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Differences between male and female fertility in Russia - an evaluation of basic pattern and data quality using the first wave of the Russian GGS

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An evaluation of basic pattern and data quality using the first wave of the Russian GGS

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Abstract

While most demographic fertility studies focus on child birth behavior of females, little is known about differences between males and females fertility behavior. The lack of empirical research about men stems from problems such as linking fathers and their biological offspring, biological differences in male reproductive behavior as compared to women, missing data and concerns about the quality of existing data sources. Using the data from the Russian Generation and Gender Survey (2004) of the cohorts 1924 to 1970, this study provides insights into sex-specific fertility differences, by comparing fertility age, timing and parity patterns of Russian men and women. Aggregate measures as well as event history techniques are used to analyze the hypotheses that men have a longer reproductive life span, that they start their fertility career later than women and that males vary more in their number of biological children born than do females. Furthermore, we evaluate how reliable Russian male fertility reports are compared to women’s. The results show that in spite of a typical age difference at the transition to parenthood of approximately two years, males and females have much more common fertility patterns than is suggested by previous studies. Moreover, it is shown that men’s fertility reports are not necessarily biased. These findings suggest that comprehensive future research of Russian men's fertility pattern is possible.

1. Introduction

Long-term fertility research in demography has mainly focused on fertility dynamics and behavior of women. An important reason for this focus was the direct link between women and their children. When family and parenthood were lifelong stable institutions, the analyses of female fertility patterns alluded to an almost complete picture of fertility dynamics. However, today's family and parenthood are more dynamic and multifarious. During the last decades, patterns like stepfamilies, social parenthood, and patchwork families have gained more importance in modern societies. Recent research has shown that the inclusion of men and/or fathers leads to better understanding of fertility and family dynamics (Goldscheider and Kaufman 1996; Greene and Biddlecom 2000).

Demographic studies assume that male fertility behavior is different from its female counterpart in many ways: Men presumably have a longer reproductive life span, men tend to start their fertility career later than do women, the variety of the number of biological children born to men is assumingly larger compared to that of women and men tend to underreport their fertility outcomes. These aspects are rather neglected in empirical demographic research and are often considered obstacles to incorporating men in fertility and family demography. By using the case of Russia, I will investigate the differences between male and female fertility patterns in terms of age, timing, parity and childlessness. This analysis is driven by two goals: Firstly, to compare the fertility age, timing and parity pattern of men and women and secondly, to check the reliability of Russian male fertility reports compared to women's. Thereby, it will be shown that the sex specific differences of fertility outcomes, fertility pattern and fertility reporting behavior, as assumed in demographic literature, contain only minor empirical evidence.

Men's and women's fertility patterns will be examined using data from the Russian Generation and Gender Survey (GGS) of 2004. Even if Russia is a very specific example with various country-specific demographic developments, the collected data offer an excellent possibility for sex-specific comparisons and can be used as a starting point for future fertility research on Russia with data from the GGS. The separate collection of male and female fertility histories allows a detailed analysis of age patterns, parity distributions and birth transitions of men and women. Thereby, female fertility patterns will be used as a benchmark, since they are assumed to be unbiased.

In the following, the term Russia refers to the territory of the Russian Federation. The term Russians (Russian men or women) is used for inhabitants of this area. If Russians as an ethnic group are specified, the term "ethnic Russians" will be used.

The country-specific context of Russia since the 1990s was and is shaped by dramatic changes in political, social and economic conditions. Their impact on fertility is not discussed in this study, since the aim is merely descriptive.

2. Problems and concerns when incorporating men into demographic fertility research

Since the interest among demographers and sociologists in men, their reproductive life cycle and fertility behavior is growing, barriers to incorporate males in fertility and family research are discussed. The discussion is based on the fact that it is more difficult to establish a direct link between a biological child and his father, compared to females and their offspring. This issue is often treated as a main obstacle to conducting reliable analyses and data about male fertility. In the following, social arguments and methodological issues of this debate are briefly discussed.

Social arguments: An important argument for relying on female fertility data only was the fact that marriage and the family were lifelong stable institutions in the industrialized world during a major part of the 20th century. In this "golden age of marriage," births out of wedlock, stepfamily pattern or single parenthood were minor phenomena (van de Kaa 1987). If fertility almost exclusively happens in stable and long-lasting marital unions, it is sufficient to collect fertility information from women only. Some authors have even suggested that married women can report on their husbands' attitudes towards fertility and fertility-related activities (Bachrach et al. 1992; Goldscheider and Kaufman 1996; Sorensen 1998). Thus, demographic research in general has regarded men as somehow uninvolved in fertility, other than being economically important and impregnating women (Watkins 1993; Greene and Biddlecom 2000).

During the last decades, fertility patterns have been changing in the majority of modern societies. A rapid fall in overall fertility and rising ages at childbirth were accompanied by the weakening of the link between marriage and childbearing.

Increased divorce rates and the spread of cohabitation, single-parenthood and stepfamilies show that life-long stable marital unions have lost their dominance. By excluding men from fertility analyses, their importance in fertility decisions (not only within a stable partnership) is largely ignored. Therefore, given that men and women no longer experience a similar fertility and family life cycle (Greene and Biddlecom 2000), it is necessary to analyze men's fertility behavior and their outcomes in order to get a complete picture of fertility and it's determinants.

Methodological concerns: Numerous methodological problems are mentioned in demographic literature when examining male fertility patterns. The five main issues are: 1. A mother and her children are much easier to link. Their probability to forget some or to be unaware of their own biological children is small compared to men (Toulemon 2001). 2. The length of a female's reproductive time span is well-defined, while a male's is vague (Shryock and Siegel 1976). The same applies to the age when their fertile phase is finished. 3. A man is able to impregnate more than one woman at factual the same time. Thus, checking the quality and reliability of male fertility data is more complicated in comparison to a female's. 4. Women are easier to interview because they are more often at home (Goldscheider and Kaufman 1996).[1] 5. Men tend to underreport the number of their biological children, either intentionally or due to a lack of information (Duberstein Lindberg et al. 1998a).

Various studies have found serious problems when analyzing male fertility behavior due to the previously stated problems (Bledsoe, Lerner, and Guyer 2000; Cherlin and Griffith 1998; Coleman 2000; Goldscheider and Kaufman 1996; Rendall et al. 1999). However, other studies conclude that it is possible to obtain correct fertility data from men (Duberstein Lindberg et al. 1998b; Mott and Gryn 2001).

In the following, hypotheses concerning sex-specific fertility characteristics will be described and the mentioned problems will be discussed in detail. This is followed by a short description of the dataset, variables and methods used. The empirical analyses will be presented subsequently. Firstly, I show descriptive aggregated fertility measures for both sexes. The second part will contain event history analysis of the transition to the first, second and third birth. All transitions will be modeled separately for both sexes. Finally, the paper concludes with a discussion of the results and the stated hypothesis.

[1] Despite changes in labor force participation of mothers throughout the industrialized countries, this still has evidence.

3. Hypotheses: Men becoming fathers – women becoming mothers. What is the difference?

Analyses of the sex-specific differences in fertility behavior are even rarer than research on male fertility or fatherhood. I refer to the discussion of four sex-specific differences:

1. The length of a fertile time span;
2. Age and timing pattern of fertility;
3. Completed fertility and parity distributions (childlessness vs. multiple parenthood) and
4. Underreporting behavior.

1. The first issue of interest is the length of the male's reproductive life span. Whereas women usually enter puberty between the ages between 12 and 14 and finish their fertile phase in the ages between 40 and 50, the time frame for men is less clearly defined. They usually reach puberty two years later, but their procreative capacity is not really limited. Even if there is evidence that male fertility is declining with age, it can last a lifetime (Bledsoe, Lerner, and Guyer 2000; Coleman 2000).

In medical and biological studies, this issue is well-examined and discussed. In demographic publications, however, it is more often assumed than proved empirically (Bachrach and Sonenstein 1998; Driscoll et al. 1998; Hogan and Goldscheider 2000; Greene and Biddlecom 2000; Shryock and Siegel 1976). Exceptions are the studies of Brouard (1977), Ravanera and Rajulton (2003) and Paget and Timaeus (1994). The authors agree that men have a significantly longer fertility life span than do women.

What kind of implications does this issue have for demographic research concerning male fertility behavior? To estimate male completed fertility or men's final number of children, it would require data from men at older ages compared to women (Coleman 2000). Furthermore, if a man wants to reproduce after age 50, he needs a younger woman (most likely under age 45) to fulfill his desire. Consequently, the longer reproductive life span of males could lead to more dynamic marriage/union formation and dissolution pattern and an elevated age differences in couples (Cherlin and Griffith 1998).

My first hypothesis is that men may have a longer procreative phase compared to their female counterparts (*"fertile time span" hypothesis*). Thus, older age groups (older than age 45) have to be taken into account to estimate males with a completed number of biological children, the final share of childless men and the males' age at childbearing.

2. Men start their family and fertility career two to three years later than women. The gap applies to the males' start into fatherhood. as well as to their marriage and partnership formation (Coleman 2000; Hogan and Goldscheider 2000). It is assumed that this pattern could partially be addressed to biological differences between both sexes, which is similar to the previously discussed arguments, for example the later start into puberty etc. (Coleman 2000). Furthermore, partner market theories stress two main mechanisms. First, a relatively stable birth or marriage age generates a standard age gap between men and women, due to age specific sex ratios among people without a partner and/or childless individuals (Klein 1995). Secondly, a constant age gap over different cultures and time implies a "historical perpetuation". Independent of the initial reasons (economic constraints, values, norms, traditions and institutions) of the age difference, it is repeated through following generations because of pre-defined demographic conditions and opportunity structures (Klein 1995). Nevertheless, the age gap changes if the demographic composition of a population is altered (e.g. by wars, birth booms, birth drops).

The evaluation of this hypothesis appears trivial. Nevertheless, it has important methodological and theoretical implications. Men and women of the same age are not equally fertile (especially not during their teenage years). Males and females do not have the same age-specific probability of finding a partner or becoming parents. Changing fertility-relevant societal conditions (e.g. social policies etc.) would affect men and women at different ages. Hence, when comparing cohort-specific fertility measures, the common age difference should be taken into account. Males should be related to two or three year younger females and vice versa.

My second hypothesis is that the sex-specific age difference between Russian men and women at the birth of their first biological child is around two years. Men are assumed to be two years older than their female counterparts (*"age gap" hypothesis*). This pattern has already been shown for Russian marriage behavior. The age difference is expected to have been relatively stable over time, with exceptions being in the 1940s, 1950s and the birth cohorts of the 1920s, and 1930s, due to the Second World War (Scherbov and Van Vianen 2001, 2004).

3. Men have a greater diversity in their number of biological children born compared to women. In other words, some men have a relatively large progeny size, whereas others have only few children or remain childless (Andersson 2000; Bledsoe, Lerner, and Guyer 2000; Coleman 2000; Toulemon 2001). Previous studies argue that this is valid, even if most modern societies have imposed a normative monogamy on themselves, thus minimizing the variance in reproduction and progeny size distribution which is observed in polygamous societies (Coleman 2000).

Why may such a polarization occur? Modern societies have imposed different kinds of cultural and social norms on the mating system, mainly behavioral principles, laws and legislation which forbid polygamous partnerships. Therefore, a polarization pattern between childless men and fathers of many children should no longer be strong in these societies. However, previous studies in demography and sociology have found that men with a high education, income and social status have more children (Bernhardt and Goldscheider 2001; Callister 1999), but only in one union or within serial monogamy. In other words, men who are able to fulfill the role as a "breadwinner" for a family are more attractive marriage partners and fathers (Kalmijn and Luijkx 2005). Nevertheless, among certain ethnic or religious groups, special marriage regulations (e.g. payment of bride money) could lead to a higher proportion of childless and/or unmarried men, due to missing possibilities to accumulate enough resources (e.g. money).

My third hypothesis therefore is that a polarization of progeny size among Russian men should be observable. A larger number of men (compared to women) will stay childless, whereas some males reproduce more often compared to their female counterparts (*"polarization" hypothesis*).

4. Misreporting and underreporting of male fertility is probably the most important topic when examining male fertility behavior. Most of the studies about male fertility stress that men underreport their fertility, even if they are interviewed directly (Goldscheider and Kaufman 1996; Mott and Gryn 2001; Rendall et al. 1999; Toulemon 2001). The percentage of males underreporting compared to female fertility reports ranges between 3 and 20 percent (Duberstein Lindberg et al. 1998a). The reported numbers of biological children could be biased due to intentionally or unintentionally misreporting. Whereas unintentionally misreporting is founded in the fact that especially young fathers are sometimes not informed about their fatherhood and some men tend to forget children in some cases, intentionally misreporting is caused by pressure through social norms, the partner or legislation (Duberstein Lindberg et al. 1998a).

Especially the factors which influence unintentionally misreporting behavior are uncertain. According to previous studies, commonality of a child's and father's residence over the life course, education of the father, marital status and family size influence misreporting behavior in general (Cherlin and Griffith 1998; Duberstein Lindberg et al. 1998a; Mott and Gryn 2001). The higher number of sexual partners over men's life courses adds to the complexness of this problem (Coleman 2000; Bledsoe, Lerner, and Guyer 2000). Also the set-up of the questionnaires in surveys influences the quality of the estimates. Duberstein et al. (1998) argue that the reliability of male fertility reports could be improved by asking on a partner-specific basis, on the basis of sexual behavior and by an explicit data collection related to non-residential children. Unintentional misreporting especially should occur less often with such a set-up. By asking the respondent separated from the partner and by decoupling questions about payment of child support and questions about non-residential children, one can reduce intentional misreports (e.g. due to fear of punishment and social pressure) as well.

My fourth hypothesis is that only minor differences between female and male fertility reports occur if the structure of the questionnaire (which will be discussed in the following) accounts for these issues (*"no underreporting" hypothesis)*. However, to estimate the completeness of a male's fertility, two key assumptions are necessary: 1. The total number of births of men and women from the same population should be equal, when averaged over a suitable time interval and over the same birth cohorts, if the sex ratio is not completely unbalanced. 2. Women's fertility reports are correct and complete (Rendall et al. 1999).

4. Data and Methods

Data of the recently collected Russian Generation and Gender Survey (GGS) are used in the empirical analyses. The interviews were conducted between June and August 2004 with a stratified sample technique. The data were collected on the basis of the 10 geographical regions of the Russian Federation, plus St. Petersburg, central Moscow and the suburbs of Moscow, and on the basis of modified "Raions" (counties). In the end, the whole dataset contained 11,205 valid cases for the empirical analyses in this study. Men and women were asked separately. The majority of respondents were females, turning out in 7,007 (62.5 percent) valid cases. The number of male valid cases was 4,198 (37.5 percent) (Independent Institute for Social Policy 2004). Even if the distribution of men and women is not balanced, their age distribution etc. is representative for all of Russia. The respondents were drawn from the birth cohorts 1923 to 1988. Correspondingly, the age distribution varies between 16 and 82. Unfortunately, the response rate in the most urbanized regions (Moscow and St. Petersburg) of Russia was very low. In both cities, it did not exceed 15 percent. In all other regions, 57.2 percent of the drawn sample responded to the questionnaire (Independent Institute for Social Policy 2004). The multivariate models will be controlled for this bias by including a regional variable. Furthermore, analytical weights will be used in all analyses.

The collection of fertility and partnership histories was one of the most important issues of the GGS program. Therefore, two kinds of fertility tables were conducted: 1) children in the household and 2) children currently not in the household. All children were distinguished in respect to their relation to the respondent (biological, fostered, adopted etc.). The setup of the partnership table allows for crosschecking of common biological children with every mentioned partner. Questions about child support and allowances were asked in a separate part of the questionnaire. The setup of the questionnaire fulfills most of the criteria for the collection of reliable male fertility data (Duberstein et al. 1998).

In the first part of the empirical analyses, I examine my hypotheses by using fertility aggregated statistics. Period and cohort measures are presented. Some of them are taken from official statistics (e.g. Council of Europe). Since most of the official statistics do not contain fertility information concerning males, self-estimated aggregate statistics will be presented, too.

In the next step, hazard regression models are displayed to crosscheck age and parity-specific fertility patterns. First, survival curves will be presented. In the last part, the corresponding piece-wise constant baseline intensities, interacted with sex and controlled for region of residence, are shown. The parity specific models can be written as:

$$\mu(t)_i = a_{iW}(t) * a_{iM}(t) * c_i$$

where $\mu(t)_i$ is equivalent to the intensity of first (i = 1), second (i = 2) or third (i = 3) birth, which is affected by time factor $a_{iW}(t)$ or $a_{iM}(t)$ (W = women; M = men; t = duration in months since age 12 or previous birth; for occurrences and exposure table, see Appendix: Table 5) which is interacted with sex of the respondent. Region of residence (c_i) is introduced as a time constant covariate.

5. Empirical Analyses

5.1. Sex differences in aggregated measures

In Figure 1, the Total Fertility Rate as provided by the official statistics (Demographic Yearbook 2004) as well as an estimated female and male TFR, based on the data of the Russian GGS, are presented. The measures were conducted by calculating the age-specific number of births and number of respondents for five-year period intervals.

After a considerable decrease by 1967, the TFR shows a very stable pattern around two children per woman for approximately 20 years, followed by a short increase in the 1980s (1987: 2.23) and a tremendous drop at the beginning of the 1990s, which hit its bottom in 1999 (1.17) . The estimated measures with GGS data closely follow these trends up to the middle of the 1980s, but on a lower level. They further show considerable differences between the sexes during this time. The differences increase at the end of the 1980s. Whereas the estimated male TFR follows the general trend, the female estimates are much higher. I argue that it could be due to an overrepresentation of highly fertile young women in the sample. As a previous survey study by Kreyenfeld (2002) for Germany showed, they are more often at home and consequently easier to reach by the interviewers.

However, even if the trends in the presented measures are similar, using the TFR only is an incomplete proof of sex differences and the reliability of the data, since it is very sensible to timing effects and is not showing cohort specific patterns.

The cohort specific analyses will focus on the birth cohorts up to 1970.[2] Figure 2 presents the Completed Fertility Rate (CFR) taken from the Demographic Yearbook (2004) and from estimations of Scherbov and Van Vianen (Scherbov and Van Vianen 2001). Furthermore, the average number of biological children of Russian men and

[2] It is assumed that the majority of respondents from these cohorts already had their final number of children by the date of the interview (see Figure 8 and Figure 9)

women was estimated by using the GGS (for detailed description of the distribution of respondents by birth cohorts and parity, see Appendix: Table 2 and Table 3).

The corresponding graphs in Figure 2 display moving averages (2nd order). Since the cohorts in the middle of the 1930s up to the beginning of the 1960s the estimated male and female CFR followed each other on a similar level (1.7 to 1.9 children per person), with exception of the individuals born around 1945. In the older cohorts before 1935, men (e.g. 1939: 2.1 children) reported considerably more biological children, compared to women (e.g. 1929: 1.8 children). I argue that this could be explained by a retrospective selection bias due to WWII and the Civil War (Scherbov and Van Vianen 2004). Many men from the cohorts of the 1920s and the beginning of the 1930s died in the war. Women were not similarly affected. The war led to a highly differential sex-specific mortality pattern and to imbalanced sex ratios on the partner market, as previous studies on Russian marriage behavior had shown. The sex difference around the cohorts of 1945 can be explained by another effect of WWII. Large female birth cohorts around 1940 were confronted with fewer number of males between 1943 and 1945.? Both situations lead to a very low proportion of men who never married and to a higher proportion of unmarried women. Since parenthood during this time was directly connected to marriage, only very few men stayed childless. (Scherbov and Van Vianen 2001; Scherbov and Van Vianen 2004; Avdeev and Monnier 1999).

Dating from the cohort of 1945, the fertility reports of the Russian GGS are a good approximation of the official measures. They stabilized on a level around 1.8 children up to the 1960 cohort and slightly decreased afterwards (1970: 1.6 children; censoring may be part of the explanation). This applies more to women than to men. Men's final number of children is always a bit lower compared to their female counterparts. This might indicate males underreporting.

Figure 3 shows the sex differences in detail. Given that men are on average two years older than women when they become fathers for the first time, female birth cohort groups are related to males two years older (e.g. females from cohorts: 1941 to 1945 to males from cohorts: 1939 to 1943). To account for random variation between single-year birth cohorts, the respondents were grouped in five-year cohort intervals (for distribution of respondents, see Appendix: Table 4). The sex difference is smaller than in Figure 2 and less variation occurs in the graphs. However, the patterns are similar.

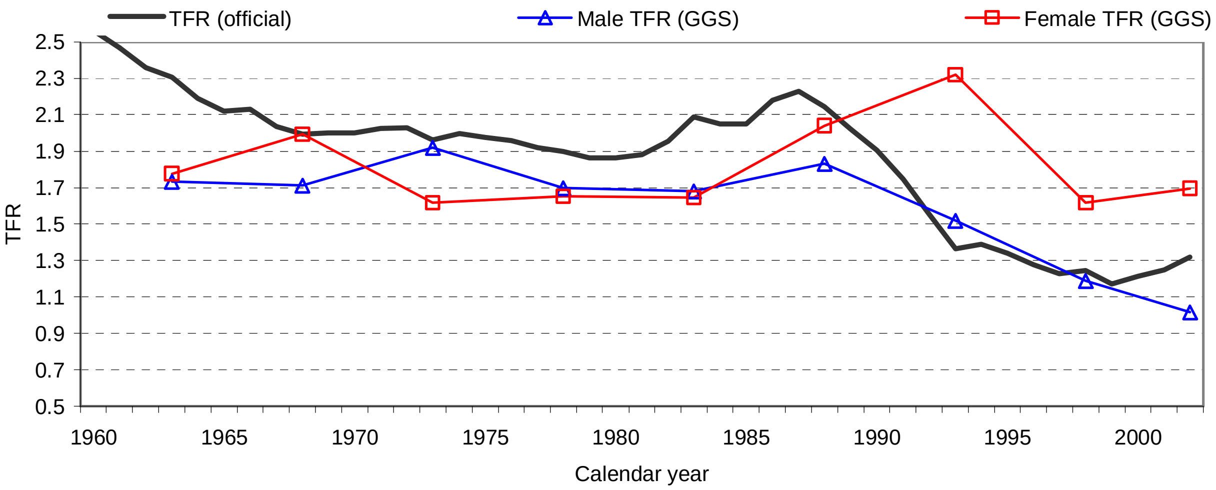


Figure 1: Total Fertility Rate – TFR **-** (1960 to 2004)
Sources: COE – Demographic Yearbook (2004), Russian GGS (2004) – own estimations

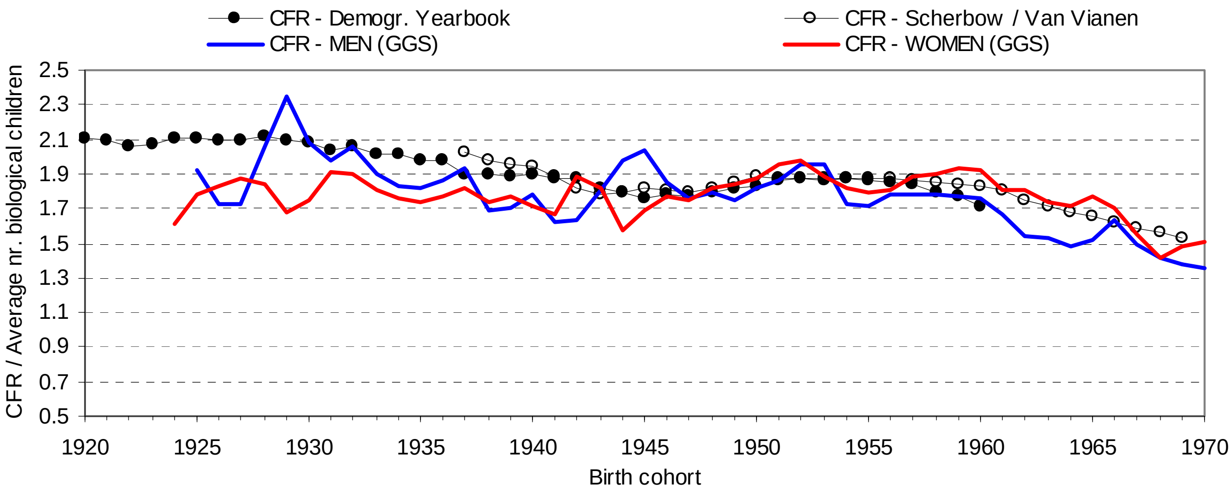


Figure 2: Completed Fertility Rate (cohorts: 1920 to 1969) and average number of biological children (2[nd] order moving average over cohorts: 1925 to 1975)
Sources: Demographic Yearbook (2004); Scherbov and Van Vianen (2001); Russian GGS (2004) – own estimations

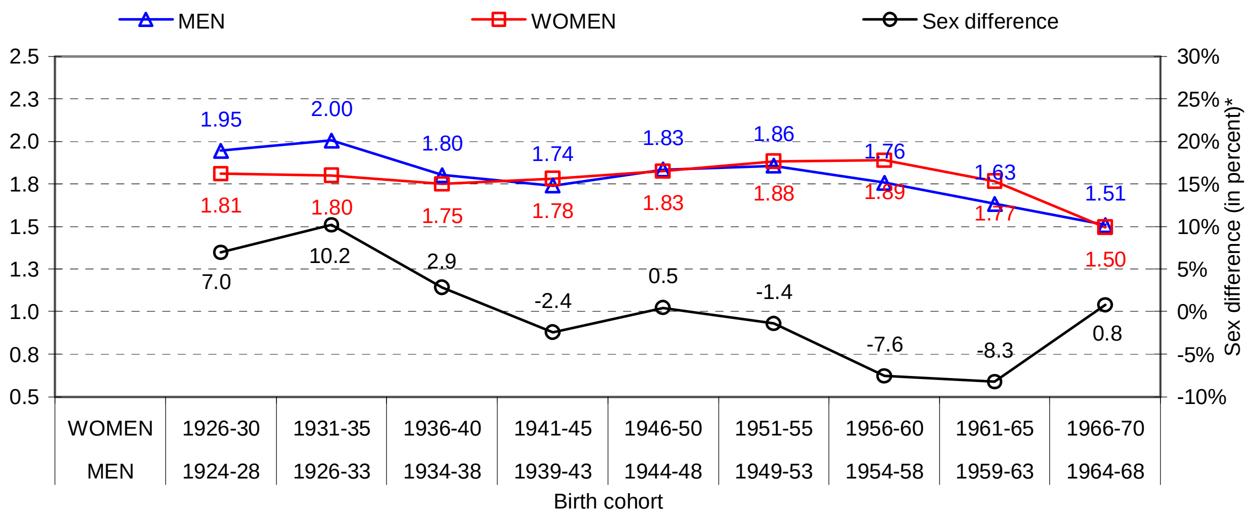


Figure 3: Sex differences in average number of biological children
Source: Russian GGS (2004) – own estimations;
NOTE: * positive values = men reporting more biological children than women
negative values = women reporting more biological children than men

Whereas men in the oldest cohorts report more biological children than their female counterparts, this pattern changes following the cohorts of the 1940s. I argue the cohorts between 1924 and 1935 are biased by WWII. After excluding these cohort groups (males: 1924 to 1933, females: 1926 to 1935) and averaging the sex differences over the cohorts from 1936 to 1970 (females) and from 1934 to 1968 (males), the average difference is 2.3 percent. This means that men report 2.3 percent fewer children than their female counterparts.

To sum up, according to the presented aggregate statistics, Russian men report fewer biological children than do women. The sex differences in the number of biological children are considerably smaller than studies from Toulemon (2001) or Rendall (1999) would suggest.

Figure 4 displays the percentage of childless men and women by five-year birth cohort groups and the sex differences for the birth cohorts up to 1970 (for women) and 1968 (for men). Again, female cohorts are compared with male cohorts two years older. Childlessness is generally uncommon among Russians and up until the birth cohorts of 1970, it remained at a level around 10 percent. This applies to both men and women, with only minor differences. The results presented in Figure 4 show that sex-specific differences are most pronounced among respondents from the birth cohorts after 1960. However, by averaging sex-specific childlessness over the female birth cohorts between 1936 and 1970, correspondingly men of the cohorts from 1934 to 1968 (not biased by WWII), the overall difference is 2.6 percent. The stable level of reported childlessness and the small sex differences support the assumption that the Russian GGS provides estimates of good quality for male fertility compared to previously discussed studies and used samples (Toulemon 2001; Rendall 1999).

Furthermore, parity-specific distributions of Russian men and women for different birth cohorts are estimated (Figure 5 and Figure 6) to examine whether a higher proportion of men are fathering a large number of biological children. In spite of differences in the two youngest cohort groups (again, biased by the WWII), the distribution over the births cohorts of childless men and women on the one side and fathers and mothers with more than three children on the other side is very similar. The two-child family dominates Russian society in all birth cohorts and the number of individuals with more than three biological children is constantly declining from the oldest to the youngest cohorts, whereas the proportion of one-child families is

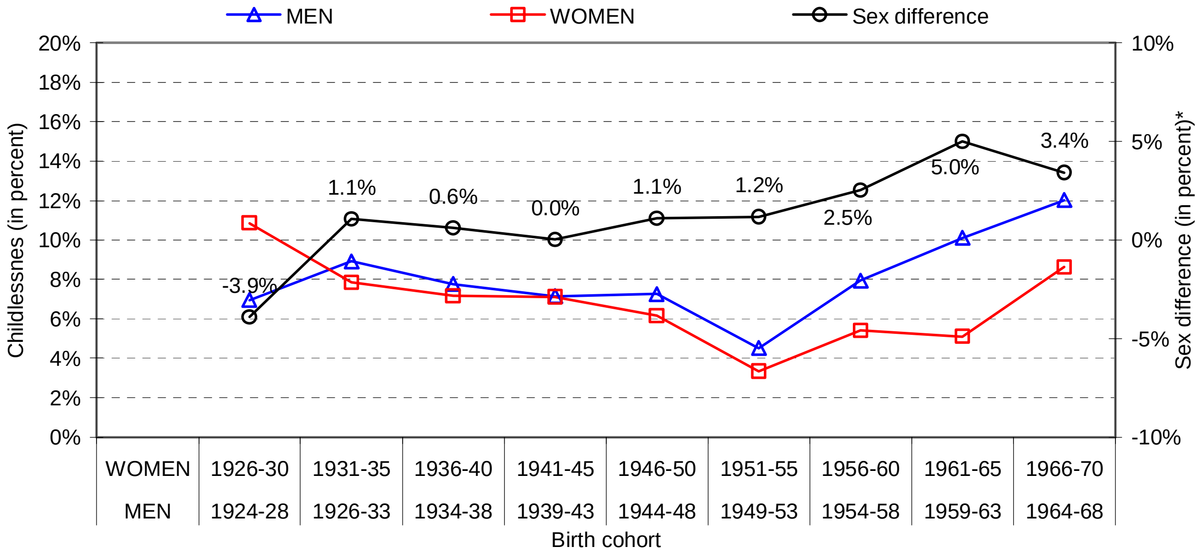


Figure 4: Reported childlessness, at interview (cohorts 1923 to 1987) and occurring sex differences
Source: Russian GGS (2004) – own estimations
NOTE: * positive values = men reporting a higher level of childlessness
negative values = women reporting a higher level of childlessness

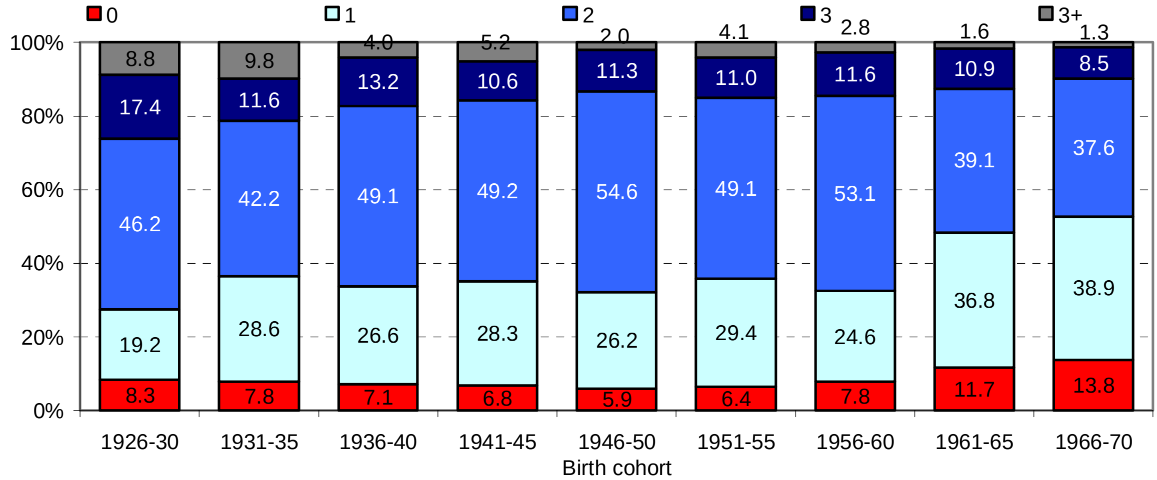


Figure 5: Men – Parity-specific distributions (cohorts 1923 to 1970)
Source: Russian GGS (2004) – own estimations

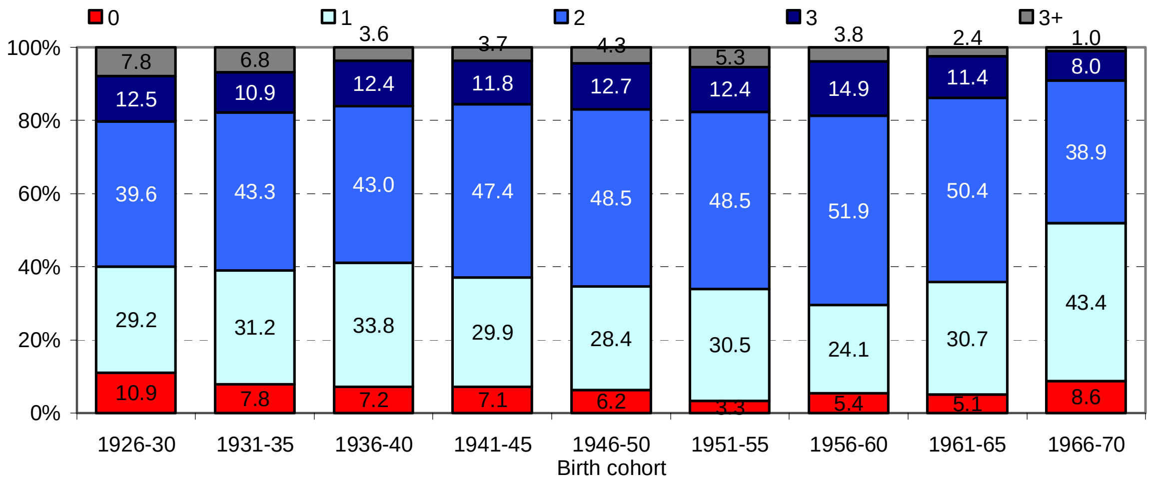


Figure 6: Women - Parity specific distributions (cohorts 1923 to 1970)
Source: Russian GGS (2004) – own estimations

increasing. There is no evidence for a polarization effect that more males than females have three or more biological children.

In the next section, sex-specific age characteristics are examined. In Figure 7 the median age at first birth, estimated from the Russian GSS, and the sex-specific differences for different calendar years (five-year groups) are presented.

Throughout the 1950s and up to the mid 1960s, the age at first birth was relatively stable for both sexes (men: app. 25; women: app. 23). At the end of the 1960s, it significantly declined (2 years). Afterwards, from 1970 to the end of the 1980s, it entered again a stable phase (men: app. 23; women: app. 21). The age patterns at the end of the 1940s were different. During this time the first birth took place earlier in life (women: 21.3; men: 21.6) and the age difference between men and women was much smaller compared to the following periods. The age patterns in the 1990s were also different. Between 1992 and 1999, the age difference between the sexes increased. This was mainly due to an increased age among Russian men at the first birth of their children, whereas a female's age at first childbirth stayed stable. In the new millennium, the age gap has decreased again. Generally, the sex-specific age difference over all periods is very stable. It ranges around two years i.e. Russian men are usually two years older than women when becoming a parent.

Whereas the small age differences and the low age at childbirth of males after WWII could be mainly explained by an unbalanced sex ratio, the explanation of the occurring differences in the 1990s most probably needs a more detailed analysis of factors on the individual, as well as societal, level.

The age differences between Russian males and females, from the cohort perspective, are displayed in Figure 8. They are similar to the previous results. Men's median age at fist birth stayed very stable over all birth cohorts (1920s, 1930s: app. 26; 1950s, 1960s, 1970s: app. 24) but it declined two years in the cohorts of the 1940s. Oppositely,, women's age at first birth constantly declined, with the exception of in the 1940s, where it slightly increased. The average age distance between the sexes over the birth cohorts from 1936 to 1970 was 2.14 years, i.e. on average men were 2.14 years older than their female counterparts. However, in the oldest cohort group men were younger than women at their transition to parenthood, due to the imbalance in the partner market after WWII. The increase of the age gap between Russian males and females in the birth cohorts around 1940 is explained by the large male birth cohorts of the years around 1940.

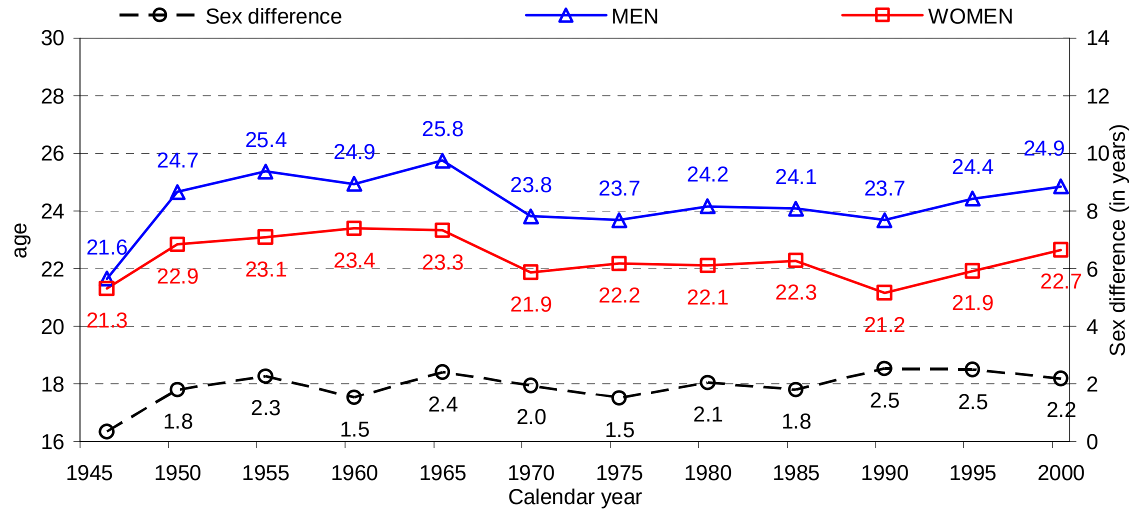


Figure 7: Median age at first birth (period 1946 to 2004)
Sources: Russian GGS – own estimations

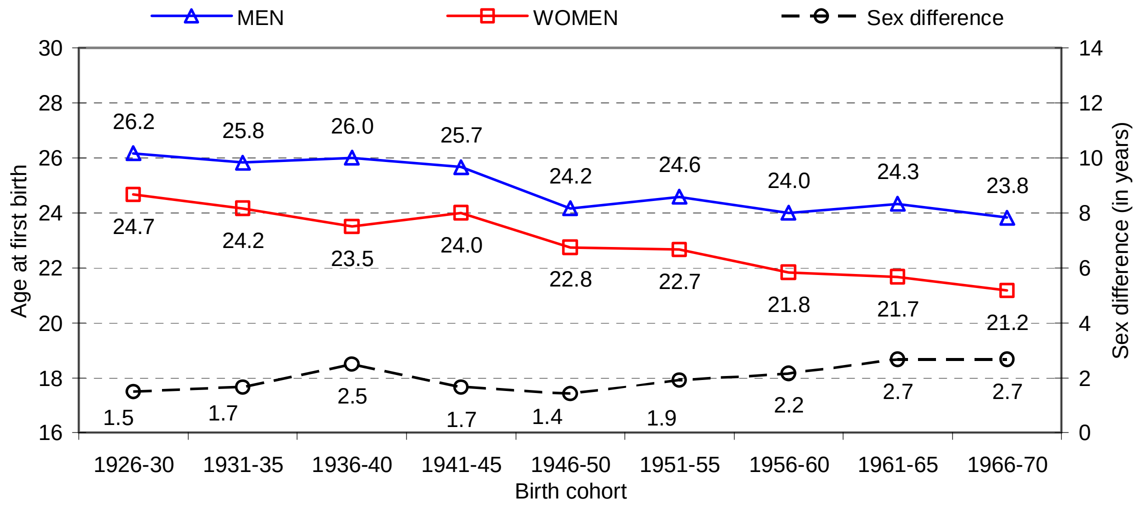


Figure 8: Median age at first birth (cohorts 1926 to 1970) – K-M-estimates
Source: Russian GGS (2004) – own estimations

Birth cohort	Age at 1st birth 10th percentile		Age at last birth 90th percentile		Interval length	
	MEN	WOMEN	MEN	WOMEN	MEN	WOMEN
1926-30	22.17	20.83	40.92	41.67	18.75	20.83
1931-35	23.42	20.25	44.25	39.50	20.83	19.25
1936-40	22.58	19.83	44.67	38.33	22.08	18.50
1941-45	22.67	20.00	41.92	41.67	19.25	21.67
1946-50	21.25	19.42	41.42	37.58	20.17	18.17
1951-55	21.75	19.25	40.67	36.67	18.92	17.42
1956-60	21.42	19.50	40.50	35.50	19.08	16.00
1961-65	21.50	19.17	43.83	35.58	22.33	16.42
1966-70	21.25	18.67	…	…	…	…

Table 1: Age at first birth 10th percentile, 90th percentile age at last childbirth – KM estimates (cohorts 1923 to 1970); Source: Russian GGS (2004) – own estimations

When entering the partner market, they were confronted with the extremely small female generations of the WWII years (1943 and 1944) (Scherbov and Van Vianen 2004).

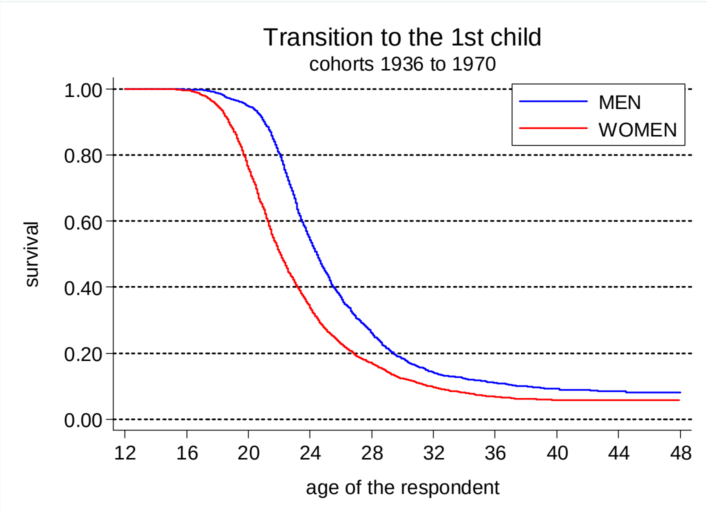
In Table 1, the 10th percentile of the age at first birth, the 90th percentile of the age at last birth and the distance between both estimates are displayed. It shows that Russian men are reproducing at older ages and for a longer period of time than are females, with the exception of the two oldest cohort groups and the birth cohorts around 1945. Again, these exceptions are related to the described effects of WWII. Similar to the age at first birth, the upper age border decreased over the cohorts for both sexes. For 90 percent of female and male respondents from the birth cohorts between 1926 and 1965, the age at last birth did not exceed 45 years.

5.2. Sex differences in parity-specific transition models

In Figure 9, Kaplan-Meier survival functions for the transition to the first birth are presented. In order to follow the logic of the previously shown aggregated measures, I estimated separate graphs for the cohorts between 1936 and 1970. Previous cohorts are not introduced in the models in order to avoid biases due to the effects of WWII.

First, the presented findings concerning the sex specific age differences are confirmed. In general, men experience their transition to the first child significantly later than do women. Even if the age difference at first birth varies between the different cohorts, the average difference between the sexes is approximately two years (cohorts up to 1970). Whereas women start their main transition phase around the age of 19 and finish this phase at 28, Russian men become fathers for the first time between the ages of 21 and 30. Furthermore, the distribution of childless men and women varies. The average variance over the cohorts between 1936 and 1970 is 2.2 percent (females: 5.6 percent; males 7.8 percent). Similar to the results from the aggregated measures, the survival functions show reliable estimates for the generations up to 1970, even if men tend to report biological children significantly less often.

In Figure 10, the survival curves for the transitions to the second birth are presented. No remarkable sex-specific differences occur. Sixty-nine percent of all Russian one-child fathers and 68 percent of all Russian one-child mothers from the birth cohorts between 1936 and 1970 experience a second birth.



Wilcoxon-Test:
chi2 = 866.42
p <= 0.001;

Log-Rank-Test:
chi2 = 465.84
p <= 0.001

Figure 9: Transition to the first child – K-M-estimates
Source: Russian GGS (2004) – own estimations

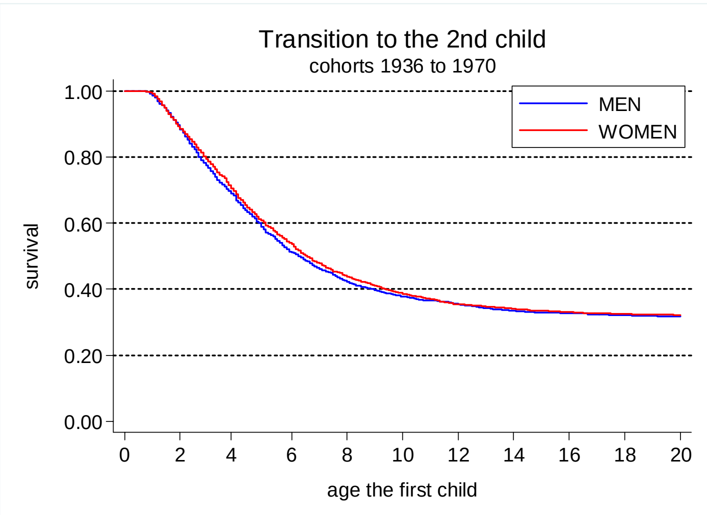


Figure 10: Transition to the second child – K-M-estimates
Source: Russian GGS (2004) – own estimations

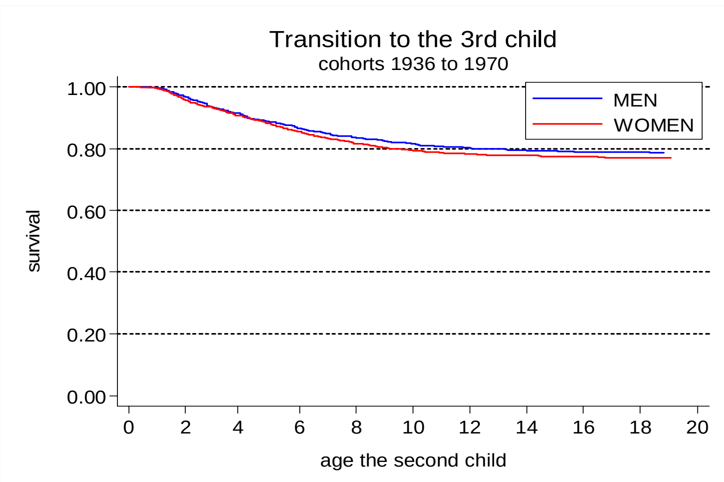


Figure 11: Transition to the third child – K-M-estimates
Source: Russian GGS (2004) – own estimations

Thus, only one third of Russian one-child parents have no subsequent births. The timing patterns relative to the subsequent births are the same for the sexes. Eight years after the first birth, the main transition phase to the second birth is finished and 60 percent ended up having a second child.

The transition to the third birth (Figure 11) also shows similar sex-specific patterns. Seven years after the previous birth, the main transition phase to the third child is finished. This applies to Russian women as well as to Russian men. In comparison to the second birth, only a minority of all two-child parents have more children. Not even one third of all two-child parents experience subsequent births. This illustrates the strong dominance of the two-child family in Russia. Figure 11 also shows that more two-child mothers tend to have a third child in comparison to their male counterparts. In the birth cohorts between 1936 and 1970, the sex-specific difference is 1.5 percent (females: 22.9 %; males: 21.4 %).

The last two survival functions show that Russian men and women have very similar fertility timing patterns. Once they have started their reproductive career, nearly no differences occur. Moreover, there is no evidence for a male parity polarization pattern.

In Figure 12, the baseline intensities for Russian men and women and their transition to the first child are presented. The process time is the age of the respondent, starting from age 12. The process ends at first birth and cases are censored at time of interview. The male transition phase starts approximately two years later compared to the female one. The risk of fist birth peaks for women between ages 20 and 24, whereas for men it is the highest between 22 and 28. Since the risk of a first birth declines afterwards to a value around zero at the age of 48 for males as well as for females, there is no evidence that men have remarkably higher risks of a first birth at older ages.

Figure 13 shows the baseline intensity of the transition to the second birth by sex. The process time is the age of the first child, ending at the second birth or at time of interview for censored cases. Only small sex-specific differences occur. It confirms that the fertility timing pattern of the second birth is nearly the same for Russian men and Russian women. The highest risk for a second birth is observable between 1 and 6 years after the first birth and it peaks when the first child reaches age 5. Afterwards, the risk constantly declines and reaches a level around zero 18 years after the previous birth.

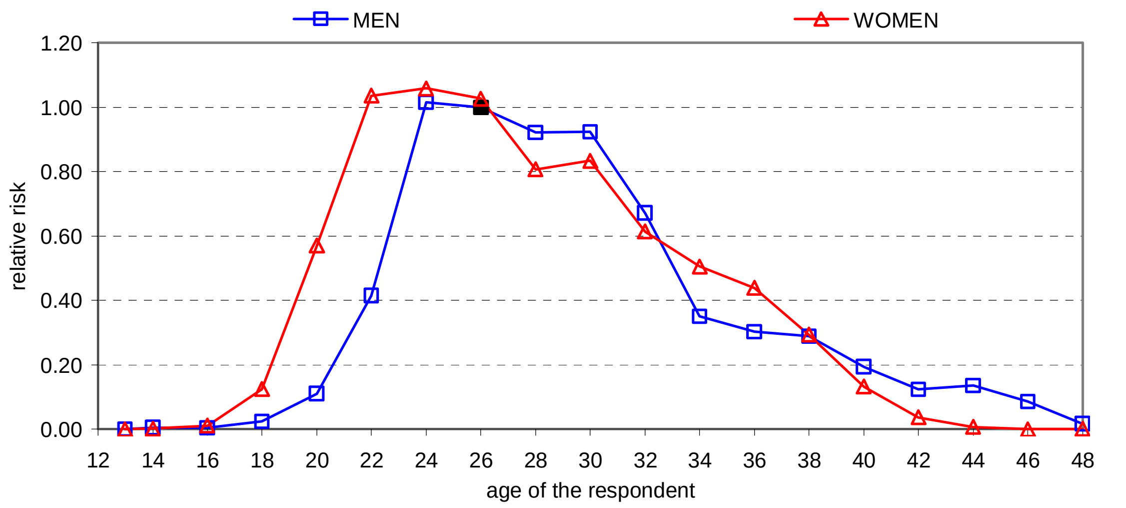


Figure 12: Transition to the first child – baseline intensities (cohorts 1936 to 1970), controlled for: area of Residence: *Relative to men age 24*
Source: own estimations – Russian GGS (2004)

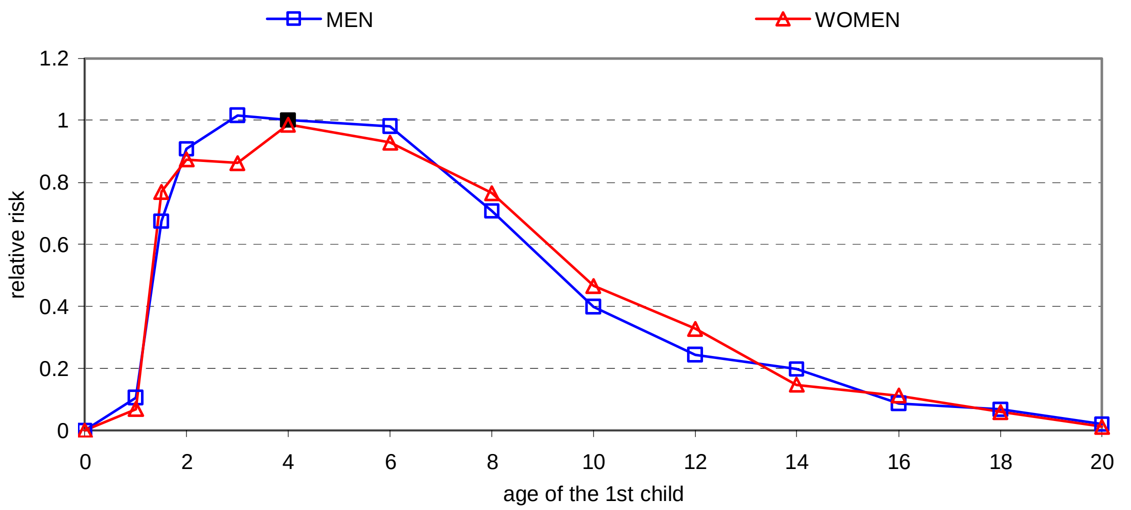


Figure 13: Transition to the second child – baseline intensities (cohorts 1936 to 1970), controlled for: area of residence: *Relative to men's 1st child age 3*
Source: own estimations – Russian GGS (2004):

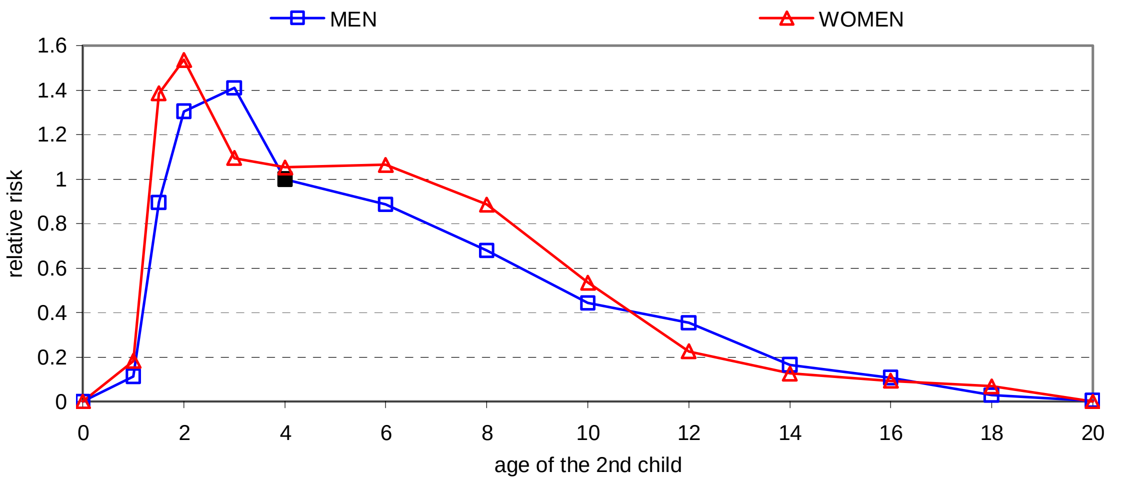


Figure 14: Transition to the third child – baseline intensities (cohorts 1936 to 1970), controlled for: area of residence: *Relative to men's 2nd child age 3*
Source: own estimations – Russian GGS (2004)

This applies to women as well as to men. Consequently, the time frame when family extension usually occurs is more or less similar for both sexes.

The baseline function of the transition to the third birth is presented in Figure 14. The age of the second child is used as the process time, which ends at the birth of the third child or at time of interview for censored cases. Again, the differences between the sexes are only minor. Timing pattern as well as the length of the time frame when a third birth most probably occurs is nearly the same for Russian men and women. The risk of a third birth peaks shortly (two to three years) after the previous birth and declines fast. This pattern is more pronounced for females then for males. However, 18 years after the birth of the second child, the propensity for a subsequent birth is close to zero for the sexes.

6. Discussion

The purpose of this paper was to evaluate the differences between Russian male and female fertility behavior in respect to four hypotheses. Although sex-specific differences are often viewed as problematic when analyzing male fertility, it was shown that these differences are much weaker than other demographic studies suggested. Data of the Russian GGS (2004) were used to conduct aggregated fertility measures, survival functions and hazard regression models for men and women.

1. *"fertile time span" hypothesis*: Neither the evaluation of the aggregate statistics, nor the transition to the first, the second and the third birth allude to the assumption that Russian men have a much longer reproductive life span in comparison to their female counterparts, even if men have the biological ability to become fathers at older ages. Consequently, the age in which the fertility of Russian males is completed is not different from women's age. It is reasonable to assume that both sexes finished their reproductive career at age 49 or even earlier (see Table 1).

This pattern should be related to two issues. First, it was shown that male fertility pattern in Russia, most of the time, was characterized by a start of the birth career at early ages, short birth intervals as well as an early finish. Secondly, the strong dominance of the two-child family in Russia further adds to the explanation. Russian fertility behavior may be described with four words "Everybody, Early, Few and Quickly." (Avdeev 2001: 9)

These patterns can be explained by very stable country-specific family formation characteristics and homogenous reproductive behavior: 1. Relatively early marriage and the first birth are closely connected. 2. The desirable number of children has been and still is stable at a level around two in the last 60 years. 3. The family formation (1^{st} child) is quickly completed, with short spacing between marriage and first birth and between the subsequent births (Zakharov 1997; Zakharov 1999). So far such patterns have only been described for Russian females. However, they are similarly applicable to men.

2. *"Age gap" hypothesis*: The estimation of the age at first birth (by period and birth cohort), the survival functions and the corresponding baseline intensities confirm the hypothesis that Russian men start their fertility career two years later than do Russian females. This also applies to their first union formation (Scherbov and Van Vianen 2001, 2004). Moreover, no sex-specific timing differences in the transition to the second and third birth occur. Once Russian males and females have started their family formation, the family extension follows nearly the same timing pattern relative to the previous birth.

The stable age gap can be explained by different factors. 1. Males become sexually mature approximately two years later compared to their female counterparts. 2. According to marriage market theories, relatively stable ages at first birth and "historical perpetuation" generate a stable age distance within the range of two to three years. This age gap is only widened or closed if high barriers (economic or social) to enter a (marital) partnership are imposed on men or women, e.g. payment of high bride money or dowry; the achievement of a certain social position etc. Even if the presented models did not account for such factors, the results suggest that these barriers are small in Russia. 3. From the Russian cohorts of WWII it is known that in times of crisis and demographical change, the age gap is not fixed (Avdeev and Monnier 1999). I focused on the birth cohorts between 1940 and 1970. Thus, respondents who entered the partner market in a phase of relatively stable demographic, political and economic conditions were included. The sex-specific age gap was stable for around two years.

3. *"Parity polarization" hypothesis*: The presented findings did not support the hypothesis that men have a greater diversity concerning their number of children born compared to women. I did not find a polarization between men with no or few children and males with a relatively large progeny size. Even if a higher level of

reported childlessness among Russian males was observed, a concentration in higher parties was absent.

Socially imposed monogamy, early and fast family formation and a relatively small number of biological children (like in the majority of European societies) are the main reasons that no polarization effect is observable in Russia. Very young ages at marriage and the prevalence of the two-child family in Russia confirm this argument. It is a question to be addressed in following studies as to whether polarization patterns occur between different societal groups i.e. ethnic, religious, educational, employment status etc.

4. *"No underreporting" hypothesis*: To clarify whether Russian men underreport their fertility outcomes, or to what extent the male Russian data of the GGS are reliable, was one of the most important aims in this study. Only minor differences between the number of biological children reported by males and females were expected, since the questionnaire setup should weaken biases of intentional and unintentional misreporting (Duberstein Lindberg et al. 1998a). Nevertheless, the estimations of the TFR, the level of childlessness, the CFR and the various parity-specific transition models allude to the assumption that also in the Russian GGS men tend to report fewer biological children compared to their female counterparts. Russian respondents report approximately two per cent fewer children than do females. The underreporting bias is small compared to previously conducted studies (Goldscheider and Kaufman 1996; Mott and Gryn 2001; Rendall et al. 1999; Toulemon 2001). This means that if the men and women should have the same completed fertility when averaging over a sufficient time span, the Russian GGS is relatively weakly biased due to male misreporting behavior. Consequently, it provides reliable estimates of male fertility pattern. This enables future research on male fertility with this dataset.

The parity-specific transitions are not affected by misreporting to the same extent. The transition to the first birth seems to be especially biased. The few studies on male misreporting behavior point out its association with births out of wedlock, with non-residential children and with births early in the life course (Bledsoe, Lerner, and Guyer 2000; Cherlin and Griffith 1998; Rendall et al. 1999). In Russia, a first birth usually occurs at young ages. Consequently, male's stronger pronounced underreporting pattern at the transition to the first child is likely to be due to (unintentional) misreports of young men who have a higher risk of non-marital births, of children living apart and of partnerships (LATs - living apart together).

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7. Appendix

Parity	MEN		WOMEN		TOTAL	
	#	%	#	%	#	%
0	260	8.6	324	6.3	584	7.2
1	890	29.5	1583	30.8	2473	30.3
2	1412	46.9	2405	46.8	3817	46.8
3	343	11.4	625	12.2	968	11.9
3+	107	4	205	4	312	4
4	*81*	*2.7*	*131*	*2.6*	*212*	*2.6*
5	*16*	*0.5*	*37*	*0.7*	*53*	*0.7*
6	*3*	*0.1*	*23*	*0.4*	*26*	*0.3*
7	*3*	*0.1*	*10*	*0.2*	*13*	*0.2*
8	*4*	*0.1*	*1*	*0.0*	*5*	*0.1*
9	*1*	*0.0*	*2*	*0.0*	*3*	*0.0*
Total	**3013**	**100.0**	**5141**	**100.0**	**8154**	**100.0**

Table 2: Distribution of respondents by sex and number of biological children (birth cohorts 1926 to 1970) – absolute weighted numbers and percent

Birth cohort	MEN		WOMEN		TOTAL	
	#	%	#	%	#	%
1926-30	176	6.1	312	6.3	488	6.2
1931-35	182	6.3	315	6.3	497	6.3
1936-40	271	9.3	562	11.3	834	10.6
1941-45	168	5.8	321	6.5	490	6.2
1946-50	386	13.3	602	12.1	988	12.5
1951-55	416	14.3	728	14.7	1144	14.5
1956-60	491	16.9	897	18.1	1389	17.6
1961-65	424	14.6	700	14.1	1124	14.3
1966-70	395	13.6	526	10.6	920	11.7
Total	**2909**	**100**	**4963**	**100.0**	**7874**	**100.0**

Table 3: Distribution of respondents by sex and 5-year birth cohort groups (cohorts 1926 to 1970) – absolute weighted numbers and percent

Birth cohort	MEN	
	#	%
1924-28	119	4.5
1929-33	176	6.6
1934-38	219	8.2
1939-43	214	8.1
1944-48	259	9.7
1949-53	378	14.2
1954-58	468	17.6
1959-63	454	17.1
1964-68	370	13.9
Total	**2658**	**100**

Table 4: Distribution of male respondents by "shifted" 5-year birth cohort groups (cohorts 1924 to 1968) – absolute weighted numbers and percent

1st Birth	Time at risk	Rate	Events	Respondents
Male	738127.5	0.00435	2274	4398
Female	996216.3	0.00575	3988	6804
Total	1734343.8	0.00516	6262	11202
2nd birth				
Male	373557.4	0.00506	1436	3166
Female	746551.4	0.00450	2534	5639
Total	1120108.8	0.00469	3970	8805
3rd birth				
Male	712909.0	0.00057	305	1870
Female	1231079.5	0.00061	594	3308
Total	1943988.5	0.00060	899	5178

Table 5: Exposures and occurrences by sex for the transitions (birth cohorts 1936 to 1970) to first, second and third birth