions. The qualitative feedback also highlighted aspects of the survey that we had done well, such as using emotively charged language to explore intentions and including a motives question relating to climate change.

In the following chapter (research paper 2), I will now present more detailed findings about the performance of the motives questions in the UK and Polish pilot studies.

5 PREDICTING THE DESIRE FOR CHILDREN: CONSTRUCTING A CHILDBEARING MOTIVATIONS SCALE

RESEARCH PAPER COVER SHEET

Please note that a cover sheet must be completed for each research paper included within a thesis.

SECTION A – Student Details

Student ID Number	Ish1408068	Title	Ms
First Name(s)	Alyce		
Surname/Family Name	Raybould		
Thesis Title	Disentangling the “fertility gap”: exploring the link between gendered division of labour and reproductive decision-making in high-income countries		
Primary Supervisor	Rebecca Sear		

If the Research Paper has previously been published please complete Section B, if not please move to Section C.

SECTION B – Paper already published

Where was the work published?			
When was the work published?			
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Where is the work intended to be published?	Not yet decided
Please list the paper’s authors in the intended authorship order:	Raybould, Alyce Mynarska, Monika Sear, Rebecca

Stage of publication	Not yet submitted
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SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	I co-wrote the questionnaire with Monika. I planned and conducted the UK data collection. I ran the analysis. I wrote the paper, incorporating comments from Monika and Rebecca.
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SECTION E

Student Signature	A.G.Raybould
Date	17/05/2021

Supervisor Signature	Rebecca Sear
Date	17/05/2021

ABSTRACT

Background:

Researchers interested in reproductive decision-making have used different psycho-social theories to craft survey questions and inform empirical predictions. One such psycho-social theory, the Traits-Desires-Intentions-Behaviour framework (Miller, Severy and Pasta, 2004), is particularly useful for standardising data collection because of the clear definitions for each component. However, methodological challenges for measuring 'traits' (which Miller defines as motives for children) remain. Previous studies have measured motives by asking respondents to assess a long list of positive and negative aspects of having children. This study explores whether it is possible to measure motives using a limited number of questions.

Methods:

Building from previous theoretical and empirical work on motives for children, we sought to test a variety of motivations for children using UK and Polish samples and use the findings to construct a short childbearing motives scale. We tested the motives by evaluating their predictive value for desires and intentions for children, as outlined by the TDIB framework.

Results:

We found remarkable overlap in which motives were most predictive of the desire for children in both contexts, and a good fit between the data and the themes we had identified during background theoretical research. There were, however, some differences between countries. The correlation between negative motives and desires/intentions was weaker for Polish respondents than UK respondents, and 'confirming fertility' was an important motivator for desiring children in the Polish sample. In the UK, 'confirming fertility' was not important in predicting desires, but concerns about climate change were. From the 29 motivations tested, we selected 14 individual motivations to form a scale on the basis of the themes identified during background theoretical research and strength of correlation to childbearing desires and intentions. We found this scale to be highly associated with both desires and intentions for children whilst controlling for relevant background characteristics.

Discussion:

This paper shows that a short motives scale can be used to operationalise the Traits-Desires-Intentions-Behaviour pathway in future European surveys. Further testing will be needed to validate framework and scale in other global settings.

5.1 INTRODUCTION

Changing fertility patterns since the mid-20th century in low-fertility settings have prompted demographers to identify causal factors which explain decreasing birth rates and postponement of childbearing. These include factors like levels of education, contraceptive prevalence, and patterns of socio-economic inequality. However, demographers are also becoming more interested in *how* these different factors lead to changing reproductive behaviour. To do so requires data collection operationalising psycho-social theories of reproductive decision-making. One such theory is the Traits-Desires-Intentions-Behaviour (TDIB) framework (Miller, Severy and Pasta, 2004) which outlines how dispositions to react favourably or unfavourably to childbearing (referred to as 'traits' in this model, but which can also be described as motives for childbearing) translate into desires (a general wish for a child in the presence of no obstacles) which then translate into intentions (a plan to have/not have a child factoring in various obstacles). Finally, intentions lead to appropriate behaviour to achieve/avoid a pregnancy. A major benefit of this framework compared to other psycho-social theories is the clear definitions of each stage of the reproductive decision-making pathway, providing a standard way to operationalise the components for data collection.

However, whilst the last three components (DIB) have clear-cut definitions, the measurement of motives is more challenging. First, there is no universally accepted classification of what childbearing motives are (Hoffman and Hoffman, 1973; Nauck, 2014; Guedes *et al.*, 2015). Measurement of motives is usually done across two dimensions: positive and negative aspects of childbearing, whereby positive aspects make childbearing more likely and negative aspects make childbearing less likely. However, exactly which positive and negative aspects are asked about is not standardised. Secondly, those that have written questions to measure childbearing motives (Miller, 1995; Guedes *et al.*, 2015) use a long series of approximately 50 positive and negative items that are not practical for modern online surveys (Galesic and Bosnjak, 2009). Participant drop out is more likely the longer the survey is (Galesic and Bosnjak, 2009), so it is essential to only ask the minimum number of questions needed to accurately measure a concept.

This paper therefore has two aims. First, we aim to review previous theoretical and empirical studies on childbearing motives to build a set of key themes that are consistently used to measure motives. These themes were then used to develop a series of questions about motivations for children. Our second aim is to determine whether a short scale measuring childbearing motives, consisting of a subset of these motivations, performs well and could potentially be used in surveys to assess childbearing motivations. To do so, we piloted a selection of childbearing motives building from the key themes we identified using samples from Poland and the UK. As the TDIB framework outlines that motives for children should be predictive of desires and intentions, we evaluate the success of

each motive by its strength of correlation to each of these two concepts. Using this information and our key themes, we then constructed a short scale of seven positive and seven negative motivations. Finally, we test whether the scale is still predictive of desires and intentions after controlling for various background factors.

5.2 BACKGROUND

5.2.1 Measuring reproductive decision-making: the TDIB framework

The TDIB framework is a psycho-social theory designed within psychology to conceptualise the decision-making pathway of childbearing. The first step on the pathway is 'traits', also referred to as motives, defined as dispositions or motivations for having children. These traits have biological and genetic underpinnings, and are shaped during individual development and particularly by early life experiences into two broad childbearing dispositions: reacting favourably or unfavourably towards childbearing. These two broad dispositions become narrowed and refined during individual psychosocial development, and ultimately culminates in a collection of attitudes (specific motives) towards different aspects of childbearing and childrearing. The amalgamation of these motives then affect behaviour through the pathway of fertility desires and intentions. 'Motives' and 'motivations' are used interchangeably in this paper, although some psychologists prefer to use one term over the other.

Motives for children were originally operationalised by Miller into two groups relating to people's tendency to react favourably or unfavourably to various benefits (positive motives) and costs (negative motives) of having children (Miller, 1995). The sum of these positive and negative motives is then theorised to translate into a 'desire' for children. A desire is defined as a wish, preference or ideal for children in the presence of no obstacles (Miller, 2011); desires are typically operationalised by asking about whether the individual would ever like to have a child, or about their ideal family size. In the TDIB, desires are then translated into intentions (a plan to act in the short term, measured by asking about intending to have a child within a short time frame, typically within 3 years (Miller, 2011)). Finally, intentions lead to the appropriate behaviour to meet the proceptive or contraceptive goal. This can be assessed through questions about frequency of sexual intercourse, actively trying for a child and contraceptive use. Consequently, the effect of the individual's background characteristics or early life experiences are expected to be strongest for childbearing motives, weaker and more indirect for childbearing desires, and in case of intentions, the direct effect might be close to none (Miller, Severy and Pasta, 2004), because desires and intentions are also influenced by an individual's current circumstances, and mediated through one another in the decision-making pathway.

The model has been widely accepted by psychologists (Avison and Furnham, 2015; Guedes *et al.*, 2015) and is getting increasing recognition in the field of Population Studies (e.g. Testa 2012; Luppi and Mencarini 2018; Mynarska and Rytel 2018; Guzzo *et al.* 2019). While there are a few other psycho-social frameworks of reproductive decision-making (for example the widely used Theory of Planned Behaviour (Ajzen, 1991) or the Cognitive-Social model (Bachrach and Morgan, 2013)) a major strength of the TDIB framework is that the distinct and defined phases of the pathway lend themselves easily to operationalisation in surveys. Further, the TDIB shares many overlapping features with these other theories, meaning that it would still be possible to test these other theories using questions informed by the TDIB. For example, when testing the cognitive-social model, Rackin and Bachrach (2016) found that the effect of family background on reported expectations (corresponding to intentions in Miller's terminology) were nearly entirely mediated by ideal family size (corresponding to desires in TDIB). This aligns well with the mechanism outlined in the TDIB, that background characteristics will have the most direct influence on motives, and an indirect influence on desires and intentions.

5.2.2 **Challenges of Operationalising the TDIB model: How to conceptualise motives**

Whilst desires and intentions for children have widely accepted operational definitions (Miller, 2011), motives are more challenging to operationalise. There is not a universally accepted classification of childbearing costs and benefits in psychology (Hoffman and Hoffman, 1973; Langdridge, Sheeran and Connolly, 2005; Nauck, 2014; Guedes *et al.*, 2015). Miller originally measured motives using a battery of questions on motives for children (27 positive and 20 negative) in his Childbearing Questionnaire (CBQ) (Miller, 1995). These questions were inspired by an earlier Value of Children framework (Hoffman and Hoffman, 1973). Miller categorised the items into five positive motivation themes (Joys of pregnancy, birth and infancy; Traditional Parenthood; Satisfactions of child rearing; Feeling needed and connected; Instrumental values of children), four negative ones (Discomforts of pregnancy and childbirth; Fears and worries of parenthood; Negatives of childcare; Parental stress) as well as two unclassified items: one on wanting to give a child siblings, and the other on whether having another baby divides how much time a parent can give to their other child. Miller's classification of motives has been used in studies in the USA, Iran and Poland (Pezeshki, Zeighami and Miller, 2005; Mynarska and Rytel, 2020; Miller *et al.*, 2021) but is yet to be tested in a variety of contexts. This may partly be because the Childbearing Questionnaire consists of a long list of items which is too long for practical use in large scale studies, particularly given recent moves to collect considerably more data online (Galesic and Bosnjak, 2009). Further, the motives need updating to account for modern childbearing contexts. For example, the original question used

language specific to married couples, excluding those who might have children outside of marriage, and did not capture more contemporary issues like environmental concerns.

Another more recent attempt to measure childbearing motives was taken by Guedes et al. (2015), who combined a background theoretical review with empirical exploration to identify key themes in positive and negative childbearing motives. First, the authors developed a theoretical classification based on the literature and a qualitative study. Secondly, they built an empirical classification based on the collected data. Their classification into themes had significant overlap with Miller's (see Appendix 5.1 for a detailed comparison). Two additional themes, however, were economic/utilitarian values for children (e.g. support in later life) and social-normative concerns about having children (e.g. environmental degradation). Like the CBQ, their classification consisted of many items: 26 positive items and 21 negative items.

This paper aims to explore whether it is possible to minimise positive and negative motives for children into a much shorter scale that would be suitable for large social surveys, without losing the validity or predictive value of the motives scale for childbearing desires and intentions.

5.3 DATA AND METHODS

5.3.1 Selection of Motives and Questionnaire Design

We collated the findings of four theoretical and empirical pieces of work to highlight key themes that are consistent across studies of motives (Miller, 1995; Guedes *et al.*, 2015; Mynarska, 2015; Brzozowska and Mynarska, 2019). The first piece is Miller's Childbearing Questionnaire, the second the theoretically and empirically informed motive items reported by Guedes et al. The last two citations are for studies exploring the performance of motives tested in the second wave of the Polish Generations and Gender Survey (GGG). The motive items in each of these studies is compared in Appendix 5.1, with common themes linking the rows of the table. Following this process, we worked independently to select individual positive and negative motives items from within the broad themes, and compared our choices and reasoning to see which themes and items were consistent between the selections. Following this process, six key themes were identified for positive motives, and five for negative motives. These themes are the same as Miller's (Positives: Joys of pregnancy and birth, instrumental values, feeling needed and connected, traditional parenthood, and satisfactions of childrearing; Negatives: Discomforts of pregnancy and birth, parental stress, fears and worries, and negatives of childrearing) with two additions stemming from Guedes et al's work and findings from the Polish GGS: 1) socio-economic/utilitarian value of children for positive motives and 2) socio-ecological concerns for negative motives. Building from these themes, 15 positive items and 13 negative items were chosen to be included in the pilot. The items are listed

with their themes in Appendix 5.1, and the rationale for each item's selection is detailed in Appendix 5.2.

The phrasing of the items in the questionnaire centred around perceived individual importance of each item to the individual for why they would / would not like children. Alternative phrasing about agreeing or disagreeing with different motives was trialled in the Polish pilot but was not as successful as the 'importance' wording. The answers given by respondents to the question were on a 5-point scale as this had proved effective in previous empirical studies (Mynarska, 2015). The scale ranged from completely unimportant (coded -2), rather unimportant (-1), neither important nor unimportant (0), rather important (1), very important (2).

In order to test the performance of the motives questions, we tested correlations between each motive with desires and intentions for children, as outlined in the causal pathway of the TDIB. We therefore asked respondents about their desires for children as "Do you want to have a(nother) child in the future" with possible answers being definitely not, probably not, unsure, probably yes and definitely yes. Intentions for children were asked by "Do you intend to have a(nother) child in the next 3 years?" with the same possible answers.

Background demographic characteristics of sex, age, partnership status, number of children, educational attainment, employment status and household size were asked to be used as control variables. In the UK, partner's sex (to establish whether a couple was same or opposite sex) and respondent's country of birth were also asked. These items were selected as they are widely acknowledged to be associated with childbearing intentions and outcomes in low-fertility settings.

5.3.2 Data Collection

The UK data was collected using participant provider Prolific (<https://www.prolific.co>) and the survey was hosted on the platform JISC Online Surveys. Data collection ran from 19-25th January 2021. The target sample was 200 individuals with no children, 200 with one child, 200 with two children, and 100 with three or more children (700 total). Participants on the database are 55% women, 45% men so it was assumed a roughly equal gender balance would be achieved. In addition, all participants had to be UK citizens, aged 18-49 and neither they nor their partner (if they had one) could be pregnant. These questions were asked prior to the survey by Prolific and stored on the participants' file, so the information could be used as pre-filters. All participants were paid £7.50 an hour for participating in the survey (regardless of the quality of their response), and the survey took an average 7 minutes to complete. A consent form needed to be signed before the survey could be taken.

During data collection, an error with the pregnancy filter meant that the sample with no children entirely consisted of women. An additional sample of 80 men with no children was then collected. The final sample therefore consisted of 281 individuals with no children, 200 with one, 200 with two, and 101 with three or more children. Following examination of the data, 2 respondents were removed from the sample for having failed three attention checks included to establish data quality. The data collection was funded by the Economic and Social Research Council as part of the lead author's PhD studentship, and the project received ethical approval from LSHTM (Reference number: 22682).

The Polish data was collected through a private research company IQS by Dr Monika Mynarska and colleagues, who translated the questionnaire into Polish. Data collection ran from 14-22nd September 2020, and the survey was administered online. Participants gave their consent online before taking the survey. The target sample was 500 respondents, representative of the Polish population aged 18-49 by sex, education, and place of residence. Participants who were currently pregnant, or had a partner who was pregnant, were excluded. The final sample consisted of 194 individuals with no children, 120 with one, 132 with two, and 54 with three or more children. Descriptive statistics for the sample can be found in Appendix 5.3.

5.3.3 Data Analysis

Firstly, we test for correlations between each of the positive and negative motive items with childbearing desires and intentions. We use these correlations to choose individual motive items with which to construct a short motives scale. This is because a valid measure of childbearing motives should be predictive of both stated childbearing desires, and to a lesser extent, stated childbearing intentions. We use Spearman rank correlations to account for the ordinal nature of the data (Weaver *et al.*, 2017). After assessing which items correlate most strongly (both in terms of effect size and significance, although the two go hand in hand), we compare these items to our original themes identified during background research. We then constructed a scale ensuring that an item from each theme was included. We then construct the scale using these items and establish the Cronbach's alpha (measure of scale reliability) to validate the short scale.

The second part of the analysis used ordered logit regressions to test whether the shorter motives scale was predictive of desires and intentions after controlling for relevant background characteristics.

5.4 EMPIRICAL RESULTS

5.4.1 Which motives best predict desires and intentions for children?

5.4.1.1 Positive motives

In both countries, we found that all but two motives correlated positively with both desires and intentions. Six of the fifteen motives were most highly correlated with both desires and intentions in the UK and Poland: 1) Having a child makes parents' relationship stronger; 2) Having a child brings lifelong happiness; 3) Fulfilling religious values; 4) Support in later life; 5) Becoming closer to own parents; and 6) Parental instincts (Figure 5.1 and Appendix 5.4). In Poland, there was one additional motive that was also relatively strongly correlated to both desires and intentions: having a child is a confirmation of parents' fertility. Whilst this factor was correlated with desires and intentions in the UK (0.15 and 0.17 respectively) the coefficients were smaller than in Poland (0.21 and 0.23 respectively). The motive 'children make parents' lives richer' was the only motive not correlated with desires in the UK, whereas 'watching your child grow and develop' was the only motive not associated with intentions in Poland. In terms of variation between countries, 'Guiding and teaching your child' was more highly correlated to both desires and intentions in the UK; 'holding a new-born baby' and 'watching your child grow and develop' were also more highly correlated to intentions in the UK in comparison to Poland. This illustrates the potential for some cross-national variation in the importance of different motivations.

After examining the correlations, we constructed a short scale of positive motives for children, using evidence from the correlations as well as the theoretical themes we had identified (Joys of Pregnancy/Birth; Instrumental Values; Satisfactions of childrearing; Feeling needed and connected; Traditional parenthood; Socio-economic aspects). The six motives that correlated most highly with both desires and intentions covered four of the six themes we sought to capture in the scale (Joys of Pregnancy/Birth; Feeling needed and connected; Traditional parenthood and Socio-economic aspects). We included these motives in the short scale, apart from the motive relating to closeness to own parents (Table 5.1). We did not include this motive because two other items (parents' relationship and religious values) already encompassed the themes of 'Traditional Parenthood' (Miller's CBQ) or 'Social/Normative aspects of childbearing' (Guedes *et al.*, 2015). Further, the item on strengthening parents' relationship covers the concept of changing relationships at the time of parenthood (although specific to the parents' relationship only). This motive was decided as more valuable to include over the motive on relationship to own parents, as there is a parallel question on strain to parents' relationship in the negative motives.

The themes ‘instrumental values of children’ and ‘satisfactions of childrearing’ were not covered by the items strongly correlated to desires and intentions in both countries. In order to make sure the scale covered these themes, we included the motive ‘children are a confirmation of parents’ fertility’ (instrumental value) and the item ‘Guiding and teaching your child is hugely satisfying’ (satisfactions of childrearing).

Together these seven motives have a Cronbach’s alpha of 0.86 in Poland, and 0.73 in the UK. A Cronbach’s alpha above 0.7 illustrates acceptable internal consistency of the scale, so the values suggest good reliability of the scale in both contexts.

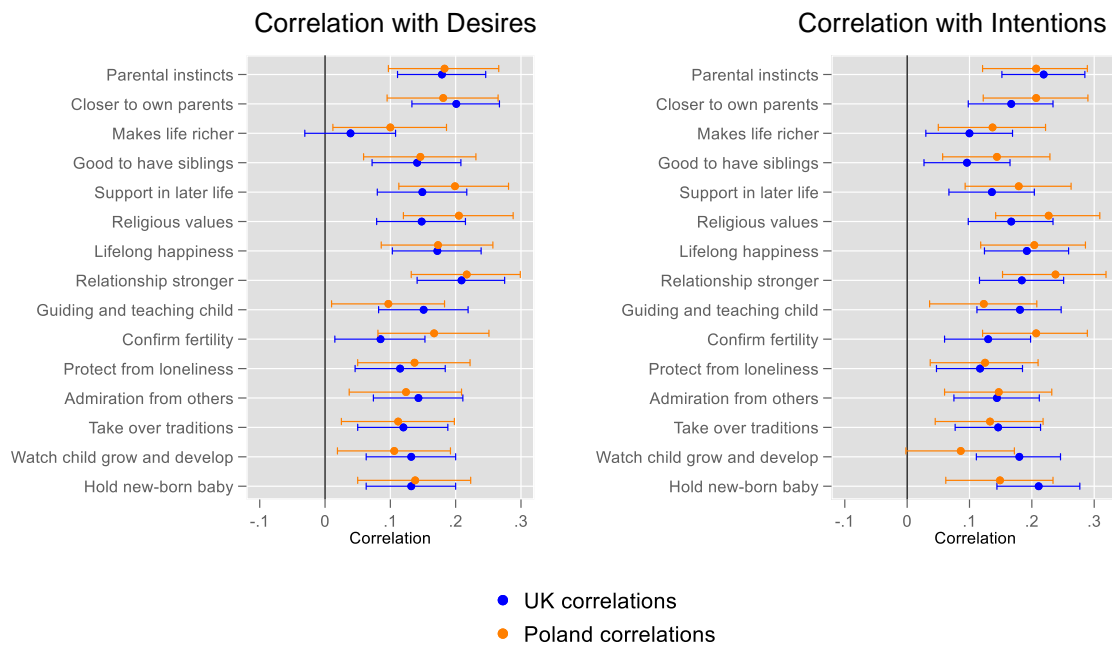


Figure 5.1: Correlation between individual positive motives and A) Desires and B) Intentions in UK and Poland with 95% confidence intervals

Themes	Items in each theme	Items highly correlated to desires in both countries	Final selected items for short scale
Joys of pregnancy, birth, and infancy	Having strong maternal/paternal instincts. It is a wonderful feeling to hold your newborn baby in your arms.	Having strong maternal/paternal instincts.	Having strong maternal/paternal instincts.
Instrumental values	A child is confirmation of the parents' fertility. It's good for a child to have siblings.	-	A child is confirmation of the parents' fertility.
Satisfactions of childrearing	Guiding and teaching your child is greatly satisfying. Watching your child grow and develop brings great joy.	-	Guiding and teaching your child is greatly satisfying.
Feeling needed and connected	Having a child brings lifelong happiness. Having a child protects you from loneliness as you get older. Having a child makes parents' life richer.	Having a child brings lifelong happiness.	Having a child brings lifelong happiness.
Traditional parenthood	Having a child makes the parents' relationship stronger. Having a child allows parents to fulfil their religious values about family life. Having a child brings you closer to your own parents. A child will take over our family name, values and traditions. By becoming a parent, you gain admiration from your family and friends.	Having a child makes the parents' relationship stronger. Having a child allows parents to fulfil their religious values about family life. Having a child makes you closer to your own parents.	Having a child makes the parents' relationship stronger. Having a child allows parents to fulfil their religious values about family life.
Socio-economic aspects	Having a child ensures parents will be supported in later life.	Having a child ensures parents will be supported in later life.	Having a child ensures parents will be supported in later life.

Table 5.1: Comparison of positive motive themes identified during background research (column 1) and the items chosen to measure them (column 2). Column 3 shows which of these items correlated highly with desires in both countries, and column 4 the items chosen to make the positive motives scale.

5.4.1.2 Negative motives

There were fewer negative items that correlated with both desires and intentions in Poland and the UK (Figure 5.2 and Appendix 5.4). Across the board, effect sizes were smaller for the correlations compared to the positive motives. Four items consistently performed poorly (no significant correlation for either outcome or country): 1) Fears and worries about child's well-being, 2) Fear of failing as a parent, 3) Fears about women's bodies changes after pregnancy and 4) Lack of knowledge and competency to be a good parent. There were also fewer motives that were significantly correlated to desires and intentions in Poland (5 of 13 motives) compared to the UK (10 of 14 motives).

Five items consistently correlated with both desires and intentions in the UK and Poland: 1) Raising a child is a great burden on parents' time and energy; 2) Difficulty combining work and childbearing; 3) Being responsible for your child is very difficult; 4) Raising a child limits your freedom; and 5) The large amount of money to ensure a good quality of life for your child. Two additional factors were also correlated to both desires and intentions in the UK, but not in Poland: 1) The financial strain of having children and 2) Having a child is irresponsible given ongoing climate change. Again, this illustrates the potential for some national variation in motives.

One additional motive was asked about in the UK pilot: the process of adoption, surrogacy, or gamete donation. The item did not correlate with intentions for children but did with desires. Interestingly, however, it had the opposite direction of correlation compared to the other negative motives: those that were more worried about these processes had a stronger desire for children. This suggests the item does not perform in the same way as the other motives, and could be explained by those who are worried about this process are being worried precisely because they really want to have children.

Our background comparison of negative motives revealed five themes (Discomforts of pregnancy/childbirth; Parental Stress; Fears and worries about parenthood; Negatives of childcare; Social and ecological worry). Four of the five motives that correlated well with desires and intentions fell under the 'negatives of childcare' theme. We included each of these five motives in the scale, but to encompass some of the other themes, we added the item related to the discomforts and health risks of pregnancy to the scale (theme on discomforts of pregnancy and childbirth) which correlated with intentions for children in both countries (Table 5.2). Similarly, we added the item on children adding strain to the parents' relationship (parental stress) which correlated to both desires and intentions in the UK, but not in Poland. An item on climate change was left out of the short scale as the wider social survey these questions are designed for will ask about this separately, thus we wanted to see whether the scale would perform well without this item included. Together, these seven items have a Cronbach's alpha of 0.85 in Poland, and 0.80 in the UK, demonstrating good intra-scale reliability.

Themes	Items in each theme	Items highly correlated to intentions in both countries	Final selected items for short scale
Discomforts of pregnancy and childbirth	<p>The discomforts and potential health risks of pregnancy and delivery.</p> <p>After pregnancy and childbirth, mothers never feel as happy and confident with their bodies as they did before.</p> <p>The challenging process of adoption, surrogacy or finding a gamete donor.</p>	-	The discomforts and potential health risks of pregnancy and delivery.
Parental stress	Having a child adds strain to the relationship between parents.	-	Having a child adds strain to the relationship between parents.
Fears and worries about parenthood	<p>Being responsible for your child is very difficult.</p> <p>Being a parent would mean having frequent fears and worries about your child's wellbeing.</p> <p>Fear of failing as a parent.</p> <p>Lack of knowledge and competency to be a good parent.</p>	Being responsible for your child is very difficult.	Being responsible for your child is very difficult.
Negatives of childcare	<p>Raising a child is a great burden on parents' time and energy.</p> <p>It is difficult to combine work and childrearing.</p> <p>Raising a child limits your freedom to do other things.</p> <p>The large amount of money needed to ensure your child has a good quality of life.</p> <p>Raising a child brings financial strain.</p>	<p>Raising a child is a great burden on parents' time and energy.</p> <p>It is difficult to combine work and childrearing.</p> <p>Raising a child limits your freedom to do other things.</p> <p>The large amount of money needed to ensure a good quality of life for your child.</p>	<p>Raising a child is a great burden on parents' time and energy.</p> <p>It is difficult to combine work and childrearing.</p> <p>Raising a child limits your freedom to do other things.</p> <p>The large amount of money needed to ensure a good quality of life for your child.</p>
Social and ecological worry	Having a child is irresponsible given the ongoing climate change.	-	-

Table 5.2: Comparison of negative motive themes identified during background research (column 1) and the items chosen to measure them (column 2). Column 3 shows which of these items correlated highly with desires in both countries, and column 4 the items chosen to make the positive motives scale.

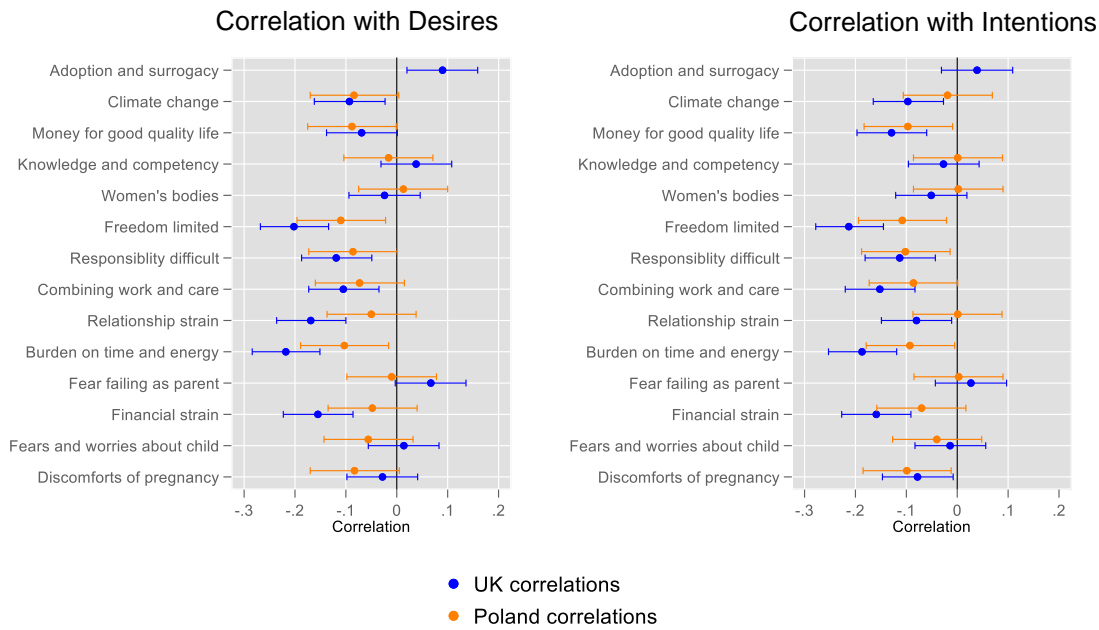


Figure 5.2: Correlation between individual negative motives and A) Desires and B) Intentions in UK and Poland with 95% confidence intervals.

5.4.2 Can a short scale of motives predict desires and intentions for children?

After selecting the items for the positive and negative motives scales, we summed the scores for the positive items to create the positive scale and summed the scores of the negative items to form the negative scale (distributions in Appendix 5.5). We then tested whether the scales were predictive of desires and intentions for children in a regression model controlling for various demographic characteristics, which would indicate that they operationalise the TDIB model effectively. As desires and intentions are measured with an ordered categorical variable (definitely not, probably not, unsure, probably yes, definitely yes), we used ordered-logistic regressions.

We found that the positive and negative motive scales were significantly associated with both desires and intentions in the UK and Poland, whilst controlling for relevant background factors (Table 5.3). The coefficient for this positive motive scale was 0.16 (95% CI 0.123 – 0.188) for desires in the UK, and 0.18 (95% CI 0.145 – 0.218) for desires in Poland. Interpreted, this means that an increase in positive motivations by a factor of one resulted in an increase in strength of desire for a(nother) child by a factor of 0.16 in the UK, and 0.18 in Poland. The effect size of the coefficients on intentions was lower in both countries: in the UK it was 0.13 (95% CI 0.012 – 0.166) and 0.17 in Poland (95% CI 0.128 – 0.202).

Looking at the negative scale, the effect size was smaller than that of the positive scale for both countries/outcomes, but was still significant. For desires, the coefficient in the UK was -0.1 (95% CI -0.123 - -0.07), and in Poland -0.08 (95% CI -0.115 - -0.051). For intentions, the coefficient in both

countries was -0.06 (95% CI -0.088 - -0.038 UK and -0.095 - -0.031 in Poland). The effect size of the scale's coefficient was larger for desires than for intentions, as noted with the positive scale.

Various background characteristics were also significantly associated with both desires and intentions. The most important covariate was age, which was associated with decreased desires and intentions in both countries. The next most strongly associated variable was the number of children, which was nearly always associated with desires in both countries, broadly finding that the more children an individual had, the less likely they were to desire another child. The association with intentions was more specific: in the UK, only having one child was associated with intending another child in the next 3 years. In Poland, only having two or three children was associated with lower likelihood of intending another child. Partnership status was significantly predictive of intentions in both Poland and the UK, but not of desires. Those who were single, or not living with a partner, were less likely to intend a child than married individuals. There were sporadic associations found between educational attainment and desires/intentions: in Poland, having less than a tertiary level of education (relative to those with a master's degree) tended to be associated with lesser desire/intent for children. This finding was stronger with regards to intentions. In the UK, leaving school at 16 (relative to having a postgraduate degree) was also associated with decreased desire and intent for children. Weak associations were found between employment status and desires in both countries, but there was stronger evidence that employment status affects intentions: in both countries, being a student (or unemployed in the UK) was associated with decreased probability of intending a child relative to those on a permanent contract. Household size was also sporadically associated with desires/intentions. The strength of association between the variable and outcome was stronger for intentions, particularly in the UK where those who lived in four or five person households were less likely to intend a child. Neither sex, country of birth, or same-sex status of the couple (the last two being only measured in the UK) were associated with desires or intentions.

	Desires - Poland	Desires - UK	Intentions - Poland	Intentions - UK
Negative Motives Scale	-0.083 (-0.115 - -0.051) ***	-0.096 (-0.123 - -0.07) ***	-0.063 (-0.095 - -0.031) ***	-0.063 (-0.088 - -0.038) ***
Positive Motives Scale	0.182 (0.145 - 0.218) ***	0.155 (0.123 - 0.188) ***	0.165 (0.128-0.202) ***	0.134 (0.102 - 0.166) ***
Number of children (ref: 0)				
1	-0.69 (-1.287 - -0.093) *	-0.211 (-0.715 - 0.293)	-0.113 (-0.688 - 0.463)	0.0848 (0.348 - 1.348) ***
2	-2.24 (-2.909 - -1.571) ***	-1.281 (-1.87 - -0.692) ***	-1.9 (-2.57 - -1.23) ***	-0.144 (-0.731 - 0.442)
3	-2.782 (-3.706 - -1.856) ***	-1.105 (-1.837 - -0.373) ***	-2.681 (-3.636 - -1.726) ***	-0.016 (-0.749 - 0.717)
4+	-1.817 (-3.265 - -0.369) *	-1.66 (-2.762 - -0.563) ***	-0.998 (-2.395 - 0.398)	-0.233 (-1.325 - 0.858)
Sex (ref: female)				
Male	0.261 (-0.111 - 0.632)	0.293 (-0.0158 - 0.601) ^	0.202 (-0.175 - 0.579)	0.106 (-0.208 - 0.419)
Age	-0.085 (-0.112 - -0.059) ***	-0.14 (-0.166 - -0.113) ***	-0.073 (-0.1 - -0.046) ***	-0.073 (-0.099 - -0.048) ***
Education Poland (ref: Master's degree)				
Primary not completed	-0.87 (-4.145 - 2.406)		-0.152 (-3.38 - 3.077)	
Primary	-0.549 (-1.597 - 0.499)		-1.521 (-2.639 - -0.404) **	
Lower Secondary	-1.226 (-2.108 - -0.344) **		-2.208 (-3.101 - -1.315) ***	
Basic vocational	-0.369 (-0.976 - 0.238)		-0.263 (-0.874 - 0.349)	
Secondary not completed	-0.925 (-1.789 - -0.0598) *		-1.136 (-1.997 - -0.276) *	
Secondary professional	-0.447 (-1.089 - 0.196)		-0.593 (-1.233 - 0.048) ^	
Secondary general	-0.282 (-1.005 - 0.441)		-0.629 (-1.337 - 0.08) ^	
Post-secondary	-0.317 (-1.032 - 0.397)		-0.484 (-1.213 - 0.246)	
Tertiary education not completed	0.393 (-0.620 - 1.406)		0.062 (-0.959 - 1.082)	
Bachelor's degree	-0.212 (-0.917 - 0.493)		-0.361 (-1.052 - 0.33)	
Doctoral degree	-0.546 (-1.654 - 0.561)		-0.944 (-2.176 - 0.289)	
Education UK (ref: postgraduate degree)				
No GCSEs		-0.409 (-3.406 - 2.589)		-13.01 (-1382.7 - 1356.674)
GCSEs		-0.517 (-1.022 - -0.012) *		-0.484 (-0.989 - 0.02) ^
A Levels		-0.097 (-0.478 - 0.285)		-0.1 (-0.483 - 0.286)
Vocational qualification		-0.346 (-0.879 - 0.187)		-0.285 (-0.846 - 0.276)
Bachelor's degree		0.008 (-0.4 - 0.416)		-0.151 (-0.564 - 0.261)
Employment status (ref: permanent employment)				
Fixed-term employment	0.086 (-0.375 - 0.546)	0.078 (-0.571 - 0.727)	-0.102 (-0.578 - 0.374)	-0.128 (-0.868 - 0.468)
Self-employed	0.644 (-0.079 - 1.368) ^	-0.576 (-1.122 - -0.049) *	0.253 (-0.463 - 0.968)	-0.318 (-0.853 - 0.219)
Unemployed	-0.221 (-0.753 - 0.311)	-0.774 (-1.338 - -0.211) **	-0.264 (-0.801 - 0.273)	-0.632 (-1.233 - -0.032) *
Studying	-0.025 (-0.879 - 0.828)	-0.395 (0.910 - 0.119)	-1.538 (-2.381 - -0.695) ***	-1.185 (-1.746 - -0.624) ***
Retired	-0.779 (-1.696 - 0.138) ^	-	0.11 (-0.798 - 1.017)	-
Other	0.57 (-0.498 - 1.638)	-	0.528 (-0.456 - 1.512)	-
Caring for home or family	-	0.051 (-0.521 - 0.624)	-	0.097 (-0.469 - 0.662)
Partnership status (ref: married)				
Cohabiting, not married	0.311 (-1.861 - 0.808)	0.335 (-0.047 - 0.718) ^	0.317 (-0.186 - 0.821)	0.01 (-0.374 - 0.395)
In a relationship, not living together	0.408 (-0.345 - 1.160)	-0.209 (-0.733 - 0.315)	-0.72 (-1.441 - 0.001) ^	-0.546 (-1.081 - -0.012) *
Single	-0.363 (-0.943 - 0.218)	-0.271 (-0.741 - 0.198)	-0.922 (-1.499 - -0.344) ***	-0.803 (-1.285 - -0.321) ***
Household size (ref: 1 person)				
2	0.632 (-0.238 - 1.501)	-0.195 (-0.870 - 0.480)	-0.16 (-1.004 - 0.685)	-0.2 (-0.868 - 0.468)
3	-0.176 (-0.973 - 0.622)	-0.331 (-1.006 - 0.343)	-0.944 (-1.736 - -0.152) *	-0.493 (-1.175 - 0.19)
4	0.242 (-0.587 - 1.07)	-0.859 (-1.565 - -0.154) *	-0.514 (-1.341 - 0.313)	-1.276 (-2.002 - -0.55) ***
5	0.358 (-0.565 - 1.281)	-0.713 (-1.535 - 0.108) ^	-0.504 (-1.416 - -0.407)	-1.359 (-2.196 - -0.523) ***
6	0.435 (-0.64 - 1.511)	-0.674 (-1.836 - 0.488)	-0.308 (-1.354 - 0.737)	-1.499 (-2.701 - -0.298) *
7+	1.304 ^ (-0.245 - 2.852)	-1.079 (-2.247 - 0.089) ^	1.035 (-0.379 - 2.449)	-1.012 (-2.319 - 0.296)
Whether born in UK (Ref: yes)				
No		0.199 (-0.386 - 0.783)		0.218 (-0.359 - 0.796)
Whether couple are same sex (Ref: No)				
Yes		-0.289 (-0.845 - 0.268)		-0.201 (-0.788 - 0.386)

Table 5.3: Coefficients and 95% confidence intervals for four ordered logistic regressions (model 1: association with Polish desires; model 2: association with UK desires; model 3: association with Polish intentions; model 4: association with UK intentions. $p < 0.1$ ^ < 0.05 * < 0.01 ** < 0.005 ***

5.5 DISCUSSION

This paper aimed to establish whether motives for children could be effectively operationalised, as defined in the TDIB framework, using only a short number of positive and negative motives. To do this, we tested a selection of motives, informed by previous empirical and theoretical work, using data from Poland and the UK, and selected the most informative motives for the scale. After creating one positive and one negative scale, we tested whether they were predictive of desires and intentions while controlling for various demographic variables. Overall, we found that a positive and negative scale consisting of a short number of items (7 positive and 7 negative) was significantly associated with desires and intentions in both the UK and Poland. Furthermore, the strongest associations with background characteristics were for well-established associations for reproductive decision-making: age and number of children for both desires and intentions, and partnership and student status for short-term intentions.

There are some specific findings from this paper that deserve reflection. First, is that while many of the correlations (particularly for positive motives) were statistically significant, the correlations were not as strong as those noted in the previous Polish study testing childbearing motives. For example, Mynarska and Rytel (2020) noted correlations between positive motives and childbearing desires between 0.5 to 0.75 among Polish individuals without children, whereas in our samples they ranged from 0.14 to 0.24. For the negative motives, Mynarska and Rytel found correlations between 0 to -0.6, whereas ours ranged from -0.04 to -0.24. This is likely to be because there is no stratification by important explanatory factors, such as sex and number of children, whereas the Mynarska and Rytel sample was only among individuals without children and was stratified by sex. The latter analysis showed different motives to be more or less important to men and women, for example the discomfort of childbirth and pregnancy was more strongly correlated with the childbearing desires of women than for the men.

The second finding of note is the considerable overlap between the items that correlated most highly with desires and intentions in both countries. Thus, whilst there were country-specific differences noted, the overlap in findings indicate that a short scale consisting of these items can perform well in high-income, low-fertility contexts like Poland and the UK. This is promising given that the social survey these questions are designed for primarily samples from European countries. Confirming that the scale works in other global contexts, however, would require further testing. Childbearing motives according to Miller's Childbearing Questionnaire has now been tested in USA, UK, Poland and Iran. It cannot be assumed from these analyses alone that these motive questions would work in other low-fertility contexts, like East Asia, without further testing. We had already identified some country-specific differences in motives between Poland and the UK, and the exact

motives that are important in East Asian contexts are also likely to differ. Further, the development of these psychological frameworks has been spearheaded by American scholars interested in explaining fertility in contexts like America. The generalisability of these psychological theories to high-fertility contexts, or contexts where high control over fertility is not possible because of limited access to effective contraception, would certainly need considerably more exploration.

In terms of differences between countries in the correlation of the items, there were no statistically significant differences (i.e. the confidence intervals for each motive item overlap between the two countries). However, observationally, the correlation point estimates do diverge more between countries for some items than others, and the rank of the items in their strength of correlation did differ between the two countries. For positive motives, correlations with intentions for items on 'traditional parenthood' (strengthening parents' relationship and fulfilling religious values) as well as the item on confirming fertility were stronger in Poland than in the UK. Conversely, items on the satisfactions of childrearing (guiding and teaching a child, watching a child grow and develop) as well as the item on holding a new-born baby were more strongly correlated with intentions in the UK than in Poland. The strength of correlation for items pertaining to conservative family values is in line with the literature on differences in childbearing social norms in the two countries (Fokkema and Esveldt, 2008). In terms of negative items, it is noteworthy that the correlations in Poland were consistently weaker (although not significantly different) from the UK. This would suggest that while there is little difference between Poland and the UK in terms of positivity towards children, the Polish sample does appear to be less negative than the UK sample. This again would be in line with stronger religious and pro-natal social norms about having children in Poland (Fokkema and Esveldt, 2008; Burkimsher, 2014). The biggest differences in correlation strength among individual motives between the two countries was observed for factors related to the negatives of childcare (e.g. burdens on parents' time and energy, and financial strain), and the item on climate change, with the stronger correlations observed in the UK. Separately, participant feedback collected after the survey in the UK, often pointed towards climate concerns as a major reason for adjusting desires for children among individuals without children. Therefore, whilst this factor has not been incorporated in our scale because of questions on this topic in the wider survey these questions are designed for, we would recommend incorporating an item on environmental concerns in future measurements of childbearing motives as it may be important for explaining cross-country differences in fertility.

Another finding was that the positive motives were more consistently correlated with desires and intentions than the negative motives in both countries. We identify two factors that could explain this. First, it may be because there is more of a social norm to be pro- rather than anti-natal, hence a

stronger effect size for the positive motives. Second, given that negative items were more strongly correlated with intentions than desires in Poland, it might suggest that these items are perceived in relation to an individual's immediate situation, rather than being an embedded predisposition for children. This would fit with our first point, that if individuals are generally pro-natal, negative aspects of childrearing are more easily overlooked or deemed acceptable. To address this, we would need to further explore both the content of the items and the phrasing of how they are presented to the respondent, potentially in a protocol analysis (Ericsson and Simon, 1984).

Ideally, we would also require longitudinal data to overcome potential issues of endogeneity that might explain this finding. As this was a cross-sectional study, it is difficult to tease out whether the respondent's assessment of their motives was altered by their lived experience, which would explain the strength of correlation between the negative motives and intentions. The life course perspective of Miller's model details that motives are determined by early family experiences, as well as genetics, meaning that by adolescence they should be measurable. Intentions, on the other hand, are formed in relation to a more proximate assessment of obstacles to childbearing, which will be more pertinent as the individual gets older. To truly assess whether the measure of motives performs adequately, we would therefore need cohort data which measures motives first when the individual is a teenager, to establish deep rooted preferences from childhood, and then explore their direct and indirect relationship on desires and intentions across the life course. Miller et al. (2010) used this exact approach using the US NLSY dataset, and showed the influence of genetic traits on motives formed in childhood, which in turn influenced desires, intentions and eventual birth outcomes. Similarly, Berrington and Pattaro (2014) used the 1958 British Birth Cohort (NCDS) to trace Miller's framework over the life course, finding that characteristics of the respondent's childhood (e.g. number of siblings) were associated differently with child timing and child number desires. These are the kind of assessments and tests that would be possible should the questions be fielded longitudinally as part of the Generations and Gender Survey.

Another unexpected finding was that negative motives correlated with desires/intentions in a positive direction. As noted in the results, the item on adoption in the UK did not perform like the others, being positively correlated with desires. However, there seems a logical explanation for this finding: that the concern stems from the fact that individuals really want to have children and are therefore worried that these options might not work for them. The item on 'fear failing as a parent' was also nearly positively correlated with desires and intentions in the UK. Other motives within the same theme of fears and worries of parenthood ('Being a parent would mean having frequent fears and worries about your child's wellbeing' and 'Lack of knowledge and competency to be a good

parent') also tend more towards a positive correlation than the other negative motives.

Interestingly, motives relating to fears and worries of parenthood have also correlated positively with childbearing desires in a study of childless Polish individuals (Mynarska and Rytel, 2020) and in the USA (Miller *et al.*, 2000). Miller (2015) has speculated that a potential reason for this is that the motive does not really measure personal fear about being a parent (which would constitute a negative motive), but altruistic fear for a child they love. In other words, the fear about failing as a parent stems from the motivation to be a good and responsible parent, thus it correlates with desires for children.

It should be acknowledged that this paper is still a preliminary exploration of measuring motives. For example, it is likely that these motives vary in strength of correlation by background factors like sex, age and number of children. We have not presented these findings as our primary aim was to identify motives that predicted desires and intentions across all groups, as demonstrated in the regression analysis. However, deeper understanding of which motives matter most to which people would further the contributions of this work. As mentioned earlier, validating our short motives scales will also require testing in many more contexts, particularly those outside of Europe. Different motives items and selections should also be explored to validate the scale. For example, from participant feedback gathered following the UK survey, participant's health and likelihood of having a healthy baby (e.g. genetic conditions and concerns about risk to infant as an older mother) were cited as factors important to the participant's reproductive decision-making that were not covered in the survey. More advanced methods for identifying motive themes (for example confirmatory factor analysis) and testing the pathway that links motives to desires and then to intentions (for example structural equation modelling) will also be important for verifying both the items incorporated in the scale, and that they suitably operationalise the TDIB framework. Nonetheless, this paper marks an important first step illustrating that it is possible to effectively measure motives for children using a minimal number of questions.

6 EXPECTATIONS AFTER EXPECTING: THE IMPACT OF FIRST BIRTH ON THE FERTILITY EXPECTATIONS OF 'ONE CHILD WOMEN' IN THE USA AND UK



RESEARCH PAPER COVER SHEET

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Student ID Number	lsh1408068	Title	Ms
First Name(s)	Alyce		
Surname/Family Name	Raybould		
Thesis Title	Disentangling the “fertility gap”: exploring the link between gendered division of labour and reproductive decision-making in high-income countries		
Primary Supervisor	Rebecca Sear		

If the Research Paper has previously been published please complete Section B, if not please move to Section C.

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Stage of publication	Not yet submitted
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For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	I conducted the analyses and wrote the paper. My supervisor supported this work in an advisory capacity and helped to edit the writing.
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SECTION E

Student Signature	A.G.Raybould
Date	17/05/2021

Supervisor Signature	Rebecca Sear
Date	17/05/2021

ABSTRACT

Expectations for having children are hypothesised to be predominantly influenced by societal family norms at young ages, and are adjusted during the life course in response to changing circumstances and new information. The onset of parenthood is likely to be a key event that affects expectations. This paper models how child number expectations of women who have only one child (one child women) change in the five years before and after first birth, using the National Longitudinal Survey of Youth 1979 (USA) and UK Household Longitudinal Survey (UK). We aim to determine whether one child women are distinct in their expectations from women who go on to higher parities even before first birth, and whether the event of first birth is a catalyst for changing expectations.

Our results show that, in both contexts, one child women expect closer to two children prior to, compared to after, first birth, when the trajectory declines more steeply towards one. One child women also expect fewer than higher parity mothers by the time of first birth. Our findings suggest that although one child women already expect fewer children compared to other mothers prior to first birth, their expectations are particularly affected by the onset of parenthood.

6.1 INTRODUCTION

High-income, low-fertility countries have an 'unmet need' for children: over the last 50 years, these countries have observed a mean ideal family size (the average number of children individuals consider ideal for a family to have) around two, and yet the average number of children has consistently fallen below this (Lutz, 2007; Philipov, 2009; Testa, 2012b; Harknett and Hartnett, 2014; Beaujouan and Berghammer, 2019). This difference between an ideal of two and achieved below replacement fertility is commonly known as the 'fertility gap'. Demographers have postulated that differences in observed fertility between countries are more likely to be explained by differences in the ability of individuals to realise their expectations, rather than differences in expected fertility (Bongaarts, 2001; Beaujouan and Berghammer, 2019). This implies that certain factors are impeding individuals from achieving their goals. However, averaging both fertility experiences and ideals across all individuals to calculate the gap is likely to conceal individual heterogeneity in both measures (Morgan and Rackin, 2010; Harknett and Hartnett, 2014). For example, a gap between a mean ideal family size of two and actual fertility of 1.7 could be separated into many people intending three but having none amongst others who meet their ideal of one or two, or into many wanting two and having one.

This paper seeks to improve our understanding of the 'fertility gap' by exploring how and when expectations for children change among a specific parity group: women who only have one child (one child women). There is a growing literature on the expectations of women who never have children (Maximova and Quesnel-Vallée, 2009; Gray, Evans and Reimondos, 2013; Mynarska *et al.*, 2015; Fiori, Rinesi and Graham, 2017; Gemmill, 2019; Rybinska and Morgan, 2019; Albertini and Brini, 2020), but very little analyses focus on one child women, who are also having fewer than the normative ideal of two. This is an overlooked group considering one child women make up an increasing proportion of mothers (Frejka and Sardon, 2007; Frejka, 2008), particularly in Southern, Central and Eastern Europe (Billari and Kohler, 2004; Frejka and Gietel-Basten, 2016). One child women are likely to be different to women who have no children, for example they might be more certain about having children, than women with no children, but are also likely to be different compared to women who have the normative two children. Together this poses the question: do women who only have one child always plan to have one child? Or do they initially subscribe to the strong societal norm of two and revise downwards over the life course?

Further, this paper clarifies the role of first birth in this 'expectation pathway'. First birth is a time point of considerable change in terms of subjective well-being and mental health (Margolis and Myrskylä, 2015; Myers, Burger and Johns, 2016; Luppi and Mencarini, 2018), household burden and division of labour (Kühhirt, 2012; DeRose *et al.*, 2019; Campolo, Pino and Rizzi, 2020), and

employment arrangements and earnings (Baxter, Hewitt and Haynes, 2008; Evertsson, 2013). This paper therefore not only addresses the contribution of one child women to the fertility gap, but also whether having a child acts as the catalyst for revising expectations for these women.

6.2 BACKGROUND

6.2.1 Expectations Over the Life Course

The motivational sequence leading to fertility behaviour is characterised in the demographic literature by many different concepts and terms (Miller, 2011). The fertility gap uses *mean ideal family size* as its measure of comparison to achieved fertility. The measure is thought to be highly reflective of societal family norms (Trent, 1980; Philipov and Bernardi, 2011), and does not always translate to the individual's personal desire for children (Quesnel-Vallee and Morgan, 2003). This paper therefore focuses specifically on childbearing *expectations*: the number of children wanted by the individual accounting for perceived obstacles outside of the individual's control (Miller, 2011). Conceptually expectations are close to childbearing *intentions*, which represent a commitment to act on the plan to have a child (Miller, 2011). Stated expectations and intentions are nearly identical in empirical studies; we therefore refer to previous literature on both concepts.

Psychosocial theories of reproductive decision-making, such as the cognitive-social model (Bachrach and Morgan, 2013), outline that expectations in early life are more likely to be informed by the individual's childhood family experiences and normative family size ideals. Expectations are therefore considered to be at their most 'unrealistic' and uncertain at younger ages, given the inability to foresee future circumstances. During the life course, expectations will be revised based on 'critical junctures' in the life course (e.g. having a partner), competing preferences (e.g. career goals that are incompatible with family goals) and new knowledge (e.g. having a child). The Traits-Desires-Intentions-Behaviour framework (TDIB) outlines a potential mechanism for how expectations can be altered over the life course by linking them in a pathway. Initial motivations for children (traits or dispositions to feel, think and act in ways that affect childbearing) are biologically based and non-conscious (Miller, 2011). These motivations form desires for children (the ideal childbearing goal in the presence of no obstacles), before being translated into intentions which consider the probability of their execution. Intentions are implemented through instrumental behaviours such as aiming to achieve or avoid conception. However, partner's intentions, life course factors and fecundity issues can impede the ability of the individual to successfully achieve a birth. The framework outlines how desires and intentions will change over the life course because of situational factors, many of which are affected by the event of a first birth.

Previous studies have sought to examine the reasons for changes in expectations over the life course. Although some have used cross-sectional samples to infer change (Testa and Grilli, 2006), the more convincing explorations come from studies that follow individuals longitudinally. Putting to one side a growing literature on expectations over the life course among childless individuals, studies looking at expectations among *women with children* find that there is a considerable number who do have stable expectations, particularly among those desiring two children (Quesnel-Vallee and Morgan, 2003; Heiland, Prskawetz and Sanderson, 2008) and in USA analyses (Quesnel-Vallee and Morgan, 2003; Ray *et al.*, 2018). The studies also highlight, however, sizeable adjustments of intentions over the life course among other groups. Change over the life course has been explained by various factors including partnership status (Mitchell and Gray, 2007; Hayford, 2009; Liefbroer, 2009; Iacovou and Tavares, 2011; Gray, Evans and Reimondos, 2013), education (Liefbroer, 2009; Dey and Wasoff, 2010; Ray *et al.*, 2018), the labour market (Heiland, Prskawetz and Sanderson, 2008; Liefbroer, 2009; Gray, Evans and Reimondos, 2013; Ray *et al.*, 2018), religion (Heiland, Prskawetz and Sanderson, 2008; Ray *et al.*, 2018), number of siblings (Heiland, Prskawetz and Sanderson, 2008; Dey and Wasoff, 2010) and expectations for more than two children (Quesnel-Vallee and Morgan, 2003). Postponement of childbearing to the thirties, in particular, has been associated with adjustment of intentions downwards over the life course compared to those who start childbearing earlier (Liefbroer, 2009), as has age more generally, with those in their thirties expecting fewer than those in their twenties (Quesnel-Vallee and Morgan, 2003; Heiland, Prskawetz and Sanderson, 2008; Hayford, 2009; Dey and Wasoff, 2010). In the USA, increases in expectations over the life course were associated with initially desiring fewer than two children (Quesnel-Vallee and Morgan, 2003) and with sequential childbearing. The size of the effect, however, appears larger for higher parities (Miller and Pasta, 1995b; Heiland, Prskawetz and Sanderson, 2008; Ray *et al.*, 2018) and for those who have positive previous birth experiences (Iacovou and Tavares, 2011).

In terms of parity specific adjustments, psychosocial theories of fertility behaviour outline that childbearing decisions are adjusted after the birth of each child (Udry, 1983; Miller and Pasta, 1995b). Until a particular birth occurs, individuals are not able to experience and learn exactly what they enjoy or dislike about this stage of parenthood and evaluate whether they would like to have a further birth. This is particularly true for first births and the advent of parenthood. The literature reports mixed findings on the relationship between first births and changing fertility expectations. Gisser *et al.* (1985) found no evidence of a 'baby shock' (i.e. that having a first child causes fertility desires to be revised downwards) in Austria. Miller and Pasta (1995b) found evidence of upwards revisions as a result of a birth in the US, but Ray *et al.* (2018) found that US women who had one child were less likely to increase their fertility ideals over the life course compared to maintaining

stable intentions. Furthermore, although the addition of ‘a child’ was associated with increased fertility ideals over the life course, the first child was not. Iacovou and Tavares (2011) found that first births occurring to UK individuals who expected to only have one child were associated with increasing expectations, but both upwards and downwards revisions were common for those who expected to have more than one child prior to first birth. The authors conclude that revisions are less related to parity and more to the individual’s closeness to reaching their expectations target prior to the birth.

6.2.2 Fertility Background of Study Countries

Psychosocial theories of fertility behaviour assume that prior to first birth and at young ages, expectations predominantly reflect normative ideals and become more diverse as the life course progresses. However, there are no comparative studies to explore whether this is generalisable across settings. Although statistically testing the comparison between countries is challenging because of differences in datasets, comparing national samples descriptively can still provide insight into whether one child women share a common experience in their expectation trajectories over the life course across contexts, and whether there is evidence of a persistent fertility gap at the individual level for these women. By extension, if there are differences, contextual explanatory factors can be explored in a comparative setting. We have therefore chosen to explore changing expectations in the USA as our primary analysis, and then perform the same analysis in the UK to validate the results observed in the USA.

Both countries included in this paper have relatively high childbearing for low-fertility countries, a prevalent two-child family norm and their 20th century fertility decline has been largely driven by fewer large families among birth cohorts of the 1940s and later (Zeman *et al.*, 2018). They also both have ‘liberal’ welfare regimes (Esping-Andersen, 1990). Liberal countries are characterised by a lack of state support for families, requiring families to rely on market employment for income, and using that income on market services to allow them to combine work and family. The two countries are compared in more detail below.

6.2.2.1 USA context

Compared to other low-fertility countries, the USA has seen relatively high fertility around replacement level across the last 30 years, with a young mean age of first birth (between 24 to 27). In terms of cohort fertility, there has been a gradual decline towards smaller families, but in 2018 67% of all women aged 40-44 had at least two children, with two children being most common (35% of all families) (Guzzo and Schweizer, 2020). The proportion with one child increased to a high of 19% in 2000, but remained stable since then (Guzzo and Schweizer, 2020). Fertility in the US is also strongly distinguished by demographic groups: Latina women, women who do not finish high school

and religious Catholics have some of the highest fertility rates among population subgroups (Gemmill & Hartnett, forthcoming).

Period fertility has been declining recently as a result of postponed childbearing for all birth parities, particularly among teens and young women (Gemmill & Hartnett, forthcoming). Whether cohort fertility will be affected by this postponement will depend on the ability of these cohorts to 'catch up' and meet their fertility goals at later ages. There has been little evidence of this in other high income regions with typically higher fertility, like Nordic countries (Hellstrand *et al.*, 2020), but there is some evidence of catching up in US women in their 30s and 40s (Gemmill & Hartnett, forthcoming).

In terms of expectations for children, both period and cohort measures of expectations are relatively close to observed fertility, with a small 'fertility gap' between 1.97 (CFR) and 2.22 (ideal) (Morgan and Rackin, 2010; Beaujouan and Berghammer, 2019). Morgan and Rackin (2010) show, however, that this is less a result of US women successfully achieving their intentions, but rather an overall balance in errors between those that over and under achieve their intentions. Indeed, the US is unique for having one of the highest unintended pregnancy rates among high-income countries (Singh, Sedgh and Hussain, 2010), and recently observed reductions in the rate have been identified as a primary driver for falling US fertility alongside declining fertility amongst Latina women (Gemmill & Hartnett, forthcoming). Repeated postponement of fertility, lack of a suitable partner and declining fecundity with age were identified as important obstacles for the group that do not realise their intentions for children (Morgan and Rackin, 2010).

6.2.2.2 UK context

Compared to the US, the UK has a later mean age at first birth (28.95 vs 27.37, ('Human Fertility Database', 2020)) and a lower TFR (1.68 vs 1.73, ('Human Fertility Database', 2020)). However, fertility is not as low as in some high-income contexts, fluctuating between a low of 1.63 in 2001 and high of 1.91 in 2011, with latest CFR estimates at 1.84 (ONS, 2019). There is also, relative to the rest of Europe, a 'hump' in the fertility schedule at younger ages in the 1990s and 2000s (Rendall *et al.*, 2005), although the teenage pregnancy rate has now decreased considerably (Heap, Berrington and Ingham, 2020). There is therefore considerable dispersion in the tempo of UK childbearing over the last 30 years, with both significant young childbearing *and* an increasing mean age of first birth.

As in the USA, the UK has witnessed a fertility postponement to older ages (ONS, 2019). There has also been an increasing proportion of childless and one child women, and a decreasing proportion of large families over the last 30 years (Sobotka, 2017; Office for National Statistics, 2020). However, two child families remain the most common over time (Office for National Statistics, 2020). As with

the tempo of childbearing, the dispersion in family size is more than that observed in other European countries: a higher level of childlessness, a low percentage of one child women and relatively more women with two or more children (Shkolnikov *et al.*, 2007).

UK childbearing has therefore typically been characterised as polarised between different population subgroups (Sigle-Rushton, 2008). In particular, highly educated women are most likely to be childless (Berrington, Stone and Beaujouan, 2015), and postpone fertility to later ages (Berrington, 2004). The fertility of non-UK born mothers is higher than native born mothers (Tromans, Natamba and Jefferies, 2009; Coleman and Dubuc, 2010). Employment, age, geography and partnership characteristics are also important (Berrington, 2004; Fiori, Graham and Feng, 2014)

In terms of intentions for children, whilst there has been a general decline in average intentions over the life course, mean ideal family size remains around two (Smallwood and Jefferies, 2003; Ní Bhrolcháin, Beaujouan and Berrington, 2010). The latest estimated gap is small, between 0.2 and 0.3 (Smallwood and Jefferies, 2003). However, this has a marked educational gradient, with higher educated women having a larger gap than less educated women, for whom the gap is almost non-existent (Berrington and Pattaro, 2014; Beaujouan and Berghammer, 2019). The degree of certainty in intentions is also variable by group, particularly prevalent at younger ages and unpartnered women (Ní Bhrolcháin and Beaujouan, 2011). This is matched by declining intentions for two children as women age, switching to one or none, and increasing diversity in intentions away from two over the life course (Ní Bhrolcháin, Beaujouan and Berrington, 2010). Of particular interest to this research question, among women with children, uncertainty in intentions is very prevalent among one child women. 38% of one child women were estimated to be uncertain about continued childbearing, which is higher than for women with two (23%) or more than two children (16%) (Ní Bhrolcháin and Beaujouan, 2011).

6.2.3 Research questions

This paper aims to explore the trajectories of fertility expectations around first birth for women who only have one child in the USA and the UK. In doing so, we explore whether women who only have one child always plan to have one child, or revise expectations away from family size norms over the life course. We test whether first birth acts as a 'critical juncture' resulting in revised expectations, as the onset of parenthood is known to be a time point of considerable change for individuals, and compare our findings in each country. Further, we focus only on women's expectations, as many changes at first birth have a gendered impact (e.g. division of childcare) or are specific for women (e.g. pregnancy and birth experiences). Specifically, we address three research questions:

Question 1: Do one child women experience a decline in fertility expectations after first birth?

In the years prior to first birth, we would predict expectations among one child women to be closer to two as they will primarily reflect normative family size and background factors (Rackin and Bachrach, 2016). As life progresses expectations will instead reflect life experience and new knowledge, in this case the birth of the first child. We therefore anticipate one child women to revise their expectations downwards after first birth, rather than sustaining an ideal of two.

Question 2: Do one child women experience a decline in expectations after first birth not seen for higher parity women?

In the five years prior to first birth, we expect mothers of all parities to have similar expectations, reflecting normative ideal family size. After first birth, we anticipate mothers that go on to higher parities to remain stable in their expectations whereas one child women will follow a downwards trajectory.

Question 3: Are there any characteristics of one child women which are particularly associated with changes in trajectories around the time of first birth?

Based on prior research, in the US we expect that one child women will be demographically select. For example, they will be less likely to be Latina, Roman Catholic and less educated, since these demographic groups tend to have higher fertility. Similarly, in the UK, we predict that one child women will be less likely to have a lower level of completed education and less likely to have a partner. In terms of whether the characteristics of one child women are associated with differences in trajectories, if such women are mainly from demographic groups with lower fertility then our analysis will have little power to detect differences in trajectories between demographic groups. Otherwise, we expect to see steeper revisions over the time period of analysis associated with demographic characteristics which typically indicate higher fertility (such as religiosity and partnership).

6.3 DATA AND METHODS

6.3.1 Methods

To observe typical trajectories in expected family size at the time of first birth, we use Poisson mixed-effect models and longitudinal datasets. Repeat observations of individuals' expected family size over time (level one) are clustered within an individual (level two) to account for both the individual's time-invariant and time-varying characteristics. This type of model is similar to a linear growth curve (hierarchical cluster) model. However, a linear growth curve model would be inappropriate for our analysis given expectations for children are a count variable and the linear

model uses a normal distribution. In this analysis, we therefore use a Poisson distribution with log as the link function of the model to account for the discrete nature of the outcome variable.

Trajectories in expected family size are calculated for the interval five years before to five years after birth. Time is operationalised as months either side of first birth. As we expect larger changes to occur in the period after first birth, splines are added to allow the trajectory to vary at different time points. The addition of splines means we can explore whether revisions of expectations are likely to occur within a particular year after birth, and by extension suggest why women might be revising their expectations. For example, drops soon after birth may be more likely to be linked with a difficult pregnancy or birth experience, whereas revisions later might suggest difficulties managing caring responsibilities. Splines are added at the month of birth, one year after month of birth, two years after month of birth, three years after month of birth and four years after month of birth. The p-value for the splines evaluates whether there is a significant difference between the slope of the spline interval and the slope of the first interval (the period before pregnancy).

The variable of interest to this paper is expected family size (i.e. the number of children one has plus any more expected). However, evaluations of expected family size are fundamentally altered by first pregnancy, making the period before and after birth incomparable. Once a woman is pregnant or has her first child, she must factor that child into her fertility expectations, meaning that expected family size cannot be lower than one. This introduces a problem as the data is then zero-truncated and no longer follows a Poisson distribution. One option would be to use a zero-truncated Poisson model, but this would not be appropriate to use for time points before first birth where some women expect to have no children. In order to make sure a consistent model is used throughout the whole time period of observation, we modelled the outcome of *additional number of children expected*. This is equivalent to expected family size prior to first pregnancy. After first pregnancy, the model itself estimates additional expected children (so the first child is excluded from the total), but in the figure illustrations we add one to the post-birth estimates so that changes in predicted *total* expected family size can be observed both before and after birth. Pregnant individuals are included in this 'post-birth' group if they either declare that they are pregnant in the survey (i.e. demonstrating they know they are pregnant and are factoring this into their childbearing expectations), or if they are at least two months pregnant as we assume from this point onwards most will know they are pregnant. All UK one child women who were two or more months pregnant also declared that they were pregnant, and in the absence of complete pregnancy data in the US data we assumed the same would apply.

However, by correcting for zero-truncation through using additional number of children, a new problem is created in the model: that once an individual is pregnant/has a child they will revise their additional number expected downwards by at least a factor of one to reflect the child they are pregnant with or had. This makes it appear like there is a steep revision in expectations at pregnancy in the model estimates, when in fact it is just a reflection of the model moving from predicting total expected family size (as the individual has no children) to number of additional children expected in addition to the child had. To account for this, we therefore include a control for whether the woman was pregnant/had had their first child at the time of observation.

The specification of our model is therefore:

$$1) \quad \log(Y_{ij}) = \beta_{0j} + \beta_{1j}Months_{ij} + \beta_z X_{ij}$$

Where:

$$1a) \beta_{0j} = \gamma_{00} + U_{0j}$$

$$1b) \beta_{1j} = \gamma_{10} + U_{1j}$$

The number of additional children expected for an individual at a given month around first birth ($\log(Y_{ij})$) is predicted by the person-specific intercept (random intercept, β_{0j}) and the person-specific effect of months around first birth (random slope, $\beta_{1j}Months_{ij}$). The person-specific intercept and slope can be divided into an average effect (γ) and the person-specific residual from this average effect (U). The person-specific intercept and slope controls for unobserved heterogeneity between subjects, by assigning a unique starting point and trajectory over time to each individual. This makes sense to include given the research interest in changing expectations, as there is no reason to assume that individuals' expectations should start and evolve in the same way over time. Lastly, a set of fixed covariates are added to the prediction ($\beta_z X_{ij}$).

The fixed covariates in the 'empty' model are the splines and a control for whether the individual is not yet pregnant. In the multivariable models, demographic characteristics not affected by first birth (detailed in the following section) were added to this fixed part of the equation in a sequential manner. We do not include covariates that are likely to change around first birth, such as employment status, household division of labour and well-being. Disentangling the causal pathway of changes in these variables occurring around first birth requires more complex statistical methodologies (Berrington *et al.*, 2007). To allow for variation over time, interactions of the

covariates with months around first birth were tested and included in the multivariable model if significant ($p < 0.05$).

As part of robustness checks, to see whether correction was needed for overdispersion, a random intercept was also added at level one (observations). However, as the variance for the parameter was consistently close to 0 across models, this illustrated minimal overdispersion and thus we do not include this parameter in the presented models. The data and presented models are detailed in the following section.

6.3.2 Data and Measures

6.3.2.1 UK Sample

The UK data combine waves from the British Household Panel Survey (BHPS) with Understanding Society (together known as UK Household Longitudinal Survey, UKHLS) that have information on childbearing expectations (University of Essex: Institute for Social and Economic Research, 2020). Specifically, we draw on BHPS waves 2 (1992), 8 (1998), 11 (2001), 12 (2002), 13 (2003), 17 (2007) and Understanding Society wave 5 (2013-2014) which asked:

Thinking about your plans for the future, do you think you will have any (more) children?

How many more/many children do you think you will have?

The question wording changed depending on whether the respondent has a child already (i.e. asking 'how many more' to respondents with a child rather than 'how many children'). Although the time points are unequally spaced due to data restrictions for our outcome of interest, multilevel models can account for this as well as partially missing data (Curran, Obeidat and Losardo, 2010). BHPS initially sampled a representative sample of the UK population from 5500 households from across Great Britain. A booster sample was added in 1999 for Scotland and Wales, and again in 2001 for Northern Ireland. Understanding Society commenced in 2009 adding a sample of 40,000 households and combining BHPS households from its second wave (2010-2011). All household members over 16 are asked to complete an individual questionnaire and are followed up over the waves.

To select our sample, we first restricted to women who were known to have had their first child by the last wave of all data collection (2017) and have complete information on that child's year of birth and their fertility expectations. To better compare higher parity and one child women, we then added a censor at second childbirth for higher parity women so that fertility expectations after second birth were excluded from analysis (given that the additional number of expected children would change for women after having their second birth). As the mixed-effect model requires at least three observations per individual (Curran, Obeidat and Losardo, 2010), women with fewer

observations were dropped from the sample. We also required all observations to be within ten years either side of the first birth, and at least two of the observations to be within five years either side of first birth so that we are able to capture change at this time point. Further, those with a first birth prior to 1990 were dropped as all had observations falling outside the period of interest (five years before to five years after first birth). This left a sample of 303 mothers and 1102 observations (Model 1). The second model is only fitted for women who, as far as is known, only had one child. This was established by looking at the last recorded observation of number of children for the participant in the whole UKHLS. This last recorded observation may lie outside of the time period/waves used in this analysis. This model included 192 women, with 718 observations (Model 2). This sample size is still adequate for a multilevel model to perform well (Curran, Obeidat and Losardo, 2010).

Additional covariates added to the model for one child women include age at first birth, expectation prior to first birth, year of first birth, partnership status, and highest qualification attained (Model 3). The operationalisation of each variable is detailed in Appendix 6.1, along with a report on the characteristics of the dropped participants, and sample attrition. Overall, the sample remains reasonably constant through time, and there are no large differences (more than 5% difference) in demographic profile between those in the sample and those who are dropped from the sample (21% of women who ever had a first birth). However, among those who only have one child, the included sample were less likely to have had a first child before the age of 24 and were more likely to have a university degree than those that were dropped. These features of the dropped participants suggest the restrictions of the analysis mean that the findings cannot be extrapolated to more recent UK childbearing among younger and less educated women.

6.3.2.2 USA Sample

The National Longitudinal Survey of Youth (NLSY) follows a cohort aged 18-22 from 1979, initially yearly, and then every two years from 1994 until 2014 (Bureau of Labor Statistics: U.S. Department of Labor, 2019). The women of this cohort therefore have complete fertility information. Expected family size was asked at every wave through the question: 'Altogether, how many (more) children do you expect to have?'. As with the UK questionnaire, the question wording changes depending on whether the respondent has a child already (i.e. asking 'many more' rather than 'many').

Our first model included all women who had at least one child, a censor at second birth for higher parity women, and at least three repeat observations of our outcome within the time point of interest (five years before and after birth). 11 observations were dropped as they expected more than ten children which all appeared to be data entry mistakes. This model included 3652 women

with 18145 observations (Model 1). The second model used a sample of only one child women with at least three observations in the interval of interest. This sample comprised 1078 women with 5783 observations (Model 2).

Additional covariates included in the model for one child women (please see Appendix 6.2 for more detail) included age at first birth, partnership status, expectation prior to first birth, highest qualification attained, geographical region and ethnicity (Model 3).

Statistics on the women who were dropped from the two samples (12% of women who ever had at least one child, and 10% of women who only ever had one child) can be found in Appendix 6.2. Overall, excluded women among those who had ever had at least one child, were more likely to have had their first child before 20. Otherwise, there were no sizeable differences by education, total number of children, ethnicity, religion, region, or between the included and excluded one child sample. We also include a figure illustrating the sample size for the models over time in Appendix 6.2. Sample size is relatively constant over time but drops in the model for all women because of censoring at second birth.

6.3.2.3 Comparability of the Datasets

The datasets share several overlapping features. For one, they ask about fertility expectations with the same question phrasing. They also share some covariates, such as whether the respondent went on to have a second child, age at first birth, partnership status, and highest qualification attained.

However, there are also differences which hamper comparability. The most important being differences in survey structure and time-period of observation. The USA survey is a cohort study of 14-22 year olds which started in 1979, meaning that all women have now completed their childbearing. By contrast, the UK survey has a household panel structure, with the first survey used here from 1992. This necessitates controlling for the year of first birth in the UK survey, as women of the same age may have been subject to different childbearing norms and environments in the 1990s compared to the 2000s. Further, whilst there is overlap in the period of observation of the two surveys, the UK survey has more recent childbearing recorded. Difference in time periods should therefore be noted as a potential explanation for differences in trends between the two countries.

Another comparability issue is that the UK sample is smaller than the US sample, meaning the analyses have less statistical power. Finally, not all UK one child women have completed their childbearing, making the identification of final 'one child women' as in the cohort study impossible. However, the sample is not heavily biased towards women who will eventually have two children: 56.8% of the one child women were 45 and over at the time of last observation in the UKHLS.

Further, 75% of the UK one child women were observed for the last time at least 8 years after first birth, and it is unlikely many of these will have a second child after this time point. We also performed a sensitivity analyses with only women who were 45 or older at the last time of observation in the UKHLS and produced similar results to our main findings but with wider confidence intervals (Appendix 6.3). A detailed comparison of the UK and US datasets can also be found in Appendix 6.4.

6.4 RESULTS

In the following section, we begin by describing the characteristics of the different samples in this study, so that we can evaluate how selectivity influences our findings. We then show the trajectories of fertility expectations for one child women in both countries, before comparing them to the trajectories of higher parity women. Finally, we test whether any characteristics of the women are associated with differences in the level (intercept) and change in trajectories (slope) of fertility expectations over time.

6.4.1 Descriptive Analysis

The characteristics of our four samples (one child women in the UK and US, women with more than one child in the UK and US) are reported in Table 6.1. One child women in the UK sample are more likely than US one child women to be in partnerships when observed (17.9% difference) and are more likely to finish school with a qualification (10% difference). Whilst the USA and UK have nearly equal share of women with a first birth in their late twenties (26-30), the rest of the USA one child sample is more skewed towards younger ages (<26 years) at first birth (54.9%) compared to the UK (19%).

Comparing one child women to mothers of higher parities, one child women appear to be demographically distinct on some characteristics. In both countries they are more likely to be slightly older at first birth, and expect fewer than two children prior to first birth. In the USA they are also more likely to not be Hispanic, Black or Catholic. In the UK, one child women are more likely to be partnered, lower educated and have their first child in the 1990s.

	UK women with 1 child (observation count)	UK women with 2+ children (observation count)	USA women with 1 child (observation count)	USA women with 2+ children (observation count)
Average number of observations per individual	3.9	3.6	5.7	5.1
Partnership status	N=718	N=384	N=5782	N=12363
No partner/spouse	181 (25.2%)	113 (29.4%)	2493 (43.1%)	5266 (42.6%)
Partner/spouse	537 (74.8%)	271 (70.6%)	3289 (56.9%)	7097 (57.4%)
Education	N=718	N=384	N=5764	N=12338
Did not finish high school	31 (4.3%)	3 (0.8%)	823 (14.3%)	2451 (19.9%)
Finished high school			2586 (44.9%)	5305 (43.0%)
GCSE or other qualification	279 (38.9%)	123 (32.0%)		
A level	184 (25.6%)	110 (28.7%)		
Attended college			2355 (40.9%)	4582 (37.1%)
Completed university	224 (31.2%)	148 (38.5%)		
Age at first birth	N=718	N=384	N=5782	N=12363
Under 20	43 (6.0%)	0 (0%)	1202 (20.8%)	3491 (28.2%)
21-25	93 (13.0%)	58 (15.1%)	1969 (34.1%)	5063 (41.0%)
26-30	177 (24.7%)	161 (41.9%)	1441 (24.9%)	2780 (22.5%)
31-35	274 (38.2%)	145 (37.8%)	723 (12.5%)	891 (7.2%)
36+	131 (18.3%)	20 (5.2%)	447 (7.7%)	138 (1.1%)
Expectation before first birth	N=718	N=384	N=5782	N=12363
1 or 0	104 (14.5%)	19 (5.0%)	872 (15.1%)	796 (6.4%)
2 stated at least once	446 (62.1%)	365 (95.0%)	4620 (79.9%)	11171 (90.4%)
Only observed after first birth	168 (23.4%)	0 (0%)	290 (5.02%)	396 (3.2%)
Ethnicity			N=5782	N=12363
Hispanic			723 (12.5%)	2384 (19.3%)
Black			1363 (23.6%)	2970 (24.0%)
Non-hispanic and non-black			3696 (63.9%)	7009 (56.7%)
Geographical region			N=5727	N=12231
North East			1008 (17.6%)	2198 (18.0%)
North Central			1232 (21.5%)	2904 (23.7%)
South			2409 (42.1%)	4570 (38.2%)
West			1078 (18.8%)	2459 (20.1%)
Religious affiliation in 1979			N=5747	N=12336
None			549 (9.55%)	902 (7.3%)
Protestant			2800 (48.72%)	5562 (45.1%)
Roman Catholic			1738 (30.24%)	4320 (35.0%)
Jewish			45 (0.78%)	105 (0.8%)
Other			615 (10.7%)	1147 (11.7%)
Decade of first birth	N=718	N= 384		
1990-1999	308 (42.9%)	107 (27.9%)		
2000-2010	410 (57.1%)	277 (72.1%)		

Table 6.1: Observation counts and percentages of different model covariates among all mothers and one child women in the USA and UK.

6.4.2 Question 1: Do one child women experience a decline in fertility expectations after first birth?

The figures in the following sections plot predicted expected family size from five years before to five years after first birth. The first red line illustrates when an individual is two months pregnant, and the second the first birth. Regression results are reported in Table 6.2, and the unadjusted

figures (not adding 1 to the estimates after first birth in order to plot total expected family size) are presented in Appendix 6.5.

In both the UK (Figure 6.1, left panel, n=192) and the USA (Figure 6.1, right panel, n=1078), one child women appear to follow similar trends in their expectations over time. The years from five to one year before birth are marked by a slightly decreasing trend in both contexts: in the UK from 1.7 to 1.65, and in the USA from 2 to 1.7. By the time of first birth, one child women are thus expecting on average fewer than the normative ideal family size of two. After this time point the control for being pregnant/having a first child creates a small jump between the pre-pregnancy period and the period after. It would be disingenuous to not control for pregnancy/having a first child, as the evaluation of total expected family size is fundamentally altered when the individual must expect at least one child. A sharp change from the time-period before is therefore the most accurate way to model this change in evaluation, rather than linking the time periods together which would imply gradual change over time. However, the overlapping confidence intervals, particularly in the UK, imply that there is not a significant change in expectations at pregnancy.

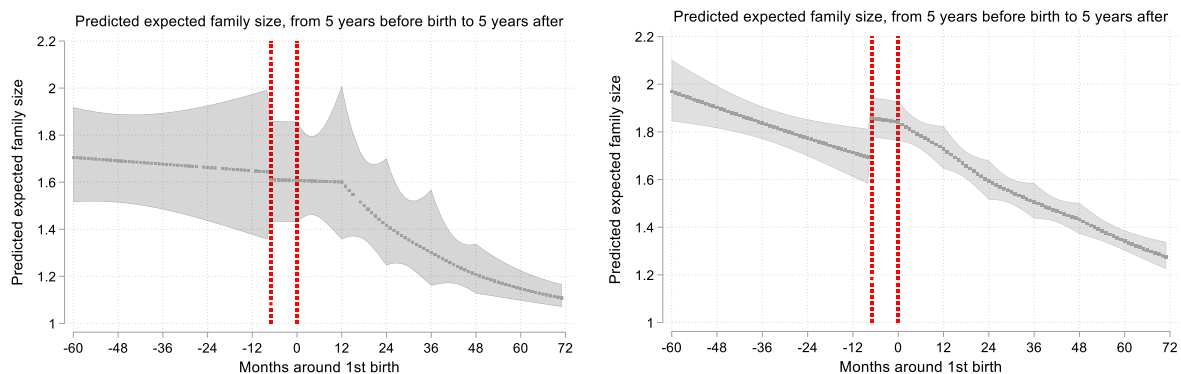


Figure 6.1: Predicted expected family size from 5 years before to 5 years after first birth in the UK (left) and USA (right) for one child women. Shaded area corresponds to the 95% confidence interval. Note, the confidence intervals appear to 'peak' at the end of the spline intervals because of the log specification of the model, and that uncertainty in the estimates is greater as time increases.

In the five years after first birth, a steeper downward trend compared to before first birth can be seen in both contexts, particularly the UK after the child is age 1. This was confirmed in a simpler analysis with only one spline at pregnancy (Appendix 6.6), which found a significantly steeper regression line in the period after, compared to before, first birth ($p < 0.005$ in both countries). During the post-birth period, expectations for one child women drop from 1.6 to 1.1 in the UK, and 1.85 to 1.3 in the USA. The slope of the final spline interval (from four years after birth) was significantly decreasing relative to the angle of the first spline interval (from five years before first birth to pregnancy) in both countries. Although the other intervals were not statistically significant, each spline interval had a coefficient steeper than that of the first interval before birth. This may suggest

that there is not enough statistical power to detect change in the shorter (one year) spline intervals given there is a clear overall trend downwards. In the intervals prior to the last, the steepest coefficient in both contexts is in the year when the child is aged one (0.7 in the UK, and 0.84 in the USA). In terms of the random-effects, the confidence interval for the person-specific intercept and slope in both countries does not cross 0. This suggests that in both contexts, the random-effects explained more of the variation between individuals than the fixed-effects alone (the splines and pregnancy control).

	Meaning	Levels	UK one child women (718 obs, n=192)	USA one child women (5770 obs, n=1078)
Constant	Intercept of the model	NA	1.71 ***	1.94 ***
Time	Baseline effect per 12 months	Linear, 0 is the intercept (5 years before birth)	0.99	0.97 *
Binary indicator 'not yet pregnant'	Changes in additional number of children expected when the arrival of the first child is confirmed	Time < -7 months from birth	Ref	Ref
		Time => -7 months from birth	0.38 ***	0.51 ***
Time binary indicator (Splines after birth)	Changes in expectation at different ages of the first child	Child < 0:	Ref	Ref
		Child aged 0-12 months:	1.00	0.90
		Child aged 12-24 months:	0.70	0.84 †
		Child aged 24-36 months:	0.73	0.88
		Child aged 36-48 months:	0.69	0.88
		Child aged 48-50 months:	0.72 ***	0.81 ***
Person-specific random-effects	Standard deviation of person-specific intercept and slope	Time (slope)	0.09 (0.06 – 0.13)	0.09 (0.08 – 0.1)
		Constant (intercept)	0.08 (0.0 – 34.01)	0.206 (0.15 – 0.29)

Table 6.2: Incidence rate ratios for one child women in the UK (column 4) and USA (column 5). Column 1 lists the variable, column 2 the variables meaning, and column 3 the categories of the variable. No p-values reported for the random-effects, only the confidence interval. *** $p < 0.005$, ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$

6.4.3 Question 2: Do one child women experience a decline in expectations after first birth not seen for higher parity women?

Here we fit a model for UK (n=303, average number of observations per person=3.6) and US (n=3652, average number of observations per person=5.9) mothers, stratifying by parity and including a censor for higher parity women at second birth (Table 6.3, Figure 6.2). The censor means that estimates of expected family size are comparable in the period after first birth between one child and higher parity women. Note, though, that it means that the sample of higher parity women becomes more selective as time passes since first birth, as women increasingly drop out of the sample because of their second birth. The censored higher parity sample have a different trajectory

over time compared to one child women in both contexts. The higher parity sample begin with slightly higher expectations, and remain more stable in those expectations (if not increasing in the UK) in the period before first birth. After first birth, the higher parity women follow a downwards trajectory, increasingly similar to one child women's trajectory, as the higher parity sample becomes more selective. The p-value for difference in slope (the interaction between time and the two groups) is highly significant in both contexts ($p < 0.005$). The standard deviations and confidence intervals of the random-effects suggest that they have explained more unobserved heterogeneity between subjects than the fixed-effects (pregnancy control, splines and eventual parity) alone. The only instance where this is not true is for the person-specific intercept in the UK, where the standard deviation was estimated as very close to 0. This implies that the differences in intercept among the

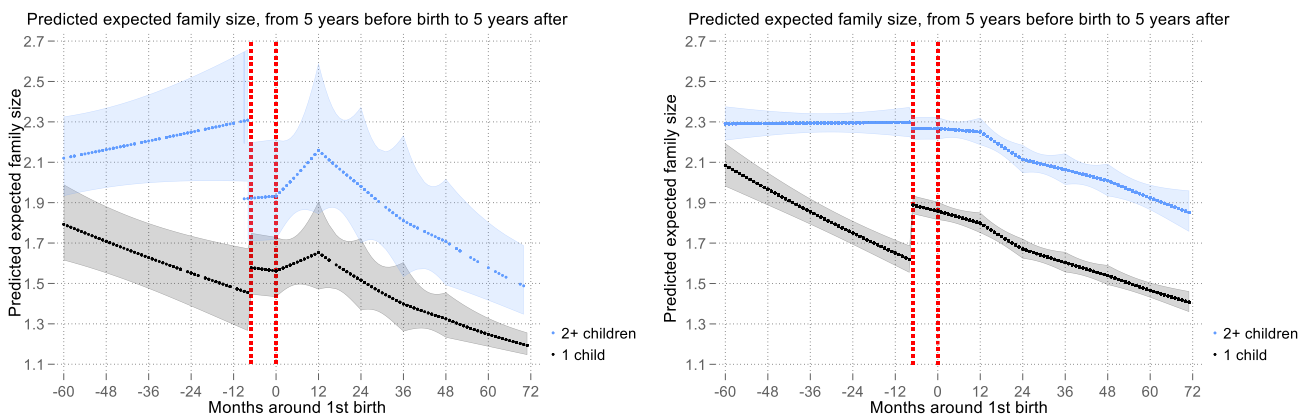


Figure 6.2: Predicted expected family size (modelled with random intercept and random slope) from 5 years before to 5 years after first birth in the UK (left) and USA (right) for all mothers, stratified by parity (1 child and 2 or more) and including a censor at second birth. Shaded areas are the 95% confidence interval. The colour of the area corresponds to the line that they are calculated for.

UK sample is nearly entirely controlled for by the fixed-effects.

	Meaning	Levels	UK all mothers (1102 obs, n=303)	USA all mothers (18108 obs, n=3652)
Constant	Intercept of the model	NA	1.79 ***	2.07 ***
Time	Baseline effect per month	Linear, 0 is the month of birth	0.95 ***	0.95 ***
Binary indicator 'not yet pregnant'	Changes in additional number of children expected when the arrival of the first child is confirmed	Time < -7 months from birth	Ref	Ref
		Time => -7 months from birth	0.40 ***	0.55 ***
Time binary indicator (Splines after birth)	Changes in expectation at different ages of the first child	Child < 0:	Ref	Ref
		Child aged 0-12 months:	1.22	0.99
		Child aged 12-24 months:	0.83	0.89 *
		Child aged 24-36 months:	0.81	0.95
		Child aged 36-48 months:	0.86	0.95
		Child aged 48-50 months:	0.80 ***	0.91 *
More than one child	Whether mother eventually had more than one child or not	No	Ref	Ref
		Yes	1.18 *	1.1 ***
More than one child x Time	Interaction of the two groups (one child vs higher parity women) expectations over time	No	Ref	Ref
		Yes	1.07 ***	1.06***
Person-specific random-effects	Standard deviation of person specific intercept and slope	Time (slope)	0.04 (0.02 – 0.08)	0.04 (0.04 – 0.05)
		Constant (intercept)	0.00	0.22 (0.19 – 0.25)

Table 6.3: Incidence rate ratios for all mothers in the UK (column 4) and USA (column 5). Column 1 lists the variable, column 2 the variables meaning, and column 3 the categories of the variable. Control for final parity is included and a censor at second birth. No p-values reported for the random-effects, only the confidence interval. *** $p < 0.005$, ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$

6.4.4 Question 3: Are there any characteristics of one child women which are particularly associated with changes in trajectories around the time of first birth?

Finally, we test for differences in intercept (mean differences in expectations) and slope (difference in overall trajectories) of expectations by different covariates known to be associated with fertility expectations and outcomes (Table 6.4). In the univariate analysis for the UK (Appendix 6.7) and the USA (Appendix 6.8), age at first birth was strongly predictive of differences in trajectories (Figure 6.3). There were minimal differences in starting point (five years before birth, the intercept) in the UK, whilst in the USA we found evidence that the oldest two age groups expect fewer children at this time point ($p < 0.05$ for 31-35, $p < 0.005$ for 36+). There was much clearer statistical evidence in both contexts of variation across time in the two groups. Compared to the youngest age group, each age group sees a steeper downwards trajectory over time. The overall trend observed, therefore, is

steeper revisions before first birth for the older age groups, and after first birth for the younger age groups.

We also explored whether expectations prior to first birth (either expecting two at least once, or consistently expecting fewer than two prior to first birth, Figure 6.4) were predictive of differences in intercept and slope. By nature of the dummy variable, differences in intercept are to be expected ($p < 0.005$ in both countries). In the US there was also a significant difference in slope between the two groups (i.e. the interaction between the two expectations groups with time), but not in the UK. The trend seen is that women expecting fewer than two children are much more stable in their expectations before and after pregnancy (aside for the jump accounting for first birth). However, women who expect two or more children before first birth show a general decreasing trend over time.

In the USA, we also stratified the analysis by geographical region (plot in Appendix 6.9). We included this covariate as we predicted it should *not* influence the evolution of expectations over time. We found no statistically significant difference in the intercept at five years before birth between the groups, or a significant interaction with time (differences in slope). Plotting predicted expectations over time, the Southern region does appear to be less pro-natal than the other regions, although confidence intervals overlap. Together the evidence suggests that the experience of one child women in their expectations over the time period of first birth does not vary by region, as we predicted. This further supports our argument of a similar experience for one child women geographically, both within and between the countries in this analysis.

In the USA neither education ethnicity, partnership status nor religion produced significant differences in slope or intercept among one child women in the univariate analysis. In the UK, partnership status, education, and year of first birth (cohort control) were not significant in the univariate analysis. All reported trends in intercept and slope across demographic groups in the two countries held when included in the full model of all covariates (Table 6.4).

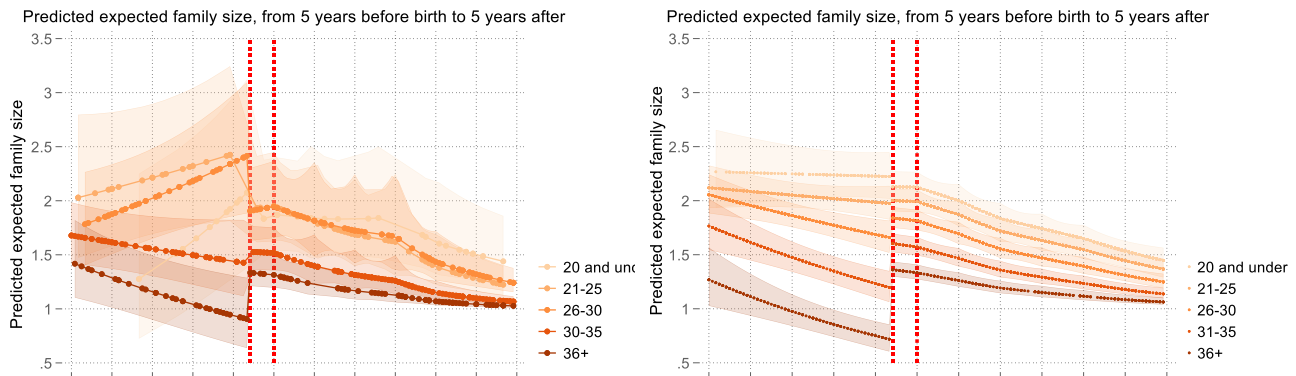


Figure 6.4: Predicted expected family size (modelled with random intercept and random slope) from 5 years before to 5 years after first birth in the UK (left) and USA (right) for one child women, stratified by age of first birth. Shaded areas are 95% confidence intervals. The colour of the shaded area corresponds to the colour of the line that it is calculated for.

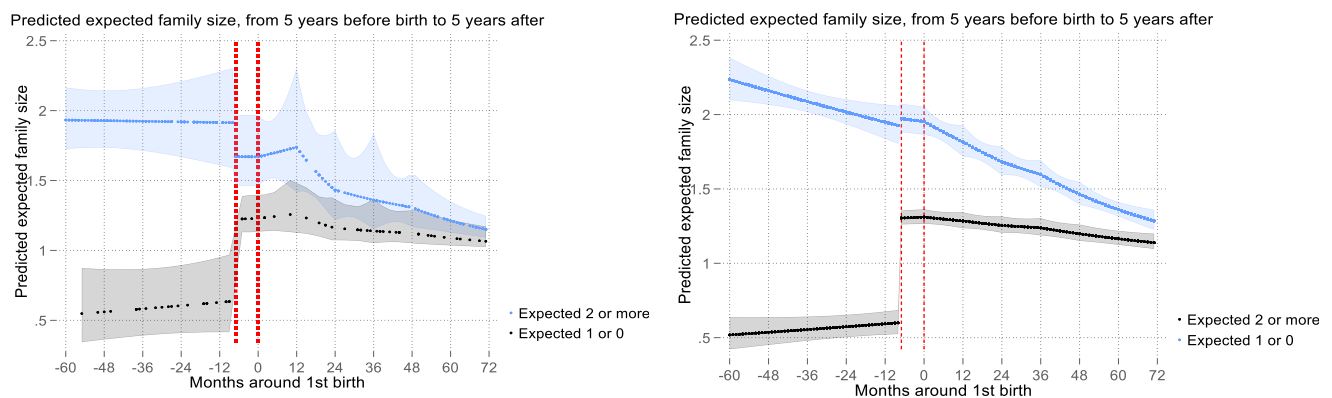


Figure 6.4: Predicted expected family size (modelled with random slope and random intercept) from 5 years before to 5 years after first birth in the UK for one child women, stratified by expectations prior to first birth. Shaded areas are the 95% confidence interval. The colour of the shaded area corresponds to the line that it is calculated for.

	Meaning	Levels	UK one child women (obs = 550, n=142)	USA one child women (obs=5379, n=988)
Constant	Intercept of the model	NA	2.15 ***	2.58 ***
Time	Baseline effect per month	Linear, 0 is the month of birth	1.05	0.98
Binary indicator 'not yet pregnant'	Changes in additional number of children expected when the arrival of the first child is confirmed	Time < -7 months from birth	Ref	Ref
		Time => -7 months from birth	0.36 ***	0.50 ***
Time binary indicator (Splines after birth)	Changes in expectation at different ages of the first child	Child < 0:	Ref	Ref
		Child aged 0-12 months:	0.89	0.88
		Child aged 12-24 months:	0.68	0.88
		Child aged 24-36 months:	0.97	0.90
		Child aged 36-48 months:	0.64	0.83
		Child aged 48-52 months:	0.65 ***	0.83 *
Partnership status	Whether respondent has a partner	No	Ref	Ref
		Yes	0.86	1.01
Education	Highest educational attainment	GCSE or other qualification	Ref	
		Finished high school		Ref
		Did not finish high school	0.75	0.98
		Attended college		1.06
		Completed University	1.08	
		A level	0.94	
Age at first birth	Age at first birth grouped into five-year intervals	Under 20	0.43*	Ref
		21-25	Ref	0.90
		26-30	0.95	0.86
		31-35	0.91	0.84
		36+	0.83	0.79†
Age at first birth x Time	Interaction between age at first birth and time variables	Under 20	1.19*	Ref
		21-25	Ref	1.00
		26-30	1.04	0.97 †
		31-35	0.95	0.93 ***
		36+	0.89*	0.88 ***
Expectations before first birth	Binary indicator of whether 2 children expected at least once before first birth	Yes	Ref	Ref
		No	0.36 ***	0.24 ***
Expectations before first birth x Time	Interaction between expectations before first birth and time variables	Yes		Ref
		No		1.10 ***
Decade of first birth	Binary indicator of decade first child was born for UK panel survey	1990-1999	Ref	
		2000-2010	1.06	
Ethnic group	Three category ethnic group identifier	Hispanic		Ref
		Black		0.99
		Not black or hispanic		0.98
Geographic Region	Four category regional location identifier	West		Ref
		North East		1.01
		North Central		0.98
		South		0.94
Religious affiliation in 1979	Five category religious affiliation identifier	No religion		Ref
		Protestant denominations		0.98
		Roman Catholic		1.08
		Jewish		1.00
		Other		1.10
Person-specific random-effects	Standard deviation of person specific intercept and slope	Time (slope)	0.05 (0.02 – 0.11)	0.07 (0.06 – 0.08)
		Constant (intercept)	0.00	0.00

Table 6.4: Incidence rate ratios for one child women in the UK (column 4) and USA (column 5), including socio-demographic covariates. Column 1 lists the variable, column 2 the variables meaning, and column 3 the categories of the variable. No p-values reported for the random-effects, only the confidence interval. *** $p < 0.005$, ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$

In both countries, the confidence interval for the standard deviation of the person-specific slope did not cross 0, implying that heterogeneity between individuals was better accounted for over time through their inclusion. The standard deviation for the person-specific intercept, however, was estimated as very close to 0 in both countries. This suggests that nothing additional was gained through the inclusion of the random-effect in terms of explaining variance in the intercept over what is controlled for by the fixed-effects. This is unsurprising given that the fixed-effect for expectation prior to first birth necessarily constrains the intercept of the model between groups.

6.5 DISCUSSION

The existence of a fertility gap in high-income countries suggests that individuals are facing obstacles to meeting their childbearing goals. However, this aggregate measure hides the variability of personal expectations over the life course. This paper aimed to dissect whether, and how, childbearing expectations changed for UK and US one child women. In doing so, we explored how one child women contribute to the fertility gap (i.e. do they always intend to have one child, or do they revise downwards over the life course?). One child women are an interesting group to focus on in relation to the fertility gap, as whilst they become parents, they have fewer than the normative two. We hypothesised that the time around first birth may act as a catalyst for changing expectations, in a way not experienced by women who have more than one child. Further, we use the comparison between the USA, the UK and US regions to assess the homogeneity of one child women's expectation trajectories across contexts and whether demographic characteristics are associated with variation in those trajectories.

Firstly, we explored whether one child women experience a decline in fertility expectations after first birth in both the US and UK. Overall, the pattern observed in the trajectories of one child women is broadly similar across contexts: stability, but a slight decrease in expectations before first birth, followed by a marked decrease in expectations after first birth towards one. Therefore, we broadly find evidence supporting the hypothesis that one child women's expectations decrease close to one after first birth across contexts, but with the caveat that they are already starting to revise their expectations away from an average of two before first birth. We also did not find any particularly steep change within a given year, although the steepest drop in both countries occurred when the child was between one and two. The similarity of changing expectation trajectories over the time of first birth for one child women suggests that their contribution to the fertility gap lies in revising expectations from an average of two to one child over the life course. The differences between countries and regions in pronatalism are likely to be explained by different underlying demographic characteristics (e.g. the USA has a younger childbearing profile for one child women than the UK),

the time period of observation (the UK observes slightly later childbearing, mostly in the early 2000s), cultural variation in the strength of the two-child family norm, and differences in social support between the two countries. Examples of the latter include differences in the amount of paid maternity leave and state subsidised childcare and health services.

Our second question was whether the trajectory of fertility expectations differs around the time of first birth for one child women compared to higher parity women. We found a clear divergence in the lead up to first birth: higher parity women maintain expectations above two prior to first birth, whereas the expectations of one child women begin to decrease. After first birth, the shape of the trajectories in each group looks more similar as the sample for higher parity women becomes more selective because of censoring. This means the shape of the overall regression line (the angle of which differs between the two groups because of the fitted interaction with eventual parity) becomes increasingly determined by the expectation trajectory of the one child women in the years preceding first birth. However, it is noteworthy that whilst the members of the higher parity group are decreasing their expectations at five years after birth to 1.9 in the US and 1.5 in the UK, the one child group have decreased their expectations to much closer to one (1.4 in the US and 1.2 in the UK). Thus, whilst the censored higher parity sample follow a similar trajectory after first birth to one child women, they are still more pro-natal.

Lastly, we tested whether any characteristics of one child women were associated with differences in expectation trajectories around the time of first birth. In the US, we found minimal differences between education, ethnic, or religious groups in trajectories over this time period. Selectivity may have played a role; indeed, the one-child sample was biased (in comparison to the higher parity women) towards non-black and non-hispanic women, those that attended college, and those that are Protestant or non-religious. These differences between one child and higher parity women are in line with known differences in fertility in the USA: Latina women, Catholic women and women who did not finish high school are known to have higher fertility, and are thus less likely to only have one child.

Neither education nor partnership status were predictive of expectation trajectories for UK one child women. This would appear to confirm that sample selectivity is diminishing the variation in trajectories between women, given that educational attainment is already known to be correlated with age at first birth (Berrington, 2004). However, the model may not have detected differences because the small sample size will have decreased statistical power. The only significant covariates in both countries were age at first birth and expectations prior to first birth. This, however, was a very important finding in terms of understanding the potential mechanism behind changing childbearing

expectations. We found that relatively older women were more 'realistic' in their intentions, revising them down more steeply before first birth compared to younger women. This would suggest that older women are revising their expectations because of a perceived decrease in opportunity for childbearing, as well as potentially a lower probability of conceiving (Beaujouan *et al.*, 2019). It will therefore be essential in further enquiry into why childbearing expectations change around first birth to understand the interaction between different explanatory factors and their interaction with age, as the reasons and mechanisms are likely to differ.

We restricted our analysis to only include more stable characteristics as explanatory factors for variation in trajectories over the time period of first birth. This is because including factors in our model that can and do change around first birth (e.g. pregnancy experiences, household division of labour, labour market activity, partnership dissolution, subjective well-being) would require more advanced statistical methodologies to disentangle causality during a time of many simultaneous changes. However, these variables are likely to have the most explanatory power for why one child women are revising their expectations more steeply after first birth. Nonetheless, we can draw on the previous literature and our analysis for potential explanations. Ní Bhrolcháin and Beaujouan (2011), for example have noted one child women in the UK are more uncertain about their fertility intentions than other women. In the USA, women with one child, relative to women without children, have also found to be more unsure about their fertility intentions (Jones, 2017). This may be a reason why expectations after birth are more susceptible to change in response to first birth and associated changes for one child women, compared to higher parity or childless women. Relatedly, it must be noted that observing change in child number expectations may not necessarily represent 'true' changes in intentions: absolute measures of expected number of children do not capture the known flexibility, ambivalence or uncertainty in childbearing intentions (Trinitapoli and Yeatman, 2018; Ní Bhrolcháin and Beaujouan, 2019). It is likely that measures of these concepts have considerable explanatory power for the seeming 'changes of mind' about having children presented in our findings.

The selectivity of our analytical sample also offers potential explanations for why one child women are revising their expectations downwards. For example, as the one child USA women are less religious compared to women with more children, they may be less likely to experience strong pro-natal social norms, making it easier for them to revise their expectations downwards. This would fit with previous findings that religious women have more stable fertility ideals (Ray *et al.*, 2018). The high education level among US one child women may also be indicative that one child women are delaying childbearing relative to those who complete education earlier. This is supported by the

skew of the sample to older ages at first birth (relative to the higher parity sample). Delaying first childbirth results in a decreased likelihood of meeting expectations for large families, and thus more variability in fertility plans over time (Heiland, Prskawetz and Sanderson, 2008; Liefbroer, 2009).

There are various limitations to our approach that should be acknowledged. First, is that we do not statistically compare the two countries because of comparability issues, such as the smaller sample size of the UK data, and that a small proportion of UK women will eventually have a second child. These issues mean that the UK dataset can only be used tentatively in descriptive comparisons to the US data. Second, there are inherent restrictions to our statistical model about how the trajectories are predicted. For example, including an interaction of a covariate over time allows the trajectory to vary between covariate groups, but it retains the overall angle of the regression line. This presupposes that the angle of the regression line at each spline is the same for each of the groups. Finally, we chose to restrict our comparison to two countries with similar fertility profiles. However, this means that our findings are not necessarily generalisable to other low-fertility settings.

Nonetheless, we argue that our analytical strategy presents a clearer picture of change in expectations around first birth compared to previous studies exploring the effect of births on expectations. First, a Poisson specification is used, rather than a linear one to better account for the discrete nature of childbearing expectations. Secondly, by focusing exclusively on one child women, as opposed to all women over the life course, we eliminate the impact of progression to higher parities on expectations over the life course. Including women of all parities would make it difficult to identify those who are revising down during the life course, amongst those who are raising their expectations in line with the number of children they have (Kuhnt, Kreyenfeld and Trappe, 2017). Identifying women that adjust their expectations downwards over the life course is vital for improving our explanation of the fertility gap, where individuals appear to not have as many children as they say they want. Our paper finds that revisions in fertility expectations for one child women fall close to one child in the 5 years after, not before, birth. Further, steeper revisions after first birth suggest that becoming a parent does affect expectations negatively for one child women, and particularly one child women who have a first birth at younger ages. The reasons behind these revisions, however, would require further causal investigation. Such investigations would be benefitted by data collection, including qualitative work, asking about changing expectations and pregnancy intendedness in the years directly after first birth when we identified the most change. To conclude, this analysis is an important first step in disentangling and explaining the fertility gap persists in the UK and USA: we find expectations change after 'expecting' for one child women.

7 PARENTHOOD, EMPLOYMENT, DOMESTIC LABOUR AND FERTILITY: PIECING THE PUZZLE TOGETHER IN AUSTRALIA

RESEARCH PAPER COVER SHEET

Please note that a cover sheet must be completed for each research paper included within a thesis.

SECTION A – Student Details

Student ID Number	Ish1408068	Title	Ms
First Name(s)	Alyce		
Surname/Family Name	Raybould		
Thesis Title	Disentangling the “fertility gap”: exploring the link between gendered division of labour and reproductive decision-making in high-income countries		
Primary Supervisor	Rebecca Sear		

If the Research Paper has previously been published please complete Section B, if not please move to Section C.

SECTION B – Paper already published

Where was the work published?			
When was the work published?			
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion			
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Where is the work intended to be published?	Advances in Life Course Research
Please list the paper's authors in the intended authorship order:	Raybould, Alyce Sear, Rebecca

Stage of publication	Not yet submitted
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SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	I conducted the analyses and wrote the paper. My supervisor supported this work in an advisory capacity and helped to edit the writing.
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SECTION E

Student Signature	A.G.Raybould
Date	17/05/2021

Supervisor Signature	Rebecca Sear
Date	17/05/2021

ABSTRACT

Household division of paid and unpaid labour has been theoretically and empirically linked with the probability of having children in high-income contexts. Further, division of labour is known to change considerably when individuals first become parents: the time spent on domestic tasks increases in response to the needs of the new-born child, and the couple's division of labour tends to become more gendered than prior to first birth. Previous work has sought to identify trajectories in women's employment before and after first birth. In this analysis, we explore the joint changes in paid *and* unpaid labour responsibilities around first birth using sequence analysis. Using longitudinal time-use data from Australia, we cluster women into different paid-unpaid work groups. We then explore whether there are demographic characteristics associated with these trajectories, and whether cluster membership is associated with the probability of progressing to second births. We find that women who mostly do unpaid work, or part-time paid work hours, across the transition to parenthood are more likely to be younger, unpartnered and less highly educated at first birth. Furthermore, women who consistently work part-time are the slowest to progress to a second birth, whereas women who leave the labour market after first birth are the quickest. This analysis therefore disentangles some of the complex interactions between the onset of parenthood, changing paid and unpaid labour dynamics, and family trajectories.

7.1 INTRODUCTION

How couples divide household labour has been linked to both the number of children they want to have, and the number they go on to have in high-income, low-fertility settings (Neyer, Lappegård and Vignoli, 2013; Raybould and Sear, 2021). However, the division of labour between couples is known to change considerably when couples become parents (Craig and Bittman, 2008; Frenette, 2011; Grunow, Schulz and Blossfeld, 2012; Baxter *et al.*, 2015; Argyrous, Craig and Rahman, 2017; Kim and Cheung, 2019; Campolo, Pino and Rizzi, 2020). The time spent on domestic tasks increases in response to the needs of the new-born child, and division of labour tends to become more gendered than prior to first birth: women typically take on more domestic work than men after first birth, regardless of the prior division of labour within the couple (Grunow, Schulz and Blossfeld, 2012; Baxter *et al.*, 2015; Campolo, Pino and Rizzi, 2020). This paper aims to explore whether there are typical trajectories in both paid and unpaid work at time of first birth using time-use data from Australia between 2001 to 2019. Having identified trajectories, we then examine whether there are demographic characteristics associated with these trajectories, and whether different trajectories are associated with differing probabilities of progressing to second births.

7.2 BACKGROUND

7.2.1 Division of Labour at First Birth

Across high-income, low-fertility settings, there is no larger observed change in couples' gender role attitudes and division of paid and unpaid work than following first birth (Craig and Bittman, 2008; Frenette, 2011; Campolo, Pino and Rizzi, 2020). In terms of paid work, mothers in these settings are more likely not to work after having children than men (Frenette, 2011; Kühhirt, 2012; Harkness, Borkowska and Pelikh, 2019; Campolo, Pino and Rizzi, 2020). Mother's employment trajectories are also more variable in comparison to the father's, with transitions in and out of the work force over the course of family formation (Hynes and Clarkberg, 2005; Lu, Wang and Han, 2017).

For unpaid labour at first birth (family and domestic work), men's housework time is noted to remain fairly stable whereas women experience a considerable increase in responsibilities (Baxter, Hewitt and Haynes, 2008; Craig and Bittman, 2008; Dribe and Stanfors, 2009; Kühhirt, 2012; Campolo, Pino and Rizzi, 2020). This shift to a more unequal division of labour is much larger at the onset of parenthood than for any subsequent births (Craig and Bittman, 2008; Frenette, 2011; Kim and Cheung, 2019). Furthermore, studies have noted that men with young children perform overall less labour (both paid and unpaid summed) than women with young children (Craig and Bittman, 2008), and that the dual burden of working and caring is most intense when children are young (Nomaguchi and Fetto, 2019).

Gender role attitudes have also been noted to shift at parenthood, typically becoming more in favour of a strict division of labour along the lines of the 'male-breadwinner-female-homemaker family' (Baxter *et al.*, 2015; Endendijk, Derks and Mesman, 2018). However, variability in the direction of change has been observed. For example, Zhou (2017) finds UK mothers have more flexible gender role attitudes after first birth if they are working full-time, whereas women who leave the labour force after first birth have more rigid gender role attitudes. Furthermore, studies have noted that if couples hold more flexible gender role attitudes prior to first birth, it limits the extent of the shift to more rigid gender norms and division of labour after first birth (Schober, 2013; Endendijk, Derks and Mesman, 2018; Campolo, Pino and Rizzi, 2020).

Together, findings point to the central importance of rigid, societal-level male-breadwinner gender norms in determining the transition away from flexible divisions of labour and individual-level gender role attitudes that couples hold prior to first birth in high-income settings. Indeed, several studies have indicated that norms the primary driver of changes in the couple's division of labour at parenthood in comparison to factors such as partners' relative earnings, time use and labour market prospects (Grunow, Schulz and Blossfeld, 2012; Kühhirt, 2012; Aassve, Fuochi and Mencarini, 2014). Furthermore, a recent international comparison found that paid and unpaid labour configurations between parents compared to non-parents in Central and South America, Eastern Europe, Southern Europe, Asia and South Africa, did not vary as much as in Australia, Western Europe, North America and Northern Europe (DeRose *et al.*, 2019). This is interesting given that the latter list of countries are usually considered as more 'gender equal countries' (McDonald, 2000a). This therefore highlights that while countries may be more advanced in achieving gender equity in some spheres, they may be less advanced in achieving gender equity in other domains (Mills, 2010; Breda *et al.*, 2020). In Australia (the study region of this paper) there is a significant hurdle in achieving gender equity in the family, where rigid male-breadwinner family norms about who performs caring tasks are still very strong (DeRose *et al.*, 2019).

7.2.2 Division of Labour and Fertility

Several demographic theories have sought to link gender equity in the household to fertility intentions and outcomes (Esping-Andersen and Billari, 2015; Goldscheider, Bernhardt and Lappegård, 2015). Starting from a post-second world war world view (i.e. a view which ignores that women throughout history have combined work and childrearing), these theories broadly outline that fertility on a macro-scale in high-income settings will fall and rise in response to two gender revolutions. The first revolution is in the public sphere as women gain equity in the labour force. Fertility falls as women take on as much paid work as men, but without sufficient adjustments within the couple to increase men's unpaid work hours because of restrictive male-breadwinner gender

norms. This means the possibility of having children, or more children, may not be feasible because of a 'dual burden' of paid and unpaid work experienced by women. Fertility only rises again when there is a subsequent revolution in the private sphere and men take on as much housework as women.

In terms of a more proximate causal relationship, research has linked division of labour to fertility via changes in well-being at first birth. Firstly, unequal division of labour following first birth has been associated with greater psychological distress and decreased well-being among dual-earner families in Canada, the USA, and Australia (Tao, Janzen and Abonyi, 2010; Offer and Schneider, 2011; Matysiak, Mencarini and Vignoli, 2016). Further, well-being in terms of partnership satisfaction has been shown to decrease among new Dutch parents where the mother left paid employment after first birth (Keizer, Dykstra and Poortman, 2010).

Second, changes in labour division strategies and changes in well-being have been independently associated with revising the number of children couples wish to have. For example, Johnstone et al. (2020) found that Australian mothers who left the labour force after first birth desired fewer children. Regarding well-being, Luppi and Mencarini (2018) found that a decline in well-being at first birth for Australian mothers was associated with decreasing fertility expectations.

Third, changing divisions of labour and well-being have also been shown to be independently associated with birth outcomes. Decreased well-being following first birth has been linked with decreased probability of having a second child in Germany and Australia (Margolis and Myrskylä, 2015; Luppi, 2016). The relationship between gendered division of labour and fertility is more variable, sometimes with male-breadwinner families having the most children (e.g. Luppi 2016), and sometimes couples who divide all labour equally having the most children (e.g. Harknett et al. 2014). However, a consistent finding is that women with a dual burden tend to have fewer children (Oláh, 2003; Torr and Short, 2004; Dommermuth, Hohmann-Marriott and Lappegård, 2017). In this manner, changing division of labour, well-being, and fertility connect in a causal pathway: those with a dual burden are more likely to have lower well-being, and those with lower well-being are likely to desire and have children.

7.2.3 Are there typical work-family trajectories?

Pulling all these links together, it seems likely that changes in work and family life will cluster together into different typical work-family trajectories. The most famous attempt to categorise typical work-family types in high-income, low-fertility settings is Hakim's preference theory (Hakim, 2002). The theory starts from the premise that in these settings, structural and social constraints have been minimised, meaning that an individual's personal preferences have more influence in

determining life outcomes. For example, the theory points to the contraceptive revolution, equal opportunity legislation and growth of service sector jobs as turning points in removing constraints on choice. The theory outlines that women can be grouped based on their preferences about paid and unpaid work. These work-family preferences in turn determine life course outcomes, including the number of children that women are likely to have (Hakim, 2003). The groups Hakim identifies are 'home-centred', 'work-centred' and 'adaptive' women. 'Home-centred' women have a preference to invest in domestic rather than paid labour, and 'work-centred' women the reverse. 'Adaptive' women lie in the middle with a preference to balance family and employment, and make up the largest group of the three proportionally. These preferences mean women are more or less likely to be responsive to other life course factors, like investment in education, employment opportunities, family policies and timing of marriage. Hakim's theory is specific to women, as she believes male-breadwinner-female-homemaker gender norms present an ultimatum between employment and homemaking for women only (Hakim, 2002). Hakim used data from a 1999 British survey to support the theory, pointing to evidence that home-centred women are likely to have the most children, and work-centred women the least (Hakim, 2003). Similarly, Vitali et al. (2009) found Hakim's three preference groups significantly predicted fertility outcomes in eleven different European countries, but not fertility intentions.

The theory and its underlying assumptions have been heavily critiqued. Firstly, Hakim gives little explanation as to why women should fall into a restricted set of three categories, rather than a greater number of groupings, or on a spectrum (Crompton and Harris, 1998; Maher and Dever, 2004; Aassve, Billari and Piccarreta, 2007). Secondly, while preferences may be important in decision-making, they are not the only determinant of work-family outcomes (Tomlinson, 2006). Hakim does not deny that constraints may exist in determining eventual work-family outcomes; however, the theory is clear that individuals' choices matter most (Crompton and Lyonette, 2005). Little consideration is given to how factors like support with childrearing, societal gender role attitudes, employment opportunities, and socio-economic need might constrain women enacting their preferences (McRae, 2003; Vitali *et al.*, 2009; Davia and Legazpe, 2014), or indeed how these factors are influential in the very formation of preferences (Walters, 2005; Kan, 2007). As such, reverse causality is difficult to rule out between preferences and behaviour (Vitali *et al.*, 2009). The theory also does not explore the possibility of preferences changing and adapting over the life course (Berrington *et al.*, 2007; Baxter *et al.*, 2015; Zhou, 2017). Johnstone and Lee (2016), for example, found that in their Australian sample of women aged 18-23, most changed their work and family preferences over a ten-year period, with minimal overlap between preferences stated in 2000 and work-family lifestyle in 2009. Further, as highlighted in the previous section, there is

considerable change at parenthood in terms of division of labour and attitudes. Heterogeneity in both behaviour and preferences cannot be well accounted for in preference theory.

Evolutionary and anthropological perspectives offer some clarity on this discussion about Hakim's theory. From an evolutionary perspective, most women are expected to have a preference for combining work and family responsibilities, as this is the labour division strategy most common throughout human history. In this regard, Hakim's theory and evolutionary perspectives do overlap. Ethnographic work from foraging and small-scale agricultural populations indicates that men and women throughout history have tended to take complementary roles in both productive and domestic labour (Hewlett, 2000; Ahnert, 2006; Giuliano, 2015). Additionally, women typically took on tasks that could be combined with childcare such as food processing and growing food in and around the home (Lew-Levy *et al.*, 2018). A cross-species comparative perspective further suggests that humans have evolved a very specific life history compared to other great apes (Galdikas and Wood, 1990). Human children have a particularly long period of childhood development post-weaning, which can lead to a mother providing care to multiple children simultaneously. This has arguably only been possible because humans are cooperative breeders, where mothers receive a considerable amount of help with raising children from a diverse range of helpers, typically from other kin (Sear and Mace, 2008; Hrdy, 2009). This support with childcare allowed mothers through much of human history to combine productive and domestic labour.

In post-industrial WEIRD (Western, Educated, Industrialised, Rich, Democratic) societies, changing migration patterns related to educational and employment opportunities, and norms about family structure, have resulted in the family unit becoming isolated from wider kin support networks (Kasper and Mulder, 2015; Colleran, 2020). Further, paid work cannot be combined easily with childrearing as it is often done outside the home. Women therefore either face the choice of specialising in one of these two spheres of labour or performing a difficult balancing act. However, unlike in preference theory, an evolutionary life history perspective clearly positions this situation as a structural constraint in the lived environment that is unlikely to be preferred by all women. It highlights the contemporary importance of novel norms about division of labour (i.e. that contemporary paid and unpaid work are separate spheres that cannot be combined) and this is reflected in how types of employment are structured (e.g. that many jobs need to be done outside the home).

Further, evolutionary theories of sexual division of labour highlight another area that is lacking in preference theory. Ethnographic studies of labour division position childcare, domestic tasks and agricultural tasks as each being productive forms of labour that need to be distributed between kin

members. Unlike this more holistic understanding of work, Hakim's theory is usually operationalised using preferences about amount and type of work and preferences about having a family (Hakim, 2002; Kan, 2007; Vitali *et al.*, 2009). However, preferences about household division of labour are absent, or assumed to be the inverse of preferences about paid work (i.e. if a woman has a preference not to invest in paid work, she therefore has a preference to invest in unpaid work). This oversight may stem from the observation that women often do more domestic work than men, independent of the couples' relative earnings and time availability (Aassve, Fuochi and Mencarini, 2014). However, this highlights that a major structural constraint to women in enacting their family preferences is a lack of gender equity in the household because of strong male-breadwinner gender norms. This fact is entirely missing from Hakim's theory and is crucial to understanding family trends. For example, Sigle (2010) found that although women's work hours in the UK were correlated with probability of divorce (fitting with the trajectories of Hakim's theory that a commitment to paid work is associated with 'less family'), it was in fact men's household contribution that drove this association. Fathers' unpaid work stabilized marriage regardless of women's work hours, and the link between women's work hours and divorce was entirely confounded by this. Categorising women into typical work-family trajectories cannot be accurate unless it also accounts for women's unpaid work. Furthermore, using these categories to predict family outcomes such as divorce, childbearing expectations or childbearing outcomes would be biased without consideration of gendered division of labour.

7.2.4 Aims

Instead of a rigid classification of work-family trajectories, we aim to explore whether there are typical trajectories in paid and unpaid work at first birth using time use data from Australia. We take on board previous findings of considerable heterogeneity in work-family behaviour and preferences over time and seek to explore whether typical trajectories can be identified descriptively without the need to impose a causal explanation. We also move beyond static observations, using methods that can capture heterogeneity in trajectories across time.

While many studies have looked at how paid work and family trajectories change over time (Hynes and Clarkberg, 2005; Harkness, Borkowska and Pelikh, 2019; Cabello-Hutt, 2020; Comolli, Bernardi and Voorpostel, 2021), we incorporate measures of both paid *and* unpaid labour to identify women experiencing a 'dual burden' in our trajectory analysis. Having identified the trajectories (clusters), we then explore whether demographic characteristics are associated with cluster membership, as previous studies have noted that housework and childcare arrangements vary between groups. For example, some studies in low fertility contexts have found that higher educated mothers tend to get more help from fathers with childcare and housework (Kan and Laurie, 2016; Cheng and Hsu, 2020),

but also that higher educated mothers tend to spend more hours per week performing childcare (Sayer, Gauthier and Furstenberg, 2004; Guryan, Hurst and Kearney, 2008). We therefore explore the association between paid and unpaid work trajectories and mother's age, educational attainment, and partnership status at first birth. Lastly, we examine whether the clusters are associated with the probability of having a second child.

7.3 METHODOLOGY

7.3.1 Data

This study uses data from the survey 'Household, Income and Labour Dynamics in Australia' (HILDA) (Department of Social Services; Melbourne Institute of Applied Economic and Social Research, 2020). The survey is a panel consisting of a nationally representative sample of 7682 Australian households. Survey waves have been fielded annually since 2001, with 19 waves currently available. The survey questions are asked to all adults above 15 years old in selected households, and new members of the panel are included when a new individual joins the household (e.g. when a child is born, or a child becomes above 15).

In terms of the work-family context in Australia, the total fertility rate has been below replacement level (2.1 children) since the 1970s. However, the country has relatively high fertility in comparison to other high-income contexts, typically around 2 children per woman. Linking fertility to household division of labour, the probability of having another child was found to be negatively associated with the amount of unpaid domestic work performed by Australian mothers in the first six HILDA waves (Craig and Siminski, 2010). However, the male partner's share of domestic labour in HILDA was not associated with probability of further births (Craig and Siminski, 2011).

Policies to support women to work and care are limited in Australia, and this may explain why the amount of unpaid work performed by Australian mothers increases starkly at first birth in comparison to mothers in other high-income countries (DeRose *et al.*, 2019; Johnstone, Lucke and Hewitt, 2020). Australian couples also typically shift to gender roles and attitudes more in line with male-breadwinner family norms after first birth (Baxter, Hewitt and Haynes, 2008; Craig and Bittman, 2008; Baxter *et al.*, 2015; Argyrous, Craig and Rahman, 2017; Perales, Jarallah and Baxter, 2018). This significant increase in unpaid work after first birth for women in Australia makes the setting ideal for exploring changes in division of labour over time, particularly in response to first birth. Given this, we expect to find paid-unpaid work trajectories highlighting a significant shift in burden of work for women following first birth. We also expect these trajectories to be associated with the probability of progressing to further births, as it has been previously shown that Australian mothers' housework burden has been predictive of childbearing (Craig and Siminski, 2010).

7.3.1.1 Variables

7.3.1.1.1 Defining 'states': what is dual burden?

In this analysis we explore whether there are typical trajectories in changing paid and unpaid work around the time of first birth using a sequence analysis. Broadly speaking, sequence analysis identifies the degree of similarity between individuals in a given sample, depending on their 'states' at different time points. States refer to the category an individual lies within at a certain temporal point (in this analysis, at the yearly observation). The trajectory is, therefore, made up of a sequence of these states. For example, if we were interested in a trajectory of partnership status per year, four states could be single (S), married (M), divorced (D) or widowed (W). A trajectory is then comprised of a marker for the states over time; for instance over three years, someone who is married for one year and then divorced for two, would have a trajectory of 'MDD'.

The HILDA survey was chosen as the Australian data set for this paper because it measures time use diaries for each wave, meaning it contains detailed information in each survey wave on how much paid and unpaid labour an individual typically does per week. We use this information to define the 'states' of the sequence analysis. For paid work, we use information on each woman's average hours per week spent in paid employment. For unpaid work, we use information on average time spent per week doing three tasks: 1) Household errands (defined as shopping, banking, paying bills and keeping financial records), 2) Housework (defined as preparing meals, washing dishes, cleaning, washing, ironing and sewing), and 3) Caring for children (defined as playing, helping with personal care, teaching, actively supervising and transporting them). We sum the time spent doing these three things and define it as the total time spent doing unpaid labour per week.

In terms of the states themselves, we considered a few options for ways to incorporate them into the sequence analysis. Sequence analysis is able to incorporate changes in different domains over time using a 'multi-channel' framework. This means that instead of having a single number coding the individual's state at a given time point, a series of numbers are coded for each time point to identify a set of different states. In our case this would be one code for the paid work state and one for the unpaid work state. Alternatively, one could explore trajectories in the two domains separately and then explore how they interact with one another in regression models. We did not opt for either approach. As we are interested in disentangling the ways in which the linked changes in paid and unpaid labour interact with decisions for having more children, the literature points to the 'state' of interest as an experienced 'dual burden'. This is when a woman both works and has a sizeable amount of unpaid work at home, meaning that both paid and unpaid work need to be considered jointly. There are therefore two elements that need to be captured in a 'dual burden' state. First, whether a woman is doing both paid *and* unpaid work ('dual') and second, whether the

time use in both are sizeable ('burden'). We therefore opted for creating our own states combining time spent in paid and unpaid labour, rather than treating them as two different states.

We started by creating three states. Firstly, women with minimal involvement in paid work (i.e. no 'dual' element), defined as fewer than 16 hours of paid work a week (39% of observations, yellow in Table 7.1). Secondly, women who are in the labour force but perform fewer than 3 hours of domestic tasks per day (i.e. fulfil 'dual' element but not a considerable 'burden' so are labelled 'small dual burden', lilac in Table 7.1, 33% of observations). Finally, women who are in the labour force and perform more than 3 hours of domestic tasks per day (i.e. both 'dual' and 'burden', dark purple in Table 7.1, 28% of observations). Three hours per day was chosen as the boundary for burden based on quintiles in the amount of domestic labour. 40.74% of the sample did 21 hours or fewer hours of housework per week.

Table 7.1: Division of the sample into three groups based on paid and unpaid work hours per week. Yellow: Those who work less than a part time job (39%) Lilac: Those who have a small dual burden (33%) Dark purple: Those who have a large dual burden (28%)					
Hours of paid work per week	Hours of unpaid work per week				
	0-12	12-20	21-33	34-54	55+
0 (no paid work)	50	44	49	87	466
1-16 (some paid work but less than a part-time contract)	32	14	19	34	201
17-35 (equivalent of a part-time contract)	84	55	45	101	220
35-40 (equivalent of a full-time contract)	300	164	87	75	121
41+	160	73	27	20	32

However, the three-state division is quite a crude grouping, as it puts women together with quite different paid work hours, and women in the first group with quite large differences in unpaid work hours. Therefore, we also implemented a six-state model, providing a finer amount of detail about paid and unpaid work hours. We start by dividing the sample into three groups based on how much paid work they do: women who do no hours of paid work, women who do part-time paid work (fewer than 35 hours a week), and women who do full-time paid work (35 hours or more a week). We then split each of these three paid work groups into two, depending on the amount of unpaid work: one group that do fewer than three hours of unpaid work a day, and the other for women that do more than three hours of unpaid work a day (Table 7.2).

Table 7.2: Division of the sample into six dual burden groups based on paid and unpaid work hours per week.

Light blue: No paid work hours, fewer than 3 hours unpaid work a day (3.7%)
 Dark blue: No paid work hours, more than 3 hours unpaid work a day (23.5%)
 Light green: Part-time paid work, fewer than 3 hours unpaid work a day (7.2%)
 Dark green: Part time paid work, more than 3 hours unpaid work a day (24.2%)
 Light red: Full-time paid work, fewer than 3 hours unpaid work a day (27.2%)
 Dark red: Full-time paid work, more than 3 hours unpaid work a day (14.1%)

Hours of paid work per week	Hours of domestic work per week				
	0-12	12-20	21-33	34-54	55+
0 (no paid work)	50	44	49	87	466
1-16 (some paid work but less than a part-time contract)	32	14	19	34	201
17-35 (equivalent of a part-time contract)	84	55	45	101	220
35-40 (equivalent of a full-time contract)	300	164	87	75	121
41+	160	73	27	20	32

7.3.1.1.2 Predictor and Outcome variables

To explore demographic characteristics associated with cluster membership, we use a continuous measure of age at first birth, highest educational qualification achieved at first birth, and partnership status at first birth.

To investigate whether the clusters are associated with progression to further children, we follow the individuals to see whether a second birth occurs.

7.3.1.2 Sample selection

Sample selection took place in two stages. First, we identified all women who had a first birth during the 19 survey waves (2200 women). Second, we identified those with complete time use information for each survey year, from 2 years before first birth, to 3 years after first birth. This time-period was chosen to identify patterns in dual burden immediately before and after first birth.

Sequence analysis requires complete information on state sequences at each time point. This introduces potential concerns when there are cases with missing observations. One solution is to drop these individuals from the analysis, although this can introduce selection bias into the estimates. Another solution is to impute missing data using imputation methods. However, this can introduce information bias into the estimates. Among women who gave birth to their first child and were observed in each of the five years around first birth, 7% were not part of the HILDA sample that filled out time use diaries, so were excluded. Another 48% had missed recordings of time use within this time span. These individuals were also excluded because the sequence analysis requires a complete set of observations, leaving a sample of 512 women (2560 observations). Different lengths

of study intervals around first birth were trialled to see how this impacted sample size under the constraint of needing complete data. Increasing the interval width by 1 year resulted in roughly 100 respondents being dropped; decreasing the interval by 1 year added about 100 respondents to the sample (Appendix 7.1). I opted to keep the interval from 2 years before first birth to 3 years after first birth for this descriptive analysis. This was because I wanted at least two years either side of first birth to make sure that paid and unpaid work were captured prior to pregnancy, and after maternity leave had finished. Further, the additional year after first birth kept more of the sample than adding an additional prior to first birth. This added year therefore optimised the length of the study interval whilst retaining as many in the sample as possible.

Descriptive exploration (Appendix 7.2) showed that, compared to the whole sample, our selected sample was less likely to be unpartnered (3% difference) and more likely to be higher educated at time of first birth (between 2-4% difference). There were also differences in age at first birth between the selected sample and the whole sample. The selected sample had 3% fewer under 20s, 6% fewer 20-25s, and 8% more 30-34 year olds. As these differences were relatively small, we continued using the reduced sample to determine cluster membership. However, it must be acknowledged that younger, less educated and unpartnered respondents are underrepresented, meaning that clusters identified in paid and unpaid work are less likely to be generalisable to them. In terms of differences in time use between the excluded and included sample, it is difficult to establish exact percentage differences because for every year around first birth, between 28-67% of the excluded sample had missing time use information (Appendix 7.2). However, from those that did have time use information, their change over time still followed the same trend as for the included sample (a switch to a high unpaid workload after first birth). The percentage not in paid work in the excluded sample (excluding missing observations) was higher than in the included sample, but it is difficult to know whether this is representative of the whole excluded group or just those enumerated.

Once clusters were identified using this sample, the cluster membership was merged back onto the complete respondent file (across all waves), for subsequent regression analyses. Observations for these 512 women spanned from year of first birth up to 16 years after first birth (4,285 observations in total). Half the sample were followed until at least 7 years after first birth (259 of 512), and 25% to 11 years after first birth (122 of 512).

7.3.2 **Methods**

In the first part of this analysis, we identified typical trajectories in paid and unpaid work around first birth using a sequence analysis. Distance matrix computation between individual sequences was

done using the Needleman-Wunsch algorithm (optimal matching) (Needleman and Wunsch, 1970; Brzinsky-Fay, Kohler and Luniak, 2006). To partition the sequences into clusters based on their distances, we used Ward's linkage, which produces a tree diagram (dendrogram) of relatedness between different sequences (Ward, 1963). The tree plot is then apportioned into different numbers of 'clusters'. In this analysis we explore splitting the whole sample into different numbers of groups, ranging from a division into halves, and working up to a division of the sample into tenths. An alternative method for splitting the data into clusters is 'partitioning around medoids'. We also tried this method, and it produced the same clusters descriptively as those from Ward's linkage.

The sequence analysis was first run using the three defined states, and then with the six defined states. When the analysis was run with the six-state framework, a different distance matrix between states was required. In the three-state sequence analysis, a change between each state was treated as a difference of one, which implicitly means that the distance between each state is always the same. This was logical given that moving between the three states took a change in one aspect (i.e. either 1) moving in and out of the labour force or 2) the amount of unpaid labour). The same is not true in the six-state sequence analysis as there are many more states. Therefore, the 'substitution cost' of moving between states is instead defined by the actual observed transition probabilities between the states in the sample.

Following the identification of clusters, the researcher must choose which clustering solution is 'best'. In this analysis we made the decision based on how different clustering solutions were to one another descriptively, and quality criteria tests. These tests indicate how similar individuals that have been grouped together really are. For example, having too few clusters may not capture the breadth of heterogeneity in trajectories (individuals within clusters may be quite dissimilar), while having too many clusters means that sample size may be minimised too much to be useful. We used average silhouette width, Calinski-Harabasz index and the Duda-Hart index as part of the quality evaluation (see Appendices 7.3-7.5). In terms of qualitative evaluation, we examined each clustering solution from smallest (2) to largest (10) and evaluated whether the additional cluster in the next solution was descriptively different to the clusters presented before. If it was, the clustering solution with more clusters was chosen. This process continued until clusters were no longer meaningfully different descriptively, or sample sizes became too small (subjectively defined as fewer than 50 individuals in a group).

Following the identification of clusters, we used the clusters from the six-state framework in the further analysis. We used a multinomial regression model to explore whether there were demographic characteristics associated with belonging to a typical trajectory. Lastly, we use

membership to the clusters as a predictive variable in an event history analysis. The 'survival' of interest is remaining with one child, rather than the 'event' of progressing to a second child. We used a discrete-time model (logit model) to account for data only being collected on a yearly basis, which introduces interval censoring. Demographic and evolutionary-anthropological resource and support theories linking labour division strategies to childbearing, hypothesise that those who have more support (and thus less of a dual burden) tend to have more children. This analysis does not use eventual parity as the outcome of interest because of the panel nature of the data, making censoring a concern for those who had not yet reached 45. While one cannot necessarily infer from these theories that those who have less dual burden will progress more quickly to their next child (the measurement of the event history model), the contention that they should have more children implies that they will have a lower probability of stopping at one child. The event history analysis can therefore still partially test gender revolution, cooperative breeding and resource allocation theories (i.e. those who have less support for childrearing, and more of a dual burden, will tend to remain with one child).

7.4 RESULTS

7.4.1 Paid and Unpaid work clusters

7.4.1.1 Three 'Dual Burden' States

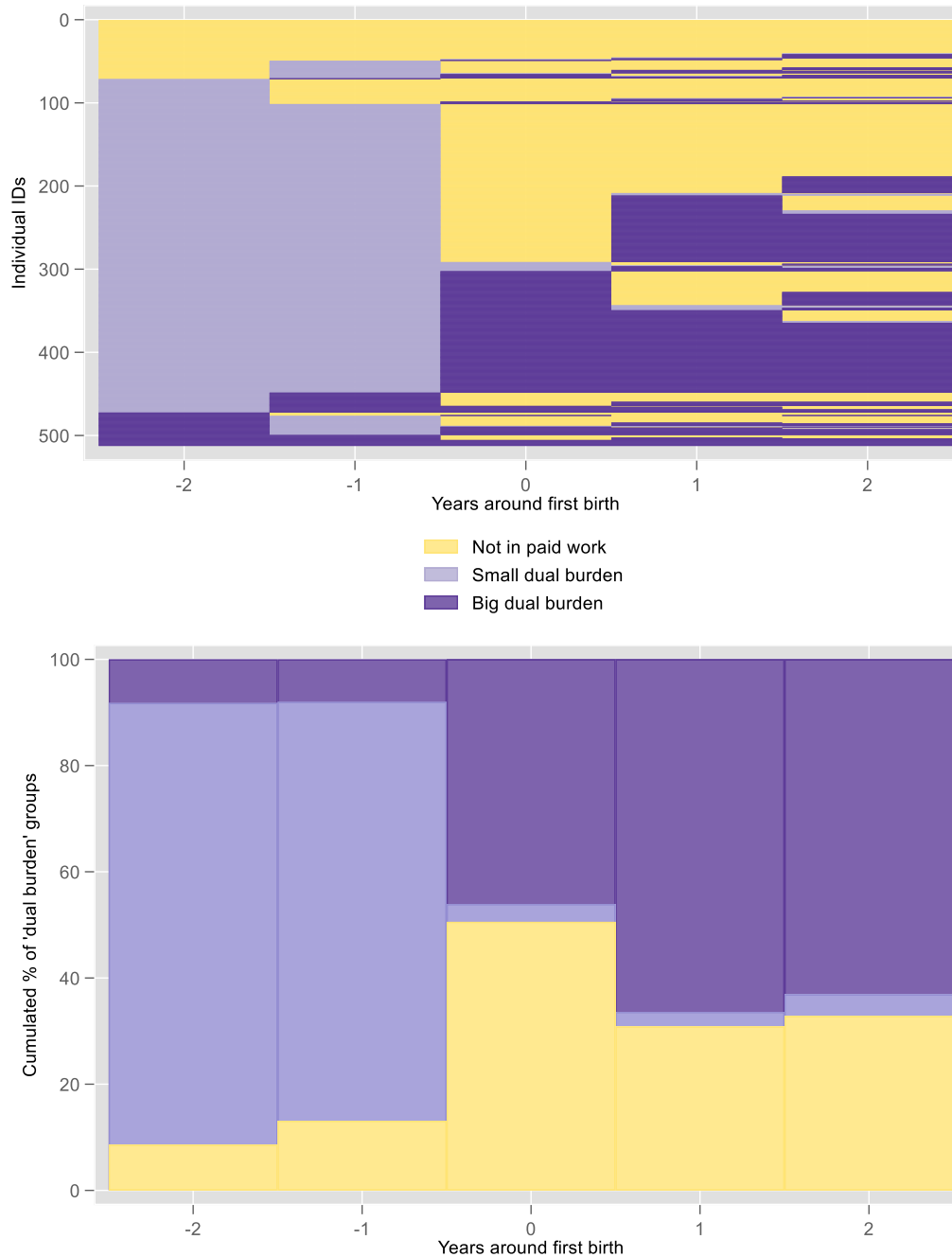


Figure 7.1: Top, individual sequences in the whole sample for each woman from 2 years before to 3 years after first birth. Bottom, the cumulative distribution of three dual burden states for the sample, from 2 years before to 3 years after first birth.

Figure 7.1 shows the paid and unpaid labour trajectory for each of the 526 individual sequences, from 2 years before first birth to 3 years after first birth. Respondents in yellow are those who are not in the labour force, lilac are those with a small dual burden, and dark purple those with a large

dual burden. Descriptively, four broad groups of trajectories seem apparent: those who have a small dual burden then do not work after first birth, those who have a small dual burden and then have a mix of large dual burden/time out of the labour force after first birth, those who consistently do not do paid work, and those who have a small dual burden and then switch to a large dual burden after first birth. Cumulatively, a clear shift in paid and unpaid work happens at the year of first birth. Prior to first birth most women fall into the ‘small dual burden’ group, whereas after first birth the sample divides fairly evenly into those not in the labour force and those with a large dual burden.

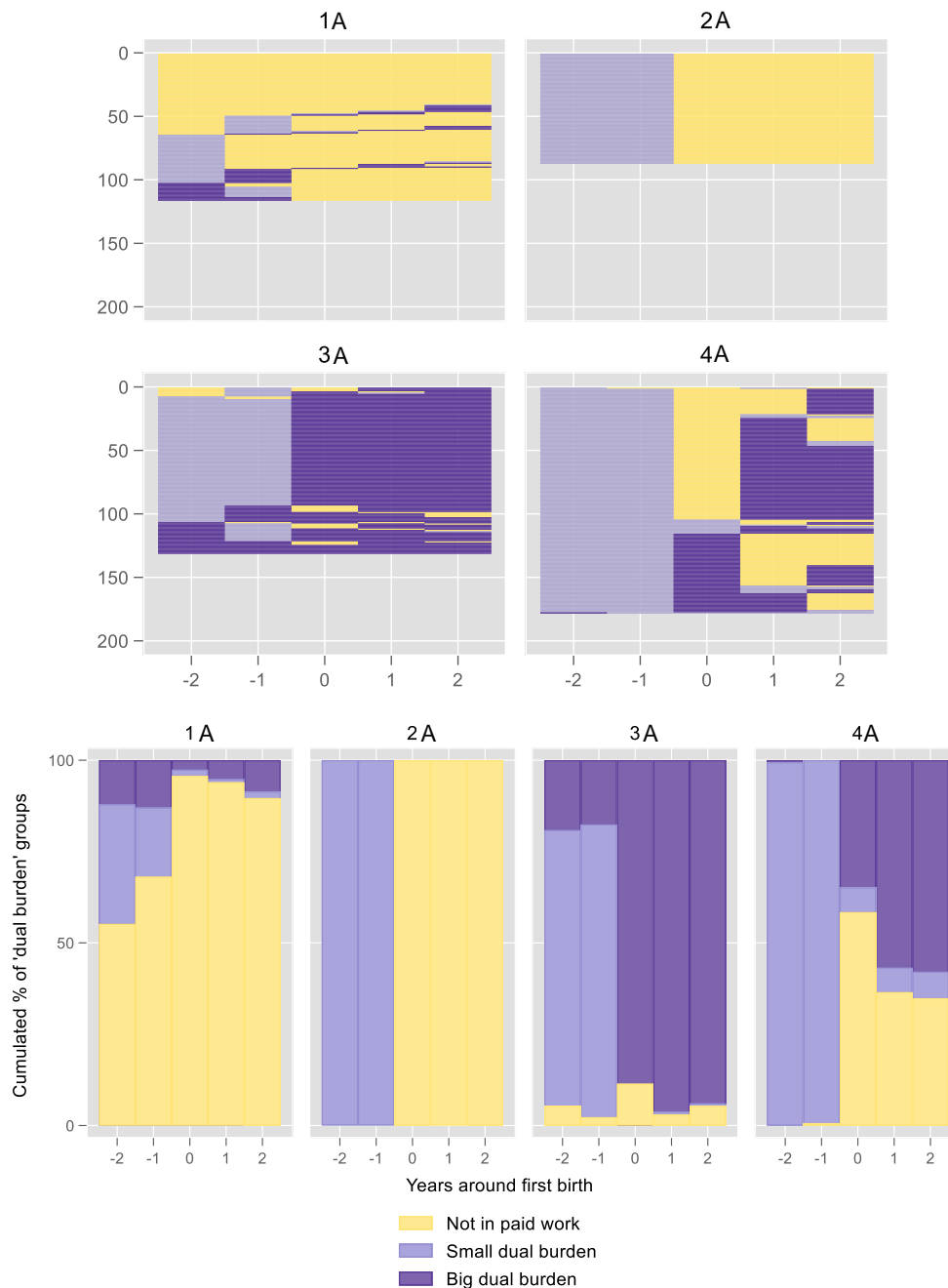


Figure 7.2: Top, the four clusters with the individual sequences of each cluster member. Bottom, the four clusters with proportion of those in each cluster belonging to the three dual burden groups.

These graphs were then apportioned into clusters following the methodology previously outlined. The quality criteria pointed to a small number of clusters being higher quality solutions, with average silhouette width of the clusters starting to be highly variable for some clusters at solutions of five or more clusters (Appendix 7.4). We therefore opted to use the four-cluster solution, as cluster quality was better than in the five-cluster solution, and the solution showed more distinction between trajectories than the three-cluster solution. Figure 7.2 shows the proportion of each cluster in each of the three states over time in the top panel, and the individual trajectories for each member of the cluster over time in the bottom panel. Cluster one shows some variation prior to first birth, but most of the women in this group are consistently not in the work force. Cluster two shows no variation: all members have a small dual burden prior to first birth and then drop out of the labour force. This was the most common individual sequence in the analysis (87 women, 17%). The third cluster broadly shows women who consistently work over this time frame, most commonly moving from a small dual burden to a large one after first birth (84 women (16.4% of the whole sample) followed this exact individual sequence). Finally, cluster four shows women who mostly worked prior to first birth, and then move between a large dual burden and time out of the workforce after first birth.

7.4.1.2 Six 'Dual Burden' States

The analysis using six states presents a more detailed picture of the changes in paid and unpaid labour occurring over the time of first birth. The overall story is similar: before first birth most women do 3 or fewer hours of unpaid work a day, and most are in full time work. After first birth, paid work trajectories diversify but, across the board, women move to doing more than 3 hours of unpaid work a day (Figure 7.3). As part of robustness checks, we also experimented with cutting the boundary for unpaid work at 9 hours, which is the average amount of unpaid work per day in the sample after first birth. However, this did not change the overall trends observed over time in unpaid labour: prior to first birth, the hours of unpaid work across the board, are significantly less compared to after first birth. There is, however, some diversity in the amount of unpaid work hours between the clusters (Appendix 7.6). Those who drop out of the labour force take on the biggest change in unpaid work hours (an average increase of 9.6 hours a day), whereas those who continue in full time work have the smallest change (an average increase of 6.6 additional hours a day). The other three clusters all adjusted by an increase of between 7.9-8.3 additional unpaid work hours per day. These distinctions in unpaid work hours and relative shifts are not well captured in the sequence analysis because of the definition of the 'states', but are interesting to note in terms of how to interpret subsequent findings in the regressions.

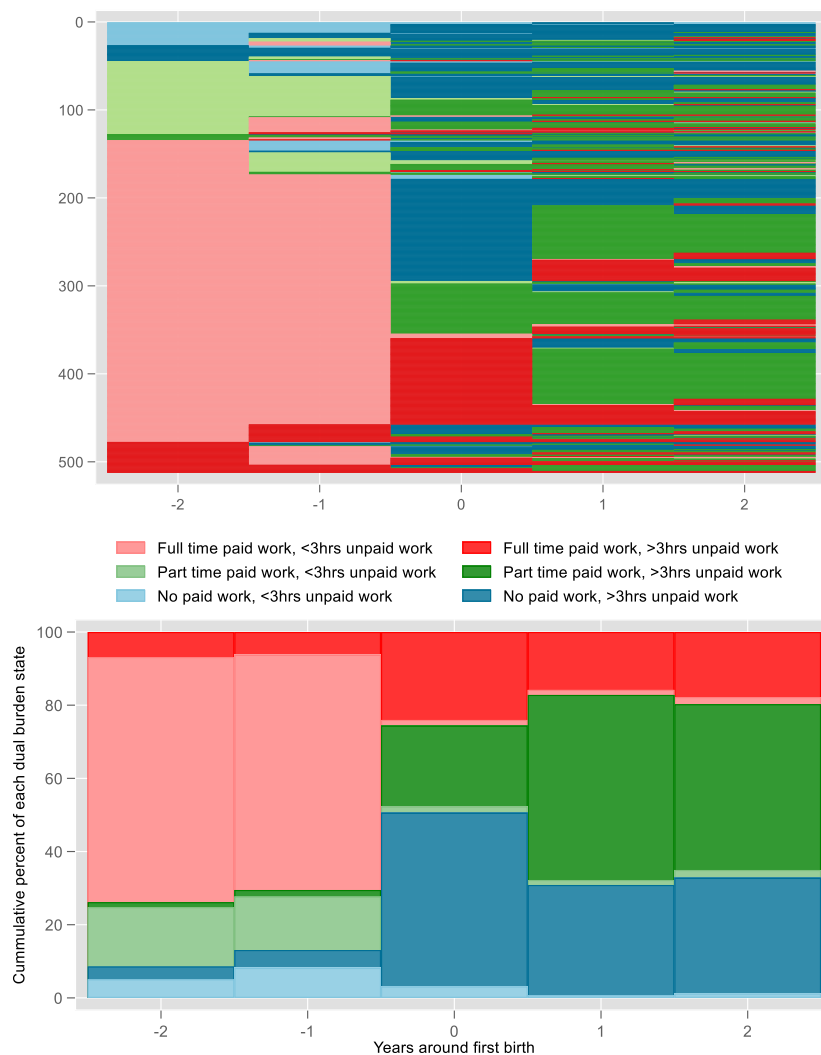


Figure 7.3: Top, individual sequences in the whole sample for each woman from 2 years before to 3 years after first birth. Bottom, the cumulative distribution of the six states for the sample, from 2 years before to 3 years after first birth.

From the overall sequences, we apportioned the sequences into different numbers of clusters. We opted for the five-cluster solution, as the quality of the clusters was good (Appendix 7.5) and sample size was still reasonable between the groups (the smallest being 53 women). Three of the clusters found in the three-state analysis were still represented in the new clusters: 1) women who mostly do not work over the whole period (cluster 1a previously and cluster 1b now (n=75, 15%)); 2) women with a small dual burden before first birth who drop out of the labour force after first birth (cluster 2a previously, cluster 2b now (n=96, 19%)); and 3) women who move from a small to large dual burden (cluster 3a) are now split into two in cluster 4b (n=198, 39%) and 5b (n=90, 18%). The distinction in this split is between those who work part-time after first birth (4b) and those who work full-time after first birth (5b). This distinction in paid work transitions after first birth is missing from the three-state model.

Cluster four in the three-state solution, where women had a low dual burden before first birth and then move in and out of the labour force after first birth, is not clearly represented in these new clusters. Instead, this group has been disbanded between the new clusters on the basis of whether the work after first birth is predominantly part-time or full-time. The novel cluster in this new clustering solution is 3b (n=53, 10%), which shows a group of women who move from fewer than 3 hours of unpaid work a day to more than 3 hours of unpaid work a day but are consistently in part-time work. Previously this group was merged into the three-state cluster showing women who move from a small dual burden to a large dual burden. We opted to use the six state clusters in the further analysis presented in this paper, as they present a more detailed picture of paid and unpaid work hours in this sample.

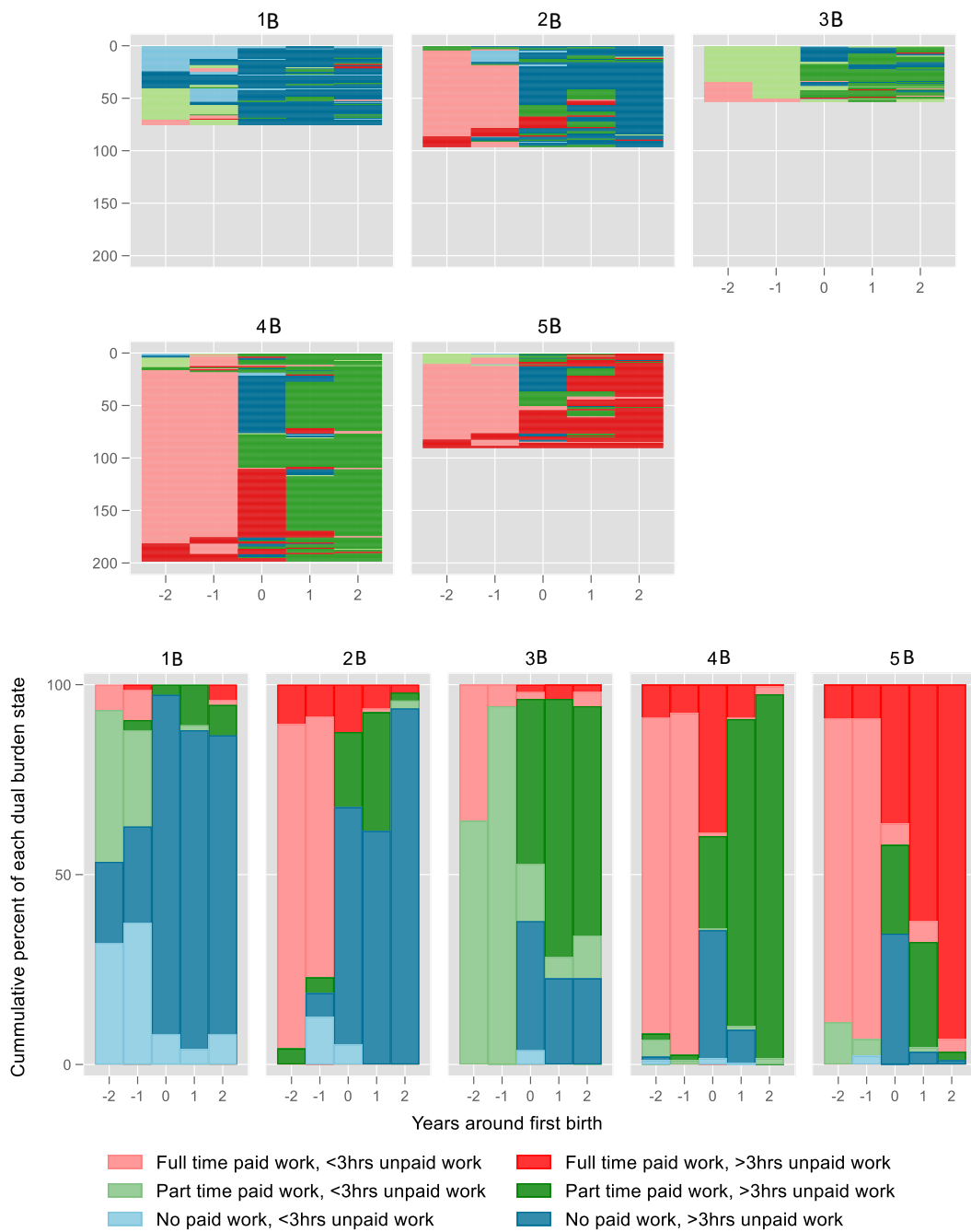


Figure 7.4: Top, the five clusters with the individual sequences of each cluster member. Bottom, the five clusters with proportion of those in each cluster belonging to the six states.

7.4.2 Demographic Predictors of Cluster Membership

Using multinomial regressions, we then tested whether any demographic characteristics were associated with cluster membership (see Table 7.3 and descriptive statistics in Appendix 7.7).

Compared to the fourth cluster (those that switch to part time work after first birth), those in cluster one (those that are mostly never in paid work) and those in cluster three (those consistently in part time work) were likely to be younger at age of first birth, and more likely to be a lone parent at time of first birth. The findings also show those in cluster one to be more likely to have not gone to university relative to those in cluster four.

	Cluster one: Consistently not in paid work, but more unpaid work after first birth	Cluster two: Full time work before first birth, drop out after first birth	Cluster three: Consistently in part time work, but more unpaid work after first birth	Cluster four: Full time work before first birth, move to mostly part time work after first birth	Cluster five: Consistently in full time work, but more unpaid work after first birth
Age at first birth	-0.165 ***	-0.044	-0.104 **	<i>Reference cluster</i>	-0.006
Highest education achieved at first birth (ref: Bachelor's degree)					
Postgrad	0.463	-0.001	-0.425		0.209
Graduate certificate	0.859	-1.34 *	-0.371		-0.038
Diploma	1.191 *	0.853 *	-0.525		0.699
Cert III/IV	0.843	0.235	-0.322		-0.342
Year 12	1.221 *	-0.106	-0.207		0.488
Year 11 and below	2.618 ***	0.944	-0.634		1.132
Partnership status at first birth (ref: in a partnership)					
Not in a partnership	2.377 *	0.765	2.136 *		-0.713

7.4.3 Cluster membership as a predictor of birth progression

Lastly, we explored whether belonging to the clusters was associated with probability of progressing to second births using discrete-time event history analysis (logit models). In Figure 7.6, we present the predicted 'hazard' of progression. The hazard is the conditional probability that an individual will experience the event of interest in the time period of interest, given that they did not experience it in an earlier time period. In Table 7.4, we present the odds ratio of progressing to a second birth (from which the hazard ratio is predicted).

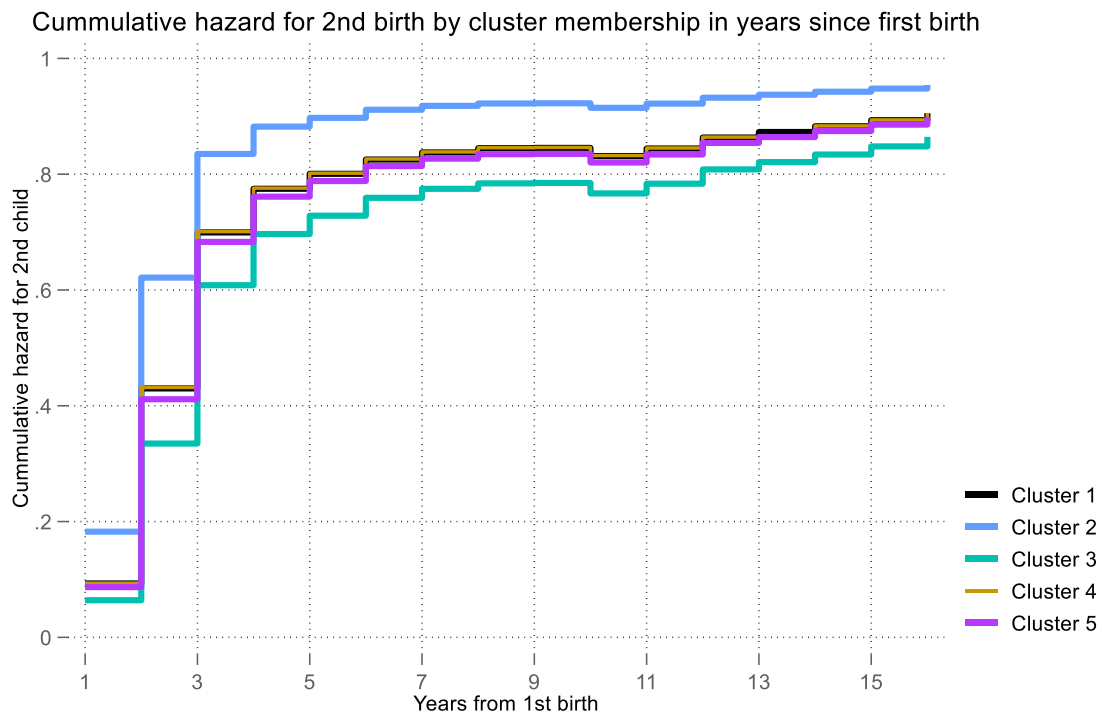


Figure 7.5: Cumulative hazard for progression to second birth by cluster group

Using cluster four again as the reference group (those who move from full-time work to part-time work after first birth), we find that those in clusters one (mainly not in paid work) and five (consistently in full-time work) are indistinguishable in their probability of progressing to a second childbirth. Cluster two (those who drop out of the labour force), in comparison, progress quicker, and cluster three (those who continuously do part-time work) progress slower. However, the difference in progression between clusters four and three is not statistically significant.

Table 7.4: Logit model estimating odds ratio of second birth.
p<0.05 *, p<0.01 **, p<0.005 ***

	Event = Second birth (odds ratio)
Years since first birth	
1	0.011 ***
2	0.079 ***
3	0.243
4	0.36
5	0.42
6	0.494
7	0.539
8	0.569
9	0.572
10	0.515
11	0.567
12	0.66
13	0.718
14	0.787
15	0.874
Cluster (ref: cluster 4)	
1	0.994
2	2.162 *
3	0.663
5	0.92

7.5 DISCUSSION

This paper aimed to explore how both paid and unpaid work change around the time of first birth using time use data from Australia. Further, we explored whether any demographic characteristics were associated with particular trajectories, and whether these trajectories were associated with quicker progression to second births. We therefore describe the many different changes that happen in quick succession at first birth (onset of parenthood, changing division of labour, and progression to further children) in order to disentangle how they might link with one another using a longitudinal perspective.

Following the three-state sequence analysis, we found a clear differentiation in work before and after first birth. In particular, there was a prominent move to either not being in work after first birth, or continuing to work but with an increased dual burden. Furthermore, women working with a ‘small dual burden’ (i.e. 3 hours or less unpaid work a day as well as a full or part-time job) all but disappeared in the period after first birth. This is in line with previous findings that there is a very pronounced increase in dual burden for Australian mothers at first birth (DeRose *et al.*, 2019; Johnstone, Lucke and Hewitt, 2020). We further explored these broad changes by dividing the states into two, distinguishing between part-time and full-time work, as well as gradients of unpaid work among those that were not in paid employment. While a similar overall picture was presented, this more detailed analysis revealed that the group which moved to a large dual burden after first birth in the three-state analysis, split into those who continued to work full-time, or more commonly,

those who switched to part-time paid employment. Further, the analysis identified a group that consistently work part-time across the transition to parenthood. This group shared demographic characteristics with the group who consistently did no paid work hours across the time period: a younger age at first birth and a higher probability of not having a partner. We also found that women who did no paid work hours were less likely to have gone to university.

Hakim's Preference Theory (Hakim, 2003) outlines that women fall into three preference groups: 'family-oriented women', 'adaptive women' and 'work-oriented women'. The first group prefer to invest in their family responsibilities and avoid paid work, speaking to the idea of the middle-class 'female-homemaker' stereotype where the male partner is responsible for the paid work in the household. However, in our analysis, women who consistently did no paid work did not fit well into this categorisation of a 'female-homemaker'. Firstly, they were more likely to be unpartnered. Furthermore, as these women tended to be younger at first birth, a better potential explanation for why these women were not employed across the transition to parenthood is that they did not form strong attachments to the work force after leaving school, rather than Hakim's assumed preference to invest in family. Additionally, we find considerable heterogeneity in behaviour over time in terms of paid and unpaid labour, and it is highly likely that structural constraints play a role in determining these groupings and the probability of further births as highlighted by previous studies (McRae, 2003; Vitali *et al.*, 2009; Sigle-Rushton, 2010; Davia and Legazpe, 2014). Our analysis therefore supports previous work critiquing Hakim's contention that preferences matter most for determining work-family outcomes (Tomlinson, 2006; Baxter *et al.*, 2015; Johnstone and Lee, 2016). Furthermore, our results support evolutionary perspectives about the importance of structural aspects of the environment for explaining mothers' labour division strategies, and subsequent family outcomes.

Our findings that age, education and partnership status are associated with trajectories in paid and unpaid work around first birth, confirms conclusions from the existing literature that life course factors matter for determining labour trajectories, in addition to the effect of first birth itself. Previous studies looking at demographic predictors of paid and unpaid labour over the life course have tended to focus on the role of education. For example, studies have found that in high-income contexts, higher educated mothers tend to get more help from fathers (Kan and Laurie, 2016), but also tend to spend more hours per week with their children (Sayer, Gauthier and Furstenberg, 2004). As we found ubiquitous increases in unpaid work hours after first birth in our clusters, our results do not particularly support or refute these previous findings. However, we did find that the group with the smallest increase in unpaid work hours after first birth were the group with relatively higher

educational attainment, this being the group who consistently worked full-time across the transition to parenthood (Appendix 7.7). This may suggest that these more highly educated women are getting more support with childrearing responsibilities as other studies have shown; however, another plausible reason is that the increase is less pronounced because these women spend more hours of their day performing paid work. A valuable extension to this analysis would be to include other known predictors of paid and unpaid work in Australia in this regression. For example, in terms of ethnicity, Indigenous couples tend to have a less uneven division of unpaid work (Ting, Perales and Baxter, 2016). Religiosity (Baxter *et al.*, 2015) and gender role attitudes (Baxter, Hewitt and Haynes, 2008) are also likely to be important predictors of labour division strategies for Australian couples. In the last part of our analysis, we found evidence that the clusters had differing probabilities of progressing to a second birth. Those who dropped out of the labour force after first birth (cluster two) were the most likely to have a second child, and those that consistently worked part time (cluster three) were the least likely of the five clusters to progress to second child, although they were not significantly different from other women who did more paid work across the transition to parenthood. This is in line with findings from Italy and South Korea, that found women who work across the transition to first birth are the least likely to have a second child (Matysiak and Vignoli, 2013; Ma, 2016). However, the same finding was not replicated in Poland, suggesting cross-national differences in this association (Matysiak and Vignoli, 2013).

However, we also found that women who consistently did not work across the transition to parenthood did not differ in their probability of having a second child relative to women who remained in paid work. This highlights issues with trying to causally interpret our descriptive findings as, for example, it is likely that women who did no paid work did not progress as quickly because of other contextual factors. One of the latter identified by us was that women in this group were less likely to have a partner at first birth. However, we could not control for demographic characteristics, such as partnership status, in the event history models. This is because demographic characteristics were already associated with cluster membership (Table 7.3) and including them would bias the interpretation of the logit models. We do, however, outline that these factors are linked longitudinally: demographic factors precede changing division of labour at first birth, and changes at first birth (which are in turn linked to demographic factors) are associated with future birth probabilities. Finding how these factors relate causally will require methods such as pathway analysis, directed acyclic graphs or structural equation modelling to establish the effect of each factor respectively on each subsequent outcome in the causal pathway. These techniques would be able to model the indirect effects of socio-economic factors on childbearing outcomes via changes in paid and unpaid work, whilst also exploring direct effects after first birth that are not mediated via

changes in work patterns. This could include other competing causal explanations or mediating factors for progression to second birth, like the role of the mother's support network and financial resources for childrearing.

The primary limitations of this analysis stem from the clustering of women on the basis of their paid and unpaid work. For the sequence analysis to run properly, observations had to be dropped, meaning selection bias may have been introduced. The trends in time use over years of observation were similar across the included and excluded sample; however, there were a higher proportion of individuals not in paid work among those who were enumerated in the excluded sample. It is difficult to estimate what direction the bias of excluding these individuals would be on the association between cluster membership and second birth. This is firstly because 36% of the excluded sample's observations had missing time use entries. Secondly, if the percentage difference between the included and excluded sample is true, one can predict two counteracting hypotheses. Firstly, that women not in paid work are better able to manage their unpaid responsibilities, making them more likely to progress quicker to a second birth. Excluding them from the analysis would therefore lead to a dilution of the effect between division of labour and second birth progression. Alternatively, given that women not in paid work in the included sample were more likely to be younger and unpartnered, the opposite association with second birth could also be true as unpartnered women would have a slower progression. To explore this further, I would need to analyse whether there were any demographic differences between the excluded sample not in paid work, and those not in paid work who formed cluster 1.

In terms of differences in demographic characteristics, these were not large (no more than 5% difference in most cases) between the included and excluded sample. However, the excluded sample was slightly younger, less educated and more likely to be unpartnered. In terms of how this might affect the sequence analysis, this may have meant trajectories more typical to these groups would have been overlooked, meaning that their inclusion may have resulted in different overall groupings. This links to the second limitation of the sequence analysis approach: that whilst it is useful for identifying similarities and differences in common trajectories, more rare trajectories may have been overlooked because of the need to keep reasonable sample sizes in each group.

A third limitation of the sequence analysis is that the yearly observation means there is a degree of interval censoring. This is a particular issue in the year immediately after first birth when women take maternity leave. Depending on when the observation falls within the year, some women may have taken maternity leave but have now returned to work. There may, therefore, be unnecessary distinctions in the clustering solution made between those who are observed during maternity leave

in the first year and those who are not. To improve this exploratory analysis, more detailed monthly data would need to be collected to clearly identify the time period where women take maternity leave.

Lastly, unlike a sequence analysis looking at objectively measured states (e.g. marital status), the states used by us are subjectively defined, and may not adequately capture the interplay between paid and unpaid work. However, as the goal of the analysis was to find broad themes in changing labour division for women around first birth, the analysis has nonetheless identified typical trends according to these states in the Australian context. This study therefore provides an important first step in disentangling how demographic characteristics prior to first birth, changing division of labour at first birth, and future childbearing outcomes are connected.

8 DISCUSSION

8.1 SUMMARY OF FINDINGS

This thesis aimed to explore whether women's dual burden of paid and unpaid work could help explain the fertility gap, by evaluating its association with women's reproductive goals, their fulfilment and eventual birth outcomes over time. To do so I examine how the theory, measurement, and operationalisation of reproductive decision-making and gendered division of labour matters for the conclusions one can draw for this question. I began in Chapter 2 by critiquing and synthesising theoretical approaches on both reproductive decision-making and gendered division labour from demographic, evolutionary, sociological, and psychological perspectives. I synthesised how theories of reproductive decision making can be combined with 'content' theories (such as gendered division of labour theories) to produce testable hypotheses implemented through the TDIB framework. In Chapter 3, I then illustrated an application of this combination of theories: I evaluated existing evidence for a link between gender equity in the household and fertility intentions and outcomes, using evolutionary perspectives to critique existing sociological theories on the topic, and the TDIB framework to give structure and clarity to the review.

Following these chapters, I used my theoretical synthesis to inform my empirical work. Firstly, to generate new data for measuring concepts pertinent to the fertility gap (Chapters 4 and 5) and secondly, to inform my analytical approach when using existing secondary data sets (Chapters 6 and 7). Having firmly established the value of the TDIB framework for standardising analysis and data collection on reproductive decision-making in Chapters 2 and 3, I wrote and tested my own questions operationalising the framework. In Chapter 4, I discussed an overview of the findings from this pilot, as well as thoughts and feelings from respondents about their reproductive decision-making. In Chapter 5, I analysed the validity of the 'motives' questions using the data we collected from Poland and the UK.

Clarifying the theoretical and methodological considerations of studying reproductive decision-making in these early chapters led to the development of Chapter 6. Instead of studying whether couples who divide labour equally are more or less likely to fulfil their childbearing intentions as I had originally planned, I decided to take a step back in the chronology of decision-making to examine how expectations change over time as an explanation for the fertility gap. I specifically focused on US and UK women who only ever had one child, who are an understudied group relative to women without children, and found a decline in expectations around the time of first birth. Building from this finding, I again focused on the time around first birth in Chapter 7 and aimed to disentangle some of the simultaneous changes at parenthood which could explain my findings from

Chapter 6. Using Australian data, I found that demographic characteristics prior to first birth dictate the division of paid and unpaid labour for mothers around the time of first birth. Further, these division strategies at first birth are associated with second birth outcomes but the causality of that pathway needs additional investigation.

In this discussion, I first pull together, interpret, and discuss the implications of my findings. Second, I discuss the limitations of the work, and lastly, I outline my recommendations for future research.

8.2 INTERPRETATION OF FINDINGS AND IMPLICATIONS

8.2.1 Is the fertility gap phenomenon driven by issues of measurement?

Previous work that has approached this question has identified several shortfalls with interpreting the fertility gap as a product of obstacles to realising childbearing goals. Firstly, that measures of ideal fertility primarily capture societal norms about childbearing rather than an individual's actual childbearing goals (Trent, 1980). Secondly, that the aggregate 'gap' hides considerable heterogeneity in both individuals' childbearing intentions and achieved fertility (Harknett and Hartnett, 2014), so while it appears that individuals are wanting two children, but many stop at one, this hides variation in the parity composition of both intentions and outcomes between individuals. Third, the construct does not acknowledge changing childbearing goals over the life course (Hayford, 2009; Liefbroer, 2009; Iacovou and Tavares, 2011). Finally, that the gap may falsely arise by comparing lifetime childbearing goals against cross-sectional achieved fertility (Beaujouan and Berghammer, 2019). To further contribute to this debate, this thesis provided a series of contributions to help improve our understanding of the fertility gap phenomenon. In order to examine the fertility gap three things are required: 1) clear theory on reproductive decision-making to inform analytical strategies investigating why achieved and intended fertility differ, 2) standardised data collection informed by these theories, and 3) a micro-level exploration of how intended and achieved fertility are interconnected over the life course.

8.2.1.1 Theoretical clarity on the fertility gap

In my systematic review of the literature on gender equity in the household and fertility (Chapter 3), I found limited evidence of any use of reproductive decision-making theories informing analyses. Most concerning was an absence of these theories in the empirical work on realising intentions for children. As a result, methodological flaws, such as comparing achieved cross-sectional fertility to lifetime intentions for children, was evident in the papers I reviewed. These papers are therefore unable to convincingly show whether inequity in household division of labour is an obstacle to realising intentions, and thus provide a counter argument to the idea that the fertility gap is only the result of measurement error.

As a result of the methodological confusion I found in my systematic review, I hypothesised that a clear guide on how to implement theories of reproductive decision-making in this area of research, as well as fertility research more generally, was lacking from the literature. This contributed to the development of the central arguments of my systematic review, encouraging fertility researchers to engage with the TDIB framework to standardise their research. I also encouraged wider use of the TDIB framework in Chapter 2, as the framework, compared to other theories of reproductive decision-making, has clearly defined concepts that lend themselves to operationalisation in data collection and analysis.

8.2.1.2 Data informed by theories of reproductive decision-making

The second requirement to answer this overarching question, on whether the fertility gap is driven by issues of measurement, is data that adequately measures both reproductive decision-making and completed childbearing in a longitudinal perspective. I struggled to find suitable data sources that met these criteria. The best data set I found and used was the National Longitudinal Survey of Youth in Chapter 6, because I could follow both childbearing expectations and outcomes throughout women's complete reproductive lives. However, the data would not allow me to explore short-term realisation of intentions (the key measurement for evaluating whether the fertility gap occurs as a result of obstacles) as this construct was only introduced into the survey in 1994, 15 years after data collection first started, by which time 86% of second children had already been born. The only survey that is truly suitable for measuring realisation of intentions is the Generations and Gender Survey, as the design of the fertility questions was informed by the Theory of Planned Behaviour. However, I and many others have argued that the TPB has been difficult to operationalise and validate (Dommermuth, Klobas and Lappegård, 2011; Mencarini, Vignoli and Gottard, 2015). This was a strong motivation for writing and testing a series of questions that operationalise the TDIB framework (Chapters 4 and 5), so that better data on reproductive decision making can be made available to answer questions like my own.

8.2.1.3 Micro-level analysis of childbearing expectations

The final requirement to explore this overarching question on the fertility gap, is to move beyond the aggregate comparison of macro-level and cross-sectional measures of intended and achieved fertility, and explore the two measures on the micro-level over time. In doing so, the mechanism for why the aggregate gap exists can be elucidated: is it that there are genuine obstacles on the path to childbearing that prevent reproductive goals from being realised? Or is it that the aggregate gap hides heterogeneity in both individual intentions and outcomes, especially given that childbearing goals shift with life course events and new information? I therefore explored how expectations change over time in the US and the UK among women who only had one child (Chapter 6). I found

evidence that expectations for children already decline among this group of women in the five years prior to first birth, averaging an expectation between 2-1.7 children. The decline towards the majority of women expecting one child, however, occurs in the five years after first birth. I therefore conclude that in these samples, there is evidence of conformity to social norms about family size prior to first birth, particularly among those who give birth relatively young, and revisions away from the norm in the years immediately following the onset of parenthood. This work therefore supports arguments that it is simplistic to interpret the fertility gap as purely the result of obstacles to childbearing, as expectations are observed to shift away from family size norms during the life course for women who only have one child. This is not to say that this shift cannot be motivated by 'obstacles', but from existing evidence, it is not true to conclude ideals for children remain constant as the fertility gap might imply.

8.2.1.4 Further lines of enquiry

To truly answer this overarching question about the fertility gap requires extensions of the current literature. First, it requires longitudinal exploration of whether downwards revisions of childbearing goals are associated with changing circumstances. For example, previous studies have shown that not having a partner, or having a partnership break up, is strongly predictive of diminishing childbearing expectations (Qu, Weston and Kilmartin, 2000; Mitchell and Gray, 2007; Hayford, 2009; Liebroer, 2009; Iacovou and Tavares, 2011; Gray, Evans and Reimondos, 2013), as is postponement of childbearing to older ages (Quesnel-Vallee and Morgan, 2003; Heiland, Prskawetz and Sanderson, 2008; Hayford, 2009; Dey and Wasoff, 2010) and poor health (Gray, Evans and Reimondos, 2013).

However, concluding whether these situational factors can be defined as undesired 'obstacles', rather than willing adjustment of priorities in response to changing circumstances requires qualitative lines of enquiry. For example, longitudinal qualitative data asking respondents about their reproductive decision-making across the transition to parenthood. This ensures there is no recall bias, as may be an issue when asking about changing intentions in a cross-sectional analysis. When a change is observed in childbearing expectations, a qualitative analysis could then ask the participants whether they can articulate a reason for this change. This would be the clearest route for establishing what may be driving changing intentions, and if there is change, whether it is considered acceptable or not by the respondent. This is particularly important at the onset of parenthood, as it has been both theorised (Udry, 1983; Miller and Pasta, 1995b) and demonstrated as a time of deliberative thinking about future family plans (Fletcher-Hildebrand *et al.*, 2021). My own qualitative work did not follow a longitudinal perspective, but it was nonetheless enlightening for my future research to hear respondents explain factors most important for their reproductive

choices. For example, participants clearly articulated that they perceived factors such as their health and a poor state of society as obstacles to fulfilling their intentions for children.

The only study I am aware of that longitudinally observed parents before and after first birth using follow up interviews was the Swiss *Beyond Families* study (Bernardi, Mynarska and Rossier, 2015). The study had limited sample size (n=12), but their findings pointed to considerable instability in the reporting of reproductive decision-making during the transition to first birth. Typically, participants presented their intention for a second child as a 'conditional' goal, usually conditional on having achieved another priority before acting on this intention, like a career progression. This study therefore supports the idea that competing goals can be described as obstacles to realising intentions. However, it makes the task of setting time frames for realising intentions in future studies challenging, as respondents present intentions as a flexible, moving target. A productive line of enquiry for my future work may therefore be to explore the role of flexibility and uncertainty in intentions as an explanation for the fertility gap. For example, in Malawi, preferences for children were observed to be more or less flexible dependent on age, socio-economic status, and perceived uncertainty from prevailing mortality conditions (Trinitapoli and Yeatman, 2018). Changing labour division strategies between couples may also influence how flexible or certain a childbearing intention is.

A second finding from the *Beyond Families* study was that while respondents were able to visualise what their lives may look like after they become parents, they were unable to predict exactly how different aspects of their future life might influence their childbearing plans. Bernardi et al. therefore suggested that a hypothesis to be tested in future work is that intentions for a second child made prior to first birth will be less predictive of that outcome than intentions made after first birth (Bernardi, Mynarska and Rossier, 2015). Chapter 6 in this thesis supports this hypothesis exactly for women who only ever have one child.

8.2.2 Does a lack of complementary roles between partners help explain why individuals fail to realise their expectations for children?

8.2.2.1 Complementary roles and forming childbearing intentions

Using the perspective of the TDIB, and the guide I outline in Chapter 2 for generating analytical frameworks, there are two potential causal mechanisms for how a lack of complementary roles between partners can result in childbearing goals becoming unrealised. First, whether gendered division of labour results in desires for children being sacrificed because of perceived obstacles, resulting in less ambitious intentions (e.g. an individual has a desire for two children, but because of perceived obstacles only intends one). In the systematic review of the literature, I found that the

most common finding (23 of 43 studies) found a positive association between more gender equity in the household and fertility intentions, both in the long term (intentions for children in the future) and short term (within the next 3 years). The most common finding after this was no statistical association (8 studies). Broadly, I conclude that my review found evidence that gender equity in the household is influencing individual's intentions.

8.2.2.2 *Complementary roles and realising childbearing intentions*

The second part of the pathway, for why childbearing ideals may not be met, is whether once an intention is formed the individual then goes on to fulfil that intention. Domestic division of labour can therefore have a secondary influence as an obstacle in this pathway. In my systematic review, I identified three papers that found realising an intention for a second child was more likely if the male partner contributed more to domestic and childcare tasks in South Korea and Italy (Rinesi *et al.*, 2011; Kim, 2017; Yoon, 2017). However, the methodology of these papers was problematic, comparing lifetime fertility desires to cross-sectionally observed fertility or number of children born within the next few years. Concluding that domestic division of labour is important for realising intentions based on these analyses alone should be made with caution.

8.2.2.3 *Complementary roles and the whole reproductive decision-making pathway*

I do not causally test for an association between gendered division of labour with either the first (forming intentions) or second (realising intentions) part of the reproductive decision-making pathway in the empirical work presented in this thesis. This is firstly because extensive descriptive exploration was needed before any causal analysis could commence. For example, studying the realisation of intentions for a second child, without exploring who would be excluded from that analysis, would have led to biased conclusions about who realises intentions, and by extension, why the aggregate fertility gap exists. Indeed, this proved to be important as in Chapter 6 I found that, on average, women who only have one child in the US and the UK are more likely to expect two children prior to becoming a mother. My analysis highlighted a shift in expectations following parenthood, which is also intertwined with considerable changes in domestic division of labour. I therefore separately needed to establish a detailed longitudinal picture of how division of labour changes during the transition to parenthood (Chapter 7) before causal analyses could be integrated to link the two. The only potential causal relationship I demonstrate between division of labour and fulfilling reproductive intentions, is an association between progression to a second child in the Australian sample and the division of labour at first birth. However, a pathway analysis would be needed to provide strong evidence for a causal link, as demographic factors such as age and education were already predictive of how division of labour changes at first birth. The direct and

indirect effects of these different variables would need to be carefully assessed, for example in a structural equation model.

The second reason for not engaging with causal analysis was due to issues of data suitability and ensuring this thesis provides a novel contribution to the literature. Since I wrote my systematic review in 2019, Riederer et al. (2019) have tested the causal pathway for how division of household labour relates to both the formation and realisation of intentions using data from the Generations and Gender Survey. As mentioned previously, the GGS is really the only suitable longitudinal data set that can be used to test these causal linkages, because the questions were written to operationalise the Theory of Planned Behaviour. Riederer et al. find that household division of labour is instrumental in the formation of intentions for children in Austria, France, Hungary and Poland. However, household division of labour did not further enable or inhibit the probability of those intentions becoming realised. Division of labour in the household can therefore be considered a potential explanation for why the fertility gap exists, however primarily through the causal mechanism of intention formation.

8.2.3 Does gendered division of labour still matter for contemporary low fertility?

In the introduction to this thesis, I raised the point that the relevance of gender equity explanations for low fertility has been questioned in light of falling fertility in Nordic states (Hellstrand *et al.*, 2020). Lesthaeghe (2020) has argued that U-shaped gender revolution theories have been overly determined by the relatively high fertility of these states in the early 2000s, pulling the right hand tail of the curve up into a U shape. Given the more family friendly policies in these countries (Sweden, Norway, Finland), this served to confirm gender equity arguments. However, fertility has fallen in these countries to much lower levels in the last 10 years. The total fertility rate (TFR) in Norway reached historical new lows in the last 10 years, 1.56 in 2019 and 1.48 in 2020 (Statistics Norway, 2021). The Finnish TFR has reached even lower levels, standing at 1.35 in 2019 (Rotkirch, 2020), although there was a slight uptick in 2020 (1.37), the first increase since 2010 (Statistics Finland, 2021). The falling TFRs in these countries has led to increasing scepticism in gender equity explanations for fertility, with increasing attention in the demographic community to theories relating to social, economic and climatic uncertainty to explain these trends (Aassve, Le Moglie and Mencarini, 2021). This fits with Lesthaeghe's critique that gender equity theories are overly reliant on a single explanatory factor for explaining macro-fertility trends, without giving due consideration to other structural and ideational factors (Lesthaeghe, 2020). Further, a longitudinal analysis of macro-level gender equity (defined as women's political empowerment) and fertility has failed to replicate the U-shaped curve between gender equity and fertility in high income contexts (Kolk,

2019). As a result, I have witnessed several informal discussions between demographers about whether to still consider exploring gender equity arguments as an explanation for fertility trends.

Some clarity might be brought to this debate by restating that gender equity consists of many different facets of equality (Mills, 2010; Neyer, Lappegård and Vignoli, 2013). For example, the Kolk study uses public-sphere measures of gender equity (female political empowerment) as its explanatory variable. Public sphere gender equity, as gender revolution theory argues, is typically associated with decreasing rather than increasing fertility, so exploring the correlation between men's domestic work and fertility may have produced a different finding (Goldscheider, Oláh and Puur, 2010). As I explore in the beginning of my systematic review, another facet of gender equity studied in relation to the demographic transition, is female decision-making power. However, the rise in female formal education and female decision-making power may simultaneously be associated with a clamping down on female autonomy during the demographic transition through the spread of patriarchal, male-breadwinner family norms (Basu, 2002, 2017). Different aspects of gender equity can therefore operate independently to one another. The most accurate way to operationalise and test U-shape curve theories would be to observe fertility over time relative to changing social norms about gender roles.

The second factor that can help provide an answer to this debate, is to clarify whether gender equity in the household is being used as an explanation for macro or micro-level fertility. Macro and micro-level population processes are intertwined. Aggregate population trends are driven by casual factors and pathways (i.e. decision-making) occurring at the individual level (Billari, 2015). However, there are also downwards effects from the macro to the micro level, meaning it is simplistic to view population trends as purely the aggregation of micro-level behaviour (Courgeau *et al.*, 2016). There is certainly evidence of a macro-micro interaction between macro-level gender equity and gender equity experienced at the micro-level (Hook, 2006; Ruppner and Huffman, 2014; Ruppner and Maume, 2016). Fuwa (2004), for example, finds that women in less gender equal countries (macro-level gender equity) experience less gender equity at the individual level regardless of their individual characteristics (e.g. income and education).

Nonetheless, it is fair to partition the level at which different causal factors operate and their effect respectively on micro and macro measures of fertility. Original U-shaped theories outline that fertility levels will fall then rise in response to changes in the predominant division of paid and unpaid labour within a society (i.e. a macro-level measure of gender equity) (Esping-Andersen and Billari, 2015). However, this theory has also been extrapolated to apply on the micro-level: that within a given sample male-breadwinner-female-homemaker couples, and couples who divide all

labour equally, will have higher fertility relative to couples where the woman has a dual burden of paid and unpaid labour (e.g. Oláh 2003; Brodmann et al. 2007; Dommermuth et al. 2017).

Lesthaeghe has criticised analyses like these as ‘reading history sideways’ (Lesthaeghe, 2020).

However, I would argue that it makes the most sense to continue studying the relevance of gender equity arguments for fertility in micro-level studies like these. The timing of a return to higher fertility, as outlined in U-shaped curve theories, has never been modelled or specified. Further, in light of decreasing fertility in the ‘gender egalitarian’ Nordic states, and a failure for a U-shaped fertility curve to materialise yet, the relevance of gender equity theories to explain macro-level fertility seems to be diminishing (Demeny, 2015).

However, whilst acknowledging that there are macro-micro interactions to be accounted for, examining the micro-level influence of gendered division labour on individual’s reproductive decision-making is still a highly relevant area of interest to demographers. Approaching the topic using insights from life history theory and cooperative breeding hypothesis, shows that support with childrearing will always remain important in explaining individual’s reproductive decision-making. Fertility decisions and outcomes are ultimately dictated by finite energetic resources, which will be allocated to competing life history traits (e.g. childbearing, immune function, growth) in accordance to other environmental and contextual factors. Alleviating burdens on those energetic resources through support with childrearing, whether through the male partner, friends, family or paid childcare services, will always serve to free up more resources for potential future childbearing. The exact way this plays out will be more nuanced than ‘more support results in more children’, owing to socio-cultural factors. However, the ultimate explanation for fertility behaviour cannot be lost when seeking to understand individual’s childbearing choices and outcomes.

8.2.3.1 Does ‘uncertainty’ trump gender equity as an explanation for low fertility trends?

As mentioned at the start of this section, the growing explanation for current low fertility trends relates to perceived uncertainty and fear of the future (Campisi *et al.*, 2020; Vignoli *et al.*, 2020; Aassve, Le Moglie and Mencarini, 2021; Balbo and Ivanova, 2021; Comolli and Vignoli, 2021). This work stems from findings during the 20th century of procyclicality between economic crashes (e.g. the Great Recession or the 2007-2008 financial crisis) and fertility. Fertility increases during periods of economic growth and recedes during times of financial hardship (Goldstein *et al.*, 2013).

Extending from this, the literature has identified a plethora of uncertainties that can influence fertility in high-income contexts, such as the rise of insecure work contracts, rising house prices, political instability, and climate change. In the qualitative work presented in this thesis, several of these themes came up as reasons important to individuals’ reproductive decision-making. Indeed, a

perceived poor state of society and climate change were some of the most impassioned responses I received.

As this is a burgeoning area of research, and beyond the scope of work in this thesis, I cannot provide a definitive answer to how and whether gendered division of labour theories fit into this explanation for low fertility. However, I have two thoughts stemming from the work of my PhD. First, is that the link between uncertainty and fertility cannot be understood without also addressing patterns of inequality in high-income countries. Inequality for women in balancing career and family responsibilities, I would argue, is a key component of uncertainty for women when planning their futures. Second, I have argued that a key part of understanding fertility, in line with evolutionary perspectives, is exploring the role of the environment in driving decision-making. Perceived and experienced support with childrearing, as well as socio-economic or climate uncertainty, are both features of the environment likely to play a role in determining decision-making. It is therefore positive to see a wider recognition by demographers of environmental factors as explanations for current fertility trends.

8.3 LIMITATIONS

An overarching concern with research presented in this thesis, and research on fertility generally, is how to effectively measure and analyse reproductive decision-making given the complexities of the psychology and behaviour involved. In this thesis, I have called for greater standardisation of research and analysis informed by the TDIB framework. However, inherent with advocating for clear rules on how to operationalise this complex behaviour, I also risk oversimplifying undoubtedly multi-causal and multi-faceted psychological processes in both my theoretical and empirical work. For example, reproductive decision-making is driven not only by conscious thinking (as I measure in my survey), but also non-conscious and sub-conscious processes that are difficult to capture and measure (Bachrach and Morgan, 2013). Further, biological parenthood is also determined by physiological factors and the necessity of opposite sex partners. Thus, while fertility research like my own needs a certain amount of focus and simplification to be practical, the conclusions reached from my findings must be interpreted cautiously, because of the complexities in studying reproductive decision-making. Below, I will now discuss the more specific limitations relating to the different approaches and methods used in the chapters of this thesis.

8.3.1 Theoretical Limitations

This thesis grapples with several different theoretical stances and substantive areas of research. However, it is not possible to synthesise and incorporate all aspects that may have been relevant to

this thesis. For example, in my guide to implementing theory in research, I may well have overlooked useful theories that could have been incorporated.

The systematic review may also have missed relevant papers, either because the search terms were not broad enough, or because of the way I defined inclusion/exclusion criteria. The conclusions I made from the literature may also be subject to bias, as the interpretation of the literature is based on my own prior knowledge. Decisions I made along the way in conducting the review will have also influenced how I presented and interpreted the findings, particularly as formal meta-analysis was not possible because of the variability between analyses in how gender equity in the household, and fertility intentions and outcomes, were operationalised.

At the beginning of the thesis and initial chapters, I explore the intersections between the three main theoretical perspectives I draw from in this thesis (psychology, sociological demography and evolutionary anthropology). In the empirical work, my research questions were informed primarily by psychosocial theories (Chapters 4, 5 and 6) and demographic theories (Chapters 6 and 7). Evolutionary theories were used as a critical lens with which to highlight the importance of complementary roles and support networks for childbearing (Chapters 2,3 and 7). I do not explicitly test any questions informed by from evolutionary resource-allocation or support theories in this thesis. This might have included testing whether fertility desires, probability of fulfilling intentions and eventual child number are associated with the size of the mothers' support network, different types of support they receive (e.g. financial, with childcare, potential availability of support), who exactly provides that support (e.g. there is some evidence that support received from maternal and paternal grandparents has differing effects on child outcomes (Sear and Coall, 2011)), and how the role of fathers specifically and financial resources might mediate any of these relationships (Rotkirch *et al.*, 2011; Park, 2012; Schaffnit and Sear, 2014, 2017b; Stulp *et al.*, 2016). Evolutionary-informed questions were not incorporated firstly because of time constraints: significant exploration of reproductive decision-making measures became essential as the thesis progressed to critically address the concepts of the fertility gap and the fulfilment of reproductive intentions. This meant that only one paper (Chapter 7) tested questions relating to division of labour. Secondly, testing evolutionary-informed questions would have required a significantly more holistic approach to the study of support for childrearing and fertility. I deliberately chose to limit analysis in Chapter 7 to the mother only, rather than extending the analysis to also look at the role of the partner's labour and extra support from the mother's network. While this would be necessary to address questions of causality, the descriptive focus of Chapter 7 meant that it was logical to try and describe mothers in all circumstances, regardless of their partnership status. A focus on how labour is divided between

mothers and fathers would necessarily require the exclusion of women without a partner and same-sex partnerships. Significant time outside of what I could achieve in this PhD would therefore have been required to adequately model the diversity of modern-day families under an evolutionary framework.

8.3.2 Limitations in Primary Data Collection and Analysis

The primary goal of the data collection described in this thesis was to pilot, and validate, a set of questions operationalising the TDIB framework. As a result, a representative sample, beyond ensuring reasonable diversity across individuals with different numbers of children, was not a priority in designing the sampling frame. However, this does limit the extent to which findings can be classified as representative of the UK population.

Further, the analysis presented in Chapters 4 and 5 is descriptive or limited in statistical inference. For example, I decided which motives to incorporate into the short scale based on Spearman's rank correlation statistics and prior theoretical reasoning. A more thorough validation of the scale in future will involve pathway modelling of the entire TDIB framework, to test the direct and indirect effects of each component on one another. As discussed in Chapter 5, longitudinal cohort data would also be needed to prove that our formulation of motives were not simply endogenous to desires and intentions, performing with the life course process detailed by Miller.

8.3.3 Limitations in Secondary Data Analysis

8.3.3.1 Samples and generalisability

In both analyses in Chapters 6 and 7, there is potential for bias in our estimates because of sample selection. In Chapter 7, those not included in the sample were more likely to be under 25 and unpartnered, for example. In Chapter 6, the sample of UK women was limited by the panel structure and irregular waves of the survey. This meant I ended with a small sample (192 women) that could only be used comparatively against the results from the USA.

Both analyses presented in Chapters 6 and 7 are also exclusively focused on women. This is not per se a limitation, as an all-women sample was chosen given that women's dual burden is theoretically linked to low fertility. However, these analyses overlook the role and outcomes of male participants. As reproductive decision-making happens within partnerships, a more thorough investigation of men's intentions, and the interactions of their intentions with their partner's, would be important for understanding the fertility gap in its entirety. It is also important as there are different childbearing dynamics between the sexes, for example, men are more likely to not have children than women in high-income contexts (Dudel and Klüsener, 2021).

Furthermore, while the theoretical and review-based parts of my thesis focus on all high-income, low-fertility contexts, the secondary data analyses only focus on English-speaking countries (USA, UK, Australia). Therefore, my findings relating to changing expectations and division of labour around first birth are not necessarily generalisable to other low-fertility contexts. For example, in a context where having one child is more common (e.g. Southern Europe), the pattern of changing expectations for children may be considerably more stable across the life course. To truly establish the role of changing expectations and division of labour as explanations for the fertility gap across low-fertility countries, my analyses would need to be explored and replicated in countries across Europe and East Asia.

8.3.3.2 Explanatory factors

Omitted variable bias may be a limitation in both Chapters 6 and 7, as we only tested for associations between a select number of stable demographic characteristics in both studies. There are therefore potentially important explanatory factors that are not incorporated. For example, in relation to changes around first birth, characteristics of the pregnancy, birth and first child would be important to explore in further causal analysis. For example, there is evidence that women who give birth to a male infant are more likely to suffer from post-natal depression (Myers and Johns, 2019). Given decreased well-being has been linked with decreasing intentions for children (Luppi and Mencarini, 2018), features of both the pregnancy and birth would be important to account for in causal analyses.

Structural and macro-level factors important for determining fertility were also not integrated into my analyses. For example, the macro-micro interaction between family policies, societal gender norms, and employment regulations with individuals' fertility expectations and division of labour. This will be particularly important in ongoing work to understand the complete picture of how an individuals' division of labour and fertility outcomes are determined.

I also do not explore the division of labour between men and women in my empirical work, a crucial element of the gender revolution theories. This was firstly because I was interested in explaining fertility trends among all women who became mothers, regardless of whether they were in a partnership or not. Secondly, incorporating the role of a partner would mean extending the analyses in several different ways. Looking at just the role of the partner in determining women's dual labour without considering the role of wider support networks, such as family, friends and paid services, may lead to erroneous conclusions about how support matters for mothers' reproductive decision-making. Focusing purely on the influence of a male partner in determining household division of labour and reproductive decision-making would diminish the known diversity of family

arrangements in high-income contexts, not least because it ignores non-heterosexual partnerships. As I have argued in my systematic review, extending both theory and research beyond the assumption that families in high-income countries are white, middle-class, and heterosexual is important. Thus, whilst my work perhaps does not acknowledge a woman's wider context enough in explaining my findings, it also does not limit which women I include in my work.

8.3.3.3 Analytical limitations

The assumptions of the models I use may also limit the interpretation of my findings. For example, in Chapter 6, fitting the Poisson regression with interactions between time and a demographic predictor meant that the trajectory could vary between groups, but the overall angle of the regression line between groups was the same. I also was not able to adjust for survey structure in these analyses due to data restrictions (USA) and small sample size (UK). The standard error for these estimates may therefore be too small. In Chapter 7, the cluster analysis is also imbued with assumptions about the nature of the data. For one, it assumes that people can be divided into clusters. While the robustness checks for the 'quality' of the clusters used were satisfactory, it is important to still acknowledge that by grouping my sample, I eliminate some of the diversity between, and within, individuals in my discussion of how division of labour changes at first birth.

Limitations in interpreting my analyses may also have arisen because of researcher degrees of freedom. For example, how I chose to operationalise various covariates (e.g. whether to include age as a continuous or categorical variable) or the basis on which I exclude women from my samples, may all influence the final results of the regression analyses. To counter this, I do not base my interpretations purely on the basis of p-values, and also incorporate effect sizes and confidence intervals into how I interpret my findings. In future, use of techniques like a multi-verse analysis may prove useful to identify which findings remain consistent, despite variations in how the analyses is conducted (Steege *et al.*, 2016).

8.4 RECOMMENDATIONS FOR FUTURE RESEARCH

Earlier in the discussion I outlined some future avenues of research that will be necessary to answer the overarching research questions of this thesis. These include longitudinal qualitative studies across the time of first birth to establish reasons for instability in expectations, and causal pathway analysis to test the direct and indirect effects of household division of labour and parenthood on fertility expectations and outcomes.

There are two further areas that also warrant more investigation. First, further testing and validation of the TDIB framework in contexts outside of Poland and the UK. While studies in other European contexts are important, testing in settings beyond Europe will also be crucial in order to validate the

theory for global use. Nearly all major psycho-social theories of reproductive decision making are written by American scholars to explain fertility in contexts like America, and it cannot be assumed that they will explain reproductive decision-making in other contexts. Certainly the 'motives' are very Eurocentric (and designed to be so), but even how family futures are planned and perceived may vary considerably outside of low-fertility settings.

The second area for further research is exploring COVID-19's impact on both gendered division of household labour and fertility. In terms of gendered division of labour, studies during the last year have suggested that COVID-19 has exaggerated existing gender inequities in the division of unpaid labour. While studies do point to an increase in men's childcare time across high-income contexts in the past year (Andrew *et al.*, 2021; Kreyenfeld and Zinn, 2021), women's childcare time has substantially increased in absolute hours, and exceeds men's hours irrespective of women's number of paid hours and income relative to their partner's (Andrew *et al.*, 2021; Xue and McMunn, 2021). One would expect, in line with gender revolution and evolutionary-anthropological theories, that the exacerbation of women's dual-burden during this time would have affected the number of children women would like to have, particularly if they already had children. This research question certainly warrants testing and exploration given the uniqueness of the current time.

8.5 CONCLUSION

The original rationale for this thesis was to explore whether gendered division of labour could explain why individuals realise, or fail to realise, their intentions for children. By extension, I aimed to explore whether gendered division of labour could help explain the fertility gap phenomenon in high-income, low fertility settings. However, interpreting results of an analysis is futile if not supported by strong theoretical reasoning, and high quality, suitable data. Finding both to be lacking in the existing research on the topic of gendered division of labour and the fertility gap, this thesis makes theoretical, practical, and substantive contributions to the literature. In this thesis, I have synthesised a variety of theoretical perspectives on the topic of reproductive decision-making and gendered division of labour to guide more standardised and informed research. Further, through evaluating an expansive and diverse literature on the topic, as well as conducting my own qualitative research, I am able to suggest further study avenues for fertility research. My practical contribution is through the writing and testing of new questions measuring reproductive decision-making to help integrate more theoretically informed questions into existing longitudinal surveys. Finally, my substantive contribution is to disentangle and describe complex interactions between expectations for children, parenthood, and division of labour using advanced quantitative methodologies. In doing so, I have created the basis for further causal investigations between these different factors.

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10 CHAPTER 3 APPENDIX

10.1 APPENDIX 3.1: SYSTEMATIC REVIEW SEARCH TERMS, EXCLUSION CRITERIA AND PAPERS RETRIEVED AT EACH STAGE

Systematic review search terms:

Fertility AND intention OR birth OR births OR childbearing OR fertility AND housework OR childcare OR "child care" OR "work-life balance" OR "work-family conflict" OR "gender division" OR "gender equality" OR "gender equity" OR "gender inequality" OR "gender inequity" OR "gender roles" OR "gender norms" OR "gender revolution".

Limit to disciplines:

Social sciences, medicine, arts and humanities, economics, econometrics and finance, psychology, environmental sciences, agricultural and biological sciences, biochemistry, genetics and molecular biology, multidisciplinary

Limit to Country/Territory:

US, UK, Germany, Italy, Sweden, Netherlands, Australia, Austria, France, Switzerland, Norway, South Korea, Canada, China, Japan, Spain, Hong Kong, Belgium, Czech Republic, Poland, Finland, Singapore, Taiwan, Denmark, New Zealand, Russia, Croatia, Estonia, Greece, Hungary, Luxembourg, Malta, Portugal, Romania, Slovenia, Ireland, Iceland, Latvia, Lithuania, Slovakia, Cyprus

Papers identified at Step 1 (Scopus keywords search):

Aassve et al. 2015; Andrade and Bould 2012; Arpino, Esping-Andersen, and Pessin 2015; Arpino and Tavares 2013; Baizan, Arpino, and Delclòs 2016; Bernhardt and Goldscheider 2006; Brandén et al. 2018; Brodmann et al. 2007; Bueno 2019; Bueno and Brinton 2019; Cavalli and Rosina 2011; Chen and Yip 2017; Cooke 2004, 2009; Craig and Siminski 2010, 2011; Doepke and Kindermann 2019; Dommermuth et al. 2017; Feyrer, Sacerdote, and Stern 2008; Fiori 2011; Freeman et al. 2018; Frejka, Goldscheider, and Lappegård 2018; Harknett et al. 2014; Kan and Hertog 2017; Kato 2018; Kato, Kumamaru, and Fukuda 2018; Kaufman 2000; Kim 2017; Köppen and Trappe 2019; de Laat and Sevilla-Sanz 2011; Lee and Hwang 2017, 2019; Li and Jiang 2019; Liu and Hynes 2012; Miettinen et al. 2011, 2015; Miller, Bard, et al. 2010; Mills et al. 2008; Mitchell and Gray 2007; Nagase and Brinton 2017; Neyer et al. 2013; Nosaka 2012; Oláh 2003; Osiewalska 2018; Park 2012; Park et al. 2010; Puur

et al. 2008, 2018; Rinesi et al. 2011; Schober 2013; Shreffler, Pirretti, and Drago 2010; Suwada 2019; Testa 2007, 2012a; Torr and Short 2004; Yang 2017; Yoon 2014, 2016, 2017; Zhou and Kan 2019

Papers identified at Step 2 (Scopus citation tracker of papers found at step 1):

Holton, Fisher and Rowe, 2009; Rosina and Testa, 2009; Westoff and Higgins, 2009; Bernhardt, Goldscheider and Turunen, 2016; Brinton and Lee, 2016; Brinton *et al.*, 2018; Okun and Raz-Yurovich, 2019

Papers identified at Step 3 (Scopus citation tracker for papers found at step 2):

Brinton and Oh 2019

Papers identified at Step 4 (Manual bibliography search for papers found at steps 1,2 and 3):

Alonso 2004; Bernardi et al. 2013; Buber 2002; Craig 2006; Fukuda 2017; Goldscheider et al. 2013; Jansen and Liefbroer 2006; Komatsu 2011; Lappegård et al. 2015; Mencarini and Tanturri 2004; Nilsson 2010; Philipov 2008; Pinnelli and Fiori 2008; Tazi-preve et al. 2004

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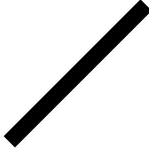



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10.3 APPENDIX 3.3: SUMMARY OF EACH PAPER INCLUDED IN SYSTEMATIC REVIEW

10.3.1 Nature of relationship key:








Trend line				
Explanation	Positive relationship between increased independent variable and dependent variable	No relationship between increased independent variable and dependent variable	Negative relationship between increased independent variable and dependent variable	U-shaped relationship between increased independent variable and dependent variable, with both male breadwinner-female homemaker and couples who share unpaid work equally/have flexible gender role attitudes having highest level of outcome




P-values are reported alongside the trend line in the table. Dotted lines signify when a direction of effect is evident, but not statistically significant.

The papers are divided into types of analyses: 1) 6 micro-level analyses testing fertility desires, 2) 18 micro-level analyses testing general fertility intentions, 3) 11 micro-level analyses testing short-term intentions, 4) 4 macro-level analyses testing fertility desires and intentions, 5) 4 micro-level analyses testing realisation of intentions, 6) 10 qualitative analyses exploring factors important for realising intentions for children, 7) 33 micro-level analyses of fertility outcomes and 8) 9 macro-level analyses of fertility outcomes.






The tables are ordered by region (Asia, Australia, Europe, USA), and then alphabetically by author. The same papers may appear multiple times in the same or different tables, depending on how many different dependent variables and countries the paper covers. When papers also explored analyses pertinent to the goal of their paper, but not to the subject of this review (e.g. Olàh (2003) included an analysis on how division of parental leave affected intentions for children in Sweden), summaries of these analyses are excluded from the table.




10.3.2 TABLE 1: Micro-level studies of fertility desires







Region	No.	Authors	Population	Data set	Research question/Aim	Theoretical background	Temporal aspect	Sample	Independent variable	Dependent variable	Method	Control variables	Results summary	Nature of relationship	Categorisation in review (association for each independent variable, categorised as positive, negative, curvilinear, none or mixed, with dependent variable)
ASIA	1	Kan & Hertog, 2017	China, Japan, South Korea, Taiwan 2006	East Asian Social Survey	Investigate whether male housework participation is associated with the number of children married couples aspire to in China, Japan, South Korea, and Taiwan.	Becker, Gender Revolution Theory	Cross-sectional	Married men and women with at least 1 child aged under 45 1743 China 460 Japan 631 Korea 615 Taiwan	Frequency of husband undertaking meal preparation, laundry and cleaning (categorical answers), and share between spouses for same tasks	Ideal family size	OLS regressions	Country, employment of respondent and partner, age, number of children, household income, education of respondent and partner	Increased husband's involvement in housework significantly associated with higher ideal family size for women. Not significant for men, but still positive direction of association if they're involved in more housework.	For women:  $p<0.05$ For men:  $p>0.1$	1 positive association for 'more domestic hours for man relative to other men'
	2	Kato, 2018	Japan 2002-2015	Longitudinal Survey of Adults in the 21st Century	Investigate the relationship between gender role attitudes and fertility intentions among Japanese single men and women of reproductive ages.	Becker, McDonald	Cross-sectional	8944 men and 7924 women, aged 20-34 with single, childless status	Gender role attitudes to division of paid and unpaid labour within a couple	Desire to have children and ideal family size	Logistic regression	Age, educational attainment, employment status, perceived benefits and costs of having children, intention to marry	Egalitarian housework attitudes associated with lesser desire for children and costs of having children, intention to marry. Men's preference for sharing childcare associated with higher fertility intentions. Author does not report significance tests.	For men and working women, housework sharing attitudes:  No significance reported For men's childcare sharing attitudes:  No significance reported	1 mixed association for 'more flexible gender role attitudes'
	3	Yang, 2017	China 1993-2011	China Health and Nutrition Survey	Analyse the link between gender equality at home and fertility among respondents aged 20-40	McDonald, Becker	Cross-sectional	1940, 20-40 year old married women with at least one child. Husband's involvement in domestic work collected separately.	Husband's and wife's involvement in domestic work	Desire for another child	Logistic regression	Age, rural, education, occupation, income of wife and husband, parity, children under 6, sex of children, living with at least one parent, survey year, province	Husband's time spent on domestic work increases fertility desire but not significant, wife's domestic work significantly decreases desire for another child when sex of existing children not considered.	Decreasing women's domestic hours:  $p<0.01$ Increasing husband's domestic hours  $p>0.1$	1 positive association for 'fewer domestic hours for a woman relative to other women' and 1 none for 'more domestic hours for a man relative to other men'
AUSTRALIA	4	Holton et al. 2009	Australia (Victoria) 2003	Data collected by authors	Investigate the relationship between attitudes towards women and motherhood, and women's childbearing desires and outcomes.	TDIB framework	Cross-sectional	569 women, aged 30-34	Agreement with attitudes regarding women in society, roles of women, women and motherhood	Ideal number of children	Multi-level regression analyses	Employment, affiliated with a religion, education, city resident, socio-economic status	Women with more traditional attitudes desired more children.	 $p<0.01$	1 negative association for 'more flexible gender role attitudes'











EUROPE	5	Miettinen et al., 2011	Finland 2008	Finnish Well-being and Social Relationships Survey	Examine how gender role attitudes relate to childbearing intentions at the onset of family life, intentions to have 3 or more children, and high personal fertility ideals among low-parity men and women	McDonald	Cross-sectional	694 men and 1086 women aged 25-44 with 0 or 1 child	Gender role attitudes regarding work and family on likert scale then categorised by authors into traditional, intermediate and egalitarian	How many children the respondent plans to have altogether. Ideal family size.	Logistic regression	Number of siblings, religion, work-orientation, family values, age, partnership status, education, income, number of children	Among men, traditional and egalitarian attitudes increase ideal family size. No significant effect on women's ideals and no obvious effect pattern.	<p>For men:</p>  <p>$p < 0.001$</p> <p>For women:</p> 	curvilinear association for 'more flexible gender role attitudes'
USA	6	Miller, Rodgers and Pasta, 2010	USA 1979-2002	National Longitudinal Survey of Youth 1979	Examine how the motivational sequence that leads to childbearing predicts fertility outcomes across reproductive careers	TDIB framework	Longitudinal	3683 males and 3883 females aged 14-22 in 1979	Gender role attitudes in 1979 based on 5 statements (a woman's place is in the home, a wife with a family has no time for employment, employment of wives leads to more juvenile delinquency, it is better for the man to be the achiever outside the home and the women to take care of the home, and women are happier if they stay home and take care of children)	Desired/ideal number of children	Structural Equation Modelling	Expected educational attainment	Traditional attitudes are associated with a larger number of children desired between 1979-1982.	 <p>no p-value</p>	negative association for 'more flexible gender role attitudes'

10.3.3 TABLE 2: Micro-level studies of gender fertility intentions

Region	No.	Authors	Population	Data set	Research question/Aim	Theoretical background	Temporal aspect	Sample	Independent variable	Dependent variable	Method	Control variables	Results summary	Nature of relationship	Categorisation in review (association for each independent variable, categorised as positive, negative, curvilinear, none or mixed, with dependent variable)
ASIA	7	Chen & Yip, 2017	Hong Kong 2012	Knowledge, attitude and practice survey	Investigate both fertility desire and intention in a parity-specific approach, examining factors in the formation of parity-specific intentions.	TDIB framework, McDonald, Bongaarts (fertility depressing factors outweigh fertility enhancing factors)	Cross-sectional	1029 predominantly married couples	Share of housework	Do you intend to give birth again' or 'Do you intend to give birth in future' if parity 0.	Logistic regression	Woman's age, woman's permanent residency, woman's education, woman's employment, household income, ideal family size, communication with male partner, satisfaction with marriage	Gender inequality in housework share negatively affected intentions only for third-birth intentions. Opposite effect seemingly for first and second child intentions but not significant.	For third child intentions:  $p<0.01$ For first and second child intentions:  $p>0.1$	1 positive association for 'more equal share of domestic labour'
	8	Li & Jiang, 2019	Shaanxi Province, China, 2015	Survey of Fertility Policy Adjustment	Analyse the varying effects of gender role attitudes on fertility intentions of women under different birth control policies	McDonald	Cross-sectional	1422 married women with at least one child	Women's gender role attitudes, housework division and whether husband looks after first child.	Intention for a second child	Multinomial logistic regression	Birth control policies, education status of first child, gender of the first child, woman's age, rural or not, woman's working status, both partners' education, husband's income, province	Direction of association is dependent on type of birth control policy. Among those under a one child policy, those with more egalitarian attitudes were more likely to intend a second, but among those under a 2 child policy, those with more egalitarian attitudes were less likely to intend to have a second child. Housework division and husband's childcare had no effect.	Those with more egalitarian attitudes under one child policy:  $p<0.01$ Egalitarian attitudes under two child policy:  $p<0.01$ For housework division and husband's care of the first child: 	1 mixed association for 'more flexible gender role attitudes' and 1 none for 'more equal share of domestic labour'





9	Lee and Hwang 2017	South Korea 2012	National Survey on Fertility and Families in Korea	What factors contribute to married working women's fertility and childbearing intentions?	Becker, Lutz, McDonald	Cross-sectional	1408 married, working women aged 15-49	Husband's share of cooking, dish washing, laundry, grocery shopping, cleaning and other household chores	Future intention for children	Logistic regression	Age, education, income, work position, level of government support, level of workplace support, help with housework from mother or mother in law, parity, marital satisfaction	Husband's active involvement in sharing specific housework tasks has positive association with intentions for parity 0 (but not significant), positive association for parity 1 (but only significant for active involvement with cleaning and laundry), no significant associations for parity 2 but again direction of association positive for all tasks except 'other housework'.	For one child couples for some tasks  $p < 0.05$ For childless or 2 child couples:  $p > 0.05$	1 positive association for 'more equal share of domestic labour'
10	Park et al., 2010	South Korea 2005	Korean National Fertility and Family Survey	Investigate trade-off between number and timing of offspring from an evolutionary perspective in a lowest fertility society	Life history theory, theory of paternal investment	Cross-sectional	977 married women, aged 20-44, 272 no children and 705 with one child	Share of housework and childcare (mostly wife, together, help from kin) and husband's time spent on housework/childcare on weekdays and weekends (more or less than 1 hour)	Intention for a child / a second child (Y/N)	Logistic regression	Woman's age, education, occupation type, household monthly income, time since first birth for those with one child, earning type (dual earner/single earner)	No significant effect for first child intention, but direction is negative for share and positive for actual contribution. For second child, husband performing more than 1 hour of housework and childcare on weekdays and weekend for employed women only, increased intentions. However, switching to relative share showed employed women who did most of housework had increased intentions compared to those that shared with their husbands, matching the same pattern seen among those intending a first child. Relative share of childcare no significant effect but positive association.	Amount of husband's time spent on housework on first child intentions, and childcare sharing on second child intentions:  $p > 0.05$ Husband's hours of housework and childcare on second child intentions:  $p < 0.05$ For husband's share of housework for first and second child intentions:  $p > 0.05$	1 positive association for 'more hours of domestic work for a man relative to other men' and 1 none for 'more equal share of domestic labour'
11	Park, 2012	South Korea 2007	Korean Longitudinal Study of Women and Family	Assess the relationship between social networks and the intention to have a second child	Social network theories	Cross-sectional	241 employed women and 634 stay-at-home mothers, aged 20-44, married, with one child	Husband's hours spent on housework and childcare on weekdays and the weekend.	Intention for a second child (Y/N)	Logistic regression	Woman's age, woman's education, woman's occupation, household income, age of first child, sex of first child, residing with wife's parents, residing with husband's parents, number of woman's and husband's siblings, instrumental and emotional support from siblings of both, frequency of social gatherings with friends and leisure time per month	Husband's domestic labour contribution over the weekend significantly increased intention for second child. Stronger effect size for employed women.	 $p < 0.05$	1 positive association for 'more hours of domestic work for a man relative to other men'
12	S. Y. Yoon, 2017	South Korea 2007-2010	Korean Longitudinal Survey of Women and Family	Examine the influence of three sources of a supportive environment for families - the state, husbands, and parents in laws - on women's fertility intentions and behaviour regarding second children.	McDonald, Gender Revolution Theory	Cross-sectional	526 married women with 1 child, aged 19-45	Hours of husbands participation in household and childcare per day	Intention for a second child: 'Do you intend to have another child in the future' (Y/N/DK)	Logistic regression	Age, employment, education, husband's income, rural residence, caregiving to parents, support from grandparents with childcare, knowledge of state family policy	Increasing support from husbands increases probability of intending a second child, but it is not significant	 $p > 0.1$	1 none for 'more hours of domestic work for a man relative to other men'










AUSTRALIA	13	Mitchell and Gray, 2007	Australia 1997	Negotiating the Life Course Survey	Explore a range of attitudes and aspirations reported by a group of childless respondents to establish whether these vary with their fertility expectations	Theories of fertility decline - de Vaus (systemic level) and Weston & Parker (individualisation of attitudes)	Cross-sectional	742 male and female respondents without children	Agreement with attitudes regarding equal sharing of housework, male breadwinner is best, woman's most important role as a mother, should give up job to be mother	Likelihood of having a child in the future (6 categorical answers)	Bivariate analysis and logistic regression	Sex, partnership status, highest level of education, age, employment status	<p>Bivariate analysis: no difference between those with more traditional attitudes and assessed likelihood of having children.</p> <p>Regression analysis: Assessment of likelihood associated with whether respondent agrees that woman's most important role is being a mother. 47% who agree assess they are likely to have a child, 26% who disagree assess they are likely to have a child.</p>	 <p>$p < 0.001$</p>	1 negative association for 'more flexible gender role attitudes'
EUROPE	14	Andrade and Bould, 2012	Portugal 2009-2010	Self-collected convenience sample	Examine the effects of women's perception of justice concerning the division of childcare in dual-earner couples on mother's intentions to have a second child	Hochschild, shift to traditionalism after birth (Schneeewind et al.)	Cross-sectional	82 women under 42, living with partner, in dual-earner couples, with one young child, who intended to have another some time	Objective child-care load in hours per week, subjective child-care load on 6 point categorical scale, perceived justice of division of child care on 6 point categorical scale	Certainty of having more children	Structural Equation Modelling (standardised path coefficients)	None	Subjective rather than objective childcare load is a significant factor on pathway to intention. Subjective load is also related to perception of justice in relationship which affects certainty of intention for a second child.	<p>For women's subjective childcare load, assuming that burdened women lie in the middle of the U-curve :</p>  <p>$p < 0.01$</p> <p>For women's number of hours:</p> 	1 curvilinear association for 'more satisfaction/perceived fairness of division' and 1 none for 'fewer hours of domestic work for woman relative to other women'
	15	Buber, 2002	Austria 1995-1996	Austrian Fertility and Family Survey	To look at the extent to which the division of household work and the perception of how fair these tasks are divided influence plans of further childbearing	Division of labour theories, Hochschild, theories of fairness perception (entitlement psychology)	Cross-sectional	364 women with one child, cohabiting with partner, under 40	Division of domestic labour and family attitudes' regarding whether women should combine employment with motherhood	Intention for a second child at a yet undecided point	Non-linear regression (probit model)	Number of siblings, religiousness, environment of childhood, marital status, age, working hours, partner's number of pre union children, age of first child,	Man performing one or more household or childcare tasks significantly increases the desire for a second child at an undecided point in time. Women with more traditional attitudes appear to desire more children, but not statistically significant.	<p>For division of labour:</p>  <p>$p < 0.05$</p> <p>For family attitudes:</p>  <p>$p > 0.1$</p>	1 positive association for 'more equal share of domestic labour' and 1 none for 'more flexible gender role attitudes'
	16	Fiori, 2011	Italy 2005	ISTAT survey	Is there a relationship between the support women received on the occasion of first childbirth and their subsequent fertility? If so, does its strength and direction depend on who provides it? Is there evidence of a contextual effect on the decision to have a second child	Theories on population dynamics that hint at the multidimensionality and complex structure of the system of causal relationships - justification for multilevel approach	Cross-sectional	3271 working women and 1424 non-working women who had a child 18-21 months previously and live with partner	Paternal commitment to childbirth, partner's amount of childcare and household tasks clustered into high, average and low	Intention for second child in the future (Y/N)	Multi-level model - random intercept logistic regression	Woman's age, partnership status, woman's education, problems in first childbirth, proportion of income spent on children monthly, status in employment, work schedule, work sector, support from others with household and care tasks, regional covariates (number of children/1000 enrolled in kindergarten)	Father's participation significantly increased probability of intending to have a second child.	 <p>$p < 0.1$</p>	1 positive for 'more hours of domestic work for a man relative to other men'








17	Miettinen et al., 2011	Finland 2008	Finnish Well-being and Social Relationships Survey	Examine how gender role attitudes relate to childbearing intentions at the onset of family life, intentions to have 3 or more children, and high personal fertility ideals among low-parity men and women	McDonald	Cross-sectional	694 men and 1086 women aged 25-44 with 0 or 1 child	Gender role attitudes in work and family on likert scale - then categorised by authors into traditional, intermediate and egalitarian	Intention for a/another child sometime in the future.	Logistic regression	Number of siblings, religion, work-orientation, family values, age, partnership status, education, income, number of children	Among men, traditional and egalitarian attitudes increase intentions for 3+ children. No significant effect for 1st or 2nd child intentions (although same effect pattern evident). No significant effect on women's intentions and no obvious effect pattern.	For men's intentions for 3+ children:  $p < 0.01$ For men's other intentions:  $p > 0.1$ For women: 	1 curvilinear for 'more flexible gender role attitudes'
18	Okun and Raz-Yurovich, 2019	UK 1992 - 2014	British Household Panel Survey	Trace couples' fertility intentions over time in response to changes in housework hours and subsequent births	Esping-Andersen and Billari, Gender Revolution Theory, McDonald's theory	Longitudinal	4320 heterosexual couples. Females under 45, males under 65. 9187 couple-years.	Housework hours of each partner and gender role attitudes regarding women being the primary caregiver and gender equity in economic contribution	Consensus in couples' fertility intentions	Multinomial regression models	Partners' employment status, union status, paid work hours of each partner, age of woman, each partners' number of children ever born, income of each partner and educational attainment of each partner, health does not limit daily activity of each partner, survey wave.	No significant relationship between male partner's contributions to housework and couple's intention, but men's increasingly egalitarian attitudes over the life course are significantly associated with higher likelihood of both partners intending more children. When women do more housework couple is more likely to agree to intending no more children. More egalitarian attitudes among women reduce the odds that the partners intend another child.	Men's attitudes and women's decreasing housework:  $p < 0.05$ Women's gender attitudes:  $p < 0.05$ Men's housework: 	1 mixed association for 'more flexible gender role attitudes' 1 positive association for fewer hours of domestic work for a woman relative to other women' and 1 none for 'more hours of domestic work for a man relative to other men'
19	Pinnelli & Fiori, 2008	Italy 2000-2001	ISTAT Survey on births 2000	Does greater partner involvement in household tasks and childcare increase the mother's desire to have a second or a third child?	Intentions to behaviour theories (Hakim, TDIB framework). Becker and McDonald.	Cross-sectional	9852 women who had a first or second child 18-21 months prior to interview	Father's participation in housework and childcare responsibilities	Intention for another child in future	Logistic regression	Area, mother's age, partnership status, mother's education, problems with delivery, proportion of monthly income spent, status in employment, weekly hours worked, work sector, support from family and friends, support from institutions	Fathers' participation in both housework and childcare significantly increased the intention to have a second child for working women. Fathers' participation had no significant influence on the intention for a third child but still same direction of effect. For non-working mothers, low father involvement increased probability of second child intention, but decreased probability of third although both were not significant.	For working women and intentions for a second child  $p < 0.001$ For third child intentions among working and non-working women  $p > 0.05$ For second child intentions among non-working women  $p > 0.05$	1 positive association for 'more hours of domestic work for a man relative to other men'
20	Puur, Oláh, Tazi-preve, et al., 2008	Europe (Austria, Estonia, East and West Germany, Italy, Lithuania, Netherlands, Poland) 2000-2003	Population Policy Acceptance Study	Shed more light on the impact of men's gender-role orientation on their fertility intentions	Becker and McDonald	Cross-sectional	5435 men aged 20-44	Male gender-role orientation based on gender attitudes at work and home - Likert scale. Grouped into traditional, egalitarian and intermediate	Mean expected number of children and mean number of children additionally expected, and intention to have a(nother) child within each male orientation group	Descriptive and logistic regression	Age, current parity, partnership status, educational attainment, labour market status	Egalitarian men have a higher expected number of children than traditional men. They are also more likely to intend to have a(nother) child than traditional or intermediate men	 $p < 0.05$	1 positive association for 'more flexible gender role attitudes'




	21	Puur, Vseviov and Abuladze, 2018	Estonia and Russia 2004-2005	Generations and Gender Survey	Investigate fertility intentions of Russian women in Estonia from an origin-destination perspective	Theories of migrant fertility patterns (adaptation, cultural maintenance and selection perspectives)	Cross-sectional	4177 women aged 20-44 (1388 Estonians, 535 Russian migrants or descendants, and 2194 Russians)	Gender role attitudes grouped into traditional, intermediate and egalitarian	Intention for a/another child in future (combining those who intended a child both within next 3 years and those who intended beyond 3 years)	Logistic regression	Population group (Russians in Russia, Russians in Estonia, Estonians), age, partnership status, current parity, urban/rural, educational attainment	The odds of intending to have a/another child increase as gender role attitudes become more egalitarian. This effect is weaker for intending a first rather than a second child. The effect is strongest ($p < 0.01$) among all women (not separated by parity) for a/another child.	 $p < 0.1$	1 positive association for 'more flexible gender role attitudes'
	22	Rinesi et al., 2011	Italy 2002	Sample Survey on Births	1) assess the extent to which fertility intentions of women with one child predict subsequent behaviour 2) test if socio-economic status and women's burden of housework influence the formation of fertility plans and their fulfilment 3) evaluate if the number of additional children desired by women with one child and the latest age at which they plan to have the last child speed up or slow down after second birth	Becker and McDonald	Cross-sectional	5425 partnered women with one child	Mother's perception of whether partner increased or decreased his involvement in housework after the first birth (more, same, less)	Intention for a second child - Do you intend to have any more children? If yes, how many are expected and at what age. What is the latest age she plans to have her last child?	Logistic regression	Woman's age, partnership status, area, education of both partners, housing tenure, woman's employment, support with housework	Decreasing partner involvement lowered the probability of intending a second child, but not significantly	 $p > 0.1$	1 none for 'more hours of domestic work for a man relative to other men'
	23	Tazi-preve et al., 2004	Austria, 2001	Population Policy Acceptance Survey	Test the consequences of gender (in)equality on the desire of women and men to have (further) children	Theories of unequal distribution: Functionalist theory, Feminist-Marxist approach, individualistic approach. Beck-Gersheim "one and a half person construct".	Cross-sectional	20-44 year old men (360) and women (420) in a partnership	'Egalitarian' if man performed chores by himself or together with partner. Otherwise traditional.	Intending a(nother) child at some point	Logistic regression	For the respondent: age, children living in the household, education, employment	Men in traditional couples have lower fertility intentions, effect size for women not reported because not significant (significance threshold not defined by author).	For men:  $p < 0.05$ For women: 	1 positive association for 'more equal division of domestic labour'
USA	24	Kaufman, 2000	USA 1987/88	National Survey of Families and Households	Focus on the effect of gender role attitudes on family formation and dissolution	Becker and Oppenheimer	Cross-sectional	2621 childless men (under 45) and women (under 40)	Gender role attitudes	Intention for a child	Logistic regression	Age, education, income, occupational prestige, religion, ethnicity, attitudes towards marriage, relationship status	Women with egalitarian attitudes less likely to intend to have a child, men with egalitarian attitudes more likely.	For men:  $p < 0.01$ For women:  $p < 0.01$	1 mixed association for 'more flexible gender role attitudes'

10.3.4 TABLE 3: Micro-level studies of short-term fertility intentions



Region	No.	Authors	Population	Data set	Research question/Aim	Theoretical background	Temporal aspect	Sample	Independent variable	Dependent variable	Method	Control variables	Results summary	Nature of relationship	Categorisation in review (association for each independent variable, categorised as positive, negative, curvilinear, none or mixed, with dependent variable)
ASIA	25	H. Yoon, 2014	South Korea 2009	National Survey of Marriage and Family	Does the sharing of childcare in the household influence a married woman's intention to have additional children?	McDonald	Cross-sectional	2919 married women, aged 20-44, with at least one child	Share of weekly hours of childcare between the parents	Intention for additional child within next 3 years	Multinomial logistic regression	State support for childrearing, market support for childrearing, grandparent-provided childcare, have a son, private tutoring expense, both partners' education, both partners' age, difference between fertility expectation and actual childbearing (positive or negative), number of children, dual or single earner household, household income, gender role attitude	Longer hours of childcare from the father and the mother increased the probability of intending a further child in next 3 years	 $p < 0.05$	1 curvilinear association for 'more equal share of domestic labour'
EUROPE	26	Bernardi, Le Goff and Ryser, 2013	Switzerland 2002-2004	Swiss Household Panel	Investigate women's attitudes towards paid employment and family in relation to the share of paid and domestic workloads within a couple and in relation to the intention to have a child	Hochschild, McDonald, TDIB framework	Cross-sectional	2513 women	Gender role attitudes, share of domestic work and satisfaction with division	Intend to have a child in next year	Fixed and random intercept logistic regressions	Age, education, occupation, practical and emotional support, household income, religion, number of children	Among childless women, only being in favour of gender equality has a positive impact on intention for a child. Among women with at least one child, being in favour of gender equality and satisfaction with division of labour had a positive impact on intending another child, whereas doing more household work had a negative effect but not significant.	Being in favour of gender equality and being satisfied with the division of labour among those with children:  $p < 0.05$ Among women with at least one child, housework division:  $p > 0.1$ Among childless women, actual division and satisfaction with that division: 	1 positive association for 'more flexible gender role attitudes', 1 positive association for 'more satisfaction/perceived fairness of division' and 1 none for 'more equal share of domestic labour'

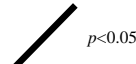
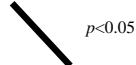

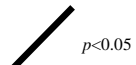
27	Buber, 2002	Austria 1995-1996	Austrian Fertility and Family Survey	To look at the extent to which the division of household work and the perception of how fair these tasks are divided influence plans of further childbearing	Division of labour theories, Hochschild, theories of fairness perception (entitlement psychology)	Cross-sectional	364 women with one child, cohabiting with partner, under 40	Division of domestic labour and 'family attitudes' regarding whether women should combine employment with motherhood	Intention for a second child within next 2 years	Non-linear regression (probit model)	Number of siblings, religiousness, environment of childhood, marital status, age, working hours, partner's number of pre union children, age of first child	Household division no effect, number of childcare tasks performed primarily by man positive effect on second child intention in next 2 years. No effect of 'family attitudes'.	For childcare division:  $p < 0.01$ For household division:  $p > 0.1$ For family attitudes: 	1 positive association for 'more equal share of domestic labour'
28	Cavalli & Rosina, 2011	Italy 2003	ISTAT "Family and Social Subjects" Multipurpose Household Survey	Analyse the process of family formation in Italy, with a specific focus on couple's reproductive intentions for a first and a second child.	Theories of couple conflict and decision making - Becker, co-operative game theory, Jansen and Liebroer "power rule", Kruger and Levy "master status"	Cross-sectional	1083 childless couples, 1330 couples with one child. Living with partner aged 18-49.	Satisfaction with division of domestic work - disagreement with partner over last year	Intention in next 3 years	Logistic regression	Age of both, area of residence, partnership status, education of both, mass attendance of both, employment status of both	Women who are less satisfied with the division are more likely to oppose their partner's intention for a first child but only significant at $p < 0.1$. Same pattern for intention to have second child but not significant.	Assuming that unsatisfied women are those that are double burdened at bottom of U curve, for first child intentions:  $p < 0.1$ For second child intentions:  $p > 0.1$	1 curvilinear association for 'more satisfaction/perception of fairness with division'
29	Harknett et al. 2014	Europe 2004 (Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and the UK)	European Social Survey	Examine the relationship between macro-level supports for child rearing and individual-level fertility outcomes	Theory of Planned Behaviour, TDIB framework, Cognitive-social model Becker, Esping-Andersen (institutions), McDonald	Cross-sectional	6760 working women aged 22-44 in 2009. Average country/wave sample size 177, ranging from 106 to 346	Male household share in dual earner couples	Intend to have a(nother) child in next 3 years	Logistic regression	Policy environment, labour market environment, support from extended family, overall support environment (state, family, male), age, religiosity, has a previous child, youngest child age, lives with partner	No effect on first birth, but marginal positive effect on higher order birth intentions	For higher order intentions:  $p < 0.05$ For first child intentions: 	1 positive association for 'more equal share of domestic labour'
30	Lappegard, Neyer and Vignoli, 2015	Austria (2008-2009), Hungary (2001) and Norway, Romania, Russia, Bulgaria, France, Germany (2004-2005)	Generations and Gender Survey	To emphasize the need for a multi-dimensional theoretical and empirical approach extending the two-step behavioural gender revolution approach to a three-step attitudinal gender revolution approach	Theory of Planned Behaviour, McDonald, Gender Revolution Theory	Cross-sectional	22698 non-pregnant women aged 18-42 and 22792 men aged 18-49.	Gender role attitudes towards mothers' and fathers' role in society and in the family	Intend to have a(nother) child in next 3 years	Logistic regression	Age, educational attainment, activity status, union status, number of children, country of residence, partner's education and partner's activity status.	Public sphere attitudes: no effect for men, but women with more traditional attitudes more likely to consider having a child in next 3 years. Mother's role attitudes: no effect for men, childless women with traditional attitudes more likely to intend a child. Father's role attitudes: no clear effect	For public sphere attitudes and mother's role attitudes among women:  $p < 0.05$ For men and father's role attitudes: 	1 negative association for 'more flexible gender role attitudes'

31	Mills et al., 2008	Italy 2003 and Netherlands 2004-2005	Dutch European Social Survey and the Italian Family and Social Actors survey	Provide an empirical test for gender equity theory by examining whether the unequal division of household labour leads to lower fertility intentions of women within different institutional contexts	Becker and McDonald	Cross-sectional	213 Dutch women, 3458 Italian women All aged 20-40 living with partner	Hours of household work by respondent. Share of household labour done by respondent (<75% and >75%)	Intention to have a child in next 3 years	Logistic regression	Age, education of respondent and partner, hours worked per week, number of children	Share of housework does not predict intentions. However, women with 30+ hours paid work and >75% household work had lower intentions and/or already have one or more children, significant only for Dutch women. Same direction of effect for Italian women and women working fewer hours but not significant	For Dutch women working 30+ hours, more equal share:  p<0.01 For Italian women and women working fewer than 30 hours:  p>0.1	1 positive association for 'more equal share of domestic labour'
32	Neyer et al., 2013	Europe 2001-2009 (Austria, Bulgaria, France, Germany, Georgia, Norway, Romania, Russia, Hungary, Italy, Netherlands)	Generations and Gender Survey	Illustrate the potential of their 'equality' equity/ conceptual approach by investigating their relationship to fertility intentions.	McDonald, feminist theory on the concept and meaning of gender equality	Cross-sectional	22,560 non-pregnant women aged 18-42, 22070 men aged 18-49	Actual division of household and childcare tasks and satisfaction with the division	Intention for a first, second of third child in next 3 years	Logistic regression	Woman's age, education, marital status, employment of both partners, country, age of youngest child, number of children for parents.	No effect of housework division for childless. For mothers: actual division of housework increases intentions. Satisfaction with childcare division increases intentions. No effect of actual childcare division on intention for second child, although still same trend. For men: Actual division of housework unimportant, but satisfaction increases intentions. Childcare both actual and perceived important in determining intentions. All have similar effect sizes though despite some not significant.	For mothers: actual division of housework and satisfaction with childcare division. For men: satisfaction with housework and childcare division  p<0.05 For mothers: actual childcare division. For men: actual division of housework  p>0.1	1 positive association for 'more equal share of domestic labour' and 1 positive association for 'more satisfaction/perception of fairness with division of labour'
33	Rosina and Testa, 2009	Italy, 2003	Family and Social Subjects' Survey by Italian National Statistical Office	Examine the determinants of couples' childbearing intentions, by taking into account the agreement or disagreement of the two members of the couple	Theory of Planned Behaviour and TDIB framework	Cross-sectional	1083 cohabiting, childless couples aged 18-49	Woman's satisfaction with division of housework within the couple	Couple agreement to have a first child in the next 3 years	Logistic regression	Type of union, education of both partners, mass attendance of both partners, employment of both, area of residence, age of both	Women being unsatisfied leads to a higher probability of couple disagreeing to have a child in next 3 years. Women also more likely to oppose partners intention for a child if unsatisfied, but not significant.	 p<0.1	1 positive for 'more satisfaction/perceived fairness with division of labour'
34	Testa, 2012	Austria, 2008	Generations and Gender Survey	Investigate the effects of couple disagreement about short-term childbearing desires on the formulation and implementation of fertility intentions. Are there relevant differences by type of disagreement, parity, gender and gender equality within the couple?	Theory of Planned Behaviour, TDIB framework	Cross-sectional	3402 heterosexual couples, female partner not pregnant and under 50	Binary variable: whether man participates in at least 6 childcare duties (dressing children, putting to bed, staying home when their sick, playing with them, helping with homework, taking to school)	1) Respondent's own intention for a child in the next 3 years 2) Do couples that perceive a disagreement about wanting a child now resolve their conflict in favour of intending a child and stopping contraception	Ordinal regression models	Respondent's gender, type of union, duration of partnership, education of both partners, employment status of both partners, age of both, children from previous unions, number of common children, number of years since birth of last child, difference in educational levels between partners, partner's desires for another child	No effect on respondent's short term intention. However, in terms of resolving disagreements in favour of intending a child and stopping contraception, men's participation had a positive effect.	For resolving couple disagreement in favour of intending another child:  p<0.05 For respondent's own intentions: 	1 positive association for 'more hours of domestic work for a man relative to other men'



USA	35	Shreffler et al. 2010	USA 2000	Marital Instability over the Life Course study	Assess the impacts of perceived self and partner work-to-family and family-to-work conflict on the fertility intentions of both women and men	Spill-over theories (Kanter 1977) and rational choice approaches (Becker)	Cross-sectional	316 men (over 19 married to a woman younger than 40) and 314 women (19-39); married and in dual-earner families	How much does your/spouse's job interfere with family life? (Work-family conflict) Do the demands of your family interfere with your job? (Family-work conflict) and gender role attitudes	Intention to have any (more) children in the next 3 years	Logistic regression	Age, education, income, race/ethnicity, religiosity, number of children, weekly work hours	Respondent's own work-family conflict does not predict intentions. For men, perceiving wife's work interferes with family significantly decreases intentions. Men with conservative gender role ideology more likely to intend to have a birth. Same trends seen for women but not significant.	<p>Assuming that double burdened women lie at the bottom of the U curve, when men perceive wife's work-family conflict:</p>  <p>$p < 0.05$</p> <p>When women perceive their work-family conflict</p>  <p>$p > 0.05$</p> <p>Gender role attitudes:</p>  <p>$p < 0.05$</p>	1 curvilinear association for 'more satisfaction/perception of fairness with division' and 1 negative association for 'more flexible gender role attitudes'
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10.3.5 TABLE 4: Macro-level studies of desires and fertility intentions

Region	No.	Authors	Population	Data set	Research question/Aim	Theoretical background	Temporal aspect	Sample	Independent variable	Dependent variable	Method	Control variables	Results summary	Nature of relationship	Categorisation in review (association for each independent variable, categorised as positive, negative, curvilinear, none or mixed, with dependent variable)
EUROPE	36	Alonso, 2004	Europe 1995-2004	Eurobarometer Surveys	Analyse Eurobarometer surveys to show whether there is some relationship between low fertility and uneven task sharing between partners	McDonald	Cross-sectional	National samples of unspecified size	Ideal and actual share between partners of housework and childcare tasks	How many children intended to have in total	Correlation	None	A more equal share of housework increased intentions, and ideal sharing of childcare increased intentions	For equal sharing of housework, and ideal sharing of childcare:  $p < 0.01$	1 positive association for 'more equal share of domestic labour' and 1 positive association for 'more satisfaction/perception of fairness with division of labour'
	37	Doepke and Kindermann, 2019	Austria, Belgium, Bulgaria, Czech Republic, France, Germany, Lithuania, Norway, Poland, Romania and Russia between 2003-2009	Generations and Gender Survey	Provide empirical evidence that agreement between potential parents is a crucial determinant of fertility, develop a bargaining model of fertility that can account for this, and argue that agreement between parents has important consequences for policy interventions	Becker	Cross-sectional	33479 couples where woman between 20-45	Distribution in the couple of 6 childcare tasks	Likelihood of woman disagreeing with her partner on the question 'do you want to have a/another child now'.	Correlation	None	In countries where women do most of the work raising children, women are more likely to be opposed to having more children and fertility is low (correlation -0.733)	 no p -value reported	1 positive association for 'more equal share of domestic labour'

	38	Philipov, 2008	Austria, Estonia, Germany, Hungary, Lithuania, the Netherlands, Poland and Romania. Year not specified.	Population Policy Acceptance Study	Discuss gender attitudes of adults towards division of labour in the family, considering different dimensions, and examining whether these are correlated with the intention to become a parent	Second demographic transition, Becker, Preference theory, McDonald	Cross-sectional	National samples ranging from 70 (West Germany) to 546 (Poland)	Attitudes relating to three gender dimensions: gender-role ideology, family consequences and economic consequences	Intention to have a / another child	Logit model	Age, marital status, religiosity, working status, education, household equivalised income	No effect on second or higher order child intentions. For first child intentions, men with more modern gender ideology are more willing to become parents in Austria and West Germany. Opposite true for women in Estonia and West Germany, and men in Romania. Other two dimensions mixed and not significant so author concludes ideology dimension is the most influential one.	<p>More modern gender role ideology among men in West Germany and Austria and intention to become a parent:</p>  <p>More modern gender role ideology among women in Estonia and West Germany, and men in Romania, and men in Romania and intention to become a parent:</p>  <p>For other attitude dimensions and higher parity intentions:</p> 	1 mixed association for 'more flexible gender role attitudes'
	39	Testa, 2007	25 European countries 2006	Eurobarometer survey	Provide an overview of the major findings from the Eurobarometer report	None	Cross-sectional	25-39 year old Europeans - small sample sizes, about 1000 people aged 15+ for each country	Being in favour of an equal division of family tasks	Mean Ideal Family Size	Correlation	None	Strong positive association between mean ideal family size among 25-39 year olds and support of equal division of family tasks	 <p>$p < 0.05$</p>	1 positive association for 'more flexible gender role attitudes'





10.3.6 TABLE 5: Micro-level studies of realising intentions for children






Region	No.	Authors	Population	Data set	Research question/Aim	Theoretical background	Temporal aspect	Sample	Independent variable	Dependent variable	Method	Control variables	Results summary	Nature of relationship	Categorisation in review (association for each independent variable, categorised as positive, negative, curvilinear, none or mixed, with dependent variable)
ASIA	40	Kim, 2017	South Korea 2008-2012	Korean Longitudinal Survey of Women and Families	Provide an up-to-date picture of Korean women's fertility intentions, fertility behaviour, and the division of domestic labour with husbands, parents, parents-in-law, and formal childcare services. It also examines how the informal and formal help women receive affects their fertility behaviour.	McDonald, Gender Revolution Theory	Longitudinal	2239 married women under 40 in 2007	Husband's time spent on domestic labour including childcare in hours/week	Second childbirth for those that intended second within time period	Logit regression	Grandparents' time spent on childcare, coresidence with grandparents, expenditure on childcare, age, education, employment, first child's age and sex, marriage duration, household income	Increasing time spent on domestic labour increased probability of realising intention for second child	 $p < 0.01$	1 positive association for 'more hours of domestic work for a man relative to other men'
	41	Lee and Hwang, 2019	South Korea 2015	2015 National Survey on Fertility and Family Health and Welfare	Examine what factors affect married women's childbirth behaviour and what causes the gap between their planned and actual number of children by adopting the 'extended theory of planned behaviour' model	Theory of Planned Behaviour	Cross-sectional	8535 married women	Perceived fairness of housework division	How many children did you plan to have at the time of marriage and how many children have you had so far?	Multinomial logistic regression	Age, education, religion, home ownership, average monthly household income, income difference between husband and wife, attitudes to family and children, perception on low fertility problems, perception of how low fertility is relevant to oneself, perception of state support for childbearing, perception of workplace support for childbearing, perception on tax-funded government support for multi-children families, ideal employment type, awareness of work-family policy, intention to use the policy, intention to use spouse work-family policy	As housework becomes more unfair, likelihood of having fewer than your planned number of children decreases in comparison to having exactly your ideal number of children.	 $p < 0.05$	1 negative association for 'more satisfaction/perceived fairness with division of labour'

	42	S. Y. Yoon, 2016	South Korea 2007-2010	Korean Longitudinal Survey of Women & Families	Examine the impact of gender equity in the family on the realisation of fertility intentions for a second child among married women of parity 1.	McDonald, household decision making (Folbre, 1983)	Longitudinal	235 married women with one child who desire a second	Gender role attitudes, hours of household work of both wife and husband.	Second birth among those who intended one	Logistic regression	Age, education, employment, husband's income, sibling size, marital duration, responsibility for children's education	Women with egalitarian gender attitudes more likely to progress to second birth, husbands participation in housework and childcare increases likelihood as well	 $p < 0.05$	1 positive association for 'more flexible gender role attitudes' and 1 positive association for 'more hours of domestic work for a man relative to other men'
EUROPE	43	Rinesi et al., 2011	Italy 2002-2008	Sample Survey on Births and Population Register	1) assess the extent to which fertility intentions of women with one child predict subsequent behaviour 2) test if socio-economic status and women's burden of housework influence the formation of fertility plans and their fulfilment 3) evaluate if the number of additional children desired by women with one child and the latest age at which they plan to have the last child speed up or slow down after second birth	Becker, McDonald	Longitudinal	4237 partnered women with one child, who expected to have other children	Mother's perception of whether partner increased or decreased his involvement in housework after the first birth (more, same, less)	Fulfilment of intention for second birth	Logistic regression	Woman's age, partnership status, area, education of both partners, housing tenure, woman's employment, support with housework, expected number of additional children, plan to finish reproductive career within x number of years	Increased involvement from the partner increased the risk of fulfilling an intention for a second birth, but the effect size is small and not significant	 $p > 0.1$	1 none for 'more hours of domestic work for a man relative to other men'






10.3.7 TABLE 6: Qualitative studies exploring pertinent factors for understanding why intentions for children become realised or unrealised

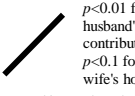
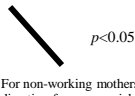

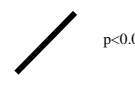
Region	No.	Authors	Population	Data set	Research question/Aim	Theoretical background	Temporal aspect	Sample	Independent variable	Dependent variable	Method	Control variables	Results summary	Nature of relationship: Positive, negative, U-shaped, no effect, mixed (not included in review categorisations)
ASIA	44	Brinton et al., 2018	Japan 2012	In-depth interviews	Examine the reasoning individuals offer for the gap between their fertility ideals and intentions.	McDonald, Gender Revolution Theory, Esping-Andersen and Billari. Designed research design to reflect McDonald - greatest opportunity costs for educated women. Bachrach and Morgan for unrealised intentions	Cross-sectional	51 highly-educated, urban, native-born adults, aged 24-35 in stable heterosexual partnerships with at most one child.	Actual and anticipated division of housework and childcare, gender-role attitudes and ideology, knowledge and attitudes concerning work/family policies	1) How many children would you like to have ideally and why? (Desire) 2) How many do you think you will actually have and why? (Expectation) 3) If there is a discrepancy between 1 and 2 can you explain the reason? (perceived obstacles)	Qualitative	Also ask about both partners' current job and workplace, and life goals for next 3 years	Gender inequality concerns barely evident in self-reasoning for gap. E.g. virtually no Japanese women mentioned heavy burden as limiting intentions, despite reporting very large share of domestic work in interview. Interpret this as Japanese women seeing gender specialisation as given. This translated into sub-replacement intentions for couples where the woman worked full-time. Typical long work hours limit male partner's participation at home.	/
	45	Brinton and Oh, 2019	Japan and South Korea 2011-2013	In-depth interviews	Why does highly educated, married women's continuous employment remain highly incompatible with childrearing in Japan and South Korea?	McDonald, Gender Revolution Theory, Esping-Andersen and Billari.	Cross-sectional	Highly educated, urban, native-born urban men and women aged 24-35. 65 from Korea and 50 from Japan.	Ideal and actual division of household labour and childcare, attitudes towards childcare arrangements, gender role attitudes	Fertility ideals and intentions	Qualitative	Also asked about employment, anticipated stability of employment in future, changes in work and home life upon marriage and those expected upon birth of a child, definitions of the ideal man and woman, attitudes towards work-life policies and government pro-natal policies.	Labour market structure and workplace norms contribute to a highly gendered household division of labour, leading many married women to either sacrifice their job or consider stopping at 1 child.	/







	46	Freeman et al. 2018	Taiwan 2014-2015	Structured in-depth interviews	Explore qualitatively the context of childbearing preferences for men and women in an Asian low-fertility setting, in an attempt to uncover the nuanced function gender roles (or any other factors) might play in fertility decisions	Becker, Esping-Andersen, Gender Revolution Theory, McDonald, Individualisation and risk (Beck and Beck Gernsheim)	Cross-sectional	16 men and 16 women with at least 1 child	Perceived constraints on further childbearing as well as information about working hours and childcare arrangements	Fertility plans	Qualitative	N/A	Tension between gendered expectations of childcare responsibilities and women's desire to 'build a life of one's own' highly relevant to understanding why couples stop at parity 1	
	47	Nosaka, 2012	Japan 2007	179 questionnaires and 52 subsequent interviews	Interpret quantitative findings with qualitative data examining the working environments of study participants, spousal domestic involvement and access to childcare.	Second demographic transition, McDonald	Cross-sectional	179 married working women from Tokyo, 52 of whom were subsequently interviewed. At least one child under 6.	Daily activities of the participants	Fertility plans	Qualitative	N/A	Women admitted acceptance of gender expectation that they primarily care for the domestic tasks. However, interviews highlighted significance of spousal cooperation for women to meet their work and family aspirations.	
EUROPE	48	Brinton et al., 2018	Spain 2012	In-depth interviews	Examine the reasoning individuals offer for the gap between their fertility ideals and intentions.	McDonald, Gender Revolution Theory, Esping-Andersen and Billari. Designed research design to reflect McDonald - greatest opportunity costs for educated women. Bachrach and Morgan for unrealised intentions	Cross-sectional	53 highly-educated, urban, native-born adults, aged 24-35 in stable heterosexual partnerships with at most one child.	Actual and anticipated division of housework and childcare, gender-role attitudes and ideology, knowledge and attitudes concerning work/family policies	1) How many children would you like to have ideally and why? (Desire) 2) How many do you think you will actually have and why? (Expectation) 3) If there is a discrepancy between 1 and 2 can you explain the reason? (perceived obstacles)	Qualitative	Also ask about both partners' current job and workplace, and life goals for next 3 years	Labour market uncertainty more commonly cited as reason for not wanting children. Few thought it was realistic or desirable for women to work after they become mothers. Economic context and changing gender-role ideology pushes couples to dual-earner, dual-carer model. Women expressed desire for equal share of work, and men suggested this would help with having more children.	
	49	Brinton et al., 2018	Sweden 2012	In-depth interviews	Examine the reasoning individuals offer for the gap between their fertility ideals and intentions.	McDonald, Gender Revolution Theory, Esping-Andersen and Billari. Designed research design to reflect McDonald - greatest opportunity costs for educated women. Bachrach and Morgan for unrealised intentions	Cross-sectional	50 highly-educated, urban, native-born adults, aged 24-35 in stable heterosexual partnerships with at most one child.	Actual and anticipated division of housework and childcare, gender-role attitudes and ideology, knowledge and attitudes concerning work/family policies	1) How many do you like to have ideally and why? (Desire) 2) How many do you think you will actually have and why? (Expectation) 3) If there is a discrepancy between 1 and 2 can you explain the reason? (perceived obstacles)	Qualitative	Also ask about both partners' current job and workplace, and life goals for next 3 years	Women voiced fears of becoming caught in 'part time employment trap' and that the time taken to get a stable job would lead to inadequate time to become pregnant. More likely to express this concern than Japan and Spain	





	50	Bueno, 2019	Spain 1985 and 2012	In-depth interviews	Analyse the generational change in fertility decisions among young Spanish adults between mid 1980s and 2010s and test the extent to which theoretical perspectives on fertility are supported by individual narratives over time.	Second demographic transition, McDonald, Esping-Andersen and Billari, Gender Revolution Theory	Cross-sectional at two time points	Highly educated, partnered adults between 20 and 40, 44 interviews in 1985 and 53 in 2012.	Gender role attitudes, housework and childcare division of labour	Fertility decisions. In the 1985 survey 'How has the process been towards considering having a baby?'. In the 2012 survey 'What are the conditions for deciding to have your first/next child?'	Qualitative	Also asked about economic and job characteristics and partnership formation.	2012 young adults considered persisting gender inequality within the household to be an important conflict for fertility decisions. This is a conflict that is more prevalent among the 2012 women compared to 1985 cohort of women. Author concludes this supports the idea that the gender transition has advanced but is not finished, supporting gender equity theories of fertility.	
	51	Bueno and Brinton, 2019	Spain 2012	In-depth interviews	Examine how economic uncertainty and gender equality interact in Spain to influence fertility.	McDonald	Cross-sectional	53 highly-educated, urban, native-born adults, aged 24-35 in stable heterosexual partnerships with at most one child.	Actual and anticipated division of housework and childcare, gender-role attitudes and ideology, knowledge and attitudes concerning work/family policies	How many children intended in total?	Qualitative	Interaction with economic uncertainty and stable employment	Not a noticeable variation in fertility intentions among economically secure interviewees according to their level of gender egalitarianism. Among less economically secure individuals, the less egalitarian individuals tended to intend more children. Suggests that in Spain, greater institutional support may be necessary for gender egalitarianism to increase fertility.	Among economically secure:  Among economically insecure: 
	52	Suwada, 2019	Poland 2017	In-depth interviews	Analyse the possibilities and decisions made about procreation by Polish parents in the context of the family policy system	Theories of agency, structure and reflexivity	Cross-sectional	52 parents with a child under 8	Division of labour in the domestic sphere between partners	Having another child in future	Qualitative	Also asked about stability in the labour market, salaries and availability of affordable housing	Women whose partners are not engaged in domestic work feel that they are overwhelmed and are not eager to have more children. Most women in the sample are largely responsible for domestic chores whilst being expected to participate in the labour market.	
USA	53	Brinton et al., 2018	USA 2012	In-depth interviews	Examine the reasoning individuals offer for the gap between their fertility ideals and intentions.	McDonald, Gender Revolution Theory, Esping-Andersen and Billari. Designed research design to reflect McDonald - greatest opportunity costs for educated women. Bachrach and Morgan for unrealised intentions	Cross-sectional	53 highly-educated, urban, native-born adults, aged 24-35 in stable heterosexual partnerships with at most one child.	Actual and anticipated division of housework and childcare, gender-role attitudes and ideology, knowledge and attitudes concerning work/family policies	1) How many do you like to have ideally and why? (Desire) 2) How many do you think you will actually have and why? (Expectation) 3) If there is a discrepancy between 1 and 2 can you explain the reason? (perceived obstacles)	Qualitative	Also ask about both partners' current job and workplace, and life goals for next 3 years	Women expressed concern about work-family conflict and wage penalty of motherhood. Like Sweden, more likely to express this concern than interviewees in Japan and Spain.	











10.3.8 TABLE 7: Micro-level studies of fertility outcomes



Region	No.	Authors	Population	Data set	Research question/Aim	Theoretical background	Temporal aspect	Sample	Independent variable	Dependent variable	Method	Control variables	Results summary	Nature of relationship	Categorisation in review (association for each independent variable, categorised as positive, negative, curvilinear, none or mixed, with dependent variable)
ASIA	54	Fukuda, 2017	Japan 2001-2007	Longitudinal Survey of Newborns in the 21st Century	Investigate the direct linkage between couples' gender relations after the arrival of the first child and additional fertility by studying the correlates of second births	McDonald	Longitudinal	10808 married couples with 1 child	Division of housework and childcare	Second birth	Event History Analysis	Employment status of both partners, wife's anxiety and feelings of burden over child rearing, first child sex and birth month, whether first child premature, whether first child from premarital, wife's education, coresidence with grandparents, wife's age at first birth, region, size of municipality	Couples with traditional gender role division have higher hazard, however father's greater participation in childcare and housework (if wife self-employed) increases hazard. Greater housework commitment among full-time working wives decreases hazard.	 $p<0.05$	1 curvilinear association for 'more equal share of domestic labour'
	55	Kato et al., 2018	Japan 2001-2007	Longitudinal Survey of Newborns in the 21st Century	To examine whether or not men's active involvement in childcare and housework promotes parity progression in Japan	Second Demographic Transition, Becker, Hakim, McDonald	Longitudinal	22504 couples with 1 child, and 16289 couples with 2 children	Husband's contribution to specific housework and childcare tasks	Second or third birth	Logistic regression	Age of both partners, man's work hours per week, maternal anxiety towards childrearing, mother's employment, outsourcing of childcare, co-residence with grandparents, mother's education, total household income, region, size of city, sex of previous children.	Men's childcare participation positively associated with parity progression, but negative association for housework 30 months after previous childbirth, and no effect 66 months after previous childbirth.	For childcare contribution:  $p<0.05$ For housework contribution:  $p<0.05$	1 mixed association for 'more hours of domestic work for a man relative to other men'
	56	Komatsu, 2011	Japan 1993-2004	Japanese Panel Survey of Consumers	Does husband's time spent in housework and childcare increase birth probabilities and time specific birth probabilities?	Becker	Longitudinal	Women aged 24-34 at first survey wave. 548 person-year observations for childless, 1381 for one child, 2990 for two children	Husband's time use on housework and childcare on typical day	First, second or third birth	Pooled probit model to assess probability, event history model to assess timing	Age of wife and husband's mothers at husband's date of birth, wife's age, age at first birth, age at marriage, living with grandparent, area of residency, husband's earnings, age gap between partners, wife's years working before marriage, education of both	Husband's housework contribution does not affect first or third birth probability but does increase second birth probability	For second births:  $p<0.05$ For first and third births: 	1 positive association for 'more hours of domestic work for a man relative to other men'







57	Nagase & Brinton, 2017	Japan 2002-2012	Japanese Longitudinal Study of Adults in 21 st century	To take into account labour market structure, workplace norms, and the legal environment governing working conditions to contextualize men's contribution to household labour and its effect on transition to second birth	McDonald, Esping-Andersen and Billari, Gender Revolution Theory	Longitudinal	20486 female person years, married with one child	Weekly hours spent by husband and wife on housework and childcare, and husband's gender-role attitudes	Second birth	Fixed effects linear probability regression	Husband's income, husband's weekly employed work hours, wife's labour force participation, age of first child, wife's age, survey year	Husband's household work hours significantly increase probability of second birth for working women (dual earner couples). Women's household hours tend to decrease probability of second birth, but only significant among working mothers. Among working mothers, the more egalitarian the husband's attitudes, the less likely progression to second birth is. Same direction of association for non-working mothers on all variables, but not significant	<p>For working mothers, father's contribution and decreasing their own weekly hours of domestic labour increase likelihood of second birth:</p>  <p>$p < 0.01$ for husband's contribution, $p < 0.1$ for wife's hours</p> <p>For working mothers, husband's more egalitarian attitudes:</p>  <p>$p < 0.05$</p> <p>For non-working mothers same direction for same variables:</p>  <p>$p > 0.1$</p>	1 positive association for 'more hours of domestic work for a man relative to other men', 1 positive association for 'fewer hours of domestic work for a woman relative to other women' and 1 negative association for 'more flexible gender role attitudes'
58	S. Y. Yoon, 2017	South Korea 2007-2010	Korean Longitudinal Survey for Women and Families	Examine the influence of three sources of a supportive environment for families - the state, husbands, and parents in laws - on women's fertility intentions and behaviour regarding second children.	Esping-Andersen and Billari, McDonald, Gender Revolution Theory	Longitudinal	526 married women with 1 child, 19-45	Husband's hours of participation in housework and childcare per day	Second birth	Logistic regression	Age, education, employment, husband's income, rural residence, caregiving to elderly, fertility intentions in 2007, support from grandparents with childcare, knowledge of parental leave policy	Husband's hours increase likelihood of second birth	 <p>$p < 0.01$</p>	1 positive association for 'more hours of domestic work for a man relative to other men'





Region	No.	Authors	Population	Data set	Research question/Aim	Theoretical background	Temporal aspect	Sample	Independent variable	Dependent variable	Method	Control variables	Results summary	Nature of relationship	Categorisation in review (association for each independent variable, categorised as positive, negative, curvilinear, none or mixed, with dependent variable)
AUSTRALIA	59	Craig & Siminski, 2010	Australia 2001-2007	HILDA survey	Investigate whether the likelihood couples with one child will have more children is affected by the amount of household labour they each perform, and the way they divide it between themselves	McDonald's gender equity theory	Longitudinal	573 one child couples	Self-reported time use data for housework and childcare. Perception of fairness. Gender ideology of couple.	Second birth	Probit regression - marginal effects	Age of both parents, weekly hours of paid work of both parents, education of both parents, age of first child, household income, socio-economic status of residential area, year of observation, relationship satisfaction	More women's housework decreases the probability of second birth. Father's time spent or share of housework had no effect, nor did childcare time of either partner. Independent of gender ideology and fairness assessment.	Fewer women's housework hours:  $p < 0.05$ Father's time on housework and childcare by either partner, gender role ideology and fairness assessment: 	1 positive association for 'fewer hours of domestic work for a woman relative to other women', 1 none for 'more hours of domestic work for a man relative to other men', 1 none for 'more flexible gender role attitudes' and 1 none for 'more satisfaction/perception of fairness with division'
	60	Craig & Siminski, 2011	Australia 2001-2007	HILDA survey	Investigate whether the housework and childcare contributions of coupled Australian men with one child affect the likelihood that their wives will have a second child	McDonald's gender equity theory	Longitudinal	458 coupled fathers with one child	Self-reported time-use data for housework and childcare	Second birth	Probit regression	For both parents: age, hours of paid work, education, attitude variables (not defined). Age of first child, income, socio-economic status of the area of residence.	Men's amount and share in both housework and childcare tasks has no effect on second birth probability.		1 none for 'more equal share of domestic labour' and 1 none for 'more hours of domestic work for a man relative to other men'
	61	Holton et al. 2009	Australia (Victoria) 2003	Data collected by authors	Investigate the relationship between attitudes towards women and motherhood, and women's childbearing desires and outcomes.	TDIB framework	Cross-sectional	569 women, aged 30-34	Agreement with attitudes regarding women in society, roles of women, women and motherhood	Being a mother and number of children	Multi-level regression analyses	Employed, affiliated with a religion, education, city resident, socio-economic status	Women with larger family sizes more likely to have traditional attitudes. No significant relationship with motherhood status, although same direction of effect.	Likelihood of having a larger number of children:  $p < 0.01$ Likelihood of being a mother:  $p > 0.05$	1 negative association for 'more flexible gender role attitudes'
	62	Luppi, 2016	Australia 2001-2012	HILDA survey	Focus on the way the experience of the first child becomes a force that shapes the decision to have a second child.	None - based on literature about how subjective well-being influences childbearing	Longitudinal	436 couples with one child, woman no older than 45	Hours and share of housework and childcare, and perception of whether division is fair, satisfaction with flexibility of work-life balance, whether work opportunities were turned down after childbirth	Second birth	Event history analysis (log-logistic hazard)	Age of both partners, educational difference between partners, marital status, occupation of both, household income, satisfaction with relationship, health, outsourced childcare, personality traits, unexpected difficulties with first birth and satisfaction with employment opportunities	Among all couples: when women do most of the childcare, probability of having second child increases. When men perceive they do equal share of housework and childcare, their is a quicker progression. Turning down work opportunities among women after first birth decreases probability of second child. Among dual earners: when fathers perceive they do equal share of childcare and housework, or more than fair share of housework, progress more quickly. Mother's involvement in childcare still strong association with quicker birth progression. Difficulties for woman balancing work-family postpones second child.	For both share of housework, and work-family conflict (assuming dual burdened women are at base of U curve):  $p < 0.001$	1 curvilinear association for 'more equal share of domestic labour' and 1 curvilinear association for 'more satisfaction/perception of fairness with division'



Region	No.	Authors	Population	Data set	Research question/Aim	Theoretical background	Temporal aspect	Sample	Independent variable	Dependent variable	Method	Control variables	Results summary	Nature of relationship	Categorisation in review (association for each independent variable, categorised as positive, negative, curvilinear, none or mixed, with dependent variable)
EUROPE	63	Aasve et al., 2015	Europe (Bulgaria, France, Czech Republic, Hungary, Lithuania) 2004-2009	Generations and Gender Survey	Assess the impact of consistency between gender egalitarian attitudes and equality in the division of household labour on the likelihood of having another child, for different parities.	McDonald, Mills Gender indices	Longitudinal	9326 heterosexual respondents living with partner, woman aged under 45	Consistency between gender attitudes and behaviour	A(nother) child	Logistic regression	Ability to make ends meet, marital status, relationship quality, age of man and woman, graduate status for both, hours of employment for both, country	Consistent gender egalitarian attitudes with egalitarian behaviours significantly increased probability of having only a second child, and for women only. Same trend for higher order intentions among women, and second child intentions among men but not significant.	For women probability of a second child:  $p<0.001$ For women's higher order parity intentions and men's second child intentions:  $p>0.1$ For women's first child intentions and men's lower parity intentions: 	1 positive association for 'consistency between gender role attitudes and domestic division of labour'
	64	Bernhardt and Goldscheider, 2006	Sweden 1999-2003	Family and Working Life in the 21st Century Survey by Statistics Sweden	1) Does holding more egalitarian gender-role attitudes raise the perceived costs of children, reduce the perceived benefits of children, or a combination? 2) How do gender-role attitudes, together with assessments of perceived costs and benefits of children, affect the likelihood of early parenthood?	Second demographic transition, McDonald	Longitudinal	Aged 22-30, 559 men and 603 women who were childless in 1999	Gender-role attitudes, grouped into traditional and egalitarian	First birth	Cox regression	Perceived costs and benefits of childbearing, studying between surveys, educational level, employed in 1999, metropolitan residence, reason for leaving home, age	Traditional men are more likely to become parents. No significant effect for women but same direction of effect.	For men:  $p<0.05$ For women:  $p>0.1$	1 negative association for 'more flexible gender role attitudes'
	65	Bernhardt et al., 2016	Sweden 1999-2012	Young Adult Panel Survey and register birth data	Investigate the long-term relationship between attitudes toward domestic gender equality and men's transition to parenthood in Sweden: Are those who expect a more traditional division of paid and unpaid work also more "familistic" in the sense that they give priority to family over (paid) work so will form families earlier? If so, is it just a question of timing, with more egalitarian men postponing but later catching up?	Becker, McDonald, Gender Revolution Theory	Longitudinal	1105 childless young men aged 22-30	Attitudes regarding domestic gender equality - best arrangement for family in terms of who does paid and unpaid work	First births	Logistic regression to examine initial likelihood of childlessness in 1999 (assess problem of left censoring), event history analysis to examine births over time	Education, cohort, area, partnership status, employment, immigrant status, age	Egalitarian men less likely to become fathers during the time interval, no signs of egalitarian men 'catching up' over time.	 $p<0.01$	1 negative association for 'more flexible gender role attitudes'





66	Brodmann et al., 2007	Denmark and Spain 1994-2001	European Community Household Panel	Examine the degree to which women's fertility decisions depend on greater gender symmetry in child care	Becker, preference theory	Longitudinal	Women with one child living with partner: 305 Danish, 724 Spanish	Father's self-reported weekly childcare hours	Second birth	Event History Analysis	Age of both parents, education of both parents, household income individual income, mother's wage, mother's months employed, mother invests in training, married, use of paid childcare services	Increased father's childcare hours increased Danish 'career-oriented' (defined as investment in training) women's probability of second birth.	For career-oriented Danish women:  $p < 0.01$ For other Danish women and Spanish women: 	1 positive association for 'more hours of domestic work for a man relative to other men'
67	Cooke, 2004	Germany 1985-2000	German Socio-Economic Panel	Analyse the effect of men's participation in housework and child care on the likelihood of second birth and divorce	Becker	Longitudinal	628 one child couples, woman under 49	Both partners' participation in housework and childcare (weekly hours), whether couple is a male-breadwinner family	Second birth	Event History Analysis	Women's hours of paid labour, woman's weekly work hours, East/West Germany, education of both parents, household income, home ownership, marriage and birth in same year, age at marriage of both, months spent cohabiting before marriage	Male-breadwinner couples more likely to progress. Men's participation in childcare increased probability of second birth, housework participation no effect.	For couple type and childcare division:  $p < 0.01$ For housework division: 	1 curvilinear
68	Cooke, 2009	Italy and Spain 1994-2000	European Community Household Panel	Explore whether slight differences in gender equity across the 1990s in Italy and Spain yields differences in equity effects on fertility	Becker and McDonald	Longitudinal	Married couples with one child where woman less than 43: 582 Italian, 504 Spanish	Father's percentage share of childcare	Second birth	Event History Analysis	Wife's weekly work hours, earnings, employment type, education, husband's education, another adult in the house, woman cares for an adult, mother's age at first birth, years since first birth, household income, time spent in panel.	Increased probability of second birth in Italy, particularly for dual-earners, when father increased share, but decreased probability after husband's share exceeds 1/3.	For Italian women:  $p < 0.05$ For Spanish women: 	1 none for 'more hours of domestic work for a man relative to other men'
69	Dommermuth et al., 2017	Norway 2007-2010	Norwegian Generations and Gender Survey 2007 and birth records over next 3 years	1) Are the division of housework and child care differently associated with childbearing? 2) Are gender equality and equity in the division of housework and child care differently associated with childbearing?	McDonald	Longitudinal	1537 couples: coresidential, heterosexual, women 18-40, able to conceive, not currently pregnant	Division of household work and childcare, satisfaction with fairness with division, and the interaction of gender-role attitudes with this division	First, second and third births	Logistic regression	Respondent is man, married, duration of union, age difference with partner, woman's age, education of both, employment schedule of both, age of youngest child	Unequal division of housework (either man or woman doing more) leads to lower probability of first and subsequent births. Child care is most relevant when the respondent is satisfied with the division, as one-child couples where the respondent is less satisfied with the division of child care are less likely to have a second child. Couples with less egalitarian attitudes have a higher likelihood of a first and third birth.	For more equal division of labour and satisfaction with childcare division:  $p < 0.05$ Gender role attitudes:  $p < 0.05$ for 1st births, $p < 0.1$ for 3rd	1 negative association for 'more flexible gender role attitudes'
70	Goldscheider et al., 2013	Sweden 1999-2008	Swedish Young Adult Panel Survey. Combined with Birth Registry data up to 2008	After decades of late 20th century research showing that increasing gender equality in the workplace was linked with lower fertility, might gender equality in the home increase fertility?	McDonald	Longitudinal	767 male, 1059 female person observations. Childless at first interview. Partnered.	Consistent or inconsistent gender-role attitudes with division of labour	First, second or third birth	Cox regression	Married, education of both parents, work status of woman, break up planned, woman's age, child status in 2003, gender	Inconsistency between attitudes and labour division decreases probability of second births, particularly for women	For women having second births:  $p < 0.05$ For other parity intentions: 	1 curvilinear association for 'consistency between gender role attitudes and domestic division of labour'


71	Harknett et al., 2014	Europe (Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and the UK) 2004-2009	European Social Survey	Examine the relationship between macro-level supports for childrearing and individual-level fertility outcomes	Theory of Planned Behaviour, TDIB framework, Cognitive-social model, Becker, Esping-Andersen (institutions), McDonald	Longitudinal	7436 working women aged 22-44 in 2009. Average country/wave sample size 177, ranged from 106 to 346	Male housework share in dual earner couples	Having a first or higher order birth	Logistic regression	Policy environment, labour market environment, support from extended family, overall support environment (state, family, from male partner), age, religiosity, has a previous child, youngest child's age, lives with partner	Male housework share positively affects both probability of first and higher order births.	 $p < 0.001$	1 positive association for 'more equal share of domestic labour'
72	Jansen and Liefbroer, 2006	The Netherlands 1995-1999	Panel Study of Social Integration in the Netherlands	Examine effect of partners' attitudes on the timing of the birth of a first child, the division of domestic labour, the division of childcare, and the division of paid labour between couples	Decision heuristics for resolving conflicts between partners (power rule, golden mean rule, sphere of interest rule, social drift rule)	Longitudinal	392 couples who were aged between 30-39 in 1999	Gender-role attitudes based on 4 statements (normal for a girl to attend technical vocation school, unnatural for men to have a female superior at work, women are better suited to child rearing and it is most natural if the man is the breadwinner and the woman the homemaker)	First birth	Cox regression model	Education of both partners, cohort, hours of paired labour by both partners in 1995, marital status, union duration, gender of respondent, child-oriented parenthood attitudes	No effect of gender-role attitudes on timing of first birth.		1 none for 'more flexible gender role attitudes'
73	Köppen and Trappe, 2019	Germany 2008-2017	German Family Panel	Improve understanding of the relationship between gender equality, gender equity, and fertility by investigating the impact of actual division of paid and unpaid labour on first and second births in Germany	McDonald, Gender revolution theory	Longitudinal	Young men and women in coresidential unions. 1927 childless couples and 975 1-child couples.	Couple's employment arrangement, division of childcare, division of housework, perception of fairness	First and second births	Discrete-time logistic regression models	Duration of cohabitation, age, age of first child, marital status, self-assessed importance of having children and having a career, highest degree achieved, gender, country or region of birth.	Women being in charge of routine housework facilitates births. A perceived fairness of division in paid and unpaid work was positively associated with first and second births. Childcare has no significant association but positive effect between 'mainly female provided childcare' and transition to births.	Less female housework: $p < 0.05$ for second births, $p < 0.1$ for first births For satisfaction with division of housework: $p < 0.1$ for first births, same direction of effect for second For more female childcare provision: $p > 0.1$	1 negative association for 'fewer domestic work hours for a woman relative to other women' and 1 positive association for 'more satisfaction/perception of fairness with division of labour'

74	Mencarini & Tanturri, 2004	Five Italian Cities	Survey in five Italian provincial capitals	Assess whether there is a link between family role-set and reproductive behaviour with a special focus on dual income couples	Becker, McDonald, Hochschild, Mason	Longitudinal	3300 mothers with at least one child in 3rd year of junior secondary school	Father's time spent doing childcare, and whether housework contribution increased/decreased after children	Second or third birth	Logistic regression	City of residence, age, partner's education, both partners' religiousness, changes in both partners' working time after birth of first child, prevalent childcare of first child during first three years, changes in family's economic condition after first birth	Father's increasing participation in care of first child increased probability of second births. Father's housework contribution no effect. For progression to third child, only father decreasing housework after birth of second child has negative effect on probability of third. No childcare effect.	Childcare contribution for second child and housework contribution for third child:  $p < 0.05$ Housework contribution for second child and childcare contribution for third child: 	1 positive association for 'more hours of domestic work for a man relative to other men'
75	Miettinen et al., 2015	Finland 1999-2004	Finnish Time Use Survey and birth registration	Study how the amount and division of housework and childcare predict subsequent childbearing among Finnish couples	Becker, McDonald	Longitudinal	504 couples that live together, woman aged 18-44, with children under 15, fewer than 3 children	Continuous hours spent on housework and childcare using time use diaries. Number of woman's hours and men's share of total hours.	First, second and third births	Cox proportional-hazard regression	Age of woman, number of children, age of youngest child, place of residence, type of union, education of both partners, employment hours of both partners, both partners' enrolment in education, household income, proportion of income provided by female partner	Increase in woman's housework decreases hazard ratio for first birth and for all births among dual-earners. No effect of male share of housework. Father's contribution to childcare positively associated with continuing to second birth only. Same direction of effect for non-significant results, however.	Decreasing housework load for working women progressing to first birth and childcare division for second birth:  $p < 0.05$ Division of housework, and division of childcare on other parity progressions:  $p > 0.1$	1 positive association for 'fewer hours of domestic work for a woman relative to other women' and 1 positive association for 'more equal share of domestic labour'
76	Nilsson, 2010	Sweden 1979-1995	Swedish Survey of Living Conditions Panel	Does the division of housework, as a measurement of gender equality, have an impact on births in Swedish families?	SDT, McDonald, Hochschild, Beck-Gersheim,	Longitudinal	470 married/cohabiting individuals where female partner under 40 in 1987, who were still in partnership in 1995	Proportion of household tasks carried out by male and female partners	An increase in the number of children between two time observations	Logistic regression	Employment of both, socio-economic status, household income, woman's proportion of couple's income, number of children, civil status, woman's age.	Egalitarian couples more likely than traditional couples to have first or additional children, until demographic variables (age and parity) added to model.		1 none for 'more equal share of domestic labour'
77	Oláh, 2003	Hungary 1992-1993	Fertility and Family Surveys	Focus on second birth in Sweden and Hungary, taking into account explicitly the gendered context in which childbearing decisions are materialised. (Nb. Sweden is removed from this summary as the analysis only explored division of parental leave)	Becker	Cross-sectional	3024 Hungarian men and women with one child	Division of domestic duties	Second birth	Piecewise-constant proportional-hazards model	State family policy period observation falls under, respondent's education, respondent's employment, standardised for respondent's number of siblings, age at first birth, first-birth union order, marital status, current unemployment rate, age of first child	When home management either mainly the woman's responsibility or equally shared, higher probability of second birth.	 $p < 0.05$	1 curvilinear association for 'more equal share of division of labour'





78	Osiewalska, 2018	Europe CEE cluster: Bulgaria (2004), Czech Republic (2005), Lithuania (2006), Poland (2010/11), Romania (2005), Russia (2004) NWE cluster: Belgium (2008-10), France (2005), Norway (2007-08), Sweden (2012-13)	Generations and Gender Survey	This study aims to investigate the relationship between couples' reproductive behaviour and the division of power between partners in different country-specific contexts	Becker, McDonald, Gender Revolution Theory	Cross-sectional	Heterosexual couples with woman aged 25 - 39 (13083 CEE and 5495 NWE) and aged 40-64 (17649 CEE and 9294 NWE)	Housework inequality and woman double-burdened (time spent in paid work equal or more than her partner, and does most of the housework)	Number of children ever born, probability of first childbirth and probability of achieving average number of children among parents	Hurdle poisson regressions	Educational inequality, age inequality, paid work inequality, woman's age at union formation, rural, partnership status, woman's age, age of youngest child, country	Women doing more housework positively associated with increased fertility.	 $p < 0.001$	1 negative association for 'fewer domestic work hours for a woman relative to other women'
79	Puur, Oláh, Tazi-Preve, et al., 2008	Europe (Austria, Estonia, East and West Germany, Italy, Lithuania, Netherlands, Poland) 2000-2003	Population Policy Acceptance Study	To shed more light on the impact of men's role orientation on their fertility intentions	Becker and McDonald	Cross-sectional	Men aged 35-44, sample size unspecified	Man's role orientation based on gender attitudes regarding work and home - Likert scale. Grouped into traditional, egalitarian and intermediate	Mean number of children	Descriptive	None	Egalitarian men are more likely to have more children than traditional or intermediate men.	 Descriptive so no p -value	1 positive association for 'more flexible gender role attitudes'
80	Schober, 2013	Great Britain 1995-2005	British Household Panel Study	Investigate whether gender inequality in the division of housework and childcare may be an obstacle to childbearing and relationship stability among different groups of British couples.	Becker, Oppenheimer, Gender ideology	Longitudinal	1519 childless couples and 1517 couples with one child. Living together, female partner 20-40	Percentage of time women spend on housework relative to total weekly housework time of both partners and women's gender-role attitudes	First and second births	Cox proportional-hazard model	External support with housework, formal child care, informal child care, mother has main child care responsibility, paid work hours of both partners, couple's monthly income, education of both partners, age of both partners, marital status, relationship duration, survey year, country, first child's age	For first births: greater woman's share of housework positively associated with first birth until they do 63% or more. Significant at $p < 0.1$. Gender-role attitudes have no effect. For second births: woman's larger share of housework or childcare has no effect on probability of births. Gender-role attitudes have no effect.	For greater woman's housework among childless couples, and division of housework for working mothers (inverse U-shape categorised as mixed in review):  $p < 0.1$ For couples with one child, and gender-role attitudes: 	1 mixed association for 'fewer hours of domestic work for a woman relative to other women' and 1 none for 'more flexible gender role attitudes'
81	Westoff and Higgins, 2009	Europe (Austria, Estonia, Italy, Lithuania, Netherlands, Poland, West Germany) 1999	European/World Values Surveys	Has there been a fundamental reversal in direction of egalitarian attitudes' influence on fertility, or are measurement issues responsible for Puur et al.'s (2008) findings?	McDonald	Cross-sectional	2029 men aged 35-44	Gender-role attitudes	Mean number of children	Correlation	None	Fertility is higher for men with traditional attitudes, but inconsistently significant across countries.	 $p < 0.05$	1 negative association for 'more flexible gender role attitudes'








82	Zhou and Kan, 2019	Great Britain 1991-2017	Understanding Society and British Household Panel Study	How has the relationship between the couple-level gender division of labour and fertility changed over the last 26 years in Great Britain?	Becker, Second Demographic Transition, Gender Revolution Framework, Oppenheimer	Longitudinal	12888 couples with female as main respondent aged 20-44, living with a partner aged 20-59 (60548 couple wave observations)	Five types of labour division strategies, formed by latent class analysis of employment status, woman's share of income and woman's time spent on housework (male-breadwinner, modified male-breadwinner, dual-earner, female-breadwinner and precarious)	Odds of having a new child in next observation period	Fixed-effect logistic regressions	Number of children, both partners' age and squared term, cohabitation, duration of partnership, number of years until next observation	Odds of having a child in the next survey interval were higher for male-breadwinner couples compared to dual earner couples. However, this effect has become weaker over time, with little effect between 2009-2017.	<p>Before 2009: </p> <p>After 2009: </p> <p>$p < 0.05$</p>	negative association for 'more equal share of domestic labour'
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Region	No.	Authors	Population	Data set	Research question/Aim	Theoretical background	Temporal aspect	Sample	Independent variable	Dependent variable	Method	Control variables	Results summary	Nature of relationship	Categorisation in review (association for each independent variable, categorised as positive, negative, curvilinear, none or mixed, with dependent variable)
USA	83	Kaufman, 2000	USA 1987-1994	National Survey of Families and Households	Focus on the effect of gender-role attitudes on family formation and dissolution	Becker and Oppenheimer	Longitudinal	2621 childless men (under 45) and women (under 40)	Gender-role attitudes	First birth	Logistic regression	Age, education, income, occupational prestige, religion, ethnicity, attitudes towards marriage, relationship status, fertility intention, preconception marriage between waves	Women with egalitarian attitudes less likely to have a child, men with more egalitarian attitudes more likely but not significant.	Women:  $p < 0.01$ Men:  $p > 0.05$	1 negative association for 'more flexible gender role attitudes'
	84	Liu & Hynes, 2012	USA 1991-1996	National Institute of Child Health and Human Development Study of Early Child Care	Examine whether difficulties in balancing work and family are associated with fewer subsequent births	Lesthaeghe, Becker	Longitudinal	809 working women with at least one child.	Degree of work-family conflict, measured subjectively how much work 'spills over' into family and vice versa	Another child	Event history analysis	Satisfaction with work, woman's age, woman's education, woman's ethnicity, number of prior children, cohabiting with partner, unearned income, beliefs about working 1 month after birth, beliefs about cost of working at 1 month, work hours, work flexibility, time point	No evidence that mothers' perceived difficulty of balancing work and family influences subsequent fertility behaviour.		1 none for 'more satisfaction/perceived fairness with division'
	85	Miller, Rodgers and Pasta, 2010	USA 1979-2002	National Longitudinal Survey of Youth 1979	Examine how the motivational sequence that leads to childbearing predicts fertility outcomes across reproductive careers	TDIB framework	Longitudinal	3683 males and 3883 females aged 14-22 in 1979	Gender role attitudes in 1979 based on 5 statements (a woman's place is in the home, a wife with a family has no time for employment, employment of wives leads to more juvenile delinquency, it is better for the man to be the achiever outside the home and the women to take care of the home, and women are happier if they stay home and take care of children)	Total number of children	Structural Equation Modelling	Expected educational attainment	Traditional attitudes are associated with a larger number of children achieved by 2002.	 no p -value	1 negative association for 'more flexible gender role attitudes'

	86	Torr & Short, 2004	USA 1987-1994	National Survey of Family and Households	Is there empirical evidence to support McDonald's proposition at the individual level?	McDonald	Longitudinal	265 one-child married couples, with woman aged 18-39	Amount and share of 9 household tasks in hours per week, egalitarian gender ideologies	Second birth	Logistic regression	Wife's age, household income, wife's income share, wife employed full time, wife's education, time since first child, wife is white, first child is female	U-shaped association: most traditional (wife does > 84%) and modern couples (wife does <54%) most likely to progress to second birth.	 $p < 0.05$	I curvilinear association for 'more equal share of domestic labour'
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10.3.9 TABLE 8: Macro-level studies of fertility outcomes

Region	No.	Authors	Population	Data set	Research question/Aim	Theoretical background	Temporal aspect	Sample	Independent variable	Dependent variable	Method	Control variables	Results summary	Nature of relationship	Categorisation in review (association for each independent variable, categorised as positive, negative, curvilinear, none or mixed, with dependent variable)
EUROPE	87	Alonso, 2004	Europe 1995-2004	Eurobarometer Surveys	Analyse Eurobarometer surveys to show whether there is some relationship or not between low fertility and uneven task sharing between partners	McDonald	Cross-sectional	Unspecified national samples	Ideal and actual share between partners of childcare tasks	Mean number of children	Correlation	None	The ideal distribution of childcare (but not actual distribution) were correlated with higher fertility, as was actual division of housework but not childcare division.	For ideal childcare distribution and actual division of housework:  $p < 0.01$ For actual sharing of childcare: 	1 positive association for 'more satisfaction/perception of fairness with division of labour' and 1 positive association for 'more equal share of domestic labour'
	88	Arpino and Tavares, 2013	24 European countries in 1999 and 2008	Eurostat database and European Values Survey	Assess if recent fertility trends in Europe are associated with change in values.	Second Demographic Transition, McDonald	Two cross-sections	31716 in 1999 and 35728 in 2008. Average country sample is 1400 in each wave.	Gender-Role attitudes: Agreement with statements 'when jobs are scarce, men should have more right to a job than women' and 'do you think it is very important, rather important or not very important for a successful marriage to share household chores'.	Total Fertility Rate	Cross-sectional and panel regression models with country and region fixed effects	Individualism values in terms of relationships, children and individual autonomy	Attitudes in favour of gender equality in the labour market associated positively with TFR, but adding gender equality in the family values turns the association negative. Furthermore, in 1999 regions with the highest TFR had either a low or high level of attitudes towards gender equality on both measures, whereas a high dimension on one but not the other had lower fertility rates. In 2008 only those with both measures having high values had a higher TFR.	 $p < 0.05$	1 curvilinear association for 'more flexible gender role attitudes'
	89	Baizan, Arpino and Deleclòs, 2016	Europe (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, UK) 2004-2009	EU-SILC for children data, attitudes data from World Values Survey and European Values Survey	Assess the extent to which individual-level completed fertility varies across contexts characterized by policies supporting different gender division of labour models.	McDonald, Esping-Andersen and Billari	Cross-sectional	69213 women aged 36-44 (country samples range between 2326 and 13871)	Prevalence of gender equitable attitudes (measured by agreement to 'when jobs are scarce, men should have more right to a job than women')	Average number of children living with mother at time of interview	Poisson regression models, multilevel by country	Age, highest educational level attained, country-level family allowances, weighted leave weeks, childcare coverage, men's working hours, percent of women working part time	The higher prevalence of egalitarian attitudes results in higher fertility, but stronger association for women with higher education.	 $p < 0.001$	1 positive association for 'more hours flexible gender role attitudes'

CROSS-REGIONAL														
90	Arpino, Esping-Andersen and Pessin, 2015	27 high-income countries in Europe and North America, 1990-2009	World Values Survey, European Values Studies, World Bank data and Human Fertility Database	Exploring whether the diffusion of gender-equitable attitudes regarding female employment is associated with fertility	McDonald, Esping-Andersen and Billari	Longitudinal	Unspecified national samples	Agreement with statement: 'when jobs are scarce, men should have more right to a job than women' as a measure of gender role attitudes	Total Fertility Rate averaged over 3 years	Longitudinal panel model	Age and education	A drop in fertility is observed as countries move from a traditional to a more gender-symmetric model, but then the reverse occurs beyond a certain threshold. The relationship is moderated by the difference in attitudes between men and women: change is more rapid when men and women agree on their attitudes.	 $p<0.05$	1 curvilinear association for 'more flexible gender role attitudes'
91	Craig, 2006	Australia, Germany, Italy and Norway 1989-1992	Multinational Time Use Survey	Whether the division of paid and unpaid work between mothers and fathers affects fertility decisions	Second Demographic Transition, McDonald, Becker	Cross-sectional	Australia: 5905 Germany: 7761 Italy: 13457 Norway: 2644 Aged 25-54 couples or single parents	Hours spent on paid and unpaid work on one day	Birth rate	OLS modelling	Nationality, sex, age, income, education, number of children, day of the week, spouse's employment, age of youngest child, employment status	Birth rates are higher where male and female time allocation to paid and unpaid work is most equitable, particularly for childless households.	 $p<0.001$	1 positive association for 'more equal share of domestic labour'
92	Brinton & Lee, 2016	24 OECD countries 1990-2012	World Values Survey and Human Fertility database	Make both a theoretical and an empirical contribution to the analysis of how gender inequality is related to fertility levels in the post-industrial world	McDonald, Esping-Andersen and Billari, Gender Revolution Theory	Pooled time-series	54,764 men and women aged 20-49	Gender-role attitudes on work and family - clustered through latent class analysis (traditional, pro-work conservative, flexible egalitarian, full egalitarian). Percent of population in each group.	Total Fertility Rate	Pooled time-series regression	Young men's unemployment rate, employment protection for regular workers, GDP, economic growth, female labour force participation, public spending on family policies, year	Proportion of country's population believing in pro-work conservative ideology compared to full egalitarianism negatively affects the TFR.	 $p<0.001$	1 positive association for 'more flexible gender role attitudes'
93	de Laat and Sevilla-Sanz, 2011	OECD countries 1994	International Social Survey Program	Examine how men's participation in home production can explain the positive relationship between fertility and women's labour force participation at the cross-country level	Becker	Cross-sectional	Married women aged 25-45	Which partner performs different household tasks, and women's gender role attitudes	Family size	OLS estimation and probit model	Years of education, man's earnings, cohort	Women living in countries where men participate more in home production are better able to combine having children with market work, leading to higher fertility. However, women with more egalitarian attitudes have fewer children.	Men's participation:  $p<0.001$ Women's gender role attitudes:  $p<0.01$	1 positive association for 'more hours of domestic work for a man relative to other men' and 1 negative association for 'more flexible gender role attitudes'
94	Feyrer et al., 2008	OECD countries 2002	UN Fertility estimates and division statistics from International Social Survey Program	To show that in countries where men perform relatively more of the childcare and household production, have the highest fertility in a rich country sample	Becker	Cross-sectional	Women with children in the household	Proportion of housework and caring for sick children done by male partner, agreement with gender egalitarian attitudes regarding working mothers	Total Fertility Rate	Correlation	Female labour force participation rates for women aged 30-35, federal governments' family spending per child	Significant correlation between proportion of domestic labour done by male, and proportion of country with gender egalitarian views, and TFR.	 $p<0.001$	1 positive association for 'more equal share of domestic labour' and 1 negative association for 'more flexible gender role attitudes'
95	Frejka, Goldscheider and Lappegard, 2018	Finland, Norway, Sweden, France, Germany, UK, Netherlands, Canada, USA, Italy, Spain, 1960/70 - 2000/2014	Human Fertility Database for fertility data, multinational time use study for division of household labour data, OECD/World Bank/ILO data for labour force participation data	Establish the second shift trends during the second half of the 20th century and their effects on fertility	Gender Revolution Theory, Second Demographic Transition	Longitudinal	Unspecified national samples	Sex ratio of domestic hours (including childcare) among those aged 20-59 from 1961 to 2004. From here created a measure of 'second shift' relating sex ratio of labour force participation to sex ratio of domestic work.	Cohort total fertility rate	Descriptive	None	No increase in cohort total fertility rates by end of 20th century, but cohort fertility declined the least where the most progress in decreasing women's second shift was made (Northern Europe), and declined the most in countries where the second shift remained large/increased over time (Southern Europe).	 Descriptive so no p -value	1 positive association for 'more equal share of domestic labour'

10.4 APPENDIX 3.4: SUMMARY OF ALL PAPER CHARACTERISTICS INCLUDED IN SYSTEMATIC REVIEW, FOLLOWED BY A DETAILED BREAKDOWN OF EACH SECTION.

10.4.1 General summary

10.4.1.1 Sample characteristics

The most popular study regions were Europe (61 of 95 pieces of analysis) and Asia (20 of 95) with the most popular countries being Austria, Germany, Italy, South Korea and the Netherlands. Sample size ranged from 70 (Philipov, 2008) to 22,792 (Lappegård, Neyer and Vignoli, 2015), with the majority of analyses having large sub samples between 200-1000.

10.4.1.2 Independent variables

36 pieces of analysis examined gender role attitudes, 29 the share of domestic work between partners, 23 men's hours of domestic work, 14 satisfaction with/perceived fairness of the division of labour/perceived work-family conflict, 9 women's hours of domestic work, and 2 looking at the consistency between gender role attitudes and division of labour.

10.4.2 Methodologies

Apart from 2 pieces of analysis, all quantitative micro-level analyses used multivariate methods (regression models, structural equation modelling, event history models). Macro-level analyses used correlation, regression modelling and time-series regressions, with only one being purely descriptive. All 7 qualitative papers used in-depth interviews, and one also used a questionnaire (Nosaka, 2012). These papers aimed to interpret quantitative findings regarding the gap between individual's ideals and birth outcomes, and evaluate the individual reasoning given for this.

10.4.2.1 Number of papers using behavioural theories:

The Theory of Planned Behaviour was cited by 10 papers, the TDIB model was cited by 12 papers and the Cognitive-Social model was cited by 2 papers.

10.4.3 Desires

10.4.3.1 Sample characteristics

Among the 7 micro-level analyses, 4 studied just women, and 3 studied both men and women. 3 had Asian samples, and 1 each had a European, Australian and US sample. There was also 1 European macro-level analysis. Sub-sample sizes ranged from 569 (Holton, Fisher and Rowe, 2009) to 8944 (Kato, 2018).

10.4.3.2 Independent variables

8 pieces of analysis explored the relationship between childbearing desires and gender attitudes, 2 explored the influence of the man's participation/hours of housework or childcare, and 1 women's absolute hours of domestic work.

10.4.3.3 Methods used

All micro-level analyses used multivariate regression models apart from Miller et al. (2010) who used structural equation modelling. The macro-level study did a test of correlation. All apart from one study (Miller et al., 2010) use cross-sectional data sets.

10.4.4 General Intentions

10.4.4.1 Sample characteristics

Among the 18 micro-level analyses, the majority studied just women (11/18), 6 focused on the couple and 1 focused on men's intentions. The majority were European analyses (10/18), and the most studied countries were Italy and South Korea (4 pieces of analyses each). 3 macro-level analyses also studied general intentions in Europe. Sub-sample sizes ranged from 70 (Philipov, 2008) to 9852 (Pinnelli and Fiori, 2008).

10.4.4.2 Independent variables

Compared to the studies on fertility desires, there was a wider range of independent variables used. 9 pieces of analysis explored the relationship between general intentions for children and gender attitudes, 8 explored the effect of the division of labour between partners, 7 explored the influence of men's participation/hours of housework or childcare, 2 women's absolute hours of domestic work and 2 on subjective perception of fairness in household division.

10.4.4.3 Methods used

All studies used multivariable regression models, apart from one that used structural equation modelling (Andrade and Bould, 2012). All use cross-sectional datasets apart from one (Okun and Raz-Yurovich, 2019). Two of the macro-level studies used tests of correlation, and one a logit model.

10.4.5 Short-term Intentions

10.4.5.1 Sample characteristics

Europe was the most studied region (9 out of 11). 6 studied couples and 7 studied women's intentions, and sample size ranged from 213 (Mills et al., 2008) to 22792 (Lappegård, Neyer and Vignoli, 2015).

10.4.5.2 Independent variables

Most examined share of domestic work (6/11) or satisfaction with that division or perceived work-family conflict (5/11). 3 studied gender-role attitudes and 1 men's time spent on domestic chores.

10.4.5.3 Methods used

All studies used multivariable regression models and cross-sectional datasets.

10.4.6 Fulfilment of intentions

10.4.6.1 Sample characteristics

Among the quantitative studies, 3 have South Korean samples, and 1 studies Italy. All 4 pieces of analysis are women only, and range in sample size from 235-8535. The 7 qualitative papers sample from Japan, Taiwan, South Korea, Spain, Sweden, Poland and the USA, which have been split up into individual countries in the table in order to summarise the findings in more detail.

10.4.6.2 Independent variables

Among the quantitative studies, 3 focus on the husband's absolute contribution to domestic labour in the household (Rinesi *et al.*, 2011; Yoon, 2016; Kim, 2017), 1 on gender role attitudes (Yoon, 2016) and 1 on perceived fairness of housework division (Lee and Hwang, 2019).

10.4.6.3 Methods used

All 4 quantitative studies use multivariable logistic regression models, and by nature of their research question, use longitudinal datasets. All 5 qualitative papers used in-depth interviews, and one also used a questionnaire (Nosaka, 2012). The studies aimed to interpret quantitative findings regarding the gap between individual's ideals and birth outcomes, and evaluate the individual reasoning given for this.

10.4.7 Outcomes

10.4.7.1 Sample characteristics

The 9 macro-level analyses focus on European or OECD countries. Among the micro-level studies, Europe was the most popular region of study (20 of 33 papers), with Sweden being the most commonly studied country (6/33). Analyses from Germany (5/33), Japan, Australia, Italy, Lithuania, the Netherlands, Poland and the USA were also prominent (4/33 papers each). All studies have large samples, with the smallest subsample being 265 women (Torr and Short, 2004) and the largest 22,504 (Kato, Kumamaru and Fukuda, 2018), but most have subsamples between 400-1000. The micro-level analyses on fertility outcomes tended to focus on information gathered from couples or both sexes (21 out of 33), rather than solely women (8) or men (4).

10.4.7.2 Independent variables

In terms of independent variables, among the micro-level analyses the majority studied the division of household labour between the couple (11/33) or gender role attitudes of the individual or the couples (12/33). Others studied men's absolute hours of domestic work (9/33), or women's absolute hours (6/33) perception of fairness of division or the respondents' ideal division (5/33), and consistency between gender ideology and domestic behaviour (2/33). 6 of the macro studies analyse gender-role

attitudes, 4 the share of domestic labour, 1 men's absolute contribution to domestic work, and 1 looked at the perceived fairness of the division.

10.4.7.3 Methods used

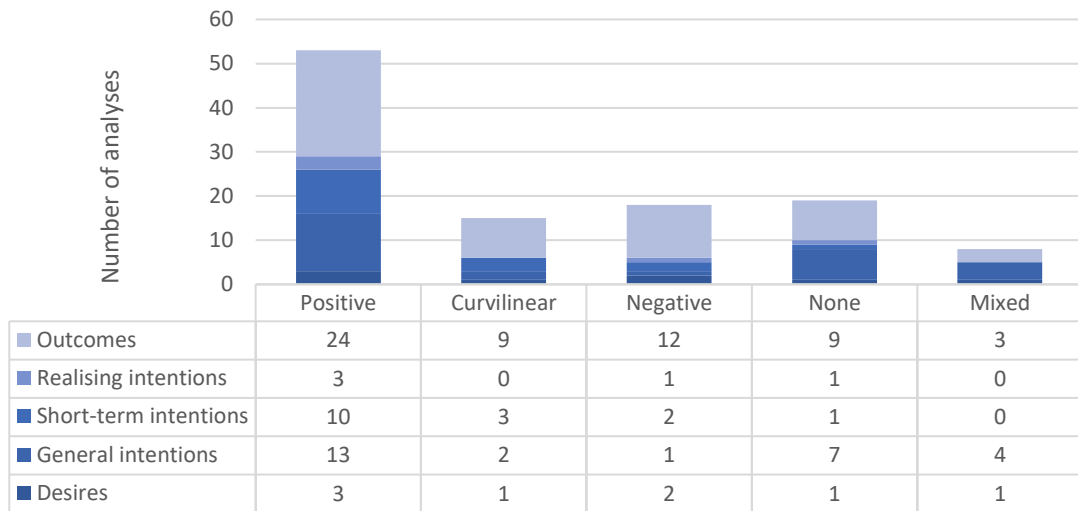
The methods used by the macro-level analyses included OLS modelling, correlation, longitudinal panel modelling, and time-series regressions. 2 did not account for potential confounding factors.

As progression is the subject of interest for the majority of the micro-level papers, 28 of them used longitudinal data sets and 14 of these studies chose time-varying event history methods to explore the association between household division of labour and childbearing. The others employed regression techniques, aside from one that used structural equation modelling (Miller *et al.*, 2010) and two that used correlation and descriptive analyses without accounting for potential confounders.

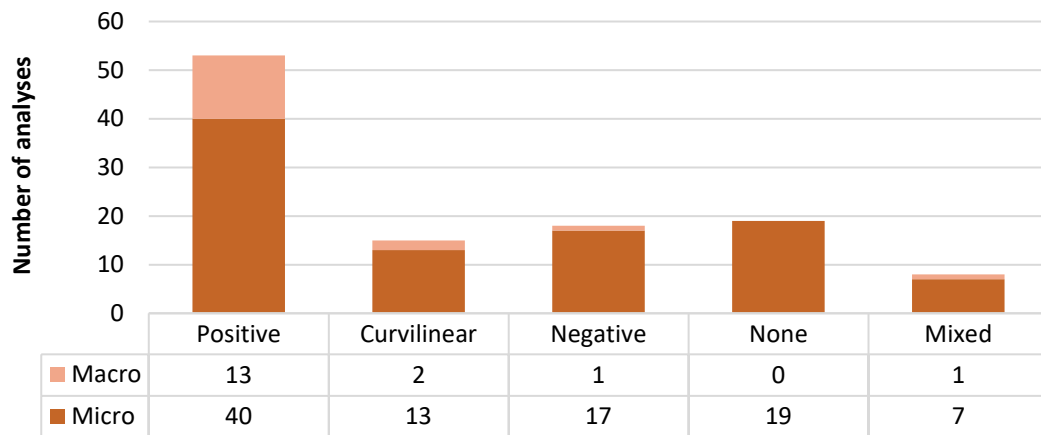
10.4.8 Visual summaries

Below are summaries of associations found by 1) dependent variable studied, 2) level of analysis, 3) region of study for desires and intentions analyses, 4) region of study for realizing intentions and outcomes analyses.

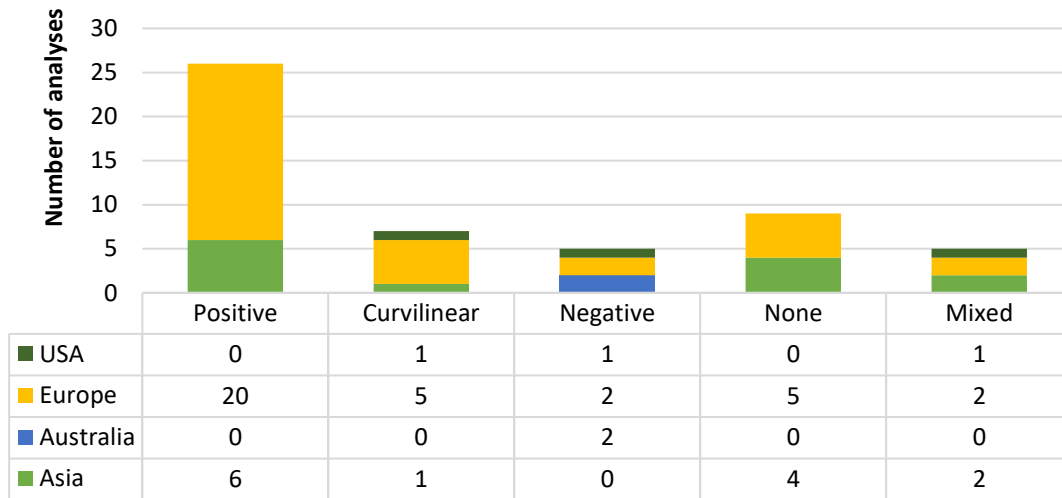
1) Associations found deconstructed by dependent variable studied



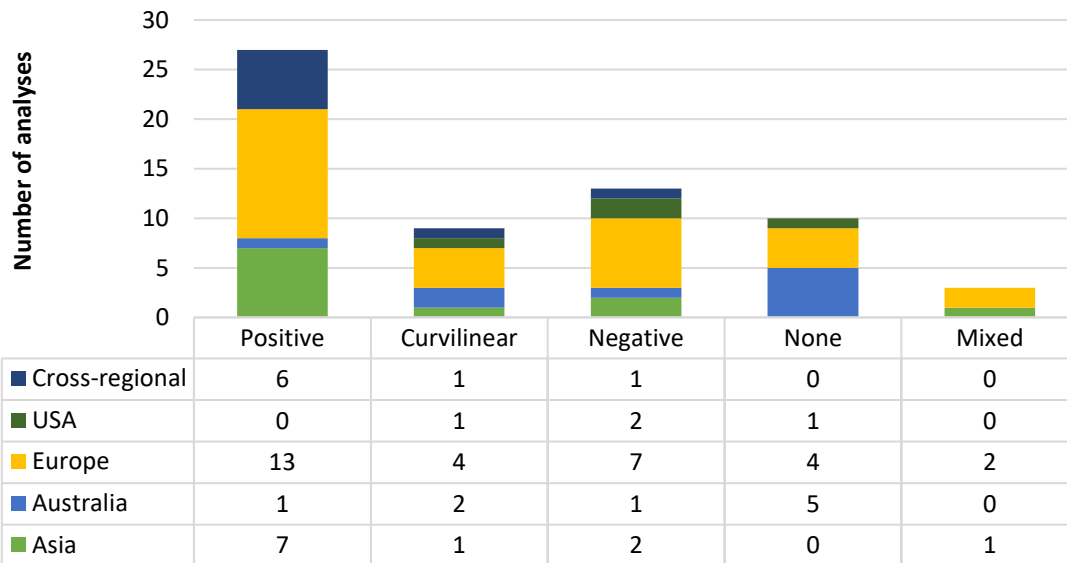
2) Associations found deconstructed by level of analysis



3) Associations found between gender equality and desires and intentions, by region studied



4) Associations found between gender equality and realising intentions/outcomes, by region studied



‘Positive’, ‘curvilinear’, and ‘negative’ refer to when these types of significant association were found for an independent variable in any group within a study. ‘None’ refers to studies where there was no significant association whatsoever found for that independent variable. ‘Mixed’ is when both significant positive and negative associations were present for different groups for the same independent variable within the same study. Qualitative analyses were excluded due to no empirical test of association being available. See Appendix 3, supplementary material, for list of studies included.

11 CHAPTER 4 APPENDIX

11.1 APPENDIX 4.1: COMPARISON OF USA ANALYSES WITH AND WITHOUT WEIGHTS

	Meaning	Levels	USA one child women non-weighted	USA one child women weighted
Constant	Intercept of the model	NA	1.97 ***	1.97 ***
Time	Baseline effect per 12 months	Linear, 0 is the intercept (5 years before birth)	0.96 ***	0.95 ***
Binary indicator 'not yet pregnant'	Changes in additional number of children expected when the arrival of the first child is confirmed	Time < -7 months from birth	Ref	Ref
		Time => -7 months from birth	0.51 ***	0.49 ***
Time binary indicator (Splines after birth)	Changes in expectation at different ages of the first child	Child < 0:	Ref	Ref
		Child aged 0-12 months:	0.91	0.93
		Child aged 12-24 months:	0.85	0.85
		Child aged 24-36 months:	0.89	0.88
		Child aged 36-48 months:	0.90	0.86
		Child aged 48-50 months:	0.83 **	0.81 **

11.2 APPENDIX 4.2: QUESTIONNAIRE USED FOR UK PILOT

(1) Socio-demographic background (8 items)

M1.	Sex	Female Male Prefer not to say
M2.	Age	NOTE: The study covers individuals aged 18-49
M3.	How many children do you have? Please include all biological, adopted, fostered and stepchildren.	Possible to mark: "Currently expecting a baby" or "Partner is currently expecting a baby". NOTE: Pregnant women and men with pregnant partners are EXCLUDED.
M4.	Do you live in	A city A town A village None of the above
M5.	What is the highest education level that you have completed?	No GCSEs or equivalent GCSEs or equivalent A level or equivalent Vocational qualification Bachelor or equivalent Masters or equivalent Doctorate or equivalent Other [TEXT BOX]
M6.	Which statement best describes your main position in the labour market?	Permanent employment Fixed-term employment Self-employment Unemployed Studying Retired / pensioner Caring for home or family

		Other [TEXT BOX]
M7.	Which describes you best:	I am married or in a civil partnership I am living with a partner (not married or in a civil partnership) I am in a relationship, but not living together I don't have a partner
M7a.	Is your partner (Routing: only those who say they're in a relationship)	Female Male Prefer not to say
M8.	How many people (including you) live in the place you consider your home?	

(2) Motives for parenthood

T1. Benefits

//Theoretically grounded//

There are many reasons why people decide to have a child. Below is a selection of reasons other people have given for why they want to have a child. Please indicate how important each of them is to you personally?

-2 completely unimportant

-1 rather unimportant

0 neither important nor unimportant

1 rather important

2 very important

T1A1. It is a wonderful feeling to hold your new-born baby in your arms.

T1A2. Watching your child grow and develop brings great joy.
T1A3. A child will take over our family name, values and traditions.
T1A4. By becoming a parent, you gain admiration from your family and friends.
T1A5. Having a child protects you from loneliness as you get older.
T1A6. A child is a confirmation of the parent's fertility.
T1A7. Guiding and teaching your child is greatly satisfying.
Check1: To check you're paying attention, please select strongly disagree.
T1B1. Having a child makes the parents' relationship stronger.
T1B2. Having a child brings lifelong happiness.
T1B3. Having a child allows parents to fulfil their religious values about family life.
T1B4. Having a child ensures parents will be supported in later life.
T1B5. *It's good for a child to have siblings
T1B6. Having a child makes parents' life richer.
T1B7. Having a child brings you closer to your own parents.
T1B8. Having strong maternal / paternal instincts.

*Questions with an asterisk are a bit different in character and formulated in relation to the 'I' - but after long deliberations we decided to leave them in the pilot.

T2. Costs (instruction as in T1)

There are many reasons why people decide **not to have a child**. Below is a list of reasons other people have given for not wanting to have a child. Please indicate how important is each of them to you personally?
 -2 completely unimportant
 -1 rather unimportant
 0 neither important nor unimportant
 1 rather important
 2 very important

T2A1. The discomforts and potential health risks of pregnancy and delivery.
T2A2. Being a parent would mean having frequent fears and worries about your child's wellbeing.
T2A3. Raising a child brings financial strain.
T2A4. Fear of failing as a parent.
T2A5. Raising a child is a great burden on parents' time and energy.
T2A6. Having a child adds strain to the relationship between the parents.
T2A7. It is difficult to combine work and childrearing.
T2B1. Being responsible for your child is very difficult.
T2B2. Raising a child limits your freedom to do other things.
T2B3. After pregnancy and childbirth, mothers never feel as happy and confident with their bodies as they did before.
T2B4. Lack of knowledge and competency to be a good parent
Check 2: To check you're paying attention, please select neither agree nor disagree.
T2B5. The large amount of money needed to ensure your child has a good quality of life.
T2B6. Having a child is irresponsible given the ongoing climate change.
T2B7. The challenging process of adoption, surrogacy or finding a sperm/egg donor.

*Questions with an asterisk – as above

***Note: Blocks T1 and T2 will be displayed to the respondents in two parts. The letter preceding section label indicate whether the item is displayed in the first step (A) or in the second (B) and in which order.

(3) Desires, intentions, behaviour and social pressure (10 questions)

DES1	We would like to ask you a few questions about having a(nother) child. First, we will ask about your desire (wanting) to have a(nother) child and next – about your actual intentions to have one. Do you want to have a (another) child sometime in the future? (Routing based on M3 will alter whether ‘a child’ or ‘another child’ is shown in the question)	Definitely not Probably not Unsure Probably yes Definitely yes
DES2	If you had to rate how much you want a(nother) child sometime in the future, with 0 being not wanting a(nother) child at all, 10 being wanting a(nother) child as much as possible how would you rate yourself? (Routing based on M3 will alter whether ‘a child’ or ‘another child’ is shown in the question)	0-10 NOTE: the scale displayed, with ends described: 0 "not at all", 10 "as much as possible", and 5 marked more clearly as the middle of the scale.
DES3	And how would you rate how much your partner wants a(nother) child? (routing: only for those with a partner based on M8)	0-10 (scale as above)
INT1	Do you intend to have a/another child in the next 3 years? (Routing based on M3 will alter whether ‘a child’ or ‘another child’ is shown in the question)	Definitely not Probably not Unsure Probably yes Definitely yes
INT2	If you had to rate how much you intend to have a(nother) child in the next 3 years, with 0 being not intending to have a(nother) child at all, 10 being completely intending, to have a child, how would you rate yourself? (Routing based on M3 will alter whether ‘a child’ or ‘another child’ is shown in the question)	0-10
INT3	And how would you rate how much your partner intends to have a(nother) child? (routing: only for those with a partner based on M8)	0-10
INT4	How many more children do you intend to have overall?	
PRO1	Are you and your partner trying to get pregnant? (routing: only for those with a different sex partner based on M7 and M7a)	Yes / No
PRO2	Are you and your partner actively pursuing having a(nother) child? For example, through adoption or surrogacy.	Yes / No

	(Routing: for those with same sex partner based on M7 and M7a, or if no answered to PRO1) (Routing based on M3 will alter whether 'a child' or 'another child' is shown in the question)	
CON	Are you or your partner currently using any contraceptive methods to avoid pregnancy?	Yes / No Not applicable
SOC1	How often do you feel pressure to have a (another) child? (Routing based on M3 will alter whether 'a child' or 'another child' is shown in the question)	Never Rarely Sometimes Often Most of the time
SOC2	How often do you feel pressure not to have a (another) child? (Routing based on M3 will alter whether 'a child' or 'another child' is shown in the question)	Never Rarely Sometimes Often Most of the time
Check 3	One more check to see if you're paying attention, please select the option 'often'	Never Rarely Sometimes Often Most of the time

(4) COVID19 (3 questions)

COV1	Have you or someone else you know personally tested positive for COVID-19?	Yes / No
COV2	For the employed (routing based on M7): Given the current pandemic situation, do you work from home?	Yes Yes, partially from home, partially outside No, my type of work must be done outside the home No, my employer does not give me such an option I worked from home (partially or fully) already before COVID19
Intro	Comparing your current situation with your situation just before the outbreak of the COVID-19 pandemic in March 2020, have the following aspects of your life improved, worsened or stayed the same?	Will be presented to participant as a tick box matrix
COV3a	A sense of/feeling of financial security	Scale: from definitely worsened (-3) to definitely improved (+3) (7 points), middle category 0 described as 'stayed the same'

COV3b	Mental well-being	As above
COV3c	Your relationship with your close ones	As above
Intro	Comparing your current situation with your situation just before the outbreak of COVID-19 in March 2020, have the following burdens and concerns in your life decreased, increased or stayed the same?	
COV4a	Concerns for your own and your close ones' health	Scale: from definitely decreased (-3) to definitely increased (+3) (7 points), middle category 0 described as 'stayed the same'
COV4b	Burdens related to household duties	As above
COV5	Directly before the outbreak of the COVID-19 pandemic, did you intend to have a (another) child in the next three years? (Routing based on M3 will alter whether 'a child' or 'another child' is shown in the question)	Yes / No / I was uncertain about what I intended to do
COV6a	If COV5 yes: Has the outbreak of the COVID-19 pandemic made you change this intention?	No Yes, I now intend to have a child sooner Yes, I now intend to have a child later Yes, I no longer intend to have a child at all I have become more uncertain about what I intend to do
COV6b	If COV5 no: Has the outbreak of the COVID-19 pandemic made you change this intention?	No Yes, I now intend to have a child in the next three years I have become more uncertain about what I intend to do
COV6c	If COV5 uncertain: Has the outbreak of the COVID-19 pandemic made you more certain about whether you intend to have a child in the next 3 years?	No, I am still uncertain Yes, I now intend to have a child in the next 3 years Yes, I now intend not to have a child in the next 3 years
COV7	If the COVID-19 pandemic has made you change your intentions related to childbearing, please explain how and why?	Open question – optional for all

11.3 APPENDIX 4.3: CONCEPT NOTE FOR GGS QUESTIONNAIRE TASK FORCE

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December 1, 2019

A proposal for an alternative approach to reproductive decision making in the GGS: Beyond the measurement of intentions.

Abstract

Here we propose a re-working of the fertility section of the GGS longitudinal questionnaire to include the 'Traits-Desires-Intentions-Behaviour (TDIB) framework' (Miller, 1994) as the underlying model to study reproductive decision-making.

We suggest this model instead of the Theory of Planned Behaviour (TPB) questions included in the baseline questionnaire. Our justification stems from the fact the TPB is a general model of behaviour that transpired to be difficult to operationalize, and despite the model inspiring the basis of many fertility analyses, it has been rarely validated in GGS-based studies. The TDIB in contrast was developed specifically by psychologists to explore reproductive decision-making, with clearly differentiated concepts (motivational traits, desires, intentions and instrumental behaviours) that develop and interact with other factors over the life course, making the model particularly suitable for a panel survey like the GGS. The benefits of the model in its own right also include the possibility to better explore ambivalence to childbearing and voluntary childlessness, two topics of increasing interest to fertility researchers, and the possibility to study the concepts independently of one another to those who are not interested in testing the entire model.

Our proposal measures each of the four concepts, building off questions already available in the GGS longitudinal questionnaire (e.g. instrumental behaviours and intentions/desires to have a child), and adapting some of them to create a coherent module. For example, we propose to measure desires/intentions on a continuous scale whilst keeping the original questions with a categorical response option that can capture uncertainty. New questions suggested are primarily to measure the 'motivational traits' through an index of positive and negative motives (roughly 5-7 items each) for childbearing. The new proposed additions are approximately equivalent in length to the original TPB section. This document is written as a concept note, rather than a concrete outline of our proposal meaning all comments and adaptations are welcomed.

Introduction

This document outlines a proposal for a GGS section on reproductive decision-making. In its original design, the GGS questionnaire contained the segment on childbearing intentions, grounded in Ajzen's (1991) Theory of Planned Behaviour (TPB). While the theory has proven useful to conceptualize reproductive behaviour, the GGS questions have rarely been used to operationalise and validate it (e.g., Billari, Philipov, & Testa, 2009; Dommermuth, Klobas, & Lappegard, 2011; Mencarini, Vignoli, & Gottard, 2015). Partially, it could have resulted from the specification of the model itself. TPB assumes that all childbearing intentions are built on attitudes towards behaviour, subjective norms and perceived behavioural control, and that any other influences are indirect. Consequently, all the determinants of fertility intentions, typically considered in demographic studies (such as age, partnership status, economic situation etc.), should be considered as predecessors of attitudes, norms or perceived control. Such an approach is not standard in demography. Moreover, as Mencarini, Vignoli and Gottard (2015) showed using Italian GGS data and graphical models, the effect of background factors (e.g., woman's age, duration of the couple's relationship, type of couple, educational levels and employment situations, religiosity and gender arrangements between the partners) on childbearing intentions have not been fully mediated by attitudes, norms and perceived control. The situation is further complicated by the fact that operationalization of Ajzen's concepts, especially of perceived behavioural control, was flawed (Dommermuth et al., 2011; Mencarini et al., 2015).

Consequently, GGS questions on intentions have commonly been used with only a general (if any) reference to TPB. It has allowed us to accumulate a substantial amount knowledge on determinants of childbearing intentions and their realisation, but no similar progress has been made in relation to the theory development. We are still suffering from terminological confusions (Philipov & Bernardi, 2012) and the data in hand do not allow us to investigate all the nuances of the process of reproductive decision-making.

We suggest, that the theoretical model of motivational sequence of Traits-Desires-Intentions-Behaviour (TDIB), formulated by Warren Miller in 1994 to explain reproductive choices, may offer an attractive alternative in this respect.

The document is structured as follows:

First, we briefly outline the model of TDIB and discuss its strengths, providing arguments for its inclusion to the Generation and Gender Survey. Second, we propose its operationalization within the GGS. We describe the overall approach to the operationalization and provide a brief rationale for each question. We also include notes on challenges related to various questions and their possible alternative versions or expansions. Please note that any remarks made in blue are more informal comments.

What is TDIB?

Traits-Desires-Intentions-Behaviour is a theoretical framework, proposed in early 1990s by Warren Miller for analysing childbearing behaviours (Miller, 1994). While the model has been expanded in various ways, e.g., by considering genetic influences or by modelling fertility choices in couples (Miller et al., 1999; Miller, Pasta, MacMurray, Muhleman, & Comings, 2000; Miller, Severy, & Pasta, 2004), the core of the model remains relatively simple. In the TDIB, a reproductive behaviour is conceptualized as an outcome of the motivational sequence that constitutes of four subsequent steps:

The first step is development of **motivational traits** (motives or motivations). Motivational traits are dispositions to react favourably or unfavourably to various aspects of childbearing. They are assumed to be genetically determined and shaped in the course of individual development and influenced by early life experiences (Bennett, Bloom, & Miller, 1995; Miller, 1995, 2011; Miller et al., 1999; Miller et al., 2000). They can be seen as cognitive schemas that are non-conscious, although a person might become aware of them through self-observation. Miller conceptualized two independent dimensions of childbearing motives: **positive childbearing motives** (PCM) are dispositions to react favourably to various aspects of childbearing, while **negative childbearing motives** (NCM) are dispositions towards unfavourable reactions. At the most basic level, these dispositions are reflected in attitudes about benefits and costs of childbearing. Conceptually, motivational traits (motives) are close to **attitudes, values or tastes** (Miller, 2011). Miller developed his own 'childbearing questionnaire' to measure motivational traits, in which he identified five categories of positive motives and four categories of negative motives (Miller, 1995).

The second step relates to formation of childbearing **desires**. Positive and negative motives, combined with other characteristics, psychological attributes and life course developments, may build into the desire to have a child. The relation between motivational traits and desires is quite straightforward: net of all other characteristics, the stronger positive motives and the weaker the negative motives – the stronger the desire. The desire describes what a person **wants** to do, but not necessarily plans to do. Conceptually, desires are close to **preferences, likes or ideals** (Miller, 2011).

The third step is constituted by formation of **intentions**. Childbearing intentions directly precede behaviour and they represent what a person actually plans to do. Intentions are based on desires but take into consideration what can be actually achieved. As Miller puts it, they are “desires constrained by reality” (Miller, 1995, p. 228). An important feature of the intention is that they are characterised by some level of commitment to act upon personal wishes, related to having children. Conceptually, intentions are close to **expectations and goals** (Miller, 2011).

In the final step, intentions lead to **behaviour**. Miller distinguishes between contraceptive and proceptive behaviour. The concept of proception was described by Miller already in his 1986 *Demography* paper, where he explicitly distinguished between instrumental proceptive and contraceptive behaviours that eventually lead to reproductive events (Miller, 1986).

Why TDIB?

There are several reasons for which TDIB seems appealing for demographers and other social researchers working on reproductive issues. First, it is the only theoretical model of decision-making designed within the field of psychology and with an exclusive purpose of explaining reproductive choices (in contrast to the TPB, which has been designed as a generic model of human behaviour and mostly used to predict voting or health related behaviour). Being developed in the field of psychology, the model is widely accepted among psychologists working on reproductive psychology (Avison & Furnham, 2015; Guedes, Pereira, Pires, Carvalho, & Canavarro, 2015; Mynarska & Rytel, 2020; Varas & Borsa, 2019). But is also commonly referred to among demographers, including in some newly developed theoretical frameworks for childbearing choices (Bachrach & Morgan, 2013). Overall, interest in the TDIB is growing among researchers working on population issues.

An important advantage of the TDIB is that it distinguishes between motives, desires and intentions and defines the concepts precisely. For even greater clarity, Miller (2011) links these constructs to other terms, commonly used in demography such as values, preferences or expectations. We have already indicated these similarities in the previous section, describing the TDIB.

Importantly, the relations between TDIB elements are described from the developmental and life course perspective. Life course approach constitutes a major framework for studying fertility (Huinink & Kohli, 2014) and it is central in the GGP as well (Gauthier, Cabaço, & Emery, 2018). The temporal order of TDIB elements makes the model a particularly good match for panel studies. With panel data, we will be able to observe and analyse how the motivational process unfolds. Using the TPB-based questions, researchers were able to observe how the intentions change over time or are realized (Billari et al., 2009; Dommermuth, Klobas, & Lappegard, 2015; Spéder & Kapitány, 2014, 2015), but the process of intention formation remains beyond our grasp. With the TDIB framework we would be able to overcome this problem. We would also be able to investigate, to what extent any change in intention – that are the most volatile of the four concepts and change over time – stems from external conditions, or whether any shift in the underlying motives or desires occurred. While the motives are considered to be the least susceptible to change, the GGS could allow for an exploration into the factors that impact them over time.

As the TDIB elements are well characterised and aligned sequentially in the life course, it is also possible to formulate and test hypothesis on their relations to other variables. For instance, since motivational traits (motives) have biological, genetic underpinnings and are shaped in the course of individual development, they are likely to be highly determined by childhood experiences (Miller, 1995). Consequently, the effect of parents' characteristics or early life experiences are expected to be strongest for childbearing motives, weaker and more indirect for childbearing desires, and in case of intentions, the direct effect might be close to none.

Such hypotheses would be also in line with the recent cognitive-social model of fertility decision-making (Bachrach & Morgan, 2013). In verification of this model, Rackin and Bachrach (2016) found that nearly all of the effects of family background on reported expectations (corresponding to intentions in Miller's terminology) were mediated by ideal family size (corresponding to desires in TDIB). It appears that conceptualisation of reproductive decision making in the cognitive-social model closely resembles Miller's approach. While it goes far beyond the scope of this paper to discuss similarities and differences between the two models, we argue that Miller's model offers much clearer distinctions in terms of terminology and has been much better operationalized in the literature. It should not be read as a criticism towards the cognitive-social model: the goal of Bachrach and Morgan was "to augment existing ways of thinking about intentions and the data demographers gather about them" (Bachrach & Morgan, 2013, p. 18), so they (successfully) tried to make sense of existing indicators and data. Miller's approach would force us to be more careful and disciplined about the

terminology we use, but the collected data would still allow us to apply a cognitive-social model in the analytic approach.

Another, crucial advantage of TDIB is the way it conceptualizes childbearing motives into positive and negative dimensions. If the two dimensions are measured independently, it is possible to identify individuals with strong pronatal and antinatal orientation, but also those who are indifferent or ambivalent. So far, within the TDIB model, ambivalence has been studied with questions on childbearing desires (Barber, Kusunoki, & Gatny, 2011; Miller, Barber, & Gatny, 2013; Miller, Barber, & Schulz, 2017; Miller, Jones, & Pasta, 2016). Attempts to measure indifference and ambivalence at the level of motivational traits are being undertaken using non-representative data, collected with psychological questionnaires in for the US, Poland and Iran (Miller, 2015; Mynarska, 2017). GGS could open a new strand of research in this area. Although measured differently, reproductive ambivalence is an important determinant of inconsistent contraceptive use and it increases a risk of pregnancy even when no clear intention to have a child is expressed (Agadjanian, 2005; Higgins, 2017; Higgins, Popkin, & Santelli, 2012; McQuillan, Greil, & Shreffler, 2011; Yoo, Guzzo, & Hayford, 2014). Studies on the topic are virtually absent in the European context, however.

Last, but not least, it has been recently argued that TDIB approach and prospective measures of childbearing motives and desires could contribute to our understanding of voluntary childlessness (Mynarska & Rytel, 2018). Understanding people's choices to have no children constitutes an important research goal given a recent increase in childlessness (Sobotka, 2017) that is attributed to—at least to some extent—personal preferences (Berrington, 2017; Rowland, 2007).

Operationalisation of TDIB – overall assumptions

In our proposal for the new GGS section on reproductive decision-making we have started with the following assumptions:

- Miller's motivational sequence of TDIB constitutes the theoretical framework of the questions and all elements of the sequence should be included. In particular, we need measures of motivational traits (both positive and negative childbearing motives), desires, intentions and (instrumental) proceptive and contraceptive behaviours.
- We want all TDIB concepts measured as continuous variables (except for behaviour – where it can be only measured as whether any behaviour takes place or not). Given that the TDIB model assumes mediation effects, the continuous variables will give us more freedom to implement more sophisticated modelling methods (including structural equation modelling) in order to capture the whole motivational process.
- We want to include measures that are useful to researchers, who do not want to implement the Miller's model in its full version (e.g. to the researchers, who are interested only in ideals or intentions), or who are interested in other theoretical models such as the cognitive-social model described above.
- We want to include questions that are based on items previously tested in other studies, as well as making use of current GGS questions.

There are several ways, in which the section on TDIB can be structured. A first option is to follow the model structure – from childbearing motives to behaviour. The reverse order could also be considered (starting with actual actions). Some form of mixed approach could also be considered. In the appendix, we present the whole TDIB section organized in line with the model. In the following sections the description of questions and their justification will be presented in the reversed order, however, since childbearing motives (positive and negative ones) pose some additional challenges and require the most elaboration.

As we describe each section (behaviours, intentions, desires, motives) we indicate sources of the questions, their logic and possible challenges or problems. We also indicate, which questions we believe are crucial, and which could be additionally included.

The following questions have been developed by Monika and Alyce with input from Rennie Miller. We consider it a first draft, a proposal to be discussed among colleagues, who work on the topic.

Note: if the question is marked with prefix FER (and a number), it means that it is already a part of GGS longitudinal survey.

Measuring behaviours

With the panel design, it will be possible to observe actual reproductive outcomes of people's motives, desires and intentions. However, the instrumental proceptive and contraceptive behaviours can also be measured and included into analyses, even with a single wave of data.

There are several items on contraceptive and proceptive behaviours in the GGS that fit perfectly with the TDIB model:

- FER10a (trying to get pregnant): Are you and your current partner trying to get pregnant? Y/N
- FER13 (had intercourse last 4 weeks): Did you have sexual intercourse in the past 4 weeks? Y/N
- FER12 (contraception): Are you and your partner using or doing any of these things to prevent pregnancy at this time? (List of methods)

The above questions capture instrumental behaviours and are well-suited for testing of the TDIB. They are also supplemented with some retrospective information in the GGS:

- FER10b (if a person trying to get pregnant – date started trying to get pregnant): When did you or your current partner first start trying to get pregnant?
- FER11 (infertility treatments): Have you ever done any of these things to help you get pregnant?

While these questions are not directly linked to the TDIB, they provide additional information important for studies on reproductive health. We consider them here, since they might be part of a coherent section on reproductive behaviours.

In addition to the above questions, we received a suggestion from Warren Miller to include two additional questions related to “trying to get pregnant”. Such questions could follow questions 10a and 10b. These questions were included in the original study of Miller (in 1990s)

- [If trying] Which of the following statements best expresses how you and your [partner] first started trying to get pregnant? 1. We abruptly discontinued our regular method of contraception; 2. We switched to a less effective method of contraception and then stopped using anything at all; 3. We were not using contraception very regularly and then stopped using it all together; 4. We were not using contraception and decided we would make a real effort to get pregnant.
- [If trying] Which of the following statements best expresses your own state of mind while trying to get pregnant? 1. I intended to get pregnant and was actively trying to make it happen; 2. I intended to get pregnant but was letting it happen naturally and without any special efforts; 3. I did not really intend to get pregnant although I did not feel I would mind getting pregnant.

These questions are not absolutely necessary within the TDIB framework, but might bring additional information.

Note: the order of items within this section might need to be adjusted for a more logical flow.

Measuring desires and intentions

Distinction between desires and intentions is crucial for the TDIB model. In the original studies of Miller (Miller, 1994, 1995; Miller & Pasta, 1995), the difference between the concepts was carefully explained to the respondents. In large scale surveys such as the GGS, such additional explanations might be problematic and the questions should be clear and unambiguous without much additional information. Some simpler way of distinguishing between desires and intentions has been successfully tested in a psychological study, based on the TDIB, conducted in Poland (Mynarska & Rytel, 2018, 2020). In the Polish study, three questions related to desires and two questions related to intentions were asked in order to create short scales of the two psychological states (wanting and intending). Since the questions within the scales were highly correlated, asking one question on each seems adequate.

The questions developed within the Polish study were asked with a 0-10 scale, which might satisfy our condition on continuous measures. However, with such a continuous scale, the explicit measure of uncertainty is lost. In the original GGS, as well as in many other surveys on childbearing intentions, the questions are asked in such a way that it is possible to capture respondents' uncertainty in their plans (i.e. through an 'unsure' response category). From the very onset of research on intentions, measures of uncertainty have been found both problematic and extremely inspiring (Morgan, 1981; Westoff & Ryder, 1977). Furthermore, uncertainty of childbearing intentions still constitutes an important, yet underdeveloped, strand of research (Bernardi, Mynarska, & Rossier, 2015; Ní Bhrolcháin & Beaujouan, 2011, 2015).

In our proposal, we strived for a compromise of including continuous measures of desires and intentions whilst keeping the "standard" way of asking the questions, which includes accounting for uncertainty. We note, however, that the scales could be (possibly) simplified for these questions. There would be one important value added of such a design. We would be able to compare simpler yes / no / unsure questions against continuous scales. We would be able to understand what "unsure" really means.

We also include a standard question on ideal number of children. Overall, we suggest the section to look as follows:

Next, we have several questions about having a(nother) child. First, we ask about your desires to have a(nother) child and the next – about your actual intentions to have one.

- (D1) First, assuming that you could have a(another) child at a chosen moment of your future life, do you want to have a(another) child? Definitely not/Probably not/Unsure/Probably yes/Definitely yes Note: It would be possible to simplify the answers and give options: No / Unsure / Yes.
- (D2) If you had to rate how much you want a(nother) child sometime in the future, with 0 being not wanting a(nother) child at all and 10 being wanting a(nother) child as much as possible, how would you rate yourself? (0-10)
- (D3) FER16b (personal ideal family size) – For you personally, what would be the ideal number of children you would like to have or would have liked to have had?
- (I1) Considering all your feelings about having children as well as your own life situation and plans, /FER14/ do you intend to have a/another child during the next 3 years? Definitely not/Probably not/Unsure/Probably yes/Definitely yes Note: It would be possible to simplify the answers and give options: No / Unsure / Yes.
- (I2) If you had to rate how much you intend to have a(nother) child in the next 3 years, with 0 being not intending to have a(nother) child at all and 10 being completely intending, how would you rate yourself? (0-10)
- (I3) FER16a (total no. of children intended) How many more children do you intend to have overall?

Compared to the previous version of the GGS, we would suggest deleting two questions:

- FER16c (general ideal family size) Generally speaking, what do you think is the ideal number of children for a family?

This question concerns overall social norms. We do not see any (significant) value of it in the light of the TDIB, but it could be kept for other purposes.

- FER15 (intention to have a child at all) Supposing you do not have a/another child during the next 3 years, do you intend to have any (more) children at all? Definitely not/Probably not/Unsure/Probably yes/Definitely yes

Within the TDIB framework, this question is closely related to childbearing desires. Since childbearing desires are operationalised in another question, this item is no longer needed.

Before we move to the last section on motivational traits, we should comment on the choice of a 0-10 scale range for questions 2 and 5 above. The 0-10 scale has several advantages: it has a zero-point that appears natural to the respondents, allowing them to indicate no interest in having a child; it can be related to percentages: 5 would be equal to 50%, meaning that a person feels “in the middle” (50/50); and a 0-10 scale is used in the GGS for questions on satisfaction – so we do not introduce too many different scales. Moreover, the 0-10 scale has been used previously in other studies, too. E.g., in HILDA there is a question on likelihood of having children “How likely are you to have a child/more children in the future?” Individuals respond on a scale from 0 (very unlikely) to 10 (very likely).

When the questions were consulted with Professor Miller, he had some doubts related to the 0-10 scale and suggested 0-4 or 0-6 scales. He argued that the 0-10 scale might be too long and too demanding for some respondents. We argued that 0-4 or 0-6 scale might not be as natural as 0-10 (percentages, other questions with a similar scale). Moreover, with a shorter scale, we would need to define each point (with 0-10, we just describe the extremes), which will bring additional challenges for the translation to other languages. While Professor Miller accepted our argumentation for the 0-10 scale, we note this issue here for others to reflect upon.

Measuring childbearing motives

Development of the scale of childbearing motives posed the largest challenge. Overall, there are two issues here.

(1) Phrasing of the question.

The overall aim of this section is to ask about respondents’ opinions on / attitudes towards various costs and benefits of having children. In the second wave of the Polish GGS, we tried to implement such questions and we phrased them as follows:

“There are various reasons for which people decide to have / not to have children. How important are these reasons for you at the moment? For each, answer on a 5 point scale: completely unimportant, rather unimportant, neither important nor unimportant, rather important, very important.”

Unfortunately, Professor Miller has doubts if asking about importance is the best way of capturing motives. The question on motives should have an element of desirability, wanting or valuing certain outcomes. In the original Miller’s childbearing questionnaire, the items were asked in terms of “how desirable”/ “how undesirable” any given consequence is. The questions required some additional explanations and instructions, however, that would not be possible in the GGS.

In the study of Guedes and colleagues (2015) the questions on positive and negative motives were asked as follows: “the respondents indicated how much they presently valued each reason for becoming a mother or father (e.g., giving meaning to my life or affirming me as an adult), using a 5-point scale (1—Not at all, 2—A little, 3—Moderately, 4—A lot, 5—Completely). In the negative

childbearing motivations subscale, the respondents indicated how much they presently valued each reason against becoming a mother or father (e.g., changing our routines as a couple or assuming a lifelong responsibility), using the same response scale". This might bring some inspiration to the GGS.

For now, we will formulate the question in terms of importance (as in the Polish GGS-PL-2, presented above), but we acknowledge it might need to be adjusted.

(2) Selection of positive / negative consequences to include into the GGS.

Positive and negative childbearing motives relate to people's tendency to react favourably or unfavourably to various costs or benefits of having children. The question remains as to which costs and benefits should be included? Which ones are crucial and which ones could be omitted?

There is no one, unequivocally, universally accepted classification of costs and benefits (Guedes et al., 2015; Hoffman & Hoffman, 1973; Langdridge, Sheeran, & Connolly, 2005; Nauck, 2014). The earliest classification comes from the Value of Children (VoC) approach (Hoffman & Hoffman, 1973). In fact, Miller drew on the VoC model when he developed the Childbearing Questionnaire (Miller, 1995). In his own work, he distinguished five categories of positive motives and four negative ones. Miller's classification has been used in some recent studies using the Polish data (Mynarska & Rytel, 2020). But the classification is not being confirmed uniformly across different studies. For instance, Guedes and colleagues (Guedes et al., 2015) used a bottom-up approach (based on the literature review and qualitative study) to reveal key dimensions of positive and negative childbearing motives. Their classification was not fully in line with the one of Millers, although some significant overlaps exists.

Overall, we faced a challenge of selecting key costs and benefits and we decided to build upon the existing theoretical classifications and on some empirical results. In particular, we built upon the following:

- 1) Categorisation of positive and negative motives as in Miller's original work (Miller, 1995);
- 2) Theoretical and empirical categorisation of Guedes and colleagues (Guedes et al., 2015); First, the authors developed a theoretical classification based on the literature and a qualitative study, second – they built an empirical classification based on the collected data;
- 3) Analysis of the questions on positive and negative consequences that were included experimentally into the Polish GGS questionnaire at wave 2. Some first analyses allowed us to verify their performance (Brzozowska & Mynarska, 2019; Mynarska, 2015);
- 4) Analysis of the data of Childbearing Questionnaire on the childless individuals in Poland (Mynarska & Rytel, 2014, 2018, 2020).

When different categorisations and analyses were compared, it became apparent that there is no clear, universal classification that could be used. Our goal was then to detect categories and items that are most consistent across different classifications. We made use of these classifications along with other studies. We worked independently to select about 5 items each for positive and negative motives. Next, we compared our categorisations to see which categories and items prevailed. As a result, we suggest the following positive and negative items to be included. For each item, a short comment on its type (category) or its rationale is provided.

Positive childbearing motives:

- a. **Having maternal / parental instinct.** Biological drive was recognized in most of the studies as a separate dimension, in studies on voluntary childlessness the issue of maternal instinct appears crucial; an alternative way of asking this question could be to include feelings and emotions related to a new-born child. A possible option, drawing on Miller's question could be: Wanting to experience holding and cuddling a baby/ an infant.
- b. **We want to watch children grow and develop.** Satisfaction of childrearing, the dimension on guiding and watching child's (rather than a baby's) development, stems from Miller's original

work but appeared in other classifications as well. The Polish analyses showed that this dimension was more relevant for men than for women.

- c. **Parenthood makes a relationship stronger.** Relationship development, next step in the relationship, project with a partner. Consequences of childbearing for a couple are universally recognized in all classifications, even though they are differently labelled (e.g., they are sometimes considered *instrumental values*).
- d. **Having a child will provide parents with companionship and support later in life.** Economic-utitarian value, it appears in most studies.
- e. **Parenthood means fulfilling religious feeling about family life.** Traditional parenthood, considering childbearing as something moral. We could consider some more general substitute for “religious”, e.g., “moral”, but the issue of religiosity seems to be highly important and the question formulated above (on religious feelings) performed well in Polish GGS-PL-2.
- f. **Children will take over the family name and traditions.** Dimension of continuity, quite apparent across most of the studies, related to prolongation of self, passing on family name, belongings, values etc.

One more possible addition could be the question that relates to overall emotional values:

- g. We experience a special love and closeness through parenthood

Negative childbearing motives:

- a. **Pregnancy and delivery are strenuous for women.** The biological component that appears universally across different categorisations. As mentioned above, the biological component was apparent also in positive motives.
- b. **Children put strain onto a relationship.** Stress for parents, marital stress, another category that appears recurrently and that “mirrors” the positive motive.
- c. **Raising children is financially difficult.** Financial costs of childrearing.
- d. **Raising children is a burden on parents’ time and energy.** Non-financial costs, importantly – the overall burdens of childcare are one of the most important dimensions in empirical studies conducted on childless individuals
- e. **Children add to the ecological crisis.** This dimension appears in newer studies and might be of an increasing importance.

There are two more additional questions to be considered. They are both highly relevant, although they might pose some challenges.

- f. For women it is difficult to combine work and childbearing
- g. Fears and worries about the future for a child

The first one, on women’s work, seems crucial, but it brings some challenges. Should it be asked in relation to women’s work only? Or both, men’s and women’s? should it be asked in terms of “work” or “career”? If this aspect is to be considered, it requires some more reflection.

The second one is overall vague, but it would capture general fear for children’s future (related to changes in environment but also to possible economic and social changes or even wars). Answers for both the positive and negative motivations will be on a 5-point scale as in the Polish GGS: completely unimportant, rather unimportant, neither important nor unimportant, rather important, very important.

The items above are formulated to fit the formula of the question from the Polish GGS (i.e., *There are various reasons for which people decide to have / not to have children. How important are these reasons for you at the moment?*). As discussed above, they might need to be altered. Any ideas and suggestions are welcome.

A final comment on feasibility of the proposed section and on its impact on the length of the GGS

All suggested questions are based on items that have been previously used in various studies, although some of them have been adjusted or slightly modified for uniformity. There are two unverified elements:

- Selection of positive and negative items. It is based on Miller's original classification with some additional dimensions, suggested in more recent analyses. We suggest 5 to 7 items for each scale. While identical or similar items have been used in previous studies, it has not been verified how our selection of items would work as a scale. Given its similarity with the Polish GGS wave 2 questions, we expect high internal consistency of the scales, but it would need to be verified. It would be advisable to run a small pilot test on them.
- Of course, the overall flow of the section requires testing. For now, we align them with the TDIB model, but the reverse order (starting with concrete behaviours) would also be possible.

As for the impact of the proposed section on the length of the GGS, it should be noted that a number of questions are already part of the GGS longitudinal questionnaire (e.g. the proceptive/contraceptive behaviours and intentions/desires questions). The totally new elements are:

- Scales on positive (6/7 items) and negative (5/7 items) motives. However, the length of this section is similar to the original TPB-based questions on attitudes, subjective norms and perceived control.
- Two questions on childbearing desires (D1, D2) and one question on intentions (I2). The scale measure for these questions will complement the existing categorical responses of the existing GGS questions, allowing a better understanding of reproductive ambivalence as already discussed. Two sentences of additional information / introduction are also added to aid with clarity in interview.
- Potentially adding two more proceptive behaviour questions as suggested by Warren Miller.

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12 CHAPTER 5 APPENDIX

12.1 APPENDIX 5.1: POSITIVE AND NEGATIVE CHILDBEARING MOTIVES AS CLASSIFIED IN DIFFERENT STUDIES.

(A) Positive childbearing motives

Miller 1995	Guedes et al. 2015 – theoretical	Guedes et al. 2015 – empirical	GG5-Poland	Motives to test (selected items in italics)
<p>Joys of pregnancy, birth, and infancy Feeling a baby move and kick inside... Giving my husband (wife) the satisfaction of father(mother)hood. Giving (helping my wife give) birth to a baby. Breast (bottle) feeding a baby. Holding and cuddling a baby. Devoting myself and much of my time to raising children and being a mother (father).</p>	<p>Biological / Physical Maternal/parental appeal, pressure of biological clock Proof of biological functioning, sex role fulfillment Enjoying pregnancy experience and birth process Genetic/biological connectedness with a child</p>	<p>Personal fulfilment Biological clock Pregnancy experience Maternal or paternal instinct Creating a personality Creating a family Blood ties Life meaning Feeling useful and important for a child</p>	i) A parent feels more complete as a woman / a man	<p>1) It is a wonderful feeling to hold your newborn baby in your arms 2) <i>Having strong maternal/paternal instincts</i></p>
<p>Instrumental values Knowing that I am fertile. Having my family and friends admire me with my baby. Having a son. / Having a daughter.</p>			<p>Emotional / Psychological Love, affective connectedness, caring and teaching Strengthening/growth, union stabilization, fulfilling a partner's wish Familial/generational union, companionship for another child Personal fulfilment/growth, life meaning</p>	<p>f) We want to watch children grow and develop</p>
<p>Satisfactions of childrearing Having my child be a success in life. Playing with my child. Having my child contribute to society. Guiding and teaching my child. Sharing child-raising with my husband (wife). Experiencing the special love and closeness that a child provides.</p>	<p>a) We experience a special love and closeness through parenthood d) Children prevent parents from feeling lonely in older age</p>	<p>5) Watching your child grow and develop brings great joy 6) <i>Guiding and teaching your child is greatly satisfying.</i></p>		
<p>Feeling needed and connected Feeling needed and useful through my baby. Having my child provide me with companionship later in life. Having a helpless baby to love and protect. Feeling more complete as a woman (man) through my baby. Living a fuller, more enriched life through my child.</p>		<p>7) Having a child protects you from loneliness as you get older. 8) <i>Having a child brings lifelong happiness</i> 9) Having a child makes parents' life richer.</p>		
<p>Traditional parenthood Having a child who will carry on my family traditions. Being the center of a large, active family. Strengthening our marriage through a child. Fulfilling my religious feeling about family life. Providing my parents with a grandchild. Fulfilling my potential by having children.</p>	<p>Social / Normative Social/familial norms and pressure, religious/moral mandates Social recognition, autonomy/responsibility affirmation Immortality, familial lineage, familial values, relation or heritages</p>	<p>Continuity Familial lineage, Family name Family relationships, Family heritage Family's values, Family spirit Couple relationship Strengthening partnership ties Fulfilling partner's project Growing as a couple Fulfilling a shared project Socioeconomic aspects Economic support Responsibility affirmation Adult affirmation, Social valorisation Moral obligation, Family expectations Gender roles, Recognition as a family</p>	<p>b) Parenthood means fulfilling religious feeling about family life c) Children take over parents' personal characteristics and values h) Children will inherit parents' properties j) Parenthood makes a relationship stronger and more committed</p>	<p>10) A child will take over our family name, values and traditions. 11) By becoming a parent, you gain admiration from your family and friends. 12) <i>Having a child makes the parents' relationship stronger.</i> 13) <i>Having a child allows parents to fulfil their religious values about family life.</i> 14) Having a child brings you closer to your own parents.</p>
<p>Economic / Utilitarian Labour force, economical help, social subsidies Support in old age</p>			<p>e) Children are necessary for the future of Polish economy (people to work) g) Children will support their elderly parents</p>	<p>15) <i>Having a child ensures parents will be supported in later life.</i></p>

(B) Negative childbearing motives

Miller 1995	Guedes et al. 2015 – theoretical	Guedes et al. 2015 – empirical	GGG-Poland	Motives to test
<p>Discomforts of pregnancy and childbirth Experiencing (seeing my wife / partner experience) the discomforts of pregnancy. Experiencing (seeing my wife / partner experience) the pain of childbirth.</p>	<p>Biological / Physical Physical discomforts/complications of pregnancy and childbirth Concerns about weight and fitness Absence of maternal/parental appeal</p>	<p>Physical suffering and body-image concerns Physical discomforts of pregnancy Negative body changes Birth complications</p>	<p>h) Pregnancy and delivery are strenuous for women</p>	<p>1) <i>The discomforts and potential health risks of pregnancy and delivery.</i> 2) <i>After pregnancy and childbirth, mothers never feel as happy and confident with their bodies as they did before.</i> 3) <i>The challenging process of adoption, surrogacy or finding a gamete donor.</i></p>
<p>Parental Stress Straining our marriage with a baby. Having a baby who stains my (wife's) health. Having a child who is a burden to my husband (wife). Having a child who makes it necessary for me (my wife) to have a job.</p>	<p>Emotional / Psychological Dealing with child's constant needs, worries and responsibilities Loss of intimacy/autonomy, fear or marital distance/separation Fear to transmit health problems/negative relational patterns Loss of autonomy, changes in career, daily routines and social life Immaturity, concerns about personal ability or qualities to parent</p>	<p>Marital stress Constraints for couple proximity Constraints for couple autonomy Constraints for couple routines Fear of couple separation</p>	<p>d) Partners have less time for each other when children are born</p>	<p>4) <i>Having a child adds strain to the relationship between parents.</i></p>
<p>Fears and worries of parenthood Having an unhappy and poorly adjusted child. Worrying about the health and safety of my child. Having a baby who is born deformed. Worrying whether I am raising my child the right way. Having a child who embarrasses or disgraces the rest of the family. Feeling guilty or inadequate as a parent.</p>		<p>Childbearing burden and Immaturity Constant worry Lifelong responsibility Constant needs of a child Childcare labour Concerns about parental qualities Concerns about parental preparedness</p>	<p>a) A fear that a child will be born ill f) Raising children brings many worries and concerns</p>	<p>5) <i>Being a parent would mean having frequent fears and worries about your child's wellbeing.</i> 6) <i>Fear of failing as a parent.</i> 7) <i>Lack of knowledge and competency to be a good parent.</i> 8) <i>Being responsible for your child is very difficult.</i></p>
<p>Negatives of childcare Being kept from my (having my wife being kept from her) career or job by a baby. Being responsible for a needy and demanding baby. Spending time and energy involved in childcare. Having to put up with the mess and noise that children make. Burdening our family finances with a child. Taking care of a baby who is disagreeable and irritating. Taking care of a sick child. Having a baby who takes away my freedom to do other things.</p>	<p>Economic / Utilitarian Concerns about financial difficulties Concerns about financial well-being and economic sacrifices</p>	<p>Financial problems and economic constraints Increased expenses Financial sacrifices Financial difficulties Constraints for financial well-being</p>	<p>Burdens b) Raising children limits parents' leisure time g) For women, it is difficult to combine work and childbearing i) Raising children brings too much responsibility</p> <p>Financial / economic e) Raising children is difficult financially c) Raising children makes it more difficult for parents to engage in paid employment and to have a professional career</p>	<p>9) <i>Raising a child is a great burden on parents' time and energy</i> 10) <i>It is difficult to combine work and childrearing</i> 11) <i>Raising a child limits your freedom to do other things</i> 12) <i>Raising a child brings financial strain.</i> 13) <i>The large amount of money needed to ensure your child has a good quality of life.</i></p>
	<p>Social / Normative Concerns about instability, insecurity and deviant trajectories Concerns about environmental degradation and pollution</p>	<p>Social and ecological worry Worry about the future Environmental degradation Social dangers Deviant trajectories</p>		<p>14) <i>Having a child is irresponsible given the ongoing climate change.</i></p>

12.2 APPENDIX 5.2: MOTIVE ITEMS WORDING IN QUESTIONNAIRE AND JUSTIFICATION FOR INCLUSION

Positive childbearing motives:

- a) **Having strong maternal / parental instincts.** Biological drive was recognized in most of the studies as a separate dimension, in studies on voluntary childlessness the issue of maternal instinct appears crucial (Mynarska and Rytel, 2020). This item was inspired by Guedes et al.'s item on parental instincts, which also performed well in the Polish GGS.
- b) **It is a wonderful feeling to hold your new-born baby in your arms.** An alternative way of exploring the same theme, by addressing the feelings and emotions related to a new-born child. This item drew on Miller's item "Holding and cuddling a baby."
- c) **A child is confirmation of parents' fertility.** An instrumental value associated with early milestones of parenting. A similar item to this was included in both Miller's CBQ and Guedes et al.'s study.
- d) **It's good for a child to have siblings.** This was an unscaled item in Miller's CBQ. It is the only item in the CBQ that explicitly focuses on second and higher order births.
- e) **We want to watch children grow and develop.** Satisfaction of childrearing, the dimension on guiding and watching child's (rather than a baby's) development, stems from Miller's original work but appeared in other classifications as well. The Polish analyses showed that this dimension was more relevant for men than for women.
- f) **Guiding and teaching your child is greatly satisfying.** An alternative measurement of childrearing satisfaction, particularly relating to the affectional bond between a parent and an older child. The item takes its wording on 'guiding and teaching' from Miller's CBQ.
- g) **Having a child protects you from loneliness as you get older.** One item addressing the theme of 'feeling needed and connected' (Miller's CBQ) and Emotional/Psychological component of childbearing (Guedes et al.). This item covers the affectional benefits associated with a lifelong bond with a child. The concept of 'companionship' was present in both studies and tested in the Polish GGS.
- h) **Having a child brings lifelong happiness.** An alternative measure of the same theme, exploring the affectional benefits and emotional value associated with a lifelong bond with a child. The word 'happiness' was not used by either Miller or Guedes et al. but was chosen by the authors to encapsulate the idea of a special closeness/love between parents and children (Miller's wording), an item which performed well in the Polish GGS.
- i) **Having a child makes parents' life richer.** An additional measure addressing the same theme. The idea of 'enriching' and finding 'meaning' in life through parenthood was evident in both Miller's items and Guedes et al.'s items.
- j) **Children will take over the family name, values, and traditions.** Dimension of continuity, quite apparent across most of the studies, related to prolongation of self, passing on family name, belongings, values etc. This item falls under Miller's 'Traditional Parenthood' theme and the 'Social/Normative aspects of childbearing' in Guedes et al.'s study.
- k) **By becoming a parent, you gain admiration from your family and friends.** A second item related to this theme. The item relates to the affectional bonds with family and friends that develop as a result of parenthood. This aspect was not explicitly mentioned in Miller's CBQ, which instead focused more on the idea of being part of a large family or giving your parents a grandchild. However, this idea was present in Guedes et al.'s classifications.
- l) **Parenthood makes a relationship stronger.** Another dimension of this theme is to ask about relationship development, the next step in the relationship, or project with a partner.

Consequences of childbearing for a couple are universally recognized in all classifications, even though they are differently labelled (e.g., they are sometimes considered *instrumental values*).

- m) **Parenthood means fulfilling religious feeling about family life.** Addressing another aspect of the traditional parenthood theme: considering childbearing as something moral. The authors considered some more general substitute for “religious”, e.g., “moral”, but the issue of religiosity seems to be highly important and the question formulated above (on religious feelings) performed well in Polish GGS-PL-2.
- n) **Having a child brings you closer to your own parents.** Items under this theme have focused on relationship with friends and partner, so this item was to explicitly acknowledge the changing relationship with the individual’s parents.
- o) **Having a child ensures parents will be supported in later life.** This item captures the Economic-utilitarian value of childbearing theme identified by Guedes et al. It appears in most studies.

Negative childbearing motives:

- a) **The discomforts and potential health risks of pregnancy and delivery.** The biological/physical component that appears universally across different categorisations. As mentioned above, the biological component was apparent also in positive motives.
- b) **After pregnancy and childbirth, mothers never feel as happy and confident with their bodies as they did before.** An alternative dimension of this theme explored in the Guedes et al. study relating to concerns about body changes that happen in the process of pregnancy.
- c) **The challenging process of adoption, surrogacy or finding a gamete donor.** This item was added to the UK pilot only. Following ethical review at LSHTM, it was decided that an item that focused on childbearing outside of two partners getting pregnant with one another should be included to make sure the themes of the survey included all types of parenthood. This item was considered an equivalent to concerns about the biology of childbearing for couples that get pregnant with one another.
- d) **Having a child adds strain to the relationship between parents.** Stress for parents, marital stress, another category that appears recurrently and that “mirrors” the positive motive.
- e) **Being a parent would mean having frequent fears and worries about your child’s wellbeing.** Capture general fear for children’s future (related to changes in environment but also to possible economic and social changes or even wars).
- f) **Fear of failing as a parent.** This item was included under the theme of fears and worries of parenthood (Miller’s CBQ) and the Psychological/Immaturity theme identified by Guedes et al. This item was included in both the surveys.
- g) **Lack of knowledge and competency to be a good parent.** An alternative measure for the same theme that was encompassed in previous studies. This item was included to try and explore the norm of intensive parenting.
- h) **Raising children is a burden on parents’ time and energy.** This item is the first dimension of the theme on negatives of childcare (Miller) and burdens of childrearing (Guedes et al.). This item pertains to non-financial costs, importantly – the overall burdens of childcare are one of the most important dimensions in empirical studies conducted on childless individuals (Mynarska and Rytel, 2020).
- i) **It is difficult to combine work and childrearing.** An additional item under this theme that explores a very well known structural issue of having children, particularly for women. This item appears across studies.

- j) **Being responsible for your child is very difficult.** Another item under this theme oriented towards the costs of intensive parenting norms. 'Responsibility' is an item that appears across studies.
- k) **Raising a child limits your freedom to do other things.** Item on fears related to burdens of parental responsibilities, both financial and on time and energy. This item appears in Miller's CBQ.
- l) **Raising a child brings financial strain.** An additional item under this theme on the financial costs of childrearing. Financial concerns appear across all the studies.
- m) **The large amount of money needed to ensure your child has a good quality of life.** One more additional item under this theme that combines aspects of financial costs with the norm of intensive parenting. This item taps into themes across the studies relating to fears about raising a happy and healthy child, as well as stopping the child from following 'deviant' trajectories under the context of social, economic and ecological change.
- n) **Having a child is irresponsible given the ongoing climate change** This dimension appears in newer studies and might be of an increasing importance.

12.3 APPENDIX 5.3: SAMPLE DESCRIPTION

	UK Frequency (%) N=789	Poland Frequency (%) N = 500
Sex		
Male	240 (30.42%)	254 (50.8%)
Female	546 (69.2%)	246 (49.2%)
Prefer not to say	3 (0.38%)	-
Number of children		
0	281 (35.93%)	194 (38.8%)
1	200 (25.58%)	120 (24%)
2	200 (25.58%)	132 (26.4%)
3	72 (9.21%)	42 (8.4%)
4	21 (2.59%)	10 (2%)
5	5 (0.64%)	1 (0.2%)
6	0 (0%)	1 (0.2%)
7	3 (0.38%)	-
Age group		
18-25	142 (18%)	83 (16.6%)
25-29	107 (13.56%)	78 (15.6%)
30-34	162 (20.53%)	85 (17%)
35-39	146 (18.5%)	104 (20.8%)
40-44	138 (17.49%)	77 (15.4%)
45-49	94 (11.91%)	73 (14.6%)
Partnership status		
Married/Civil Partnership	329 (41.70%)	217 (43.4%)
Cohabiting, not married	203 (25.73%)	104 (21%)
In a relationship, not cohabiting	99 (12.55%)	49 (9.8%)
None	158 (20.03%)	129 (25.8%)
Whether couple are same sex		
No	582 (92.23%)	-
Yes	49 (7.77%)	-
Education UK		
No GCSEs or equivalent	1 (0.13%)	
GCSEs or equivalent	90 (11.41%)	
A levels or equivalent	178 (22.56%)	
Vocational qualification	70 (8.87%)	
Bachelor's degree or equivalent	121 (15.34%)	
Postgraduate degree	329 (41.70%)	
Education Poland		
Primary not completed		1 (0.2%)
Primary		18 (3.6%)
Lower Secondary		35 (7%)
Basic vocational		107 (21.4%)
Secondary not completed		27 (5.4%)
Secondary professional		62 (12.4%)
Secondary general		53 (10.6%)
Post-secondary		42 (8.4%)
Tertiary education not completed		16 (3.2%)
BA or equivalent		45 (9%)
MA or equivalent		82 (16.4%)
Post-tertiary or PhD		12 (2.4%)
Employment Status		
Permanent employment	466 (59.06%)	201 (40.2%)
Fixed-term employment	45 (5.7%)	99 (19.8%)
Self-employment	69 (8.75%)	35 (7%)
Unemployed	57 (7.22%)	91 (18.2%)
Student	91 (11.53%)	40 (8%)
Retired	1 (0.13%)	20 (4%)
Caring for home or family	58 (7.35%)	-
Other / 'Part time'	2 (0.25%)	14 (2.8%)
Household Size		
1	45 (5.7%)	29 (5.8%)
2	169 (21.42%)	75 (15%)
3	219 (27.76%)	154 (30.8%)
4	233 (29.53%)	134 (26.8%)
5	83 (10.52%)	63 (12.6%)
6	26 (3.3%)	34 (6.8%)
7	14 (1.77%)	11 (2.2%)

12.4 APPENDIX 5.4: CORRELATION VISUAL OF POSITIVE (PCM) AND NEGATIVE (NCM) MOTIVES

PCM		Poland - Desires	UK – Desires	Poland - Intentions	UK - Intentions
1	It is a wonderful feeling to hold your new-born baby in your arms.	0.1396***	0.132***	0.1503***	0.2101***
2	Watching your child grow and develop brings great joy.	0.106*	0.1334***	0.0857	0.1792***
3	A child will take over our family name, values and traditions .	0.1197**	0.1177***	0.1391***	0.1450***
4	By becoming a parent, you gain admiration from your family and friends.	0.1269***	0.1384***	0.1465***	0.1421***
5	Having a child protects you from loneliness as you get older.	0.13***	0.1119***	0.1245**	0.1144***
6	A child is a confirmation of the parent's fertility .	0.1668***	0.0815*	0.2039***	0.1282***
7	Guiding and teaching your child is greatly satisfying.	0.0981*	0.1519***	0.125**	0.1804***
8	Having a child makes the parents' relationship stronger .	0.2155***	0.2067***	0.2365***	0.1836***
9	Having a child brings lifelong happiness .	0.1704***	0.1711***	0.2014***	0.192***
10	Having a child allows parents to fulfil their religious values about family life.	0.2076***	0.1445***	0.2299***	0.1651***
11	Having a child ensures parents will be supported in later life.	0.1989***	0.1470***	0.1804***	0.1350***
12	It's good for a child to have siblings	0.1476***	0.1376***	0.1474***	0.0940**
13	Having a child makes parents' life richer	0.0982*	0.0385	0.1373***	0.0996**
14	Having a child brings you closer to your own parents .	0.1797***	0.1979***	0.2068***	0.1649***
15	Having strong maternal / paternal instincts	0.1786***	0.1787***	0.205***	0.2188***

Positive motivations for children (column 2) reported with their correlation to categorically measured desires and intentions in Poland and the UK. For each column, the effect size of the correlation was ranked from strongest to weakest and colour coded accordingly (deep red for the strongest correlation, deep blue for the weakest correlation). The final selection of items for the positive motivations scale are highlighted in orange.

NCM		Poland - Desires	UK – Desires	Poland - Intentions	UK – Intentions
1	The discomforts and potential health risks of pregnancy and delivery	-0.0823 [^]	-0.03	-0.0992*	-0.0788*
2	Being a parent would mean having frequent fears and worries about your child's wellbeing	-0.0557	0.011	-0.0377	-0.0161
3	Raising a child brings financial strain.	-0.049	-0.1543***	-0.0703	-0.1588***
4	Fear of failing as a parent.	-0.0116	0.0659	0.0015	0.0268
5	Raising a child is a great burden on parents' time and energy.	-0.1047*	-0.2185***	-0.0915*	-0.1868***
6	Having a child adds strain to the relationship between the parents.	-0.0507	-0.1715***	-0.0012	-0.0832*
7	It is difficult to combine work and childrearing.	-0.0746 [^]	-0.1040***	-0.0879*	-0.1519***
8	Being responsible for your child is very difficult.	-0.0881*	-0.1197***	-0.1031*	-0.1140***
9	Raising a child limits your freedom to do other things.	-0.1125*	-0.2014***	-0.1107*	-0.2126***
10	After pregnancy and childbirth, mothers never feel as happy and confident with their bodies as they did before.	0.0125	-0.0256	0.0022	-0.0524
11	Lack of knowledge and competency to be a good parent	-0.0164	0.0355	0.001	-0.0285
12	The large amount of money needed to ensure your child has a good quality of life .	-0.0914*	-0.0705*	-0.0979*	-0.1312***
13	Having a child is irresponsible given the ongoing climate change .	-0.0835 [^]	-0.0976**	-0.0176	-0.1001***
14	The challenging process of adoption, surrogacy or finding a sperm/egg donor .		0.0856*		0.0367

Negative motivations for children (column 2) reported with their correlation to categorically measured desires and intentions in Poland and the UK. For each column, the effect size of the correlation was ranked from strongest to weakest and colour coded accordingly (deep red for the strongest correlation, deep blue for the weakest correlation). The final selection of items for the negative motivations scale are highlighted in orange.

12.5 APPENDIX 5.5: DISTRIBUTION OF POSITIVE AND NEGATIVE SCALE SCORES

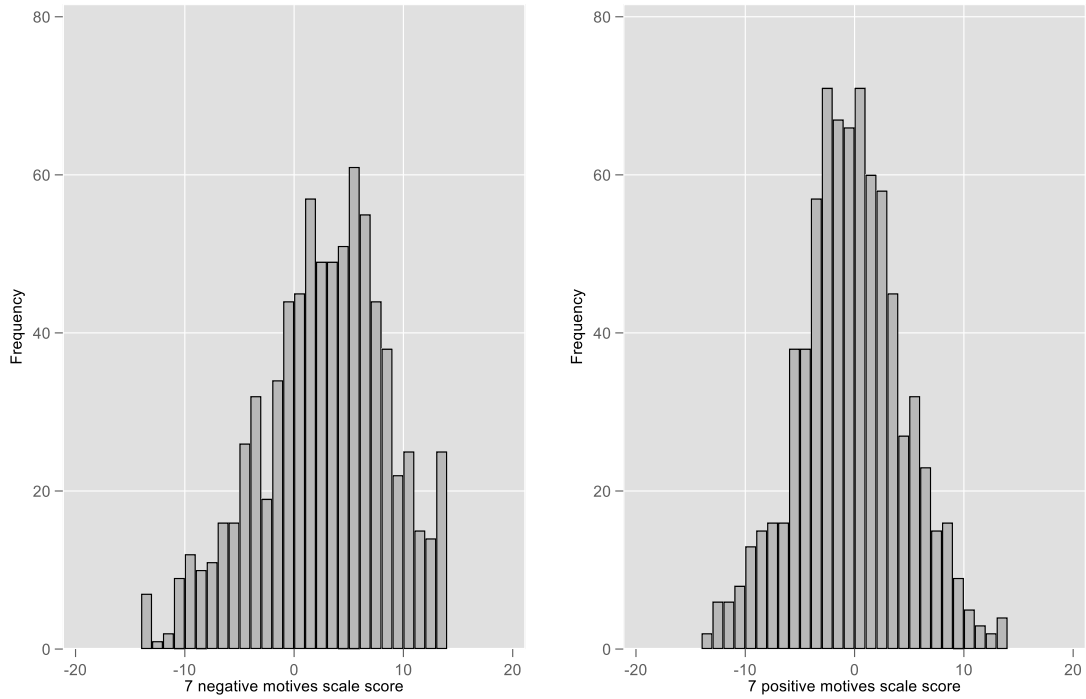


Figure 5a: Distribution of negative (left) and positive (right) scale scores in the UK

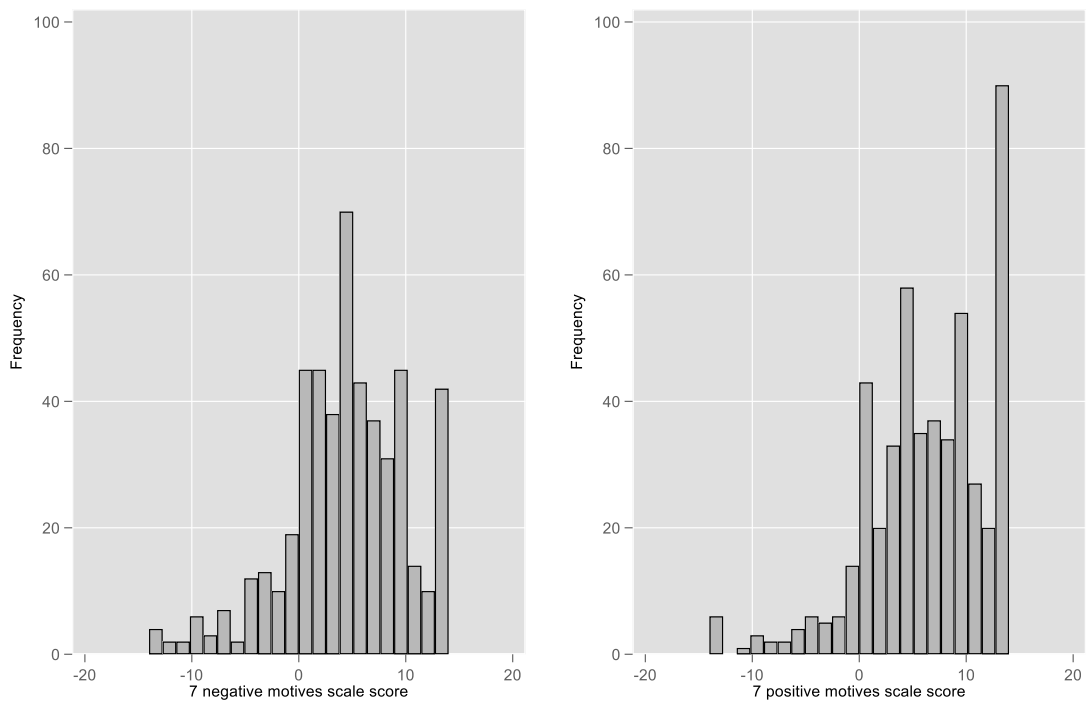


Figure 5b: Distribution of negative (left) and positive (right) scale scores in Poland

13 CHAPTER 6 APPENDIX

13.1 APPENDIX 6.1: UK ANALYSIS FEATURES

13.1.1 UK Covariates

Covariate	Type of variable and justification
Known to have more than 1 child	Binary (yes, no) Reasonable to assume those who go on to have more children likely to be more pro-natal.
Age at first birth	Grouped into: 1) Under 20 2) 21-25 3) 26-30 4) 31-35 5) 36+ Age at first birth likely determinant of how many children considered possible to have.
Expected more than one child at least once in 5 years before first birth	Binary (yes, no) Added to disentangle the trajectory of those who consistently expect 1 or fewer children before first birth from those who expect more.
Year of first birth	Grouped into: 1) 1990-2000 2) 2000-2010 Control for year of first birth as the survey is not an age cohort like the US survey. Added to control for any differences in childbearing environment (e.g. family policies, childbearing norms) between the 1990s and 2000s.
Partnership status	Binary (yes, no) based on reported partner ID Key determinant of childbearing intentions and outcomes in the UK (Fiori, Graham and Feng, 2014).
Highest qualification attained	Grouped as: 1) Degree or other higher degree 2) A-level 3) GCSE or other qualification 4) No qualification Key determinant of fertility intentions and outcomes in the UK (Berrington, Stone and Beaujouan, 2015).

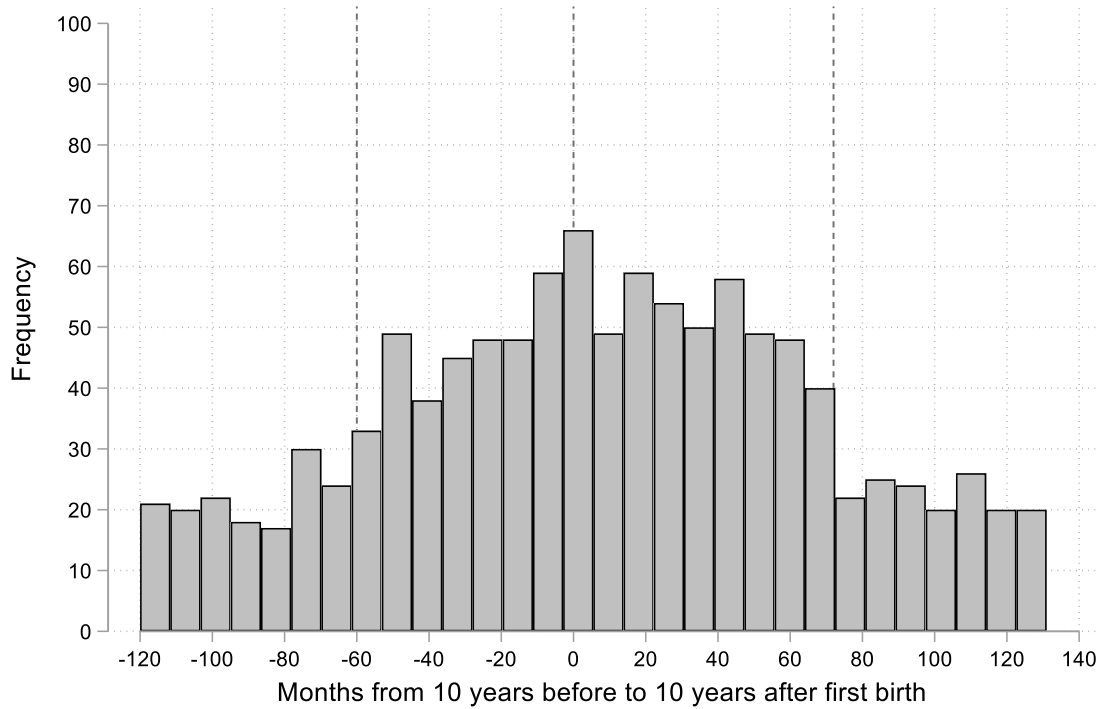
13.1.2 Characteristics of participants dropped from the UK samples

Differences of at least 5% between the whole sample and those included in the final sample are highlighted in yellow.

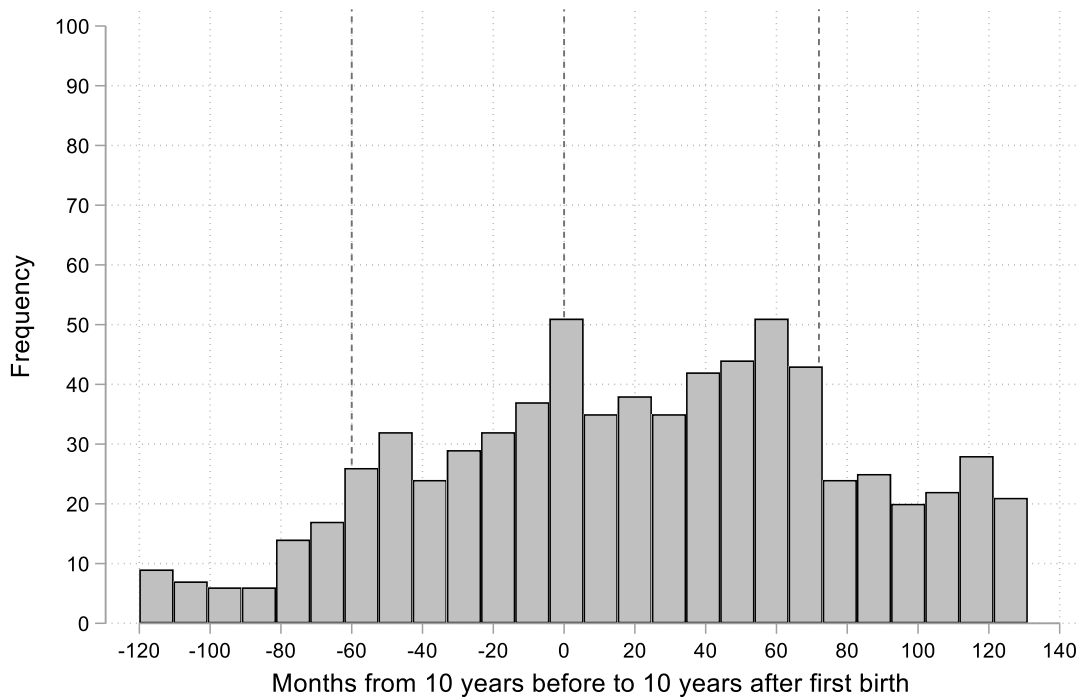
	Sample of all women who ever had at least one child (n=1099)	Women who ever had at least one child included in sample (n=906)	Sample of all women who only had one child (n=276)	Women who only had one child included in sample (n=192)
Age Group				
15-24	276 (25.1%)	207 (22.9%)	65 (23.6%)	29 (15.1%)
25-34	685 (62.3%)	594 (65.6%)	145 (52.5%)	114 (59.4%)
35-45	138 (12.6%)	105 (11.6%)	66 (23.9%)	49 (25.5%)
Number of children ever had (according to last observation)				
1	276 (25.1%)	192 (21.2%)		
2	576 (52.4%)	493 (54.4%)		
3	199 (18.1%)	178 (19.7%)		
4	38 (3.5%)	36 (4.0%)		
5	6 (0.6%)	5 (0.6%)		
6	3 (0.3%)	2 (0.2%)		
7+	1 (0.1%)	0 (0.0%)		
Educational attainment at first observation				
Degree or higher degree	344 (31.3%)	288 (31.8 %)	66 (23.9%)	54 (28.1%)
A level or equivalent	246 (22.4%)	198 (21.9%)	73 (26.5%)	48 (25.0%)
GCSE or equivalent	437 (39.8%)	364 (40.2%)	117 (42.4%)	79 (41.2%)
No qualification	70 (6.4%)	54 (6%)	20 (7.3%)	11 (5.7%)
Missing	2 (0.2%)	2 (0.2%)	-	-
Year of first birth				
1990-2000	522 (47.5%)	453 (50%)	113 (40.9%)	83 (43.2%)
2000-2010	562 (51.1%)	452 (50%)	154 (55.8%)	108 (56.3%)
2010 onwards	15 (1.4%)	2 (0.2%)	9 (3.3%)	1 (0.5%)

13.1.3 Number of observations at each time interval

Model 1: All women who had at least one child, including censor at second child birth. Lines show 5 years before first birth, first birth, and 5 years after first birth.



Model 2: All women who only had one child. Lines show 5 years before first birth, first birth, and 5 years after first birth.



13.2 APPENDIX 6.2: USA ANALYSIS FEATURES

13.2.1 USA Covariates

Covariate	Type of variable and justification
Known to have more than 1 child	Binary (yes, no) Reasonable to assume those who go on to have more children likely to be more pro-natal.
Age at first birth	Grouped into: 6) Under 20 7) 21-25 8) 26-30 9) 31-35 10) 36+ More age groups than in the UK data set as much earlier childbearing evident in US sample. Age at first birth likely determinant of how many children considered possible to have.
Partnership status	Binary (yes, no) Key determinant of intentions in other contents
Highest qualification attained	Grouped as: 1) Did not finish high school 2) Finished high school 3) Attended college These groups have salience in US context according to other studies. Important demographic variable.
Geographical region	Grouped by survey as: - North East - West - South - North Central As US is such a large study area it is useful to see whether trajectory holds across the different geographical areas.
Ethnicity	Grouped by survey as: - Hispanic - Black - Non-Hispanic and Non-Black Ethnic group an important fertility determinant in the US.
Religious affiliation in 1979	Grouped as: 1) None 2) Protestant 3) Roman Catholic 4) Jewish 5) Other Category 'Protestant' includes the survey categories Protestant, Baptist, Episcopalian, Lutheran, Methodist and Presbyterian The other categories are as coded in the survey. As data on religious affiliation was sparsely collected, but is unlikely to vary significantly over time, we used religious affiliation in 1979 only.

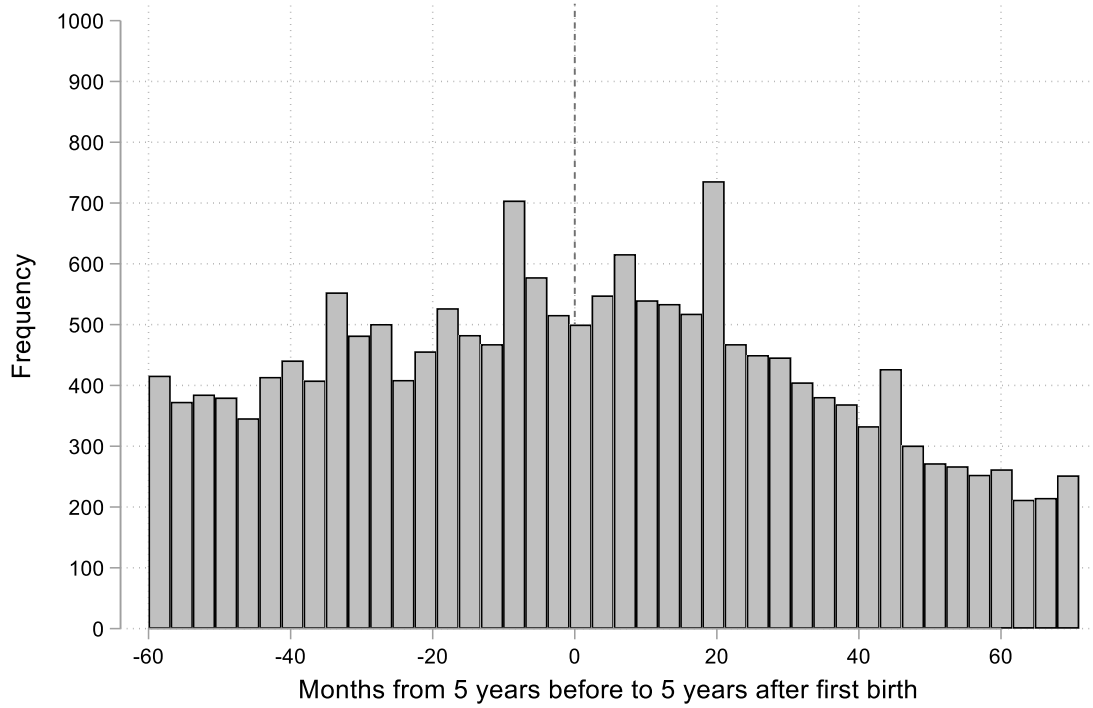
13.2.2 Characteristics of participants dropped from the USA samples

Differences of more than 5% between the whole sample and those dropped are highlighted in yellow.

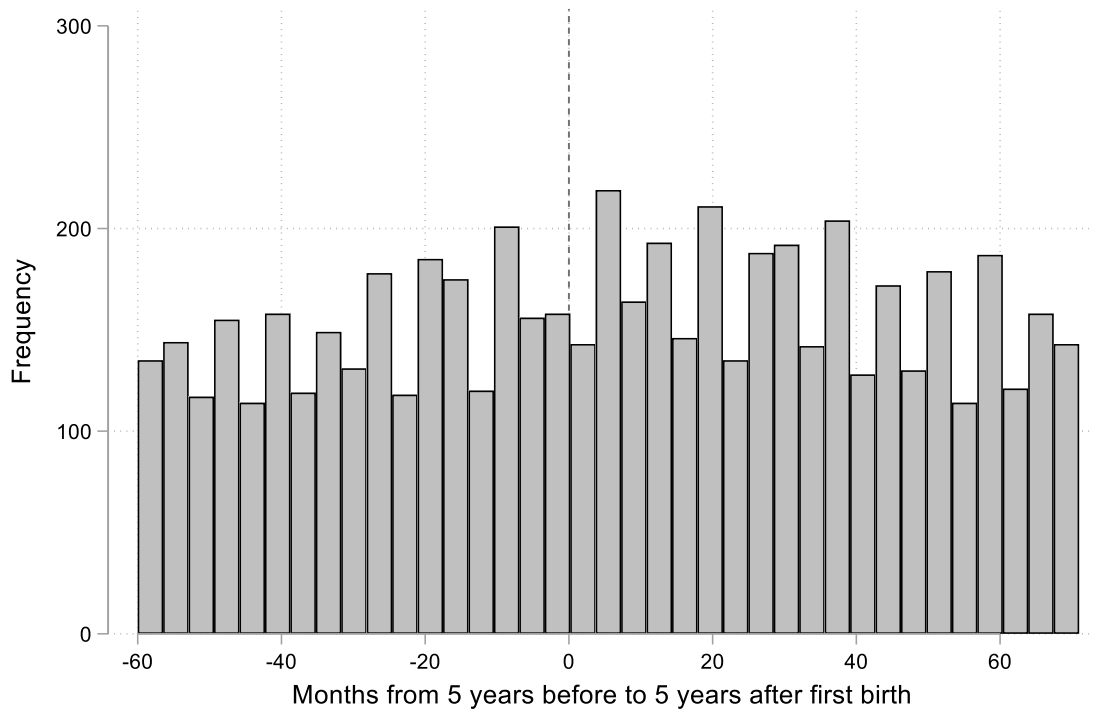
	Sample of all women who ever had at least one child (n=4937)	Sample of included women who ever had at least one child (n=4343)	Sample of all women who only had one child (n=1178)	Sample of included women who only had one child (n=1078)
Age Group				
20 and under	2045 (41.4%)	1536 (35.4%)	299 (25.4%)	238 (22.1%)
21-25	1497 (30.3%)	1465 (33.7%)	369 (31.3%)	356 (33.0%)
26-30	872 (17.7%)	846 (19.5%)	265 (22.5%)	256 (23.8%)
31-35	386 (7.8%)	368 (8.5%)	149 (12.7%)	140 (13%)
36+	137 (2.8%)	128 (3.0%)	96 (8.2%)	88 (8.2%)
Number of children ever had				
1	1178 (23.9%)	1078 (24.8%)		
2	1970 (39.9%)	1778 (40.9%)		
3	1126 (22.8%)	972 (22.4%)		
4	486 (9.9%)	367 (8.5%)		
5	104 (2.1%)	88 (2.0%)		
6	39 (0.8%)	31 (0.7%)		
7+	30 (0.6%)	25 (0.6%)		
Missing	4 (0.1%)	4 (0.1%)		
Educational attainment at first observation				
Did not finish high school	1849 (37.7%)	1545 (35.6%)	293 (24.9%)	256 (23.8%)
Finished high school	1758 (35.8%)	1543 (35.5%)	490 (41.6%)	455 (42.2%)
Attended college	1298 (26.5%)	1248 (28.7%)	379 (32.2%)	363 (33.7%)
Missing	-	-	16 (1.4%)	4 (0.4%)
Ethnic group				
Hispanic	845 (17.1%)	746 (17.2%)	148 (12.6%)	134 (12.4%)
Black	1277 (25.9%)	1046 (24.1%)	279 (23.7%)	245 (22.7%)
Not Hispanic or black	2815 (57%)	2551 (58.7%)	751 (63.8%)	699 (64.8%)
Religion				
No religion	452 (9.2%)	366 (8.4%)	116 (9.9%)	102 (9.5%)
Protestant	2259 (45.8%)	1973 (44.7%)	553 (46.9%)	510 (47.6%)
Roman Catholic	1609 (32.6%)	1455 (33.5%)	367 (31.2%)	336 (31.2%)
Jewish	36 (0.7%)	35 (0.8%)	9 (0.8%)	9 (0.8%)
Other	562 (11.4%)	498 (11.5%)	126 (10.7%)	115 (10.7%)
Missing	19 (0.4%)	16 (0.4%)	7 (0.6%)	6 (0.6%)
Region				
North East	881 (17.8%)	781 (18.0%)	213 (18.1%)	194 (18.0%)
North Central	1137 (23.0%)	1013 (23.3%)	237 (20.1%)	222 (20.6%)
South	1870 (37.9%)	1632 (37.6%)	479 (40.7%)	442 (41.0%)
West	941 (19.1%)	850 (19.6%)	217 (18.4%)	204 (18.9%)
Missing	108 (2.2%)	67 (1.5%)	32 (2.7%)	16 (1.48%)

13.2.3 Number of observations at each time interval

Model 1: All women who ever had one child, censored at second birth



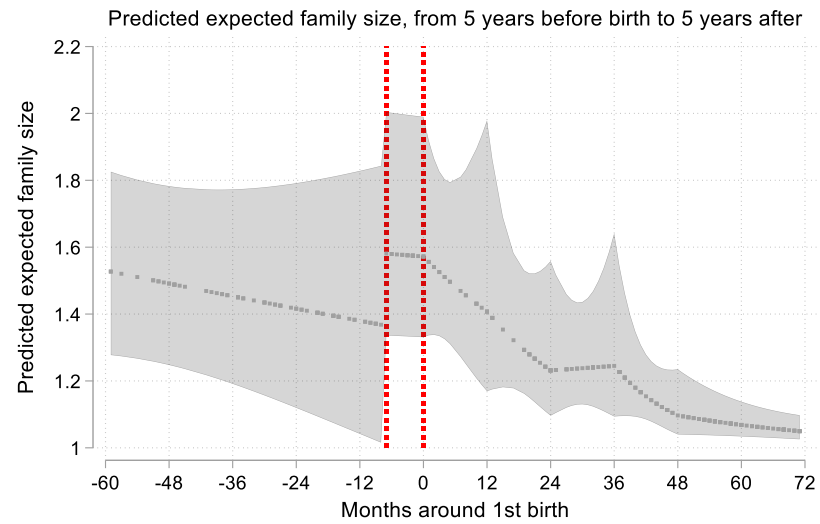
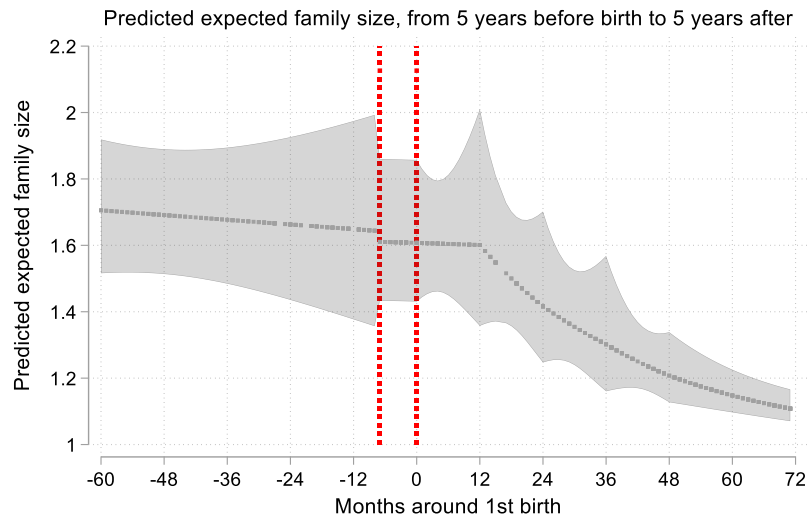
Model 2 and 3: Women who only ever had one child



13.3 APPENDIX 6.3: SENSITIVITY ANALYSIS FOR UK FOR ONE CHILD WOMEN

	Empty model (full sample) Obs=718, n=192	Empty model (Over 45 at last observation only) Obs =396, n=103	Model with covariates (full sample) Obs =550, n=142	Model with covariates (Over 45 at last observation only) Obs = 305, n=75
Constant	1.71 ***	1.58 ***	2.15 ***	2.96
Time	0.99	0.98	1.05	0.98
Binary indicator 'not yet pregnant' (Ref: yes)				
No	0.38 ***	0.42 ***	0.36 ***	0.42 ***
Time binary indicator (Splines after birth, Ref: Child <0 years old)				
Child aged 0-12 months	1.00	0.74	0.89	0.57
Child aged 12-24 months	0.70	0.52	0.68	0.68
Child aged 24-36 months	0.73	1.14	0.97	1.13
Child aged 36-48 months	0.69	0.38	0.64	0.60
Child older than 48 months	0.72 ***	0.68 †	0.65 ***	0.53 **
Partnership status (Ref: No partner)				
Partner			0.86	0.87
Education (Ref: GCSE or equivalent)				
Did not finish high school			0.75	0.90
A level			0.94	1.01
Completed University			1.08	1.08
Age at first birth (Ref: 21-25)				
20 and under			0.43 *	Omitted (no observations)
26-30			0.95	0.70
31-35			0.91	0.67
36+			0.83	0.65
Age at first birth x Time (Ref: 21-25)				
20 and under			1.19 *	Omitted (no observations)
26-30			1.04	1.14
31-35			0.95	1.03
36+			0.89 *	0.93
Expectations before first birth (Ref: 2 expected at least once)				
Never expected 2 at least once			0.36 ***	0.38 ***
Decade of first birth (ref: 1990-1999)				
2000-2010			1.06	1.00

*** p<0.005, ** p<0.01, * p<0.05, † p<0.



For comparison, on the left is the 'empty' model fitted for the whole sample (n=192), and on the right, is the same model fitted only for women who were 45 or older at last observation (n=103)

13.4 APPENDIX 6.4: DATA SOURCES COMPARISON

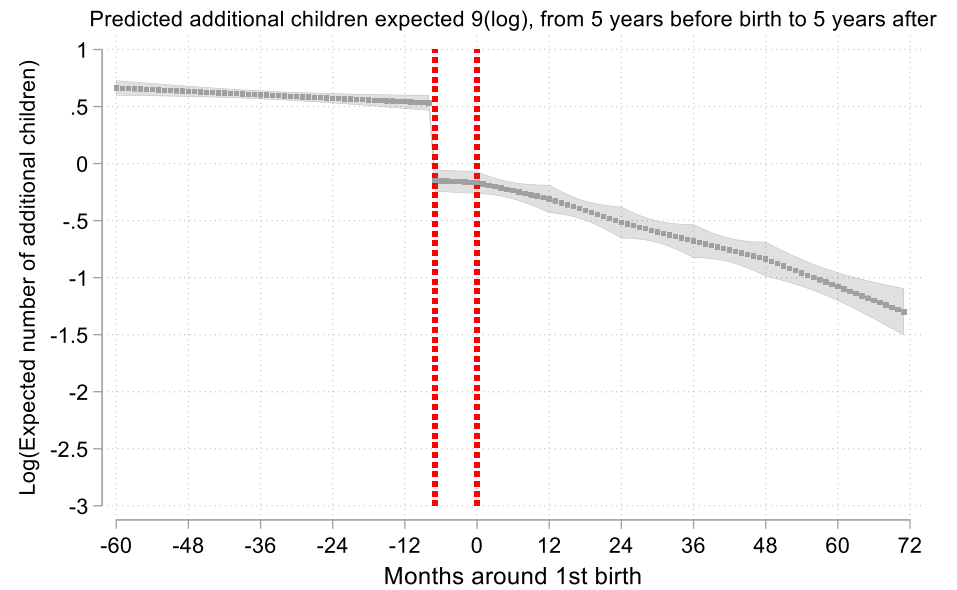
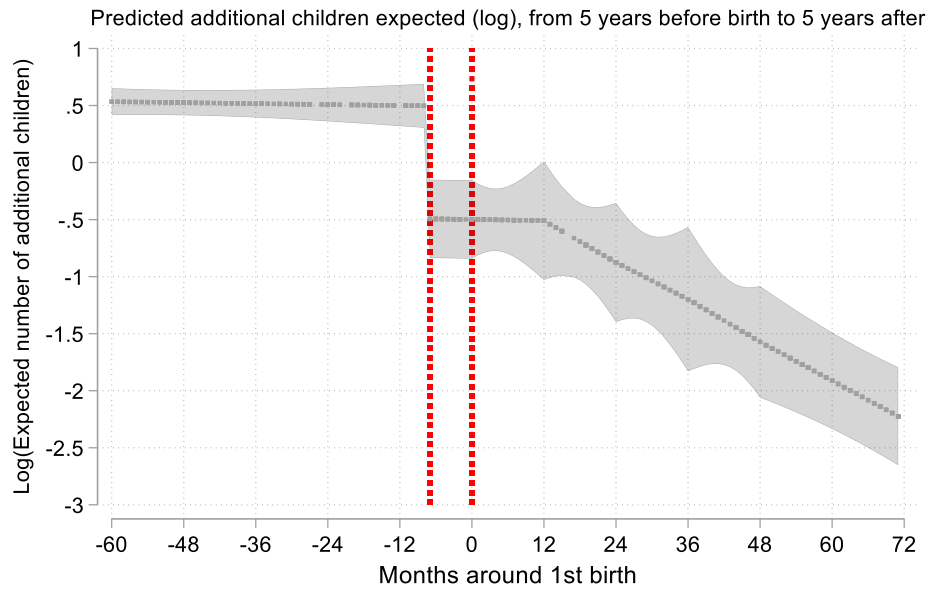
	UK (BHPS and UKHLS)	USA (NLSY'79)
Type of survey	Household panel	Cohort of women aged 14-22 in 1979
Sample selection	1) Women with at least one child, under 45, complete information, at least 3 repeat observations, 1 st child born prior to 1990 and including a censor at second childbirth 2) 1 child women only	1) Women with at least one child, under 45, complete information, at least 3 repeat observations and including a censor at second childbirth 2) 1 child women only
Sample size	1) 303 individuals, 1102 observations 2) 192 individuals, 718 observations	1) 3652 women, 18145 observations 2) 1078 women, 5782 observations
Outcome variable	Expected family size (current number of children plus number of additional children expected)	Expected family size (current number of children plus number of additional children expected)
Time period	1992-2013	1979-2014
Covariates shared across data sets	<ul style="list-style-type: none"> - Whether respondent went on to have a 2nd child - Age at first birth - Relationship status - Highest qualification attained 	
Differing covariates across data sets	<ul style="list-style-type: none"> - Year of first birth 	<ul style="list-style-type: none"> - Geographical area - Ethnicity - Religious affiliation

Ethnicity was not explored in the UK analysis because there was too little variability in the sample (91% white British).

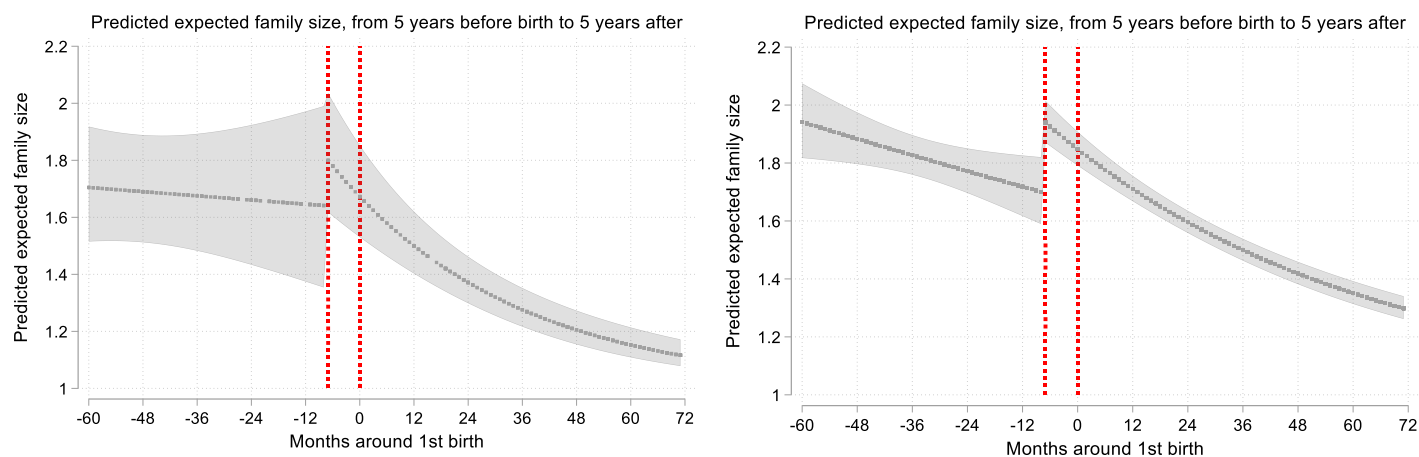
Geographical area was tested as a covariate in the USA analysis as it was hypothesised (page 27) it should not influence the evolution of expectations over time. In the UK, fertility is known to vary between the devolved nations (Berrington *et al.*, 2021), so this prediction seemed less likely to hold in the UK. If one was interested in rerunning these models for the devolved nations, it would probably be wise to run a separate model for each country to account better for contextual differences.

Religious affiliation was not included in the UK models because it was measured in waves not included in this analysis. However, if one was interested, religious affiliation was measured in the first ever wave of the BHPS, and could be incorporated into models.

13.5 APPENDIX 6.5: EMPTY UK (LEFT) AND EMPTY USA (RIGHT) MODELS OF ADDITIONAL NUMBER OF CHILDREN EXPECTED, WITH NO MODIFICATIONS



13.6 APPENDIX 6.6: EMPTY UK (LEFT) AND EMPTY USA (RIGHT) MODELS OF ADDITIONAL NUMBER OF CHILDREN EXPECTED, WITH ONLY ONE SPLINE AT 2 MONTHS PREGNANT



	Meaning	Levels	UK one child women (718 obs, n=192)	USA one child women (5770 obs, n=1078)
Constant	Intercept of the model	NA	1.71 ***	1.94 ***
Time	Baseline effect per 12 months	Linear, 0 is the intercept (5 years before birth)	0.99	0.97 *
Binary indicator 'not yet pregnant'	Changes in additional number of children expected when the arrival of the first child is confirmed	Time < -7 months from birth	Ref	Ref
		Time => -7 months from birth	0.49 ***	0.55 ***
Time binary indicator (Spline at 2 months pregnant)	Changes in expectation after realisation of pregnancy	Before 2 months pregnant	Ref	Ref
		After 2 months pregnant	0.75 ***	0.86 ***

Table 2: Incidence rate ratios for one child women in the UK (column 4) and USA (column 5). Column 1 lists the variable, column 2 the variables meaning, and column 3 the categories of the variable. *** p<0.005, ** p<0.01, * p<0.05, † p<0.1

13.7 APPENDIX 6.7: UK MODELS – UNIVARIABLE ANALYSES (EACH VARIABLE LISTED IN THE ROWS IS A SEPARATE MODEL) FOR ONE CHILD WOMEN

	N	Variable IRR	Time IRR	Variable x Time Interaction IRR
Partnership status (Ref: No partner)				
Partner/spouse	Obs = 718, n=192	0.87 (0.70 – 1.09)	1.00 (0.95 – 1.06)	1.00 (0.95 – 1.06)
Education (Ref: Completed University)				
Did not finish high school	Obs = 718, n = 192	0.81 (0.40 – 1.64)	0.97 (0.91 – 1.03)	1.09 (0.95 – 1.25)
GCSE or equivalent qualification		0.88 (0.68 – 1.13)		1.05 (0.98 – 1.12)
A level		0.90 (0.67 – 1.22)		1.02 (0.95 – 1.10)
Age at first birth (Ref: Under 20)				
21-25	Obs = 718, n = 192	2.06 † (0.96 – 4.44)	1.20 ** (1.05 – 1.37)	0.88 * (0.77 – 1.00)
26-30		1.78 (0.85 – 3.70)		0.90 † (0.80 – 1.01)
31-35		1.72 (0.82 – 3.60)		0.81 *** (0.71 – 0.92)
36+		1.46 (0.68 – 3.13)		0.75 *** (0.65 – 0.87)
Expectation before first birth (Ref: Expected 1 or none)				
2 expected at least once	Obs = 550, n=142	3.58 *** (2.17 – 5.93)	1.04 (0.86 – 1.07)	0.96 (0.86 – 1.07)
Decade of first birth (Ref: 1990-1999)				
2000-2010	Obs = 718, n=192	1.14 (0.84 – 1.56)	1.00 (0.92 – 1.07)	1.01 (0.94 – 1.08)

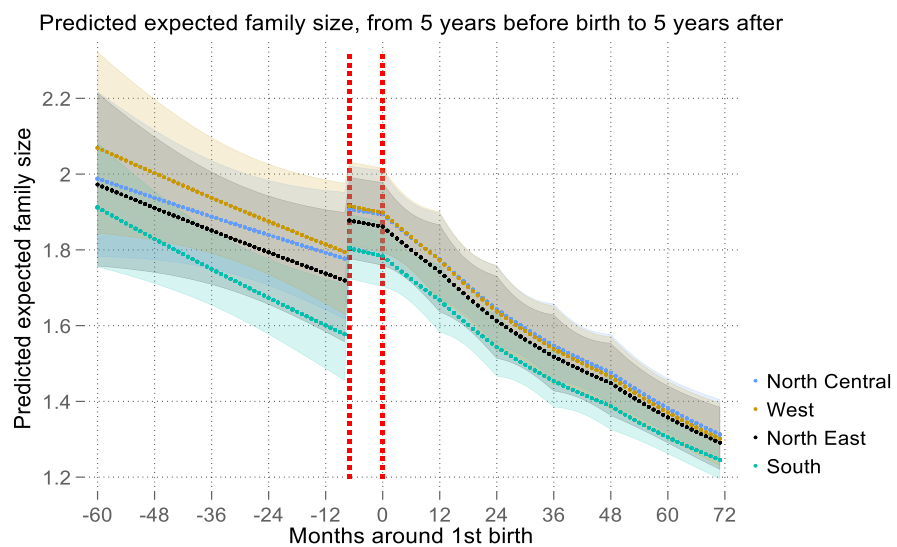
*** p<0.005, ** p<0.01, * p<0.05, † p<0.1

13.8 APPENDIX 6.8 US MODELS – UNIVARIABLE ANALYSES FOR ONE CHILD WOMEN

	n	Variable IRR	Time IRR	Variable x Time Interaction IRR
Partnership status (Ref: No partner)				
Partner/spouse	Obs = 5770, N=1078	0.96 (0.90 – 1.02)	0.97 † (0.95 – 1.00)	0.99 (0.97 – 1.01)
Education (Ref: Attended college)				
Did not finish high school	Obs = 5752, n=1078	1.11 (0.97 – 1.27)	0.97 * (0.94 – 1.00)	1.01 (0.97 – 1.04)
Finished high school		1.07 (0.96 – 1.18)		1.00 (0.98 – 1.02)
Age at first birth (Ref: Under 20)				
21-25	Obs = 5770, n=1078	0.93 (0.79 – 1.00)	1.00 (0.96 – 1.03)	0.99 (0.96 – 1.02)
26-30		0.91 (0.77 – 1.07)		0.96 ** (0.93 – 0.99)
31-35		0.78 * (0.64 – 0.95)		0.92 *** (0.88 – 0.96)
36+		0.56*** (0.43 – 0.72)		0.88 *** (0.83 – 0.94)
Ethnic Group (Ref: Hispanic)				
Black	Obs = 5770, n=1078	0.90 (0.77 – 1.06)	0.96* (0.92-1.00)	1.01 (0.98-1.05)
Not Black or Hispanic		0.95 (0.83– 1.10)		1.01 (0.98 – 1.05)
Geographical Region (Ref: West)				
North East	Obs = 5715, n=1075	0.96 (0.82 – 1.11)	0.97† (0.94 – 1.01)	1.00 (0.97 – 1.04)
North Central		0.96 (0.83 – 1.11)		1.01 (0.98 – 1.04)
South		0.92 (0.81 – 1.05)		0.99 (0.96 – 1.02)
Religious affiliation 1979 (ref: no religion)				
Protestant	Obs = 5735, n=1072	0.89 (0.75 – 1.05)	0.96* (0.92-1.00)	1.01 (0.98 – 1.06)
Catholic		0.97 (0.82 – 1.15)		1.03 (0.99 – 1.07)
Jewish		1.15 (0.66 – 2.01)		0.93 (0.81 – 1.06)
Other		1.09 (0.89 – 1.33)		1.00 (0.95 - 1.05)
Expectation before first birth (Ref: Never expected 2 at least once)				
Expected 2 children at least once	Obs = 5480, n=997	4.31 *** (3.51 – 5.30)	1.03 (0.99 – 1.08)	0.93 *** (0.90 – 0.97)

*** p<0.005, ** p<0.01, * p<0.05, † p<0.1

13.9 APPENDIX 6.9: USA REGIONAL MODEL FIGURE



Predicted expected family size (modelled with random intercept and random slope) from 5 years before to 5 years after first birth in the US stratified by region for one child women. Shaded areas correspond to 95% confidence intervals. Colour of the shaded areas correspond to the line that they are calculated for.

14 CHAPTER 7 APPENDIX

14.1 APPENDIX 7.1: SAMPLE SIZE BASED ON DIFFERENT LENGTHS OF OBSERVATION

Length of the interval around first birth	Sample size with complete information for the interval
-2 to 3 (selected for the paper)	502
-1 to 3	706
-3 to 3	371
-2 to 2	611

14.2 APPENDIX 7.2: CHARACTERISTICS OF THE EXCLUDED SAMPLE

Differences of more than 5% are highlighted in yellow.

	Whole sample of women who had a first child during the survey and completed the self-complete questionnaire (n=1058)	Characteristics of the included sample (n=512)
Age Group at first birth		
Under 20	47 (4.44%)	10 (1.95%)
20-24	194 (18.34%)	65 (12.69%)
25-29	326 (30.81%)	157 (30.66%)
30-34	325 (30.72%)	197 (38.48%)
35-39	137 (12.95%)	66 (12.89%)
40+	29 (2.74%)	17 (3.32%)
Educational attainment at first birth		
Postgrad	65 (6.14%)	43 (8.40%)
Graduate certificate	84 (7.94%)	52 (10.16%)
Bachelors	278 (26.28%)	155 (30.27%)
Diploma	112 (10.59%)	55 (10.74%)
Certificate III/IV	204 (19.28%)	90 (17.57%)
Year 12	191 (18.05%)	78 (15.2%)
Year 11 and below	124 (11.72%)	39 (7.62%)
Partnership status at first birth		
Partnered	972 (91.87%)	486 (94.92%)
Not Partnered	86 (8.13%)	26 (5.08%)

Whole Sample Time Use							
		Years around first birth					Total
		-2	-1	0	1	2	
Dual burden group	Not in paid work	116 (11%)	187 (17.7%)	617 (58.3%)	494 (46.7%)	489 (46.2%)	1903 (35.9%)
	Small dual burden	554 (52.3%)	594 (57.1%)	19 (1.8%)	24 (2.3%)	26 (2.5%)	1217 (23%)
	Big dual burden	51 (4.8%)	65 (6.1%)	298 (28.1%)	393 (37.1%)	392 (37.02%)	1199 (22.6%)
	Missing	338 (31.9%)	213 (20.1%)	125 (11.8%)	148 (14%)	152 (14.4%)	976 (18.4%)
							5295

Included Sample Time Use							
		Years around first birth					Total
		-2	-1	0	1	2	
Dual burden group	Not in paid work	71 (13.9%)	83 (16.2%)	317 (61.9%)	265 (51.8%)	260 (50.8%)	996 (38.9%)
	Small dual burden	401 (78.3%)	391 (76.4%)	13 (2.7%)	14 (2.7%)	16 (3.1%)	836 (32.7%)
	Big dual burden	40 (7.8%)	38 (7.4%)	181 (35.4%)	233 (45.5%)	236 (46.1%)	728 (28.4%)
	Missing	-	-	-	-	-	-
							2560

Excluded Sample (excluding missing)							
		Years around first birth					Total
		-2	-1	0	1	2	
Dual burden group	Not in paid work	45 (21.5%)	104 (31.1%)	300 (71.1%)	229 (57.4%)	229 (58.0%)	907 (33.2%)
	Small dual burden	153 (73.2%)	203 (60.8%)	5 (1.2%)	10 (2.5%)	10 (2.5%)	381 (13.9%)
	Big dual burden	11 (5.3%)	27 (8.1%)	117 (27.7%)	160 (40.1%)	156 (39.5%)	471 (17.2%)
							1759

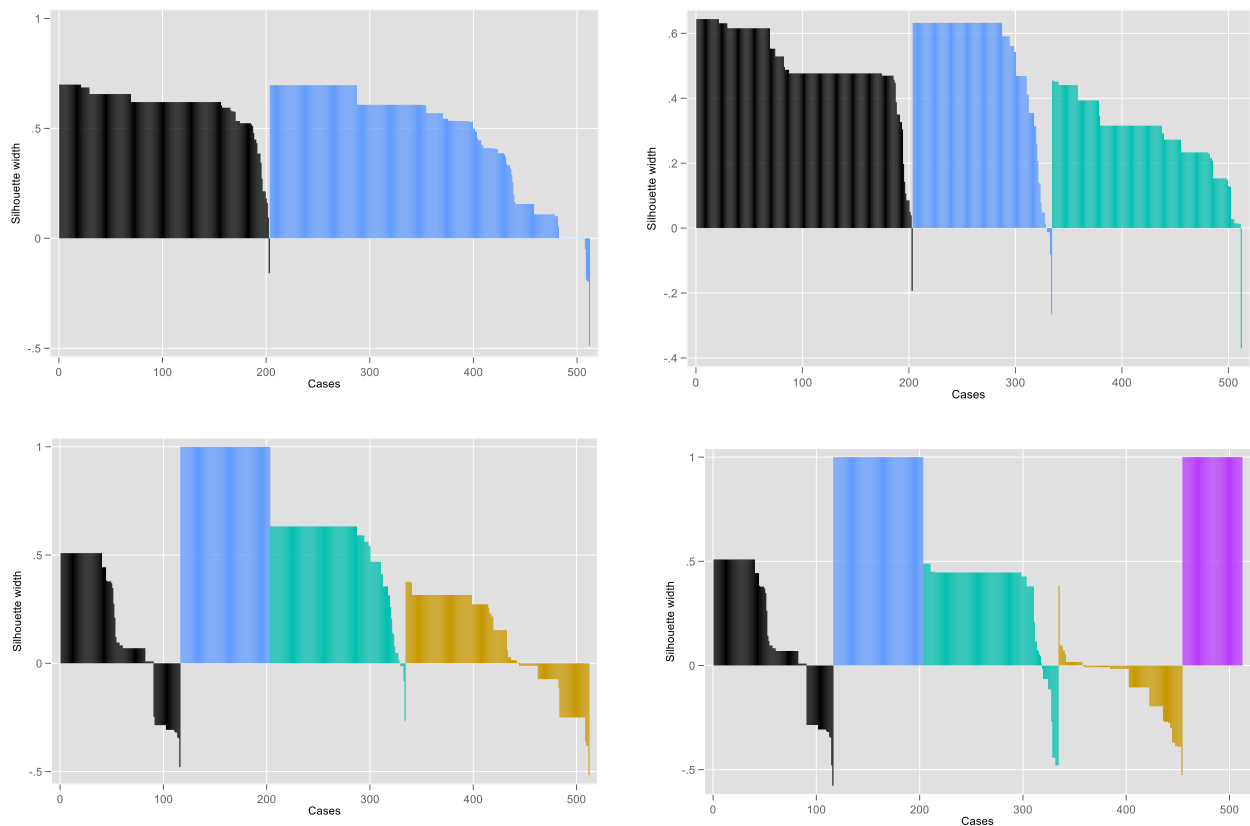
Excluded Sample (including missing)							
		Years around first birth					Total
		-2	-1	0	1	2	
Dual burden group	Not in paid work	45 (8.2%)	104 (19%)	300 (54.8%)	229 (41.9%)	229 (41.9%)	907 (33.2%)
	Small dual burden	153 (28%)	203 (37.1%)	5 (0.9%)	10 (1.8%)	10 (1.83%)	381 (13.9%)
	Big dual burden	11 (2%)	27 (4.9%)	117 (21.4%)	160 (29.3%)	156 (28.5%)	471 (17.2%)
	Missing	338 (61.8%)	213 (38.9%)	125 (22.9%)	148 (27.1%)	152 (27.8%)	976 (36.7%)
							2735

14.3 APPENDIX 7.3: CALINSKI AND DUDA-HART (T-SQUARED) QUALITY CRITERIA TESTS

Number of clusters	Calinski-Harabasz pseudo-F (3 States)	Duda-Hart pseudo T-squared (3 States)	Calinski-Harabasz pseudo-F (6 States)	Duda-Hart pseudo T-squared (6 States)
2	299.08	161.54	117.62	84.97
3	239.55	79.68	97.23	47.15
4	225.84	213.78	91.45	45.64
5	214.04	83.72	87.62	48.90
6	211.31	36.21	81.72	72.41
7	207.94	74.38	77.03	47.57
8	205.13	23.14	69.12	19.18
9	202.49	66.69	66.00	16.03
10	199.87	48.94	63.65	15.18

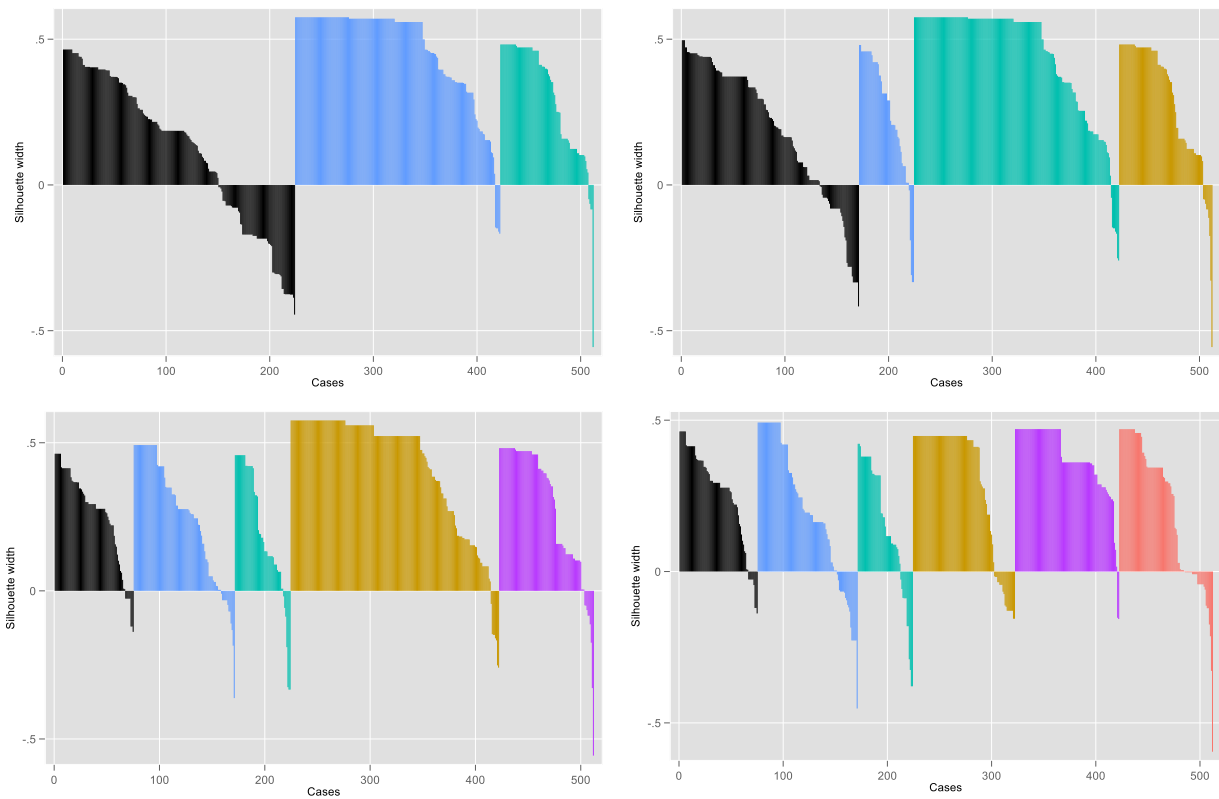
The two quality criteria tests show that, generally, as the number of clusters in the solution increases, the quality of those clusters decreases (the scores decrease). Exceptions to this are the Duda-Hart score for the four cluster solution for the three-state analysis, and the five and six cluster solutions for the six-state solution.

14.4 APPENDIX 7.4: SILHOUETTE WIDTHS FOR 3-STATE CLUSTER SOLUTIONS 2,3,4 AND 5



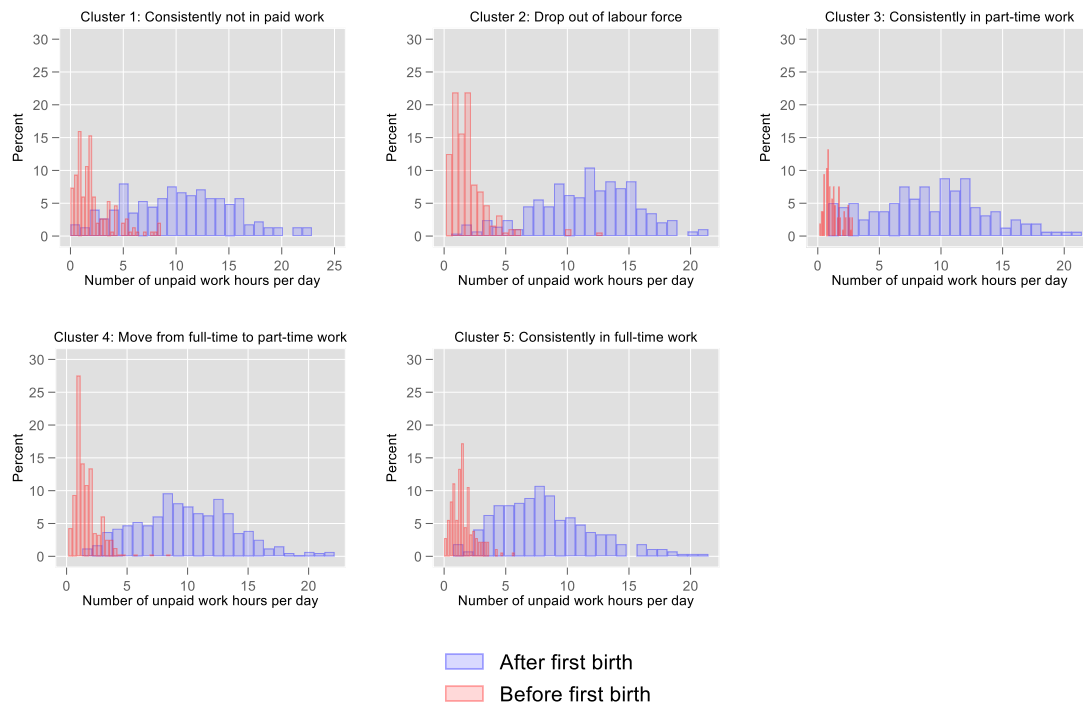
Clusters with good similarity between the individuals produce a graph similar to a sail of a ship. Complete similarity between those in the clusters results in a rectangular shape. Dissimilarity between those in the groups results in a shape of a downwards dagger (i.e. positive silhouette width scores indicate similarity, negative width dissimilarity). The silhouette width is mostly negative for cluster four when the sequences are divided into five groups (bottom right panel). This was a determining factor for using the four cluster solution, where the four clusters have a good proportion with a positive silhouette width.

14.5 APPENDIX 7.5: SILHOUETTE WIDTHS FOR 6-STATE CLUSTER SOLUTIONS 3,4,5 AND 6



In the three and four cluster solution, the first cluster has a proportion of the cluster with negative width. The amount of the cluster with a negative width is diminished in the five and six cluster solutions.

14.6 APPENDIX 7.6: DISTRIBUTION IN UNPAID WORK HOURS AFTER FIRST BIRTH BY CLUSTER



14.7 APPENDIX 7.7: DESCRIPTIVE STATISTICS

Descriptive statistics of demographic characteristics by cluster					
	Cluster one (consistently not working)	Cluster two (drop out of labour force at first birth)	Cluster three (consistently working part time with increased unpaid work after first birth)	Cluster four (full time work before first birth to part time work with increased unpaid work after first birth)	Cluster five (consistently in full time work with increased unpaid work after first birth)
Age at first birth					
Under 20	38 (10.13%)	2 (0.42%)	8 (3.02%)	4 (0.4%)	8 (1.78%)
20-24	125 (33.33%)	33 (6.88%)	55 (20.75)	65 (6.57%)	43 (9.56%)
25-29	101 (26.93%)	174 (36.25%)	77 (29.06%)	314 (31.72%)	131 (29.11%)
30-34	73 (19.47%)	195 (40.63%)	91 (34.34%)	396 (40.00%)	166 (36.89%)
35-39	28 (7.47%)	71 (14.79%)	26 (9.81%)	166 (16.77%)	80 (17.78%)
40+	10 (2.67%)	5 (1.04%)	8 (3.02%)	45 (4.55%)	22 (4.89%)
Highest education achieved at first birth					
Postgrad	4 (5.33%)	7 (7.29%)	2 (3.77%)	19 (9.60%)	11 (12.22%)
Graduate certificate	7 (9.33%)	5 (5.21%)	6 (11.32%)	25 (12.63%)	9 (10.00%)
Bachelors	9 (12.00%)	32 (33.33%)	14 (26.42%)	75 (37.88%)	25 (27.78%)
Diploma	8 (10.67%)	14 (14.58%)	4 (7.55%)	12 (6.06%)	17 (18.89%)
Cert III/IV	16 (21.33%)	20 (20.83%)	10 (18.87%)	35 (17.68%)	9 (10.00%)
Year 12	15 (20.00%)	11 (11.46%)	13 (24.53%)	26 (13.13%)	13 (14.44%)
Year 11 and below	16 (21.33%)	7 (7.29%)	4 (7.55%)	6 (3.03%)	6 (6.67%)
Partnership status at first birth					
In a partnership	62 (82.67%)	94 (97.92%)	49 (92.45%)	194 (97.98%)	87 (96.67%)
Not in a partnership	13 (17.33%)	2 (2.08%)	4 (7.55%)	4 (2.02%)	3 (3.33%)