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Research Article

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Research Article

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Abstract

BACKGROUND
The influence of spousal relations on reproductive outcomes has received considerable attention in the demographic literature. Previous studies have shown the complex interplay between age difference, female autonomy, and reproductive outcomes, but only a few have focused on historical high-fertility populations.

OBJECTIVE
This study investigates the associations between spousal age difference and the timing of first and higher order births, as well as the total number of children born.

METHODS
Data from the Demographic Data Base (married women, born between 1840 and 1889, first marriages only) are used to construct individual life courses in central and northern Sweden. The relative risk of age-homogamous and age-heterogamous couples having a child is examined using event history analysis. Poisson regression is applied to identify the effects of age difference on the total number of children born.

RESULTS
After controlling for the age of the wife, women in wife-older marriages show higher hazard rates for the transition to first and later order births compared to women in age-homogamous marriages. By contrast, women in husband-older marriages show lower hazard rates for the transition between births, with the exception of first childbirth. However, the net effect of spousal age difference on the total number of children ever born is small.

CONTRIBUTION
This study provides empirical evidence of the association between spousal age gap and fertility outcomes, using the spousal age gap as a proxy for conjugal power. It shows that women in wife-older marriages used their greater female autonomy to shorten the

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interval between childbirths, although the effect on the total number of children born is negligible.

1. Introduction

The question of whether female autonomy within marriage is related to fertility outcomes is addressed in a growing body of empirical research, most of which focuses on contemporary high fertility populations such as sub-Saharan African or Asian societies (see Upadhyay et al. 2014 for a recent overview), or contemporary low fertility populations (e.g., Osiewalska 2018). By contrast, the number of studies addressing spousal power differences in historical populations is relatively small (e.g., Feng et al. 2010). Insight into the association between female autonomy and reproductive outcomes can contribute to our understanding of regional variations in the decline of fertility (Casterline, Williams, and McDonald 1986).

In this study, historical parish registration data from central and northern Sweden between 1840 and 1889 are used to examine the association between female autonomy and reproductive outcomes in a historical population. The ability of women to influence reproductive decision-making may depend on their position within the marriage. Spousal age difference is used here as a proxy for female autonomy, reflecting a woman's bargaining power regarding reproductive decision-making (Abadian 1996; Casterline, Williams, and McDonald 1986; Skinner 1993; Bras and Schumacher 2019). The aim of this study is to examine whether age difference between spouses can explain the timing of first and higher order births, as well as the total number of children born.

The structure of this paper is as follows. The following section provides a brief overview of the literature on the associations between spousal age difference, female autonomy, and reproductive outcomes. There then follows an account of the nature of Swedish marriages and reproduction during the 19th century. The hypotheses, data, and methods are presented in the next sections, followed by a discussion of the empirical results and the main conclusions.

2. Age difference between spouses

2.1 Age difference and female autonomy

Age difference between spouses is frequently used as a proxy for female autonomy in studies of reproductive outcomes, referring to the degree to which women can influence

reproductive decision-making (Abadian 1996; Skinner 1993). In general, a smaller age difference between spouses suggests a higher degree of equality between them. One body of research suggests that industrialization in Western Europe has led to a reduction in patriarchal inequalities within the family, thereby increasing the bargaining power of women (Janssens 2007; Watkins 1993). In a second body of research, fertility transitions are seen as the manifestation of a cultural shift towards egalitarian partnerships. According to Mason (1993), couples who are more socially equal and emotionally intimate face lower costs of family planning, since there is a greater agreement between them on the factors on which the discussion should be based and because there is a greater ability to discuss matters of reproduction. The same line of reasoning is observed in Van de Putte et al. (2009), who argue that the experiences of people belonging to the same birth cohort contribute to a sense of commonality. Shared life experiences and values regarding marriage and family life reinforce and mutually confirm each other's behavior (Van de Putte et al. 2009: 1236). Van de Putte et al. (2009) observe that the age difference between spouses declined over the course of the 19th century in Western European societies. They argue that the increase in age homogamy brought with it a more egalitarian view of marriage and partner selection. However, as Pyke and Adams (2010) argue, the husband's older age does not necessarily mean that all discussions between spouses are dominated by the husband. Nevertheless, from a comparative perspective, a high proportion of marriages in which the husband is older can be seen as indicative of patriarchal family systems in which women's decision-making power on matters concerning reproduction is constrained (Barbieri, Hertrich, and Madeleine 2005; Cain 1993).

Previous empirical studies on the association between female autonomy and fertility outcomes have shown mixed results. Upadhyay et al. (2014) provide a recent overview of the literature on the relationship between women's empowerment and fertility. The majority of the 60 studies they examine were conducted in contemporary South Asian societies. Thirty-eight of these studies focused on the number of children born, and only 10 of these found a significant negative association between the number of children born and measures of women's empowerment. Five studies examined the effect of women's empowerment on the length of birth intervals and only two of these found that female conjugal power was associated with longer birth intervals. One study observed mixed effects depending on the woman's age at first birth and whether or not she had a paid occupation (Upadhyay and Hindin 2005), another study observed shorter birth intervals for Nepalese couples with greater female autonomy (Fricke and Teachman 1993), and one study found no significant association (Feldman et al. 2009). In another overview of the literature, Mason (1993) also observes mixed evidence regarding a connection between the position of women and fertility outcomes. These

findings illustrate that the effect of women's empowerment on fertility depends to a large degree on the regional context and the way female empowerment is measured.

2.2 Spousal age difference and fertility: evidence from previous studies

In their study on age difference between spouses in developing regions, Casterline, Williams, and McDonald (1986) identify three mechanisms through which spousal age difference can affect fertility. First, an increase in the age of either spouse is inversely associated with fecundability. A larger age difference will therefore negatively affect reproductive outcomes (Mineau and Trussell 1982). Second, larger age differences are associated with a higher risk of marital dissolution due to widowhood or severe sickness of either the husband or wife. Finally, less palpable but perhaps more substantial effects of large age differences on reproduction can be observed through its effect on variables affecting coital frequency, such as marital stability and satisfaction, preferences concerning family size, and the use of contraception (Barbieri, Hertrich, and Madeleine 2005; Casterline, Williams, and McDonald 1986; Knodel 1988; McDonald 2000). Together, these elements reflect both the direct effects of a higher age of either the wife or the husband on fertility (the ability to have children), and how reproductive decisions depend on the degree of equality between husband and wife (the nature of the relationship).

The literature provides mixed evidence on the relationship between spousal age difference and fertility. Skinner (1993) develops an index of conjugal power, which is identified by a combination of the wife's age at marriage and the age difference between husband and wife. His analysis of Tokugawa Japan suggests that conjugal power is connected to specific reproductive decisions such as infanticide, abortion, and early stopping of childbearing. While Skinner demonstrates the role of spousal age difference, he also acknowledges that the absolute age of the wife accounts for a large part of the observed fertility outcomes (Skinner 1993: 263). In a comparative study using historical individual and household-level data from three European and two Asian regions, Feng et al. (2010) observe that the age difference between spouses significantly reduces the likelihood of a next birth if the husband is at least six years older than the wife. This association is observed in both Western and Eastern societies. For wife-older marriages, however, the likelihood of a next birth is only significantly higher in north-eastern China. They argue that the lower probability of parity progression in husband-older marriages may indicate a negative physiological effect of the husband's older age or the wife's younger age, or it may be the result of a lower desired fertility compared to couples where the spouses are more age-homogamous. Abadian (1996) finds a different result when examining the impact of female autonomy – operationalized by

the mean spousal age difference, the mean age at marriage, and the percentage of female enrolment in secondary education – on total fertility rates in a comparative study of 54 countries in the 1990s. Abadian (1996) finds that, comparing countries, fertility rates are inversely correlated with age at marriage and female education but not with spousal age difference. Barbieri, Hertrich, and Madeleine (2005) examine the effect of spousal age difference, used as a proxy for the degree of equality between spouses, on contraceptive use in eighteen sub-Saharan African countries during the 1990s. They find that couples with small age differences are more likely to use contraceptives than husband-older couples.

An important question is whether women with greater autonomy with respect to their husband use their conjugal power to either enhance or restrict reproductive outcomes, or whether there is no effect whatsoever on fertility outcomes. The empirical literature does not provide a definitive answer to this question. Given that the physical burden of childbearing is higher for women than men, it is arguably in the interest of the wife to postpone the birth of subsequent children or to have fewer children. Women with more authority in the decision-making process regarding having children may therefore be more likely to postpone childbirth. However, evolutionary biology suggests that all individuals face a tradeoff between the costs of reproduction and the benefits of having children in terms of inclusive fitness (Conde-Agudelo, Rosas-Bermúdez, and Kafury-Goeta 2006, 2007; Hamilton 1964a, 1964b; Hrdy 2009; Mace 2014). This suggests that women with greater conjugal power can be more successful in increasing their fertility than women with less conjugal power. An important assumption for the association between conjugal power and fertility outcomes is that husbands' and wives' fertility preferences are different. If men's and women's fertility preferences are similar, it follows that there is no association between conjugal power and fertility outcomes. As described above, the empirical evidence from the literature is mixed: Some studies find shorter birth intervals for wife-older marriages in some regions (Feng et al. 2010), while others find that husband-older marriages are indicative of shorter birth intervals (Upadhyay et al. 2014).

3. Marriage and reproduction in 19th century Sweden

The demographic transition in Sweden started around 1810, when infant mortality began to steadily decline, followed by a permanent decline in birth rates after the 1870s (Brändström and Sundin 1981; Hofsten and Lundström 1976). Swedish marriages in the 19th century were not only an arrangement between two families but also a social construction in which social norms carried by the law, the Church, and the local community played an important role. The Civil Code of 1734 gave both spouses an

equal share of property held in common and all children born within wedlock became legal inheritors to their parents. The law also stipulated that no person could be forced into marriage (Giftermålsbalken: ch. 1:5).[3] While parental influence on the choice of marriage partner was visible through the parents' involvement in marriage negotiations and their right to disinherit children who married against parental will, Swedish legislation made it possible for marriages to be formed on the basis of romantic love (Ågren 2009; Dribe and Lundh 2014; Lundh 2003; Van de Putte et al. 2009).

The custom of betrothal, or engagement, was deeply rooted in the old Germanic tradition. With the introduction of Christianity in the early 13th century the ritual was not dismissed; rather, its role was made more prominent. Betrothal signified the commitment of both partners, as well as their families, to the marriage. The 1734 Marriage Code required that all Christian weddings, the only legal form of marriage, were announced by the publishing of marriage banns, and a betrothal was to precede the wedding. This gave the betrothal legal effects and children of betrothed couples had the same inheritance rights as children born in wedlock. If the fiancé refused to marry after becoming betrothed, the woman maintained her right to her share of the property in the man's household (Lundh 2003).

Although betrothal affirmed the status of women, an unmarried woman was not autonomous but was under the authority of a male person, usually her father, who acted as a guardian (*giftoman)* on her behalf (Giftermålsbalken: ch. 1 par 1.2). Since unmarried children were considered to belong to the parental household, parents had the right to disinherit children if they married against the parental will, even in the case of remarriage after widowhood (Giftermålsbalken: ch. 6). Parental influence is also visible in the help parents offered in selecting a suitable partner, although parental influence over women was stronger than that over men, who could more easily refuse the involvement of their parents (Dribe and Lundh 2014). Contemporary narrators describe how farmers in particular had a strong influence on their daughter's partner selection, as they strove to retain the size of the parental homestead. Also, marrying beneath one's social position was strongly resisted and could result in a couple falling out of favour in the community, or 'standing outside the village' (Dribe and Lundh 2014, p. 230). Parents generally sought wealthy partners from within the same social group.

At the time of engagement, the suitor traditionally provided the woman's guardian with a gift (*vängåva*), the value of which was dictated by law. However, by the 19th century it had become customary to give the gift directly to the bride. If the betrothal agreement was violated, the party not upholding the promise was forced to return the betrothal gifts and to pay a fine to the other family. At marriage, the bride's parents provided her with a dowry (*medgift*), traditionally consisting of a bed, money, or

[3] The 1734 Giftermålsbalken, Swedish marriage laws, are available online at https://sv.wikisource.org/wiki/Giftermålsbalken (last visit: July 10th, 2017)

various household goods. The dowry remained the private property of the bride, though administered by the husband, and reverted to the bride's family if the marriage ended.[4] Apart from her dowry, the wife received a gift from her husband on the day after the wedding (*morgongåva*; morning gift), which became the woman's private property and was intended to provide her with support in case of widowhood (Ågren 2009; Dribe and Lundh 2014).

Besides the law and the parents, the Church also had a strong influence on premarital relationships in Sweden. Given the relatively small geographical size of the marriage market, the Sunday service in the parish church provided a place for young people to meet in person, as did the local market. Christian morality regarding prenuptial sexual relations was very negative. The Church strongly opposed premarital conception and required the payment of a fine, corresponding to about one month's pay for a farm hand (Kälvemark 1980: 330). However, the fact that legislation was in place to protect betrothed women and their children if the husband violated the wedding agreement was a clear sign that, in practice, premarital sexual relations were widespread. Farmers in particular appear to have had a pragmatic attitude to premarital intimate relationships – for example, if the harvest or costly wedding preparations forced the marriage to be delayed – as long as the couple married later (Dribe and Lundh 2014).[5] In spite of the prohibition against premarital conception, Kälvemark (1980) observes that illegitimate births were indeed numerous in southern Sweden, as around 8% to 14.9% of all married women gave birth out of wedlock and around a third of all married couples experienced premarital conceptions.

As in other West European countries, married couples in 19th century Sweden were expected to establish independent households (Hajnal 1982; Laslett and Wall 1972). The man was expected to have an occupation that could support a family and to have saved enough money to set up a household. Consequently, entry into marriage was fairly restricted, causing a considerable proportion of the population to remain unmarried and resulting in a relatively high age at first marriage. Various arrangements facilitated the acquisition of household goods, a home, and money for the wedding. Access to land or a home could be provided through inheritance from both partners' parents, given in advance as a wedding gift.[6] From 1845, inheritance rights were equal by law, although in practice one heir could still be favoured by setting a low price on

[4] Ågren (2009) describes how the combination of legal and customary practices related to the wife and husband's ownership of property, referred to in court documents as *arcanum domesticum,* could make it difficult for creditors to assess the size of their debtors' assets (Ågren 2009:13–16, 146–147).

[5] Still, rural society was intolerant towards unmarried mothers and their illegitimate children and regarded pregnant brides as a disgrace (Dribe and Lundh 2014).

[6] Such decisions on the transmission of property not only concerned the formation of a new household with the help of the parents, but were also related to the procurement of old-age security for the parents (Dribe and Lundh 2005).

the property, giving him or her the advantage to buy out the other siblings on favourable terms (Ågren 2009: 189–190; Lundh 2003: 14). Relatives, friends, and wedding guests also helped to set up the household, as it was customary to bring household goods as gifts for the newlywed couple. Relatives who lived further away and could not attend the wedding usually sent money. Lundh (2003) argues that the institution of wedding gifts in central and northern Sweden played a prominent role in affirming social relations, as the names of the givers and the value of the gift were announced in public during the wedding. Reciprocity was another important aspect of the wedding gifts: those who received support were obliged to return the favour if needed (Lundh 2003), making communal cooperation an important aspect of the wedding. Guests were also expected to contribute to the wedding feast by bringing food and drink. These arrangements relieved the financial burden of the wedding for the betrothed couple.

During the 19th century the legal minimum marriage age in Sweden was increased from 15 to 17 years for women and from 20 to 21 years for men (Lundh 2003: 41).[7] Over the entire course of this study, in the regions of Sundsvall and Skellefteå the actual average age at marriage was around 25 years for women and 27.5 years for men.[8] Although Swedes married relatively late, these ages are similar to those in other North Western European countries (Hajnal 1982).

Altogether, Swedish marriages in the 19th century were characterized by considerable equality between the spouses. The homogamous nature of the marriage was reflected in various elements of the marital union. A betrothed woman and her illegitimate children were protected in case the man did not comply with the betrothal agreement. By law, the husband could only be married to one wife at a time. Furthermore, in the rare case of divorce the wife had a right to half the property held in common. From the Civil Code of 1734 up until 1915, the legally recognized reasons for divorce were abandonment and adultery, although divorce was opposed by the Church and socially frowned upon (Lundh 2003: 11–12). The homogamous nature of marriage was also reflected in the selection of partners. Although parents could influence the choice of partner, in the 19th century young people were increasingly able to express their own preferences due to the rise of wage labour and increase in the landless population. The relatively small age difference between spouses clearly indicates the

[7] The 1734 law determined a minimum age of 15 years for women and 20 for men. In 1920 the minimum marriage age was set at 18 years for both men and women. Sverikes rikes lag, Giftermålsbalken 1920: Ch 2 and 1: https://www.riksdagen.se/sv/Dokument-Lagar/Lagar/Svenskforfattningssamling/Giftermalsbalk-1920405_sfs-1920-405/?bet=1920:405 (last visit: July 10th, 2017)

[8] Calculated for the data used in this paper. Between 1840 and 1870 the marriage age for women declined slightly (from around 26 to around 24) but increased again between 1870 and 1890. Lundh reports an average of 29.3 years for men and 26.8 years for women using data from seven Scanian parishes between 1811 and 1860, but also observes long-term cyclical trends (Lundh 2003: 44–47).

egalitarian nature of 19th century Swedish marriages compared to those in other societies (Cain 1993).

4. Hypotheses

Following Casterline, Williams, and McDonald (1986), spousal age difference can indicate the nature of a relationship and the ability to have children. These two aspects facilitate the development of the hypotheses formulated below. It is important to recognize that fertility outcomes depend on a multitude of factors, including socioeconomic conditions, customs or other cultural aspects, and the age of both the husband and the wife. These factors are all assumed to be constant in the formulation of the hypotheses.

4.1 The ability to have a child

The existence of a spousal age gap by default entails that one spouse is older and therefore has a higher risk of mortality or infecundity. The wife's age is the most important factor influencing her ability to have a child (Bongaarts and Potter 1983; Wilson, Oeppen, and Pardoe 1988), although the chance of having a child also decreases when her husband becomes old and is more likely to become ill or pass away. Furthermore, other non-physiological factors such as marital satisfaction and sexuality may be inversely correlated with age (Casterline, Williams, and McDonald 1986). Thus, ceteris paribus, a larger age gap between husband and wife reduces their likelihood of having children. Therefore: *For a given age, women in age-homogamous marriages are more likely to enter parenthood, to have shorter birth intervals, and to have a larger number of children ever born than women (of similar age) in husband-older relationships (H1).*

4.2 The nature of the relationship

Age difference can lead to a fertility outcome that is more beneficial to the older partner if he or she is better able to influence decisions regarding reproduction. The assumptions here are that age differences reflect the older partner's autonomy, that fertility preferences differ between partners, and that a wife with greater conjugal power strives to increase her fertility. Controlling for the wife's age and other characteristics, it is hypothesized that: *For women of similar age, birth intervals will be shorter for*

wife-older couples and longer for husband-older couples, compared to same-age couples. Furthermore, wife-older couples are likely to have more children and husband-older couples are likely to have fewer children compared to same-aged couples (H2a).

Alternatively, assuming women with greater conjugal power strive to reduce fertility in order to reduce the biological costs of pregnancy: *For women of similar age, women in wife-older couples will enter parenthood later and have longer birth intervals and fewer children than same-aged and husband-older couples (H2b).*

5. Data, measures, and methods

5.1 Data

The data used in the analysis are obtained from the POPUM and POPLINK databases of the Demographic Data Base (DDB).[9] The DDB is a large, historical population database containing linked individual-level records from Swedish parish registers. The parish records contain event registrations such as births, baptisms, banns, marriages, deaths, and migration (Alm-Stenflo 1994; Jeub 1993). Parish registration has been regulated by canon law since 1686, but there has been variation in the way events are registered. The establishment of the Statistical Commission (*Tabellverket*) in 1749 and the introduction of printed forms in the 1780s led to uniform methods of population registration. The DDB has digitized the registers of a select number of parishes, allowing for the construction of the individual life histories of the people living in these parishes.

An important advantage of the DDB for this study is that it is possible to follow individuals over the life course for as long as they remained in a parish registered in the DDB. Event registrations such as date and place of birth, marital status, sex, and occupation are available for each individual, as well as their relationship to other family members. Furthermore, the DDB data include information on the exact period during which a person is observed. While the quality of the DDB is high and the number of registered people in the database is large, there are some limitations to its use. First, the digitization of parish registration is incomplete. This means that information on people moving to neighbouring parishes can be lost when that parish is not available in the database, and so not everybody can be followed throughout their entire life. However, information up to the moment of out-migration can be used. Second, the records were maintained by the parish clergy, whose task was to continuously update the birth and

[9] DDB: Demographic Data Base. Centre for Demographic and Ageing Research (CEDAR), Umeå University. POPLINK and POPUM version 4.4.2.

baptismal registers, registers of banns and marriages, registers of deaths and burials, migration lists and catechetical lists (including details about church attendance and knowledge of the scriptures). In fast-growing parishes or municipalities where servants, soldiers, or lodgers frequently moved in and out of the parish, it was difficult for the parson to record the required information. In addition, there are gaps due to the quality of the handwriting, the past treatment of the registers, and the occurrence of accidents, so not all material could be preserved and digitized (Jeub 1993).

This study is based on the life histories of 8,258 women born between 1840 and 1890 in the regions of Sundsvall and Skellefteå in central and northern Sweden. The following criteria were set for the inclusion of a woman in the analysis: She was born in the area of Sundsvall or Skellefteå, or entered a parish in this region at the age of 18 years or younger; she was married at least once; and the parish registration includes information on the occupation of her husband. The sample size for the analysis of completed fertility is smaller than that for parity transition due to migration to an unknown parish, marriage dissolution, the death of either the wife or the husband, or clerical error. Complete information is available for 6,235 women. This means that they did not migrate to an unknown parish before the age of 45, and that both wife and husband survived until age 45. The construction of the sample emphasizes the observation of a woman's complete birth history. This gives the sample a bias towards people who did not migrate to a parish not registered in the DDB. Given the institution of domestic service, the life histories of many people are truncated. As can be seen in the description of the data below, a large share of the population in this sample belonged to the farmer class, while during the second half of the 19th century Swedish society as a whole witnessed industrialization and an increase in the landless labouring class.

5.2 Outcome variables

The focus of the analysis is the effect of spousal age difference on the waiting time to first and subsequent births and on the total number of children ever born. The locus of the analysis is the wife. A life history is constructed for each woman, containing the date of her birth and that of her first husband, the date of her first marriage, the birth dates of her children, and the end of her observation window. The observation window ends with her death, the death of her partner, the dissolution of her first marriage, or migration to a parish not registered in the DDB. For the purpose of counting the number of children ever born, the sample is further restricted to women who are observed in the DDB until the age of 45 years. Stillbirths, deceased children, and multiple births are included in the count of the number of children ever born. In order to simplify the

analysis, second or later marriages of both wife and husband are excluded. The outcome variables are the woman's age at first birth, the duration of the interval between subsequent births, and the total number of children born. The birth interval is a useful indicator of fertility and is frequently used in the literature on reproduction (see, e.g., Feng et al. 2010; Van Bavel and Kok 2004, 2010; Van Poppel et al. 2012).

5.3 Independent variables

The main independent variable in this analysis is age difference between spouses. The age difference is included here using dummy variables, where the reference category is an age difference between spouses of at most two years. An age difference of more than two years is coded separately for wife-older marriages and husband-older marriages. The definition of same-age marriages as marriages where the age difference between spouses is at most two years is also used in Van de Putte et al. (2009). By contrast, Feng et al. (2010) consider marriages where the husband is zero to five years older as age homogamous. In the present study the use of other ranges did not influence the outcomes of the analysis to any great extent.

Table 1 provides descriptive information on the different variables used in the models. The husband is older than the wife in around half of all couples. Wife-older marriages are less frequently observed and their share decreased over time from around 22% to around 14% of all marriages. In contrast to Van de Putte et al. (2009), the data in this sample do not indicate an increase in age homogamy over time. This is presumably due to the selection of couples of which the majority belong to the farmer class and that display regional immobility.

In order to control for changes in socioeconomic or cultural conditions and fertility over time, dummy variables are included for the birth cohort of the wife. Community-level characteristics are controlled for using a dummy variable for the region where the wife is born. Two regions are selected based on the quality and availability of data: Sundsvall, near the Gulf of Bothnia around 400 kilometres north of Stockholm, and Skellefteå, which is located along the same coast around 350 kilometres north of Sundsvall. Forestry was the main economic activity in the first half of the 19th century in both Skellefteå and Sundsvall, while in Sundsvall agriculture also played an important role. The towns were small and population density was low compared to towns in other European countries. From the 1850s, industrialization and international trade spurred economic growth, particularly in the Sundsvall region, and encouraged the development of shipyards and iron foundries (Alm-Stenflo 1994; Schön 1997).

The husband's occupation at the time of marriage is used as a proxy variable to control for individual-level differences in social status. The DDB classifies occupations

as HISCO codes, which are converted to the HISCLASS classification scheme. The HISCLASS scheme allows for a systematic comparison of social positions based on occupational titles (Van Leeuwen and Maas 2011; Van Leeuwen, Maas, and Miles 2004). The combination of smaller groups produces four broad social classes, which are included as dummy control variables and are coded as follows: (1) foremen to higher occupations (non-manual labour), (2) farmers, (3) medium- and lower-skilled workers, and (4) lower-manual or unskilled (farm) workers. As Table 1 shows, most couples in the sample belonged to the farmer class (N = 4.506, or 54.6%), followed by medium- and lower-skilled workers.

Individual-level differences in past reproductive outcomes are controlled for by the inclusion of dummy variables for the occurrence of multiple births and the death of the previous child. Previous multiple births may serve as an exogenous factor influencing the time to conception of the next child, given the extra care required to nurture two or more children compared to one. A twin birth increases the birth order of the following child by two instead of one, so if a woman had twins at first childbirth the subsequent childbirth is registered as the third parity. The death of a child before or after eight months, both before the birth of the next child, is coded separately using time-varying dummy variables. The death of a previous child may induce a replacement effect and may thus shorten the time to conception of the next child (Derosas 2006; Knodel 1982; Van Bavel and Kok 2004, 2010). Because breastfeeding can delay the return to ovulation, the child's survival decreases to a certain degree the woman's chance of becoming pregnant again (Gray et al. 1990; Santow 1987).

Finally, the age of the wife at marriage or previous birth is included to account for the effect of age on fecundity (Van Bavel and Kok 2004). Table 1 shows that women in wife-older marriages had the highest age at marriage and highest age at first birth, followed by women in same-age marriages and husband-older marriages. The mean age at first marriage is comparable to that observed elsewhere in Sweden (Kurosu and Lundh 2014).

Table 1: Descriptive statistics

	Wife +2 years older	Same age (–2 up to 2 years)	Husband +2 years older	Total
Observations[1]	1,413 (17.1%)	2,467 (29.9%)	4,378 (53.0%)	8,258
Birth cohort				
1840–1849 (N)	396 (22.2%)	562 (31.5%)	827 (46.3%)	1,785
1850–1859 (N)	433 (19.5%)	694 (31.2%)	1,095 (49.3%)	2,222
1860–1869 (N)	279 (13.1%)	615 (29.0%)	1,230 (57.9%)	2,124
1870–1879 (N)	172 (14.2%)	315 (25.9%)	728 (59.9%)	1,215
1880–1889 (N)	133 (14.6%)	281 (30.8%)	498 (54.6%)	912
Region				
Sundsvall (N)	514 (15.4%)	1,004 (30.1%)	1,823 (54.6%)	3,341
Skellefteå (N)	899 (18.3%)	1,463 (29.8%)	2,555 (52.0%)	4,917
Social class				
Foremen to higher (N)	144 (18.5%)	218 (27.9%)	418 (53.6%)	780
Farmer (N)	675 (15.0%)	1,298 (28.8%)	2,533 (56.2%)	4,506
Medium- and lower-skilled (N)	530 (21.4%)	824 (33.3%)	1,124 (45.4%)	2,478
Lower-manual and unskilled farm worker (N)	64 (13.0%)	127 (25.7%)	303 (61.3%)	494
Age of wife				
Age at first marriage[5]	29.4 (3.8)	25.4 (3.3)	23.2 (3.7)	24.9 (4.3)
Age at first birth	29.8 (4.1)	26.0 (3.6)	23.9 (3.8)	25.5 (4.4)
Age at last birth[2]	39.0 (5.0)	38.12 (5.6)	36.59 (6.2)	37.4 (5.9)
Age of husband				
Age at first marriage	24.6 (3.1)	25.6 (3.3)	29.5 (4.8)	27.5 (4.6)
Age at first birth	25.0 (3.6)	26.2 (3.5)	30.1 (4.9)	28.1 (4.9)
Age at last birth[2]	34.2 (5.2)	38.3 (5.6)	43.1 (6.8)	40.2 (7.1)
Children ever born				
Overall mean	4.9 (2.6)	6.0 (3.0)	6.1 (3.2)	5.9 (3.1)
Mean Sundsvall	4.0 (2.3)	4.8 (2.9)	4.9 (3.1)	4.8 (3.0)
Mean Skellefteå	5.2 (2.6)	6.3 (3.0)	6.5 (3.2)	6.2 (3.1)
Previous child[3]				
Twins	1.36%	1.22%	1.36%	1.32%
Previous child died within eight months[4]	7.36%	7.94%	8.08%	7.93%
Previous child died after eight months[4]	2.87%	3.15%	3.20%	3.14%

Source: DDB, see text. (CEDAR). POPLINK and POPUM version 4.4.2.
Notes: [1)] Number of observations. Based on sample of all women in the sample (row percentages between parentheses, N=8,258).
[2)] Based on a sample of women with complete life-course information (N = 6,235).
[3)] Percentages based on all observed childbirths.
[4)] Death of child if occurred before birth of next child.
[5)] Standard deviation in parentheses.

5.4 Methods

The analysis of the effect of spousal age difference on reproductive outcomes is split into two parts. First, Cox proportional hazard models are fitted to examine whether women's age at first birth and the likelihood of parity transition are associated with the spousal age gap. The chance of a birth occurring, given a particular age difference between the spouses, is expressed as a coefficient that denotes the hazard of having a child over time relative to an unspecified baseline hazard (Cleves et al. 2010). The assumption of proportionality is examined using Schoenfeld residuals and all models are stratified on the birth cohort of the wife. Each parity transition is estimated separately and control variables are included for the effect of the wife's age, social status, regional differences, and the occurrence of multiple births or child deaths since last birth. Each parity transition sample includes women who do not have a next childbirth. Birth intervals of more than seven years are excluded from the analysis of each parity transition (N = 280). Analysis time is defined in years, with the woman's birthdate as the onset of risk of first birth, and the date of previous birth for each subsequent birth. The death of previous children is included as a time-varying covariate, changing the value of the dummy and creating a new episode when the previous child dies.

Second, the association between the total number of childbirths and the spousal age gap is examined using Poisson regression. The baseline model includes controls for social status, regional differences, and temporal variations. The effects of the wife's age at marriage on the total number of children born are examined in a separate model.

6. Results

Descriptive statistics for the outcome variable are provided in Table 2 and Figure 1. Table 2 reports the mean length of closed birth intervals by parity and birth cohort of the wife. Figure 1 shows the mean age at first and last birth over time, in relation to the age difference between husband and wife. The average age at first birth and the average number of children born remained fairly constant over time. Looking at the timing of subsequent births in Table 2, the length of the birth interval increased over the life course of individuals, but slightly decreased over time. The relatively small number of children born to the 1880 cohort is due to the fact that only a small number of complete life courses is available for this cohort. The proportions of first-born children distributed by their relation to the timing of marriage are similar to observations for southern Sweden by Dribe and Lundh (2014) and Kälvemark (1980). A considerable proportion of births occurred before or within nine months of marriage, but around half

of all births occurred after nine months of marriage. As discussed above, the general attitude towards premarital sexual behaviour was contradictory: Christian morality opposed such relations, while legislation strengthened the position of pregnant women during betrothal.

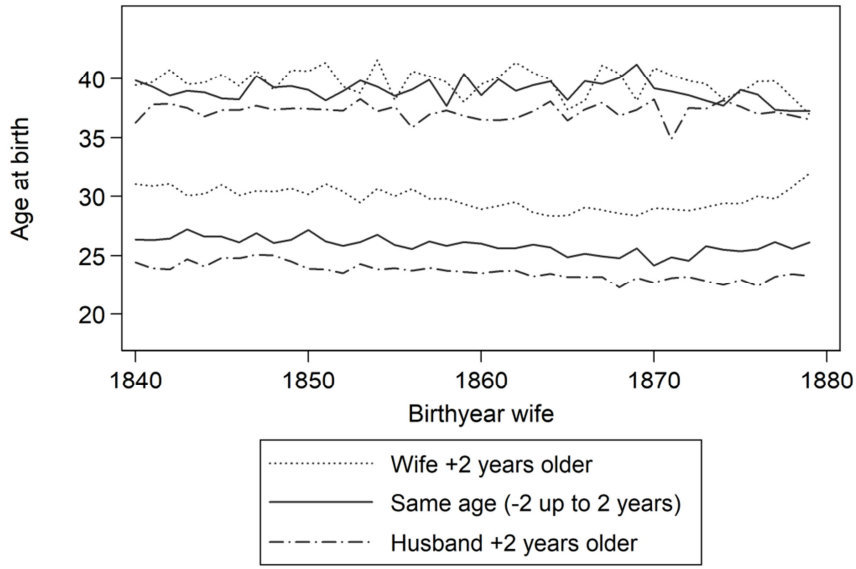
Table 2: Timing of childbirth in the Sundsvall and Skellefteå regions (Sweden), 1840–1890

	Birth cohort wife					
	1840–	1850–	1860–	1870–	1880–	All
Mean age wife at first birth[a]	26.4	25.7	24.8	25.0	25.8	25.5
Mean age wife at marriage	25.8	25.2	24.2	23.8	24.9	24.9
Birth interval by parity[b]						
1–2	26.71	26.13	24.61	23.75	22.67	25.10
2–3	30.92	29.79	28.38	26.99	25.43	28.79
3–4	30.95	30.7	28.33	27.88	25.69	29.25
4–5	31.02	31.01	28.39	29.07	26.19	29.65
5–6	31.13	29.96	28.44	29.07	26.82	29.51
Mean number of children born[c]	5.7	6.1	6.4	6.0	3.8	5.9
Timing of first child						
Before the wedding	12.3 %	9.9 %	9.8 %	7.3 %	6.7 %	9.6 %
0–8 months after the wedding	35.6 %	37.8 %	42.1 %	40.7 %	36.4 %	38.8 %
>8 months after the wedding	52.1 %	52.4 %	48.0 %	52.0 %	56.9 %	51.7 %

Source: DDB (CEDAR). POPLINK and POPUM version 4.4.2.
Notes: [a] Age in years
[b] Birth-to-birth interval in months
[c] Women observed age 18–45 or death before age 45.

Figure 1 indicates that for women, who are followed from age 18 to 45, age at first and last birth was relatively constant over time. Between marriage types there seems to be little difference in the age at last birth, but the age at first birth is highest for women who are married to a younger husband. By contrast, women with an older husband had their first child at a relatively young age. Note that Figure 1 represents the absolute age at childbirth and does not control for differences in other characteristics such as age at marriage.

Figure 1: Average age at first and last birth in Sundsvall and Skellefteå (Sweden), 1840–1890, by spousal age difference



Source: DDB, see text. (CEDAR). POPLINK and POPUM version 4.4.2.
Note: The upper three lines show the average age of women at last childbirth; the bottom three lines show the average age of women at first childbirth (N = 6.235).

Table 3 provides hazard ratios for the Cox proportional hazard models for each open birth interval. The first column shows the estimates for the transition to first birth. Column 2 provides the estimates for the hazard of a second birth for all women who already had had one childbirth (including stillbirths). Column 3 indicates the hazard of a third birth for all women who had had two childbirths (including multiple births and still births), and so on. The regression parameters are given in exponentiated form and represent the waiting time (in the form of hazard ratios) until next childbirth relative to the reference category (women in same-age marriages). A value greater than 1 represents a higher risk of having a child as time progresses, meaning a shorter interval between childbirths, while a value lower than 1 represents a longer interval compared to the reference category. All event history models are stratified on the wife's birth cohort; temporal variations in the duration of the birth interval are therefore controlled for but not visible in these models.

Table 3: Hazard ratios for spousal age differences on the transition time to first and higher order births (Cox regression model)

	Parity					
	1	2	3	4	5	6
Age difference (ref: same age)						
Wife +2 years older	1.263***	1.023	1.180***	1.190***	1.178**	1.120+
	[1.17,1.36]	[0.95,1.10]	[1.09,1.28]	[1.09,1.30]	[1.06,1.31]	[0.99,1.26]
Husband +2 years older	1.160***	0.938*	0.827***	0.850***	0.763***	0.788***
	[1.10,1.22]	[0.89,0.99]	[0.78,0.88]	[0.80,0.91]	[0.71,0.82]	[0.73,0.85]
Wife's age at marriage	0.656***					
	[0.65,0.66]					
Wife's age at previous birth		0.963***	0.928***	0.914***	0.892***	0.874***
		[0.96,0.97]	[0.92,0.93]	[0.91,0.92]	[0.88,0.90]	[0.86,0.88]
Previous infant						
Died within eight months (ref: surviving after eight months)		3.109***	3.173***	3.319***	3.836***	3.654***
		[2.87,3.37]	[2.89,3.48]	[3.01,3.66]	[3.43,4.29]	[3.22,4.15]
Died after eight months (ref: surviving until next childbirth)		2.001***	2.039***	2.259***	2.160***	1.787***
		[1.74,2.30]	[1.78,2.33]	[1.97,2.59]	[1.83,2.55]	[1.49,2.14]
Multiple birth (ref: one child born)			1.638***	0.748*	0.933	0.81
			[1.30,2.06]	[0.59,0.95]	[0.68,1.27]	[0.63,1.05]
Husband's SES (ref: foremen to higher)						
Farmer	0.992	1.108*	0.963	1.105+	1.123+	1.045
	[0.92,1.07]	[1.02,1.21]	[0.88,1.06]	[0.99,1.23]	[0.99,1.27]	[0.90,1.21]
Medium- and lower-skilled	1.203***	1.092+	0.972	1.118+	1.124+	1.056
	[1.11,1.31]	[1.00,1.20]	[0.88,1.07]	[1.00,1.25]	[0.99,1.28]	[0.91,1.23]
Lower-manual and unskilled farm worker	0.928	0.946	0.901	1.041	1.01	0.962
	[0.82,1.05]	[0.83,1.07]	[0.78,1.04]	[0.89,1.22]	[0.84,1.22]	[0.77,1.20]
Region (ref: Skellefteå)						
Sundsvall	1.107***	0.716***	0.670***	0.641***	0.714***	0.739***
	[1.05,1.17]	[0.68,0.76]	[0.63,0.71]	[0.60,0.69]	[0.66,0.77]	[0.68,0.81]
Episodes	15,389	9,634	8,229	7,293	6,246	5,397
Subjects at risk	8,245	7,974	7,016	6,017	4,974	4,110
Failures (childbirths)	7,971	7,003	6,010	5,008	4,062	3,229
Chi^2	11671.4	938.8	1156	1252.8	1235.1	1177.9
Log likelihood	–45688.3	–45650.1	–38503.6	–31351.5	–24654.3	–19109.9
Mean age of wife at parity	25.51	27.53	29.53	31.45	33.34	35.07

Table 3: (Continued)

	Parity					
	1	2	3	4	5	6
Number of twin births (at previous parity)			79	72	43	63
Number of children death within eight months		740	556	498	382	303
Number of children death after eight months		212	233	231	160	133

Notes: Stratified by wife's birth cohort.
Transition from wife's birth to first parity, and between subsequent childbirths.
Exponentiated coefficients (hazard ratios). 95% confidence intervals in brackets.
+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001.

The results indicate that, controlled for age at marriage, the hazard of a first childbirth (column 1) is higher for both wife-older and husband-older couples compared to same-age couples. Given a particular age at marriage, women who were at least two years older or younger than their husband had their first child at a lower age compared to women in age-homogamous couples. In other words, age-homogamous couples were more likely to delay the birth of the first child. As expected, age at marriage itself is positively associated with age at first birth, meaning that women who married later were having their first child at a higher age. Few social class differences are apparent, except for an increased likelihood of first childbirth for couples where the husband had a medium- or lower-skilled occupation compared to the reference group of foremen and higher occupations. The hazard ratio for the birth of the first child was higher in the economically and industrially more developed region of Sundsvall than in rural Skellefteå.

Looking at the parity transition rates from first to second birth (column 2), second to third birth (column 3), etc., it can be observed that the likelihood of a subsequent birth is higher in wife-older marriages and lower in husband-older marriages compared to age-homogamous marriages. This finding is robust to other specifications of age difference (e.g., 0–5 years as reference). The results are significant for all parity transitions, except for the transition from first to second birth in the case of wife-older marriages (column 2). The age of the wife at previous birth is included as a control variable for fecundity and, as expected, this variable is negatively associated with the hazard of parity transition. The loss of a previous child significantly increases the likelihood of a subsequent birth, regardless of whether the previous child passed away within eight months of birth or later. Multiple births are adjusted for in the sense that these women 'skip' a parity: If the first birth is a twin birth the next birth is registered as the third parity. Women whose first birth was twins had a significantly higher hazard of parity transition, but this result should be seen in light of the fact that they had been

pregnant only once before the birth of the third child. By contrast, the occurrence of multiple births significantly reduced the likelihood of transitioning to the fourth parity, either because raising multiple young children required considerable energy from the parents, causing the delay of the next birth, or because the parents stopped having children altogether. For higher order parities the occurrence of multiple births has no significant effect. Similar to the transition to first birth, there are only small differences between social groups regarding parity transition. Farmers and medium- or lower-skilled workers seem to have had higher hazards of parity transition for some birth intervals compared to couples where the husband was a foreman or higher, but with no clear pattern. Comparing regions, the birth interval was longer for women living in Sundsvall than in Skellefteå.

Table 4 provides the results of two Poisson regression models for the association between spousal age difference and the total number of childbirths for all women observed from age 18 until age 45. Both model 1 and 2 include control variables for socioeconomic status, regional differences, and cohort effects. In the second model the wife's age at marriage is included as an additional control variable. As in Table 3, a regression coefficient greater than 1 denotes a positive association between the number of children born and the independent variable, while a coefficient smaller than 1 indicates a negative association.

Without controlling for the wife's age at marriage, the first model in Table 4 shows that women in wife-older marriages had fewer children ever born compared to women in age-homogamous marriages, while husband-older couples had more children. These associations are in line with Table 1, which shows that on average women in wife-older marriages had 4.9 children compared to 6.1 children in husband-older marriages and 6.0 children in age-homogamous marriages. However, after controlling for the woman's age at marriage (model 2), age differences between spouses show another association with the number of children born. After controlling for the age of women at marriage, women who were married to a younger husband were likely to have as many children as women in age-homogamous marriages. By contrast, women who were married to an older husband were likely to have slightly fewer children over their life course compared to age-homogamous couples. As expected, the age of the woman at marriage itself is inversely associated with complete family size.

Table 4: Effect of spousal age difference on children ever born (Poisson model)

	(1)	(2)
Age difference (ref: same age)		
Wife older	0.822***	1.000
	[0.79,0.85]	[0.97,1.04]
Husband older	1.039**	0.926***
	[1.01,1.06]	[0.90,0.95]
Wife's age at marriage		0.950***
		[0.95,0.95]
Husband's SES (ref: foremen to higher)		
Farmer	1.169***	1.105***
	[1.12,1.22]	[1.06,1.15]
Medium- and lower-skilled	1.136***	1.094***
	[1.09,1.19]	[1.05,1.14]
Lower-manual and unskilled farm worker	1.149***	1.068*
	[1.08,1.23]	[1.00,1.14]
Region (ref: Skelleftea)		
Sundsvall	0.747***	0.723***
	[0.73,0.77]	[0.70,0.74]
Wife's birth cohort (ref: 1840–1849)		
1850–1859	1.006	0.98
	[0.98,1.03]	[0.95,1.01]
1860–1869	0.968*	0.935***
	[0.94,1.00]	[0.91,0.97]
1870–1879	0.946**	0.924***
	[0.91,0.98]	[0.89,0.96]
1880–1889	0.920***	0.905***
	[0.89,0.95]	[0.87,0.94]
Observations	6,235	6,235
Chi^2	771.6	1946.7
Log likelihood	–15918.7	–15331.2

Notes: Poisson regression of children ever born to women followed age 18 to 45.
Exponentiated coefficients; 95% confidence intervals in brackets.
+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001.

Looking at the effects of the other independent variables, the number of children born is negatively associated with husbands belonging to the foremen or higher class. Farmers and medium- or lower-skilled workers were likely to have more children, suggesting a connection with the significant positive hazard of parity transition for these socioeconomic groups, as observed in Table 3. Furthermore, according to Table 3, women in Sundsvall had a higher hazard of first birth compared to women in Skellefteå, but birth intervals were longer in Sundsvall. The net effect observed in Tables 2 and 4 is that women in Sundsvall were likely to have fewer children overall. Finally, although cohort effects are not central to this study, women born in later cohorts had fewer children.

The results from Table 4 show that after controlling for the age of the wife at marriage, the effects of spousal age gap on the total number of children born are fairly small, with a coefficient of 0.926 for husband-older marriages. In order to further illustrate the limited impact of spousal age difference on the number of children ever born, the total number of childbirths is set graphically against the age of the wife at marriage (Figure 2). It is clear from this figure that women who married at a higher age had fewer children than those who married young. However, as Figure 2 shows, it is hard to identify stark differences between age-heterogeneous and age-homogamous couples in the total number of children ever born.

Figure 2: Average number of children ever born in Sundsvall and Skellefteå (Sweden), 1840–1890, by spousal age difference and age at marriage

Source: DDB (CEDAR). POPLINK and POPUM version 4.4.2.
Note: Number of children ever born calculated for women followed age 18–45 (N = 6,235).

7. Discussion

What do these findings say about the relationship between spousal age difference and reproductive outcomes? First, it is important to recognize the difference between absolute effects of the age of the wife and relative effects of the spousal age gap. In all

findings, the absolute age of the woman at marriage or previous birth is an important factor influencing the fertility outcomes of the couple, as a higher absolute age reduces the likelihood of transitioning to next childbirth. Table 1 shows that, on average, women in wife-older marriages have a higher age at first marriage than women in husband-older marriages. Women in wife-older marriages also have fewer children and on average start having children at the relatively late age of around 30 years compared to women in husband-older marriages, who on average have their first child at the age of 24. Given that, on average, women in wife-older marriages start later but stop at more or less the same age (see Figure 1), they also have a shorter 'window' to have children before reaching menopause.[10] Table 3 confirms that birth intervals are shorter for women in wife-older marriages compared to same-age or husband-older marriages after controlling for the woman's age. These findings show that a higher absolute age of women at marriage or previous childbirth reduces the hazard of first and subsequent births, and reduces the total number of children ever born.

Since all analyses include the age of the wife as a control variable, it is possible and perhaps more interesting to consider the relative effects of spousal age difference on fertility outcomes, working not through fecundity but through differences in conjugal power. The results support Hypothesis 2a, showing that after controlling for the age of the woman, women in wife-older marriages have shorter birth intervals. This finding is similar to that observed by Feng et al. (2010) for southern Sweden. Furthermore, in husband-older marriages birth intervals are longer for higher parities and fewer children are born over the life course of each woman. These findings suggest that greater female autonomy, expressed by the spousal age gap, significantly affects fertility outcomes. After controlling for their age, women in wife-older marriages are able to shorten their birth intervals compared to women of similar age in age-homogamous or husband-older marriages. Hypothesis 1 does not find support in our analysis, as age-homogamous couples do not stand out as early starters with short birth intervals and a relatively large number of children ever born.

Some of the results presented above warrant further attention. The likelihood of first childbirth is higher not only for wife-older marriages but also for husband-older marriages. This shows that within husband-older marriages there is a 'catch-up' effect as the older husband is likely to encourage the birth of a first child. Furthermore, while women in husband-older marriages have slightly fewer children ever born, women in wife-older marriages do not have significantly more children than age-homogamous couples. The lower number of childbirths observed for women in husband-older marriages may suggest that either the fecundity of men decreases as they become older, thereby reducing their biological ability to have children, or that reduced marital

[10] The age at last birth for all types of marriage ranges between 36.6 and 39 years (see Figure 1).

satisfaction in husband-older marriages reduces fertility outcomes (Casterline, Williams, and McDonald 1986).

Our analysis of the association between spousal age difference and fertility outcomes considers four aspects. The first question is whether age difference says anything about the nature of the relationship, female autonomy, or the degree of equality between spouses. As discussed above, observations in the empirical literature on the relationship between female autonomy and age difference show mixed results (c.f. Abadian 1996; Barbieri, Hertrich, and Madeleine 2005). The results of this study show that women in wife-older marriages are indeed able to use their conjugal power to reduce the time interval between births. Second, it is not clear from the literature whether women with a younger husband use their autonomy to demand more or fewer children (Feng et al. 2010) or whether fertility preferences between spouses are similar. The analysis conducted here suggests that women with a younger husband do strive to increase fertility by closely spacing births, while women in husband-older marriages have relatively long birth intervals. Third, if women appear to strive to increase fertility when they are older than their husband, why would men not strive to increase fertility when they are older than their wife? Given that for men the fitness benefits of reproduction are larger than the biological costs, it seems likely that men have an incentive to increase fertility if they are in a position to do so (Borgerhoff Mulder 2000, 2007; Hamilton 1964a, 1964b). The findings in this study show that the transition time to first birth in husband-older marriages is indeed shorter than that in age-homogamous couples (indicating a catch-up effect for the first childbirth). However, for higher order births we find a longer parity transition time and the total number of children ever born is lower after controlling for age at marriage. Fourth and last, the absolute age of both spouses plays a crucial role in determining their fertility outcomes through its effects on fecundity (Matthijs 2002). It is clear that the effects of spousal age difference must be seen in relation to the age at which the spouses entered marriage. Women who are older than their husband usually entered their marriage at a relatively late age compared to their age-homogamous or husband-older counterparts. As a result, women in wife-older couples have children at a later age and have fewer years left before reaching menopause. These characteristics have positive effects on the hazard of first and higher order births, resulting in closely spaced births. The net effect is that when age at marriage is taken into account, women in wife-older couples do not produce significantly more children than age-homogamous couples.

8. Conclusion

This study uses historical parish registration data from central and northern Sweden on women born between 1840 and 1889 to examine the associations between conjugal power and various measures of reproductive outcomes. Spousal age gap is used as an indicator of conjugal power (Skinner 1993). The results show that after controlling for age at marriage, women in wife-older marriages, having greater conjugal power, display shorter birth intervals compared to women in age-homogamous marriages. Women in husband-older marriages transition to first birth more quickly than women in age-homogamous marriages, indicating a catch-up effect. By contrast, the likelihood of transitioning to second or higher-order parity is lower in husband-older marriages, suggesting that the lower female bargaining power in such marriages is associated with lower fertility outcomes. The overall effect on the number of children ever born is highly dependent on the absolute age of the woman at marriage. Nevertheless, when the absolute age is controlled for, the results show that women in husband-older marriages had slightly fewer children overall.

The main contribution of this study is that it suggests that when examining fertility outcomes, conjugal power can be approximated using the spousal age gap. However, this study also highlights that the effects of the absolute age of the wife have to be carefully accounted for. Women in wife-older marriages display a preference for shorter birth intervals and a faster transition to first birth. This suggests that while women face considerable costs of reproduction, having children yields a positive inclusive fitness benefit (Conde-Agudelo et al. 2006, 2007; Hamilton 1964a, 1964b; Hrdy 2009; Mace 2014). Vice versa, although the biological costs of having children are lower for men, they do not employ their greater bargaining power within marriage in order to shorten the transition time between births, with the exception of the transition to first birth. By contrast, after the first parity the birth interval is longer in husband-older marriages and the total number of children ever born is slightly lower.

Further research is needed in order to more closely examine the association between female autonomy and reproductive outcomes. Owing to the nature of the available historical data, it is difficult to examine other operationalizations of female autonomy. Other studies show that more-autonomous women are able to delay subsequent births, and thus played an important part in the fertility decline (e.g., Bras and Schumacher 2019). Also, there is no evidence of an increase in age homogamy for the sample used in this study (c.f. Van de Putte et al. 2009). If we were able to extend the time period of our study it would be interesting to see whether our findings remain robust after the population completed the fertility transition. In actuality, fertility outcomes were determined by the specific historical, social, and economic context in which the household was situated. Men and women in 19th century Sweden had

relatively equal rights within marriage. Especially for the farming community, which dominates the sample in this study, the marriage pattern was likely to show conservative elements, with instrumental marriages being the norm rather than modern companionate marriages. Parents influenced the choice of partner in order, for example, to reduce uncertainty surrounding the continuing existence of the family farm. While spousal age difference is connected to fertility outcomes, future research – lying beyond the scope of this paper – on the interaction between age difference and regional social norms concerning marriage and kinship may further illuminate the connection between the nature of the relationship between spouses and reproductive outcomes.

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