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Reproductive Processes Through the Lens of Gender

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Anneannem Meliha Bayrak'a

To my grandmother Meliha Bayrak

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Abstract

This dissertation examines the gendered repercussions of reproductive processes on the individuals' life course. In so doing, it provides empirical applications of the interaction between reproductive processes and the gender structure which manifests itself at three distinct levels; macro, interactional, individual. The first chapter exemplifies of how gender structure operates as a pro-natalist policy at the *macro level* through investigating the impact of Romanian abortion ban on the next generation's life-course transitions. The second chapter focuses on the *interactional level* of the gender structure by emphasizing how the effect of societal and familial expectations on giving birth to a son, in short "son preference", on fertility dynamics have evolved across different generations in Turkey. Lastly, the third chapter speaks to the *individual level* of gender structure through its focus on motherhood identity, or lack thereof, through exploring whether undergoing medically assisted reproduction is associated with stronger loneliness experience during the pregnancy seeking period due to increasing perceived social pressure on childbearing and stigma surrounding infertility. The findings of this research imply that the interplay between reproduction and gender structure has substantial consequences on demography, health, and in general on the life course of individuals.

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Chapter 1

Introduction

Reproduction is omnipresent in demography. Being an essential determinant of the survival of a population, it is located at the core of population dynamics. Since every human being is an outcome of reproduction, it also relies as a building block of a societies. Almeling (2015) defines reproduction as the biological and sociological process of having or not having children which encompasses broad range of topics such as pregnancy, birth, contraception, abortion, infertility and assisted reproductive technologies. However reproductive experiences are not universal or unified, instead, they have distinct implications according to social context in which individuals live, socialize and interact (Ginsburg and Rapp, 1991). This social context is multilayered covering policies, developments in medicine, social movements, cultural norms, social inequalities that are deeply embedded in society but at the same time subjected to change. For instance, today, even though a vast majority of women and men desire to become parents at some point in their lives (Testa, 2012), child-free couples are also becoming prevalent particularly in the European context (Tanturri and Mencarini, 2008). Similarly, while a substantial share of individuals remain involuntarily childless as a result of postponement of childbearing and emergence of infertility (Billari et al., 2006), women, especially from low and middle-income countries, continue to suffer the consequences of unintended pregnancies due to unmet need of family planning or restricted access to abortion services (Bearak et al., 2020).

Moreover, the reproductive events disproportionately occur in women's bodies, there-

fore play different roles in women's and men's lives (Riley, 2019). This biological difference in reproductive capacity contributes to the social construction of gender while gender *per se* is argued to shape the complexity of reproductive processes (Bell, 2015). Gender is a complex structure which is not only defined as a characteristic of individual identities, but also operates as an organizing principle in all societies (Riley and DeGraff, 2018). Beyond just the different characteristics of men and women, it shapes people's lives on several levels, from the socialization during childhood through formal institutions and social norms. Of the relevance for reproduction, for instance, women are assigned the primary responsibility in reproductive processes such as birth control, pregnancy and infertility while men are perceived as the secondary actors in the so-called "reproductive equation" (Almeling and Waggoner, 2013). At the institutional level, reproduction is also perceived as women's issue by politicians and physicians that reflected in government policies and development of medical technologies.

In this dissertation, I intend to approach the topic of reproduction through the framework of "gender as a social structure" suggested by Risman (2018) as reproductive processes influence how the gender structure is organized, and at the same time, it has been affected by the socially embedded implications of gender structure. In short, gender is conceptualized as a complex stratification system that has implications at the individual, interactional and macro levels of analysis. From a cultural perspective, *individual level* refers to gendered socialization and identities and their manifestation as internalized predispositions. Moreover, *interactional level* corresponds to social expectations that each of us bring to every social encounter. For instance, it includes gendered stereotypes and cognitive bias which are consequential in the availability of opportunities and rewards throughout the life-course. Lastly,*macro level* account for the way institutional regulations such as government policies, ideologies and hegemonic beliefs affect patterns of gender inequality in every aspect of our lives. Risman (2018) suggests that when approaching empirical questions through complexity of gender structure, one must take into account each level of analysis, the relationship between them and their transformation over time.

The main objective of this dissertation is to understand how the interplay between

reproductive proccesses and gender structure shapes and explains individual level differences in life-course. My main argument is gender structure interacts with reproductive processes at *individual, interactional and macro* levels and by this means it has further implications on certain life-course outcomes. Throughout the chapters, I investigate this argument by providing empirical applications from Europe and Turkey on how various reproductive experiences (e.g. abortion, fertility behavior, medically assisted reproduction) interact with gender structure at different levels. Although the outcomes of interest are at individual level, they are all influenced the interaction between reproduction and gender structure at different levels such as (i) Romanian abortion ban (policies - *macro level*), (ii) Son preference culture in Turkey (social expectations - *interactional level*) and (iii) motherhood mandate,infertility (socialization, identity *individual level*).

Summary of Chapters

The first chapter entitled **"Intergenerational and Intersectionel Life-course Effects: Lessons from Romanian Abortion Ban"** provides an example of how gender structure manifest itself as a pronatalist policy at the *macro level*. This chapter aims at investigating how the abortion ban implemented in 1966 in Romania has shaped the life-course of the larger birth cohort born after the policy change. We focus on how gender and parental-SES intersect with relative cohort size, the Easterlin effect, in affecting the next generation's major adulthood life course transitions and fertility. Our findings shed light on the gender differentials in the relative cohort size effect. More specifically, being born and raised in a larger cohort has stronger effect for women's transition to adulthood through postponing leaving home, union formation and childbearing. By showing the gendered effects being driven by women with low-SES parents, we showcase the relevance of intersectionality framework in studying the Easterlin effect on life-course. This paper is a joint work with Nicoletta Balbo and Francesco C. Billari.

The second chapter entitled **"Women's Status and the Evolution of Son Preference in Turkey"** exemplifies mainly the *interactional level* of the gender structure by emphasizing the societal and familial expectations on giving birth to a son, in short: "son

preference". Son preference is one of the most entrenched repercussions of patriarchal norms exacerbating the existent social inequalities. Similar to other patriarchal contexts, parents in Turkey manifest their preference for sons via differential stopping behavior (DSB), i.e. continue childbearing until the desired number of sons is reached. However, the second half of the 20th century characterized by a significant economic and social transformation for Turkey via increased levels of education, rapid wave of urbanization, increased female labor force participation and persistent decline in fertility. Yet, to my best knowledge, no study has investigated whether and to what extent the DSB persists across families living in Turkey. To that end, I study the evolution of DSB in Turkey across six five-year birth cohorts by bringing together all waves of Turkish Demographic and Health Survey collected between 1993-2018. Relying on the gender of first and second children, I show that the effect of having firstborn daughter on total number of children follows a declining trend across birth cohorts. This declining trend is largely driven by women with less than secondary education who are known to have more conservative values and higher fertility level, on average. Moreover, I investigate to what extent son preference is consequential to transition to third birth, as the two-child norm is becoming more widespread across the Turkish society. While having two subsequent daughters increases the probability of having the third child across all birth cohorts for less educated women, the effect becomes insignificant for the two youngest cohorts holding at least secondary degree. Finally, I provide a suggestive evidence on cultural change on family formation practices and women's status, along with economic and social transformation, has contributed to the weakening of son preference among the women of newer generations in Turkey.

The third and the last chapter entitled **"Loneliness during the pregnancy seeking process: Is medically assisted reproduction a risk factor?"** speaks to the *individual level* of gender structure through its focus on motherhood identity, or lack thereof. As the mean age at first birth and the share of women giving birth at advanced ages steadily increases, parenthood at later ages is becoming more common and reproductive experiences are diversifying. This study explores whether undergoing medically assisted reproduction (MAR) is a risk factor for loneliness experience during the preg-

nancy seeking period, and whether the association varies by gender or giving a live birth. Evidence shows that MAR can be an emotionally and economically draining experience. Compared to couples trying to conceive naturally, couples who undergo MAR are exposure to stronger stigma, experience higher dissatisfaction in their relationship and have limited leisure time to spend with their friends and family. Despite the potential link, the loneliness aspect of MAR remains unexplored. Using two waves of the Generations and Gender Survey collected between 2004 and 2011, we estimate the change in emotional and social loneliness of pregnancy seekers by mode of conception controlling for individual socio-demographic characteristics, experience of job loss and partnership dissolution. We further test whether the gender of the respondent moderate the association and whether the effects varies by giving a live birth. We find that couples who underwent MAR experience worsening in social loneliness during the pregnancy seeking period compared to couples who try to conceive naturally. This effect was entirely driven by respondents who did not have a live birth in between the two observation periods. The results did not reveal any differences by gender. Our results shed light on the relevance of loneliness aspect when studying couples' MAR experience. This chapter is co-authored with Alice Goisis.

Chapter 2

Intergenerational and Intersectional Life-course Effects: Lessons from Romanian Abortion Ban

joint work with Nicoletta Balbo and Francesco C. Billari

Introduction

Before October 1966, Romania had one of the most liberal abortion policies in Europe, allowing "free and safe" access to abortion within the first trimester of pregnancy (Pop-Eleches, 2006). Suddenly, during the rule of Nicolae Ceauşescu, the so-called *1966 Decree* banned all means of family planning and abortion except for women above 45, women with more than four children, women whose pregnancy is in danger due to health conditions and women who got pregnant due to rape or incest[1]. Since in Romania abortion was widely used as primary birth control method [2], this sudden enactment led to a boom in unintended and mistimed pregnancies, and to an immediate increase in number of births.

[1]Decree issued in October 1966 but its implementation started in December 1966. See (Hjalmarsson et al., 2019)

[2]According to Berelson (1979), the number of abortion per 100 live births was recorded as 408 in 1965

Specifically, the number of births doubled in 1967 with respect to 1966, and remained at high levels during the following four years (Mureşan, 2008). Indeed, from 1967 to 1971, Romania's total fertility rate (TFR), about 3.21, was above the average TFR of five other Central and Eastern European countries of the bloc (Bulgaria, Czechoslovakia, German Democratic Republic, Hungary and Poland), about 2.15, by almost 50 per cent (Berelson, 1979). Until December 1989, abortion and contraceptive methods remained illegal in Romania. The subsequent abolition of the ban coincided with a renewed increase in the number of abortions, and a decline in fertility (Mitrut and Wolff, 2011).

It is important to note that family-planning policies and restrictions have long-lasting effects not only on the individuals who are directly affected, but also on their children, i.e., "next generation". In terms of direct effects, for instance, legal access to abortion services helps women to better control the timing of their childbearing and in turn marriage. This encourages women to invest in their careers and human capital (Bailey, 2012), which in turn leads to better economic opportunities for their children (Ananat and Hungerman, 2012; Bailey et al., 2018). Access to safer family planning in general also improves infant health and birth outcomes (Mitrut and Wolff, 2011).

In this paper, we build on previous research that has already focused on the intergenerational effects of the Romanian abortion ban, namely, on educational attainment and labor market status (Pop-Eleches, 2006), cognitive abilities (Botezat and Levels, 2017), fertility (Gutierrez, 2020) and crime (Hjalmarsson et al., 2019). These studies, comparing the children born before and after the abortion ban, document the impact of this policy on a number of adulthood outcomes. Yet, the literature did not deal with the broader life-course consequences, including key events in the transition to adulthood (e.g., leaving home, marriage, and childbearing (Modell et al., 1976)). Moreover, both the gendered and socially stratified nature of these intergenerational effects has not been adequately explored. The first, substantive, contribution of our work stems from filling this gap.

Our second substantive contribution is an extension of the Easterlin approach through a gendered dimension, framed within an intersectional perspective. Indeed, to account for the intergenerational effects of the ban on the transition to adulthood process, we adopt Easterlin's (Easterlin, 1978, 1987) relative cohort size (RCS) hypothesis as the

primary explanatory mechanism. It predicts a slower transition to adulthood for cohorts that are relatively larger (higher RCS), as they postpone marriage and childbearing, and subsequently have lower fertility. However, as Presser (1997) already pointed out, "the dominant fertility theory about recent US fertility trends, the 'Easterlin hypothesis', views woman as secondary demographic actors". RCS effects are primarily driven by male relative income, while women are considered to respond to the conditions affecting men (Presser, 1997). For example in the original formulation of Easterlin's framework, women are expected to drop out of the labor force once the conditions are better off for their male partners. The effect of RCS on women's transition to adulthood and fertility has therefore not been adequately studied. The majority of studies on women's fertility instead looks at the role played by the increasing female labor force participation, or at changing gender norms (Oppenheimer, 1976; Macunovich, 1996, 2012). However, being born in a larger cohort, hence being raised in larger families, can have a stand-alone effect on women's life-course decisions.

While introducing a gender perspective into the classic Easterlin framework, it is essential to draw on the premises of intersectionality theory, as the complexity of the power structure produces further sources of privilege and discrimination beyond the homogeneous distinction based on gender. As social categories acquire their comprehensive meaning only when they are considered in relationship with each other (Shields, 2008), an intersectional perspective encompassing different sources of power and exclusion by the given context and time could uncover stratified implications of population policies. Yet, intersectionality is almost neglected by demographic research albeit its potential to enrich the field both theoretically and empirically (Sigle, 2016). For the case of family planning, intersectionality is particularly relevant since the decision for and access to abortion services is always socially stratified (England, 2016). For instance, there is a remarkable education gradient in unintended fertility due to social and economic disparity in access to various birth control methods (Musick et al., 2009). We therefore postulate different effects for women and men which are stratified by parental-SES. We show that being born in a large cohort does have a stand-alone impact on women's transition to adulthood, which is particularly visible in marriage market. Still, this impact is mainly

driven by women born into low-SES families, highlighting that intersectionality plays a central role in life-course events.

The other three contributions of this work are more empirical in nature. First, we exploit the discontinuity in fertility resulting from the abrupt abortion ban that took place in Romania in 1966, as a natural experiment to uncover the causal effect of relative cohort size on the next generation's markers of transition to adulthood. The sudden enactment of the abortion ban put reproductive rights in jeopardy, particularly for women who had unplanned pregnancy during the amendment. As a result, the ban prevented some women to terminate their unplanned pregnancies and led to a sudden increase in cohort size (see Fig 2.1). Relying on this exogenous shock on the number of births, we estimate the impact of RCS on the ages at leaving home, first marriage, first birth, and the number of children by age 35. Second, in the intersectionality literature, quantitative research is often regarded as limited and using simplistic methods particularly in defining the boundaries of different social categories. However, quantitative methods permit scholars to explore the heterogeneity within broadly defined categories (e.g. gender) through interacting various social dimensions, to the extent that data constraints allow (Sigle-Rushton, 2014). The present study therefore contributes to the construction of an intersectional perspective in life-course research, by providing empirical evidence on the intersection between relative cohort size, gender and socio-economic status, a fairly understudied intersectional categorization (Walby et al., 2012). In so doing, we rely our analysis on the intercategorical approach first suggested by McCall (2005). Lastly, we engage in data triangulation to better overcome the potential social selectivity of abortion. Even though the previous literature on the topic has acknowledged the social stratification of abortion in Romania, it has not explored differences by parental SES. Up until now, studies on the Romanian abortion ban have drawn on Census data, which restricts the information on parental education level for individuals who are sharing the same household with their parents. To fill this gap, next to Census data, we make use of Generations and Gender Survey data, which include retrospective information on respondent's parental background.

Theoretical Framework

Relative cohort size

How does the enactment of a restrictive abortion policy affect the life course of the next generation? To address this question, we primarily rely on a relative cohort size (hereafter RCS) mechanism, i.e. the Easterlin hypothesis. Easterlin (1978) argues that the members of larger birth cohorts experience a number of adverse consequences in the demographic, economic, and socio-political spheres, which leads them to defer leaving parental home, marriage and childbearing (Easterlin, 1987; Wright, 1989). Regarding union formation, the Easterlin hypothesis argues that economic pressures and low relative income of men in a relatively large cohort make it harder for them to fulfill traditional male breadwinner role, thereby leading to a postponement of marriage (Pampel and Peters, 1995). Additionally, economic concerns due to low relative income exacerbate intra-marital tensions and increase the likelihood of divorce (Schapiro, 1988). According to Easterlin, fertility decisions are influenced by relative income, which is defined as the income potential in young adulthood relative to the living standards experienced during childhood (Pampel, 1993). Cohort size matters for relative income since larger cohorts experience crowded labor markets, intense competition for jobs and earn lower real wages.

From a micro point of view, larger cohort size translates into more children in the household of origin, which in turn may imply a decline in parental investment due to limited household resources (Easterlin, 1978; Smith and Welch, 1981). Coleman (1988) defines social capital of the family as the relationship between children and parents, and it refers to the time and effort spent by parents for childrearing. In line with Easterlin hypothesis, Coleman (1988) asserts that younger siblings and children in larger families receive less adult attention which produces weaker educational outcomes in their later life. Furthermore, Becker and Lewis (1973) highlight the trade-off between quality and quantity while parents decide for their optimal number of children. Accordingly, for a given household budget, parents confront with the trade-off between fewer high-quality (more costly) children versus more low-quality (less costly) children. Thus, if parents

decide to have one more child, “quality-quantity" trade-off implies somewhat reduction in parental investment for each of them.

By integrating a demographic dimension into an economic approach, the Easterlin hypothesis attracted broad attention. However, empirical evidence on it is rather mixed and inconclusive, leading to different findings in different contexts. For instance, Pampel (1993) argues that, while being relevant for the U.S. context, the validity of Easterlin hypothesis remains weak for European countries. That latter finding has been ascribed to differences in national and institutional factors. Social protection policies such as unemployment benefits, subsidies for housing, and family allowances, may mitigate the harmful effect of cohort size on economic well-being through reducing individual's vulnerability to financial risks and market's performance. Moreover, differences between countries' female labor force participation and subsequent changes in gender norms can reduce the magnitude of the Easterlin effect Macunovich (1998).

On the former state socialist economies in Eastern Europe, Carlson (1992) suggests an inversion of Easterlin's hypothesis using the insights of Kornai and colleagues (1982). According to Carlson's framework, which is particularly relevant given our focus on Romania, the relative income mechanisms becomes irrelevant in socialist settings, where individual wages do not provide a good measure of economic well-being. Kornai et al. (1982) assert that in state-controlled economies the demand for labor is infinite and firms are always willing to hire more workers. Hence, in a large cohort where everyone is employed, the economy would experience a boom which result in better provision of goods and services and higher economic well-being. This would also explain the pro-natalist preoccupation of such countries, such as Romania. However the analysis of Carlson (1992) on Romania considers the period between 1956 and 1989 in which the large cohort that were born as a result of abortion ban is relatively young for union formation and childbearing. Moreover, 1989 marks the year of regime fall which lead Romania and other state socialist countries in Eastern Europe to enter a transitory phase and exacerbated the economic and social uncertainties. In particular, due to scarcity of resources and welfare provisions during the transition period, Romanian population suffered from economic vulnerability due to job losses and precarious employment which further translated into broader precariousness in

life including postponement of marriage and childbirth (Vlase and Preoteasa, 2018).

In consequence, the disadvantage of being raised in a larger cohort which is manifested itself as lower educational attainment in young adulthood in Romania (Pop-Eleches, 2006) is amplified with further economic uncertainty and social vulnerability brought by the fall of communist regime. This "double disadvantage" in economic and social sphere is reflected on the timing of life-course events. Therefore we expect that *post-ban children to have slower transition to adulthood compared to pre-ban children, as marked by leaving home, marriage, and childbearing, and have fewer children.*

Intersection with gender

Some studies (e.g., (Oppenheimer, 1988)) show how socio-economic factors, particularly the transition to adult economic roles, may influence the likelihood and the timing of marriage. According to Oppenheimer's "uncertainty hypothesis", unstable careers, low status jobs, non-employment or irregular jobs make young men less attractive in the marriage market. As a result, women, whose educational attainment is growing, have difficulties to find eligible partner and postpone their marriage decisions. Even though such mechanism assumes a male-breadwinner family model, which may have lost some of its force as gender norms had become less strong, it still continues to be relevant particularly for more patriarchal societies such as Romania in the post-socialist period (Kalmijn, 2011; Vlase and Preoteasa, 2018).

Hence, following Oppenheimer (1988)'s framework, women are expected to postpone their marriage decisions due to the shortage of eligible men in the marriage market. Indeed a study by Bronson and Mazzocco (2018) measures the causal effect of cohort size on marriage rates through exploiting the state-level variation of oral contraceptive legislation in the U.S. and finds fewer marriages in larger cohorts compared to smaller cohorts.

Furthermore the literature on marriage market documents its gendered nature. During the 20th-century, two main patterns have been observed among European women in the marriage market: either homogamy or hypergamy ("marrying-up"), that is women have

been marrying with men having respectively the same or higher socio-economic status (SES, e.g., highly-educated / employed) (Van Bavel, 2012). Hypergamy also reflects the presence of gender inequality in the age at marriage and level of education (Esteve et al., 2012). As the educational attainment of women has continued to increase and traditional gender roles have become less pronounced, the prevalence of hypergamy has declined, and cohabitation has become more popular as an option (South, 1991; Qian and Preston, 1993; Kalmijn, 2011; Esteve et al., 2012, 2016). On the other hand, research from Netherlands finds that despite the considerable decline in gendered age-differences between married couples, there is still an age difference which persists over time (Poppel et al., 2001). To link up with the RCS effect on marriage market, we expect that women who were born after the abortion ban have a harder time to find eligible partners with stable economic conditions and suitable SES. Therefore, one could anticipate that they are less likely to "marry-up", meaning that the probability of hypergamy is lower, and age and educational differences between couples is smaller compared to women who were born before the ban. Accordingly, it has been descriptively showed that prevalence of marrying with same age and younger partner has increased for women who were born immediately after the abortion ban in Romania (Cutler et al., 2012). Hence, we consider age and educational hypergamy as a potential mechanism for explaining the postponement of marriage timing and decline in the prevalence of marriage and we anticipate that *compared to women born before the ban, women who were born after the abortion ban are less likely to ever marry and more likely to postpone marriage. Subsequently, they are more likely to postpone childbearing and have fewer children.*

Intersection with gender and parental SES

Population policies might have heterogeneous consequences not only contingent on gender but also on individual's SES. Indeed, in a seminal paper on the Romanian abortion ban, Pop-Eleches (2006) shows that urban and educated women disproportionately bore the burden of abortion decree, since they were more likely to use abortion before the ban. Thus, the intersectionality between gender and social origin (or parental SES) is a notable

aspect to investigate while exploring the long-term consequences of pro-natalist policies.

For what concerns social origin, we focus on parental education, for various reasons also linked to the literature. First, children with highly educated parents socialize in a different way than children with low-educated parents. Second, children with high-educated parents might have different career aspirations than children with low-educated parents (Mooyaart and Liefbroer, 2016). Third, children of low-educated parents may see union formation as a potential way to exit an unpleasant parental home situation (Clarkberg, 1999). Within this framework, Barber (2000) provides evidence for a gender gradient in the influence of parental background on leaving home and marriage timing. Specifically, highly educated parents push more strongly their daughters to have established careers before they enter in a stable union, thus women with higher educated parents are more likely to marry later.

Furthermore, given the strong association between parents and children education, educational attainment is an essential aspect in assortative mating processes, as it signals the desirability of a partner through mirroring their parental background and indicating the current and future labor market prospects (Mare, 1991). However, the marriage market may disproportionately reward such socio-economic characteristics for men, particularly favoring high-SES men over high-SES women (Sweeney and Cancian, 2004). Therefore, we expect *the effect of RCS to be stronger among highly-educated women, due to a more limited number of eligible partners (i.e. lower chances of hypergamy), compared with women with a lower SES.*

Social inequalities are never the result of one single factor, rather, they are the outcome of the intersection of various social relations such as gender, race and socio-economic status (Hankivsky, 2014). Focusing on the race-gender intersection, Crenshaw (1989) has been the first scholar who used the term "intersectionality" in her study on discrimination of black women in the U.S. labor-market. Her critical approach argues that women who are located at the intersection of gender and race become marginalized and face limited options of collective political actions, since political communities are mostly clustered around solely gender or race identities. Building on that, several empirical studies carried out on the U.S. provide evidence on how gender and race intersect in accounting for

wage inequality (Kilbourne et al., 1994; England et al., 1999; McCall, 2001), or labor market discrimination (Kennelly, 1999). However, subsequent research on the topic has had a limited focus on the social origin component in intersectionality studies, which ubiquitously intersects with all inequalities (McCall, 2005; Nash, 2008; Walby et al., 2012). Indeed, gender inequalities in educational attainment are linked to, and daughters in lower SES families are more likely to receive education with the goal to increase their opportunities both in the labor and marriage market (Breen et al., 2010). Especially in Eastern Europe, the impact of parental background on young individual's educational and labor market opportunities is found to be particularly significant due to the highly differentiated education systems in those countries. (Iannelli and Smyth, 2008).

As the Easterlin hypothesis predicts, being born and raised in larger cohort translates into stronger economic uncertainty during the adulthood. In that case, individuals who were born in larger cohorts might postpone their transition to work by staying in education for longer periods. Under economic uncertainty, staying in education for longer periods can serve as a safe resort to avert becoming unemployed at a young age (Mills and Blossfeld, 2003). Given that education was predominantly public during both socialist regime and the post-transition period (Jemna and David, 2018), staying in education would have implied a relatively low cost on household expenditure, particularly for low-income families with stringent budget restrictions. On the other hand, children who were born in high-SES households might already achieve higher levels of education, regardless of the cohort size effect that is induced by the abortion ban. In that case, we expect women with lower-SES parents to be more likely to achieve higher levels of education if they were born after the abortion ban. This could presumably delay their entry in the labor market and their exit from parental home. Subsequently, low-SES women would be more likely to postpone union formation and childbearing. Therefore, alternatively, we predict that *the RCS effect to be stronger among women who were born in less educated families.*

Data and Methods

Data

Our analyses rely on two data sources. The first one is the Romanian Generations and Gender Survey (hereafter GGS), Wave 1. GGS is a nationally representative survey which collects retrospective data on fertility, marriage, cohabitation, contraceptive use, health and several socioeconomic indicators from individuals aged between 18 to 79 (Vikat et al., 2007), and it was conducted in Romania in 2005 on a sample of 11,986 individuals. We use information on gender, parental education, year and month of birth, number of children, age at leaving home, age at first marriage and age at first birth education. The month and year of birth of the respondent is essential to distinguish between individual who were born before and after the abortion decree. Since only Romanian women who were living in Romania got affected from the abortion ban, we exclude respondents whose mother do not have Romanian citizenship (79 observations) and respondents who were born abroad (10 observations). This, together with the exclusion of individuals with missing or improbable values (9 observations), results in a total sample size of 11,888. For gender and parental education, we divide our sample into four sub-groups, which consist of women and men with low-educated and highly-educated parents. We consider the highest educational attainment between the two parents and code parents below secondary education as *"less educated"* and the ones with secondary and above degree as *"highly-educated"*.

The second data source we use is the Romanian Census 2011 which was conducted by the Romania National Institute of Statistics, and disseminated by IPUMS-International [3]. IPUMS-I version of the Romanian Census 2011 contains information on a randomly-drawn 10 percent sample of the entire population. The questionnaire includes information on age, education, marital status of each member in a household, as well as the age at marriage and the number of ever-born children only available for women. In line with the GGS data, we drop the respondents who were born abroad (14,251 observations). As

[3]IPUMS-International is a data initiative which collects and distributes census data from around the world. Source: Minnesota Population Center. Integrated Public Use Microdata Series, International: Version 7.2 Romania Census 2011. Minneapolis, MN: IPUMS, 2019. https://doi.org/10.18128/D020.V7.2

a results, the total number of observations is 1,977,673. We make use of Census data in order to scrutinize the analysis on marriage market effect, particularly on the assortative mating dynamics after the abortion ban. Having information on the randomly-drawn sample of the entire population helps us to analyse thoroughly the age and educational differences among married couples and allow us to triangulate the results obtained using GGS data. To calculate the probability of marriage, we use information on the entire sample. Additionally, in order to have age and education information from both partners, we restrict our sample to only married and living together couples while estimating the impact on the age and educational homogamy. Finally in order to avoid duplications, we only consider female partners, since assortative mating can be studied with a focus on a specific gender, traditionally women. The number of observations in this restricted sample is 413,256.

Relying on the specification suggested by Pop-Eleches (2006), individuals who were conceived at most two months before the abortion ban were considered as being conceived during post-ban period, otherwise during pre-ban period. Before the abortion decree took place in December 1966, women can terminate their pregnancy via abortion within the first trimester. Since it can take more than a month for a woman to be aware of her pregnancy, we consider as the post-ban (treatment) group those children who were conceived from October 1966 onward (who were therefore born after June 1967). Throughout this study "post-ban" and "treatment" terms will be used interchangeably since the individuals who were born after the abortion ban are considered as "treated" by the sudden policy change.

In Table 2.1 and Table 2.2, we present the summary statistics of the outcome and the explanatory variables and their mean differences between the pre- and the post-ban groups. We provide summary statistics on the individuals who were born between 1962 and 1972 (5 years before and after the abortion decree) for GGS data and on the individuals who were born between 1964 and 1970 for Census data because, as we show in the Methods section, the maximum estimated bandwidths in the local regression analyses fall into these ranges.

Table 2.1 shows that age at leaving home and the number of children until age 35 are lower in the treatment (post-ban) group compared to the pre-ban group. Such decline in

	(1) Pre-ban	(2) Post-ban	(3) Difference (1)-(2)	(4) N
Female	0,494	0,515	-0.02	2321
Age at leaving home	21,66	20,96	0.70**	1999
Married	0,844	0,82	0.02	2321
Age at first marriage	23,32	23,16	0.17	1892
Age at first birth	24,42	24,25	0,17	1962
Log number of children	1,582	1,501	0.08***	2321
Parental level of education	0.308	0.411	-0.10***	2286
Higher education competed	0.124	0.115	0.01	2321

Table 2.1: Summary Statistics of the analytical sample - Generations and Gender Survey

	(1) Pre-ban	(2) Post-ban	(3) Difference (1)-(2)	(4) N
Female	0.497	0.492	0.01	286,327
Married	0.791	0.790	0.00	286,327
Age at first marriage	22.19	22.87	-0.68***	102,675
Age differences	3.822	3.206	0.62***	94,767
Educational differences	0.05	0.04	0.01**	94,767

Table 2.2: Summary Statistics of the analytical sample - Romanian Census 2011

fertility is in line with the Easterlin hypothesis, although the magnitude of that difference is rather small, that is 8%. Also, parents who had children during post-ban period exhibit significantly higher levels of education, which is consistent with the findings of Pop-Eleches (2006). Looking at the Table 2.2, we can see that age at first marriage is higher among women who were born during the post-ban period and the different is highly significant. Moreover, the age difference between partners is smaller for the treatment group. These descriptive information seems to confirm what the marriage market literature suggests. Overall, while these descriptive findings are relevant and informative, further analyses are required to test our hypotheses.

Methods

June 1967 constitutes the threshold to identify two groups of individuals: whose mothers' pregnancy was directly impacted by the abortion ban (*treatment*) and whose not (*control*). We exploit this break point using a similar design to regression discontinuity (RD hereafter) to estimate the effect of abortion ban on adulthood decisions (e.g. age

at leaving home, union formation and first birth) and fertility. If we were to deploy a classical RD framework, the identifying assumption would be that these two cohorts who were conceived around the cut-off point do not show any systematic differences other than their parents being exposed to an unexpected abortion ban. However, the literature has established that the extent to which Romanian women got affected by the abortion exhibit heterogeneity by their socio-economic background. Specifically, it has been shown that abortion was used as the primary family-planning method mainly by highly-educated, urban and older women in Romania before its prohibition (Pop-Eleches, 2006; Gutierrez, 2020). Therefore, the post-ban children were disproportionately born into higher-SES households. This self-selection into pregnancy by first-generation women might confound the causal relationship between relative cohort size and transition to adulthood outcomes. We acknowledge the inherently stratified preferences for abortion and for that exact reason our primary research interest is to investigate this heterogeneity by making use of the information on parental education available in our data source.

Another caveat to point out is about the McCrary density check. McCrary density check provides a formal test for manipulation of running variable by demonstrating its continuity around the cut-off point. Specifically, it should be impossible to precisely determine the allocation of the running variable on either side of the cut-off to assure the random allocation of the treatment (Lee and Lemieux, 2010). In our case, women should not predict the abortion decree and adjust their reproductive behaviors in accordance with. In other words, we should demonstrate that the probability of being pregnant in September 1966 is not statistically different from the probability of being pregnant in October 1966. However, GGS and Census data only allow us to observe the information on the month and year of birth. We make use of date of birth and go back 9 months from childbearing to approximate the month and year of conception, and by doing so we impose a discontinuity in our running variable at the threshold. To address this issue, we can make a minor twist in the validity assumption by suggesting that the probability of being born in June 1967 should be significantly higher than May 1967, since women cannot anticipate the abortion ban and have no other chance than giving birth. In order to test this assumption, first we control the mean number of births over the year of birth

descriptively. As presented in Figure 2.1, the average number of births from 1966 to 1967 exhibited a substantive jumps by almost doubling itself in one year.

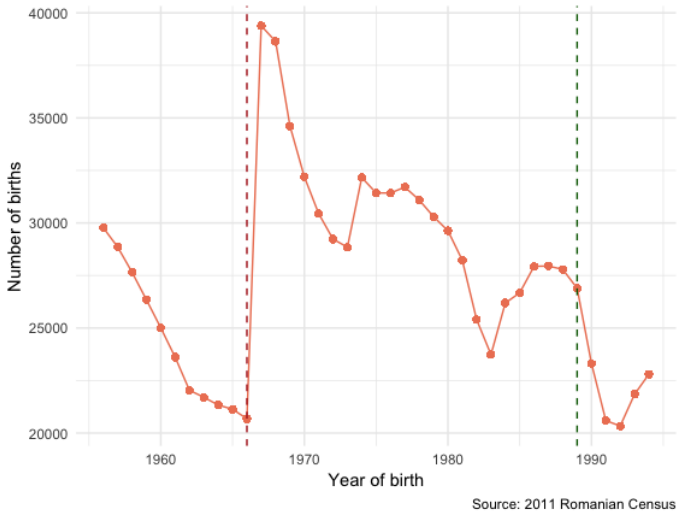
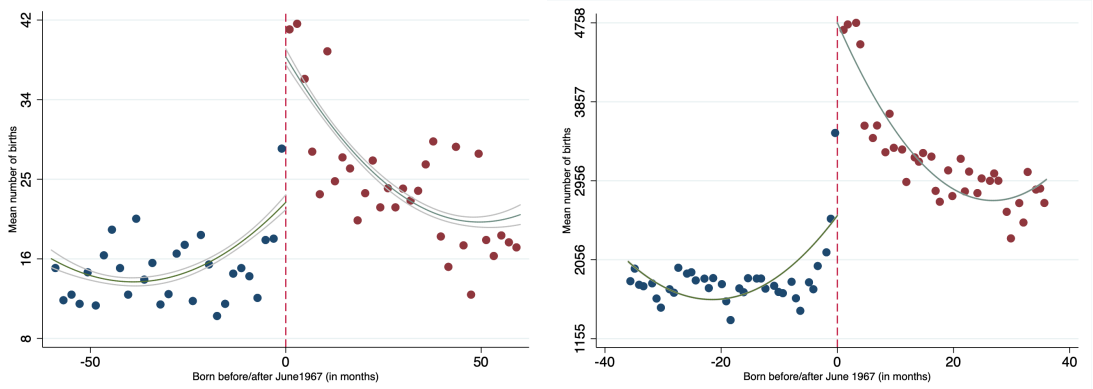


Figure 2.1: Number of births between 1955-1995 in Romania

To further check the unpredictability of the abortion decree, we plot two graphs using GGS and Census which show the mean number of births around the policy cut-off. As seen below in Figure 2.2, the number of births exhibits a large jump, implying that women could not foresee the abortion decree and anticipate their reproductive behavior.



(a) GGS

(b) Census

Figure 2.2: Mean number of births before and after the abortion ban

Below we present our "quasi-RDD" model, which measures the average treatment effect of the abortion ban

$$Y_i = \beta_0 + \beta_1 PostBan_i + f(x_i) + \varepsilon$$
$$\forall x_i \in (c-h, c+h)$$

where, Y_i is the dependent variable [4], $PostBan_i$ indicates the treatment status, x_i is the running variable (i.e., month of birth) and h is the bandwidth around the cut point c. Additionally, we control for month-of-birth fixed effects since the birth rate is higher in some months than the others regardless of the impact of abortion ban (Roenneberg and Aschof, 1990). For fertility, we consider number of children until the age 35 in order to avoid the mechanical effect of age on the quantum of fertility, and we consider as a dependent variable the transformation $ln(1 + \text{number of children})$.

We estimate the impact of abortion ban using local linear regression, and the optimal bandwidth is estimated following two different data-driven approaches which are typically used in RD framework. These methods provide stronger alternatives to the arbitrary bandwidth selection method that have been applied on the Romanian abortion ban so far (Pop-Eleches, 2006; Hjalmarsson et al., 2019; Gutierrez, 2020). First, we use Mean Square Error (MSE) optimality, and second Coverage Error Rate (CER) optimality. The MSE-optimal estimator is derived from a data-driven bandwidth selection procedure, which minimizes the asymptotic mean-square error of the point estimator, and then use this bandwidth choice for inference (Imbens and Kalyanaraman, 2012). The MSE-optimal bandwidth estimator is frequently used in empirical studies. On the other hand, Calonico et al. (2018) shows that MSE-optimal bandwidths lead to invalid confidence intervals, because they are too large to overcome the bias for valid inference. The CER-optimal estimator is used to overcome such bias, and we use results obtained from CER-optimal estimator as a robustness check, since it systematically produces narrower bandwidths.

[4]We use information on age at leaving home, age at first marriage, age at first child and number of children until age 35 both for women and men from GGS data. Additionally, we calculate prevalence of marriage, as well as age and educational differences between partners using Census data. Both data sources contain information on the marital status both for men and women and age at first marriage for women

Apart from the methodological considerations, using a narrower bandwidth allow us to prevent the overlapping effect of the dissolution of Soviet Union and the collapse of the regime. As literature suggests, the fall of the regime led to postponement in union formation and childbearing decisions mainly due to the subsequent economic uncertainty (Eberstadt, 1994; Ranjan, 1999; Sobotka, 2003). Therefore, using a narrower bandwidth will ensure that results are driven by the abortion ban and not by any other major exogenous shock. Lastly, we cluster standard errors at the month-year of birth in order to accommodate for the specification error in the running variable (Lee and Card, 2008).

Results

Descriptive evidence

Before proceeding the regression analysis results, we present the evolution of age differences between wife and husband across the all waves of Romanian census data. Using Figure 2.3, we show that there has been no significant shift in age differences between partners almost over the past four decades. More precisely, the average age difference between husband and wife is 3.5 years in the 2011 Census, as opposed to 3.63 in the 1977 Census. As discussed in the theoretical framework part, research on Europe suggest that as women achieve higher levels of education, the prevalence of both age and educational hypergamy would decrease. However for the Romanian case, it seems that women prefer to form unions with older man regardless of their educational background and that such preference actually persisted over time. Based on this evidence, our expectations on age hypergamy is somewhat confirmed. Thus, it is plausible to expect that women who were born in larger cohorts would either postpone the timing of marriage or they mate with younger men.

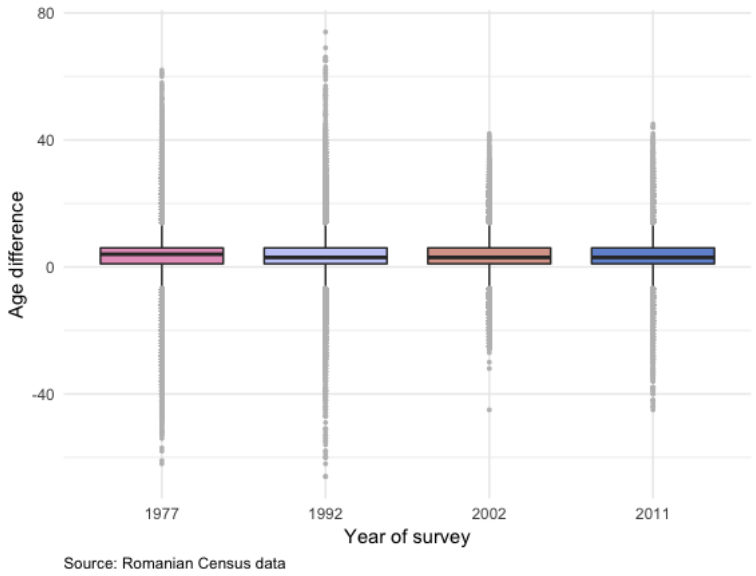


Figure 2.3: Age difference between married couples by Census year

Relative cohort size

Table 2.3 presents results on the Easterlin effect, i.e. the average effect of the abortion ban on a number of outcomes: age at leaving home, probability of getting married, age at first marriage, age at first birth, and number of children up to age 35. Within both the MSE and CER bandwidths, the impact of restrictive abortion measures is not statistically significant for age at leaving home, first marriage and the number of children. On the other hand, individuals who were born after the abortion ban give their first birth 0.87 years later than those who were born before the decree, and this difference is statistically significant. Moreover, the effect is even larger and more significant when estimated within a smaller bandwidth. Specifically, individuals who were born within the third year after the abortion ban (bandwidth is estimated as 36 months) have their first child 1.1 years later, on average.

At first glance, individuals who were born right before and right after the abortion ban seem to have experienced relatively similar patterns in the transition to adulthood. However, individuals in the post-ban group became parent significantly later compared with the pre-ban group. Still, the abortion ban affects only the timing of fertility, since we do not find a significant difference between the two groups in terms of quantum (i.e.,

number of children).

Outcome variables	(1) Linear RD	(2) Bandwidth[1]	(3) Obs.	(4) Mean	(5) Linear RD	(6) Bandwidth [2]	(7) Obs.	(8) Mean
Age at leaving home	0.609	47	1643	21.21	0.768	34	1199	21.23
	(0.551)				(0.564)			
Probability of marriage	0.039	47	1882	0.83	0.042	34	1395	0.83
	(0.027)				(0.027)			
Age at first marriage	0.357	60	1862	23.20	0.368	43	1409	23.03
	(0.271)				(0.267)			
Age at first birth	0.866**	50	1673	24.27	1.102***	36	1292	24.16
	(0.341)				(0.353)			
Number of children (log)	0.005	50	2020	1.53	-0.011	36	1518	1.53
	(0.034)				(0.0332)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. In all specifications, month of birth is included as a control variable.
[1] MSE-optimal bandwidth selector
[2] CER-optimal bandwidth selector.

Table 2.3: Average effect of the abortıon ban on life-course events

Intersection with gender

Table 2.3 reports the effect of abortion ban on transition to adulthood outcomes for women only. We find that women who were born during the post-ban period leave the parental house 1.5 years later, defer marriage decisions by almost 1 year and give birth to their first child 1.1 year later compared with their counterparts who were born during the pre-ban period. The impact of abortion policy is sizeable among women and highly significant even within a smaller bandwidth. By contrast, Table 2.4 shows the findings for men. Men who were born during the post-ban period marry 0.7 years before compared to their counterparts who were born during the pre-ban times. This effect is also significant within a narrower bandwidth. Despite the early marriage, age at first parenthood do not exhibit a significant differences between pre- and post-ban groups. Lastly, both in women and men samples, the effect of abortion ban is insignificant effect on the number of children until age 35.

Outcome variables	(1) Linear RD[1]	(2) Bandwidth	(3) Obs.	(4) Mean	(5) Linear RD [2]	(6) Bandwidth	(7) Obs.	(8) Mean
Age at leaving home	1.495***	40	734	19.79	1.244***	29	562	19.94
	(0.407)				(0.386)			
Probability of marriage	-0.010	56	1062	0.84	-0.001	40	809	0.83
	(0.029)				(0.028)			
Age at first marriage	1.141***	68	1003	21.69	0.809**	49	766	21.60
	(0.336)				(0.327)			
Age at first birth	1.114**	55	936	22.94	0.887*	40	718	22.75
	(0.433)				(0.455)			
Number of children (log)	-0.082**	50	1117	1.60	-0.014	36	856	1.60
	(0.038)				(0.034)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. In all specifications, month of birth is included as a control variable.
[1] MSE-optimal bandwidth selector
[2] CER-optimal bandwidth selector.

Table 2.4: The effect of the abortion ban on women's life-course events

Outcome variables	(1) Linear RD[1]	(2) Bandwidth	(3) Obs.	(4) Mean	(5) Linear RD [2]	(6) Bandwidth	(7) Obs.	(8) Mean
Age at leaving home	-0.920	73	1157	22.57	-0.981	52	888	22.65
	(0.706)				(0.761)			
Probability of marriage	0.076	50	1046	0.83	0.081	36	779	0.83
	(0.056)				(0.059)			
Age at first marriage	-0.701**	78	1189	24.81	-0.855**	56	920	24.83
	(0.345)				(0.335)			
Age at first birth	0.251	80	1213	25.82	0.172	58	928	25.85
	(0.351)				(0.359)			
Number of children (log)	0.084	48	1007	1.45	0.041	35	733	1.47
	(0.068)				(0.069)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. In all specifications, month of birth is included as a control variable.
[1] MSE-optimal bandwidth selector
[2] CER-optimal bandwidth selector.

Table 2.5: The effect of the abortion ban on men's life-course events

We complement the previous analysis with GGS data by conducting further analyses using Census data. Additionally, we analyze the change in age and educational differences between wife and husband which will provide us some insights on the prevalence of assortative mating. Table 2.6 reports the findings obtained using the Romanian Census data. These data allow us to further investigate marriage market dynamics, focusing on the probability of getting married and age and educational differences between married partners.

First of all, in line with the GGS results, the age at first marriage increases among women who were born after the abortion ban (see Table 2.4) albeit the magnitude of the effect is smaller in census data. The reason for such difference in terms of magnitude can be attributed to the differences in the estimation of the optimal bandwidth. Since the number of observations in Census data is at least 40 times greater than the GGS, it allows us to estimate the effect of abortion ban using a narrower bandwidth, which reduced the potential bias. Specifically, women who were born after the abortion ban marry, on average, 0.27 years later compared to their counterparts who were born before the prohibition.

Furthermore, the probability of getting married for post-ban women declines by almost 2 percent whereas the probability of getting married for post-ban men appears to be unaffected by the relative cohort size.

In order to explore homogamy and hypergamy as potential mechanisms for marriage market effect, we compare the age and educational differences between spouses whose female partner was born before the ban with the one who were born after the ban. We observe that intra-couple age differences declines by 14% for women who were born after the ban. In addition to this, educational differences between spouses shrinks by 3.4 percent, again for the post-ban women. Indeed, the findings obtained from Census data suggest that women who were born after the ban are less likely to form hypergamic unions which could result in either postponement of marriage or decline in the probability of getting married.

To scrutinize our analysis, we provide two robustness checks. First, we compare our GGS estimates with the ones obtained using Romanian census data. The two data sets are

Outcome variables	(1) Linear RD[1]	(2) BW	(3) Obs.	(4) Mean	(5) Linear RD [2]	(6) BW	(7) Obs.	(8) Mean
Prob. of marriage (men)	-0.000	45	110152	0.78	0.000	32	81009	0.79
	(0.005)				(0.005)			
Prob. of marriage (women)	-0.016***	53	124889	0.8	-0.015***	37	92417	0.8
	(0.005)				(0.005)			
Age at first marriage	0.289***	25	47486	22.61	0.269***	18	34128	22.67
	(0.034)				(0.034)			
Age difference	-0.057	22	37601	3.5	-0.144**	16	28549	3.47
	(0.071)				(0.063)			
Education difference	-0.020***	20	34429	0.04	-0.037***	14	25185	0.05
	(0.005)				(0.002)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. In all specifications, month of birth is included as a control variable.
[1] MSE-optimal bandwidth selector
[2] CER-optimal bandwidth selector.

Table 2.6: The effect of the abortion ban on marriage market outcomes using Romanian Census 2011

complementary in terms of their distinct focus on the main adulthood events and marriage market dynamics. On the other hand, they both contain information on the marital status and the age at first marriage. So far, within their own optimal bandwidth, the GGS and the Census exhibit consistent evidence regarding the probability of marriage and age at first marriage. We present the robustness check results in Appendix **??**, with three panels in which we compare graphically the point estimates obtained from using both GGS and Census data. One should note that we are unable to show the point estimates on age at first marriage for men simply because the census data contains this information only for women. Moreover, we estimate the impact of abortion ban on the probability of marriage and age at first marriage using the Census data but within the optimal bandwidth of GGS. The results obtained from census data corroborates the findings of GGS data, albeit with a smaller magnitude.

The economic and social transformation which took place in Eastern European countries after the dissolution of Soviet Union has been associated with postponement of union formation and childbearing decisions (Sobotka et al., 2003; Kotowska et al., 2008; Mureşan et al., 2008). Therefore our results might be reflecting a combined effect of the relative cohort size and the regime change on adulthood life-course decisions. We have already addressed this concern by estimating our models within narrower bandwidths. As an

additional robustness check, we restrict our analysis on marriages and births which took place after 1989 to rule out any potential heterogeneous effect of the regime collapse on pre- and post- ban individuals. We present the results in Appendix **??**, separately for the full, female-only and male-only samples. We do not observe any significant differences with respect to age at first marriage across all samples. However, on average, post-ban individuals do postpone their childbearing decisions by almost 1.5 years after 1989 and this effect is observed to be entirely driven by males who decided to have their child during post-1989 period. Consequently, while our results for female sample remained robust to the impact of the political turnover, the findings for male sample should be interpreted more cautiously.

Intersection with gender and parental SES

Table 2.7 and Table 2.9 report results for women who were born in low-educated and highly educated families, respectively. For the sake of simplicity, we here present only findings for women [5]. On average, women with lower-SES parental background leave home later by almost 2 years, postpone their union formation and childbearing timing by more than a year and have lower fertility compared to their pre-ban counterparts. All findings are robust to a narrower bandwidth selection except age at first birth. The probability of getting married is lower among post-ban women with lower-SES parental background, but the effect is insignificant.

On the other hand, as seen in Table 2.9, the effect of abortion ban on adulthood life-course outcomes is not statistically significant for women who were raised in high-SES families. Within a narrower bandwidth, the probability of getting married increases by almost 15% for high-SES women who were born after the abortion decree. Consequently, we show that the gender effect observed in our previous steps is entirely driven by women with low-SES parental background.

[5] Estimation results for men are reported in Appendix **??**

Outcome variables	(1) Linear RD[1]	(2) Bandwidth	(3) Obs.	(4) Mean	(5) Linear RD [2]	(6) Bandwidth	(7) Obs.	(8) Mean
Age at leaving home	1.934***	41	454	19.11	1.494***	30	359	19.12
	(0.571)				(0.531)			
Probability of marriage	-0.044	84	896	0.84	-0.025	60	683	0.85
	(0.038)				(0.040)			
Age at first marriage	1.255***	59	561	20.87	0.944**	42	425	20.8
	(0.438)				(0.460)			
Age at first birth	1.172**	50	524	22	0.843	36	417	21.95
	(0.547)				(0.575)			
Number of children (log)	-0.091**	52	598	1.65	-0.080**	38	458	1.66
	(0.036)				(0.037)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. In all specifications, month of birth is included as a control variable.
[1] MSE-optimal bandwidth selector
[2] CER-optimal bandwidth selector.

Table 2.7: The effect of abortion ban on the life-course events of women with lower parental education

Outcome variables	(1) Linear RD[1]	(2) Bandwidth	(3) Obs.	(4) Mean	(5) Linear RD [2]	(6) Bandwidth	(7) Obs.	(8) Mean
Age at leaving home	0.293	85	489	21.37	0.237	62	377	21.48
	(0.826)				(0.931)			
Probability of marriage	0.113	54	386	0.82	0.145*	39	303	0.81
	(0.070)				(0.081)			
Age at first marriage	-0.326	80	424	22.66	-0.480	59	327	22.86
	(0.739)				(0.858)			
Age at first birth	-0.266	65	377	24.29	-0.647	48	306	24.25
	(0.791)				(0.832)			
Number of children (log)	0.075	61	416	1.51	0.122	44	335	1.51
	(0.092)				(0.104)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. In all specifications, month of birth is included as a control variable.
[1] MSE-optimal bandwidth selector
[2] CER-optimal bandwidth selector.

Table 2.8: The effect of the abortion ban on life-course events of women with higher parental education

A potential mechanism: Education

As the last step of our analysis, we aim at uncovering education as a probable mechanism which mediates the intersectional effects of RCS on adulthood life-course outcomes. During the socialist period in Romania, education was free and centrally controlled.

In doing so, we make use of two data sets, Romanian Census 1992 and GGS, and

estimate the impact of the abortion ban on the probability of completing high school and university by gender and parental-SES.

An advantage of GGS is to collect information on both parents' education and to provide final educational outcome of the population of interest since it was conducted during their adulthood years. On the other hand, the Census data provides information on parental education as long as they dwell in the same household with their children. Thus, to capture as much as "next generation" individuals residing with their parents, we draw on an older version of Census conducted in 1992.[6] However, one should remark several caveat of this data: Since leaving parental house is an endogenous decision, our sample is likely to be selective. Also, considering the survey year, some individuals can be pursuing their education, therefore it will be difficult to observe the final educational outcome. For that very reason, we focus on the probability of completing high-school while working with the Census data.

We estimate the impact of abortion ban on the probability of completing secondary and higher education relying on the Census 1992 and GGS, respectively. The results obtained from both data sources are consistent with each other and somewhat complementary to one another. For the sake of simplicity, we solely present our findings on women.[7] According to the upper panel (Panel A), women born after the abortion ban into low-SES families are more likely to complete both high-school and university, although the effect on university degree remains slightly significant. On the other hand, we do not find any statistically significant impact of the abortion ban on the educational outcomes of women with higher parental SES. In the light of our findings, we show evidence in favor of Hypothesis 4B and conclude that the burden of RCS is more evident among women with lower parental education, which leads them postpone their transition to adulthood by increasing the probability of staying in education and in parental home for a longer period.

[6]The descriptive statistics of the Romanian Census 1992 is presented in the Appendix D
[7]Estimation results for male sample can be found in Appendix section D

	(1) Linear RD[1]	(2) BW	(3) Obs.	(4) Mean	(5) Linear RD[2]	(6) BW	(7) Obs.	(8) Mean
Panel A: Low parental SES								
High school	0.050***	32	11651	0.61	0.058***	23	8419	0.62
	(0.018)				(0.013)			
University	0.030*	65	720	0.03	0.026*	47	541	0.04
	(0.015)				(0.016)			
Panel B: High parental SES								
High school	0.005	20	6513	0.81	-0.009	15	4807	0.8
	(0.014)				(0.012)			
University	0.065	75	494	0.27	0.061	55	390	0.29
	(0.018)				(0.013)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. In all specifications, month of birth is included as a control variable. The probability of completing high school is estimated using Romanian Census 1992 while the probability of completing university is estimated using Generations and Gender Survey 2005

[1] MSE-optimal bandwidth selector

[2] CER-optimal bandwidth selector.

Table 2.9: Probability of completing high school and university for women, by parental background

Discussion and Conclusion

According to Teitelbaum (2015) many governments actively implement a range of "strategic demography" through deploying fertility, mortality, or migration policies as key instruments of national policy. Former Soviet states stand out as a prominent example of how pro-natalist policies were executed with the intention to increase labor supply, to ensure economic expansion and the consolidation of the regime. However the policy-induced boost in birth rates in Eastern Europe did not appear to be sustainable in the long-term, mainly due to more efficient contraception practices and consultation to illegal abortion services within or outside the country (David, 1982). In this paper, we investigate on the case of the Romanian abortion ban implemented in October 1966.

Despite being a short-sighted policy targeting to boost fertility rates, its spillover effects are discernible over the next generation's life-course. In light of our findings, individuals who were born after the abortion decree tend to postpone their childbearing decisions. Moreover, the increase in cohort size due to the restrictive abortion measures lead women to have a slower transition to adulthood which is visible in all life-course out-

comes: leaving home, marriage and fertility. Having said that, this study also provides further evidence on the intersectional inequalities over the life-course, by showing how the cohort size effect on the next generation's family outcomes is gendered and socially stratified. We indeed find that the overall postponement of the transition to adulthood observed in the post-ban generation is mainly driven by women who were born in lower-SES families. This confirms our expectations on women from lower social class disproportionately bearing the burden of relative cohort size. However, the uncertainty about the future induced by larger cohorts is not necessarily engender adverse consequences on the affected population. For instance, we show that women with low parental-SES are more likely to complete high-school and university if they were born in larger cohorts. This longer stay in education can potentially be attributed to universal public schooling in socialist Romania. As a result, women from low-SES families stay longer in parental home and postpone their union formation and childbearing.

A closer look upon the marriage market dynamics allows us to find evidence in favor of a "marriage squeeze" phenomenon during the post-ban period. The increase in cohort size favors post-ban men to marry earlier compared with their counterparts who were born before the abortion ban. This is actually an unexpected finding not in line with the Easterlin hypothesis. Instead, the functioning of the marriage market is particularly insightful to account for the just-mentioned piece of evidence. Since the age-hypergamy persisted over time in Romanian marriage market, the chances for men to mate with younger women are higher as the enactment of abortion ban generated a larger and younger cohort. On the other hand, our findings reveal that post-ban women are slightly less likely to get married and they postpone their union formation to later ages. This is, again, an expected consequence of the inherent hypergamy in Romanian marriage market, in which younger women may face a shortage of older men. Our analysis of the marriage market dynamics also suggests that age and educational differences between partners decline if the female partner is born after the abortion decree.

We acknowledge that an increase in the relative cohort size reflects only a part of the story of the Romanian abortion ban. The surge in abandoned and institutionalized children mirrors another notable consequence of the abortion decree which has been typi-

cally touched upon by the existing literature (Pop-Eleches, 2006; Mitrut and Wolff, 2011; Gutierrez, 2020). While following a stringent pro-natalist agenda, Romanian government was falling short of providing economic and health assistance to support families, which brought child abandonment as an alternative solution particularly for low-income families. Although it is not official, around 100.000 children were abandoned or institutionalized during the period in which abortion services were prohibited (Morrison, 2004). Being an unwanted child amounts to be raised in large households, where parental resources are scarce. Moreover, in the case of unwanted pregnancies, mothers may delay prenatal care or may be reluctant to take care of their health (Cheng et al., 2009). Thus, restrictive abortion law may lead to an increase in the number of pre-term births or low birth-weight infants, which is suggested as an important predictor of long-term inequality (Aizer and Currie, 2014). Essentially, unwantedness mechanism entails a similar theoretical implication as the relative cohort size because it directly impacts parental investment which, later on, translates into the postponement of adulthood life-course events. In other words, we expect the direction of the "unwantedness effect" to be similar to the relative cohort size effect. However the former is unfortunately untestable, due to lack of reliable comprehensive data on abandoned and institutionalized children and the timing of their life-course events in Romania.

In conclusion, the present paper is an effort to reveal the causal impact of relative cohort size on an individual's transition to adulthood through the lens of gender and social stratification. In so doing, we provide evidence in favor of the Easterlin hypothesis and shed further light on gender and socioeconomic gradient in transition to adulthood dynamics in Romania during the post-socialist era. Our results underline the importance of embracing an intersectionality approach to study relative cohort size and its repercussions over the life-course. We hope that this paper contributes to spark further interest in intersectionality perspective within the life-course approach and demographic research, in broader terms.

Chapter 3

Women's Status and the Evolution of Son Preference in Turkey

Introduction

Son preference is one of the most embedded forms of gender inequality, as it reflects how gender-based discrimination starts at a very early stage of life. Historically, the emergence of son preference is linked to lower economic and social value of having a daughter vis-a-vis having a son. Deeply-rooted patriarchal culture, which manifests itself in traditional family practices such as bride price, women's seclusion and caregiver role undermine daughters' economic and social value (Das Gupta et al., 2003). Son preference, as reproductive behavior, is practiced in two forms; *sex-selective abortion* which means to terminate pregnancy based on gender of the fetus and *differential stopping behavior* which implies to continue childbearing until the desired number of sons is reached. The immediate consequence of sex-selective abortion practice is the distortion of the sex ratios at birth (hereafter SRB) in favor of males, which was observed, e.g., in China, South Korea and India (Basu and De Jong, 2010) . Differential stopping behavior (DSB hereafter), on the other hand, is considered as an implicit form of son preference which do not have direct effects on SRB but it leads girls to be raised in larger families with limited resources allocated to them (Rosenblum, 2013; Kashyap and Behrman, 2020).

Depending on the social context, son preference can be practiced by diverse social strata and in different forms. For instance, while DSB is more pronounced among rural, less-educated and low-income population within China (Murphy et al., 2011), India, Egypt (Basu and De Jong, 2010), and Vietnam (Pham et al., 2012), sex-selective abortion is likely to be observed among wealthier, urban, and more educated families in India (Jha et al., 2006). In the context of fertility decline, this reflects the way in which urban and high-income families reconcile their preference for sons with smaller family size through having better access to ultrasound technology enabling sex-selective abortion (Kashyap, 2019). On the other hand, fertility decline and son preference via DSB are virtually incompatible as couples pursue their desire for sons through having additional children, though the recent evidence on the evolution of DSB over generations remain inconclusive. While the effect of DSB on fertility dynamics and gendered parental investment almost disappeared among the recent cohorts living in South Korea (Choi and Hwang, 2020), fertility behavior in Bangladesh is still persistently shaped by son preference (Asadullah et al., 2021). Moreover, even though DSB is a socially stratified practice, none of these studies have looked into how the DSB has evolved over time among different socioeconomic groups.

In this article, I study the evolution of DSB from a stratification perspective in the context of Turkey where parents exhibit their preference for son via son targeting fertility behavior [1] [2]. Accordingly, the number of children in families with firstborn daughters are 6.7% larger than in families with firstborn sons and the sex ratio at last birth highly male-skewed (Altindag, 2016).

Turkey represents a perfect context to study the stratified evolution of DSB given its substantial economic, demographic and cultural transformations during the past 50 years. The secularization process that took place in the first decade of Turkish Republic in late 1920s and early 1930s has brought an array of empowering rights to women, including suffrage and right to divorce which were considered as revolutionary for its era (Engin and Pals, 2018). However, this modernization process has been criticized to be rather a

[1] Sex selective abortion is not a common practice is Turkey given the legal gestational limit for abortion is 10 weeks and sex ratios at birth are balanced across birth parities (Altindag, 2016)

[2] Throughout the text, DSB and son targeting fertility behavior are used interchangeably.

top-down change introduced by the government of the time to claim its position among Western democracies and it has not internalized equally by all parts of the population (Arat, 2000). Women empowerment was disproportionately internalized by educated and urban Turkish women while leaving rural and poor women, which constituted the majority of the population at the time, out of the picture (Kandiyoti, 1987). The second half of the 20th century characterized by a significant economic and social transformation for Turkey via increased levels of education, a rapid wave of urbanization, increased female labor force participation and persistent decline in fertility (Ergöçmen, 2012). The education reforms that took place in the late 90s targeted poorer and rural parts the population and had empowering effect on women by increasing their bargaining power on marriage and contraceptive decisions and decreasing the the prevalence of bride price especially among women coming from low-SES parents (Gulesci and Meyersson, 2012). Furthermore, women's economic empowerment has become even more widespread among the younger share of the population, as the least-educated women among the younger cohorts are more likely to participate in labor force compared to their older counterparts (Tunalı et al., 2021). As consequence, Turkey's economic and social transformation is accompanied by attitudinal change in women's status and gender equality which also transformed social and economic value attributed to children and to daughters, in particular. Accordingly, material and utilitarian values attributed to children were replaced by emotional values (Kagitcibasi and Ataca, 2005).

This study intends to contribute at the extensive literature of son preference in two ways. The *first* contribution is to document the evolution of son preference in Turkey across different birth cohorts. While the prevalence of son preference in Turkey has been well-documented previously (Unalan, 1993; Altindag, 2016), its evolution across different cohorts has not been studied yet. Evidence from Turkish immigrants living in Germany shows that even though first-generation Turkish immigrants are more likely to continue childbearing after having two firstborn daughters, the salience of son-biased fertility behavior is diminishing across subsequent generations (Carol and Hank, 2020; Ezdi and Baş, 2020). These findings signal that increased educational attainment and socialization with gender-egalitarian norms could help to weaken gendered fertility preferences and bring

up the question on to what extent DSB can persist among the newer cohorts living in Turkey.

The *second* contribution contribution is to study the evolution son preference, particularly DSB, from a social stratification perspective. This constitutes an important gap in the knowledge since the gendered social norms are not necessarily shared by the entire population, nor the pace of social change is equally diffused across different social groups. For instance, while gender-egalitarian practices are better internalized by the higher-educated individuals (Raley et al., 2012), the diffusion of egalitarian gender norms take longer time in societies with higher level of social inequality and stratification compared to more equal ones (Esping-Andersen and Billari, 2015). Moreover, the social and economic cost of having an additional child can vary both by socioeconomic groups and over time. These social difference might become even more visible in a context of fertility decline, as couples who pursue having children to adhere son preference norms are becoming increasingly selective. Therefore, investigating the societal change in values and practices "on average" can conceal substantial heterogeneous dynamics which can be only uncovered only by adapting stratification perspective. From a policy viewpoint, a stratification perspective can be also instrumental to target sub-populations that still follow strong son preference and to design effective policies to close down gender gap.

Background and Hypotheses

Settersten Jr and Mayer (1997) define norms as "prescriptions" and "proscriptions" about human behavior representing what should or should not be done. Social norms can be illustrated as external forces influencing and shaping individuals' behaviors and decisions. Individuals, as social-beings, socialize with norms since childhood and they are generally expected to adhere to these explicit or implicit practices, rules or anticipations throughout their lives (Bachrach, 2014). Even though the impact of social norms in shaping individuals behaviours are argued to be declining in post-industrial societies, a number of studies providence evidence on the relevance of social norms on determining demographic behaviors (Liefbroer and Billari, 2010; Van Bavel and Nitsche, 2013; Myong et al., 2018).

Son preference is argued to be the outcome of patriarchal social norms and institutions reinforcing the inferior social position of women (Pande and Astone, 2007). There has been a well-established literature showing how preference for sons impacts reproduction both in the form of sex selective abortion (Qian, 2008; Guilmoto, 2012; Kashyap and Villavicencio, 2016; Chao et al., 2019) and differential stopping behavior (Basu and De Jong, 2010; Altindag, 2016; Kim and Lee, 2020). For what concerns the latter, mothers who have a firstborn daughter are less likely to use contraception compared to the ones who have firstborn sons (Yount et al., 2000; Channon, 2015) Nonetheless, the way son preference influence individual's behavior is not limited to reproductive outcomes. Parenting styles and parental investment on children's health and education are shaped by children's gender (Raley and Bianchi, 2006; Kashyap, 2019). In the context of Turkey, it has been shown that mothers with sons are more likely to wear religious veil to foster family reputation as compared to mothers with daughters (Aksoy, 2017).

What makes norms to be binding and self-enforcing are the informal sanctions attached to norm-violating behavior. These sanctions can be socially both rewarding and punishing. In the rural Turkey of mid-20th century, child bearing of male child strengthens woman's status within her husband's family and ensures her fuller acceptance by the in-laws especially for patrilocal resident couples (Kandiyoti, 1987). In the U.S., having all sons are associated with higher levels of marital happiness as compared to couples with equal number of sons and daughters, or more daughters than sons (Dahl and Moretti, 2004). On the other hand, not having sons can imply costs that are contingent on the context. For instance, having daughters is associated with higher probability of divorce in the U.S. (Dahl and Moretti, 2004) while it increases the likelihood of entering polygynous unions in Nigeria (Milazzo, 2014).

Changes in social norms occur when there is a substantial economic, demographic or/and social changes take place within the populations (Bachrach, 2014). Recent evidence from South Korea show that as the economic and social value of sons and daughters are becoming increasingly similar, sex-selective abortions and differential stopping behavior have started to disappear among the recent cohorts (Choi and Hwang, 2020). The weakening of son preference is getting more pronounced in Southeast Asia including in

China and in India, contexts characterized by persistent son-preferring fertility practices in the past decades (Tavassoli, 2021). Increasing access to media allows women to be exposed to modernizing ideas which improved social perception on women's status (Pande and Astone, 2007). Additionally, according to the "Second Demographic Transition" perspective weakening of son preference can be partially explained by the declining influence of social norms on individual behavior in (post)-industrial societies (Lesthaeghe and Neidert, 2006)

Since the second half of the 20th century, Turkish society has undergone substantial economic and socio-demographic transformations. In the wake of WW2, population growth had brought momentum to rural-to-urban migration (Arat and Pamuk, 2019). Accordingly, the share of population living in the urban areas went up from 18 percent in 1950 to almost 80 percent in 2018 (Hacettepe University Institute of Population Studies, 2019). This rapid wave of urbanization had two major consequences which paved the way of the fertility decline: (i) improved access to education and overall educational attainment especially for women and (ii) adaptation to urban reproductive norms favouring lower levels of fertility and efficient use of modern contraception. For instance, increasing educational attainment in the younger cohorts explains about the half of the decline in completed cohort fertility in Turkey during the second half of 20th century (Greulich et al., 2016). Moreover, rural-to-urban migration have created a social environment where islamic traditionalism encounter with urban-based relatively modern values and lifestyles (Cindoğlu et al., 2008). Indeed, fertility transitions and modern contraception take-up of internal migrants are found to become similar to urban locals which suggests adaptation to new reproductive norms on fertility and contraception along with wider availability of healthcare and family planning services (Eryurt and Koç, 2012; Erman and Behrman, 2021). As a consequence, fertility rates declined sharply and the replacement level was reached in the early 2000s. Such socialization effect has also transformed social and economic value attributed to children. The utilitarian/economic motivation behind childbearing, which is more prevalent among rural families, has progressively been replaced with the emotional value of having children (Kagitcibasi and Ataca, 2005). In the wake of this significant social transformation, I expect that *the impact of son preference on*

fertility level declines across birth cohorts in Turkey (Hypothesis 1).

However, neither social norms nor the informal sanctions accompanying their transgression are necessarily shared by the entire population. Instead, people's behaviors are more likely to be influenced and shaped by the social norms of the reference group they belong to (Merton, 1968). For instance, gender egalitarian values and attitudes exhibit sharp differences across levels of education, in particular the embrace of gender egalitarianism is less visible within the less educated population in Europe (Esping-Andersen, 2016) and in Turkey (Ozdemir-Sarigil and Sarigil, 2021). Being a direct reflection of gender inequality, son preference is also stronger among low-SES individuals (Pande and Astone, 2007) and have less influence on fertility dynamics of highly-educated groups (Murphy et al., 2011).

The socio-demographic transition of Turkey did not follow equal trajectory among the entire population. Different groups of the population have been affected by social and cultural changes in different ways and at varying paces (Yavuz, 2006). For example, rural-urban, gender and income disparities were directly reflected in the level of education obtained. To that end, the education reform took place in 1997, increasing the compulsory education from 5 years to 8 years, targeted mostly girls living in rural areas and within poorer households. This reform has been effective in postponing mean age at first birth, reducing teenage pregnancies, increasing women's bargaining power within the marriage and on contraceptive decisions (Gulesci and Meyersson, 2012; Kırdar et al., 2018). Moreover, the same reform led to increase in self-employment and decline in the prevalence of bride price, a traditional practice reflecting inferior social status of women and daughters, especially among women coming from low-SES parents. More recently, Erten and Keskin (2021) show that Turkish women who have benefited from compulsory education reform have better awareness of laws and public services that are designed to reduce gender inequalities and prevent domestic violence. They also show that women are more likely to reach information from newspapers, journals and books which is consistent with the evidence indicating that better access to media outlets contributes to the diffusion of modernizing values. As a result, I posit that *the declining effect of son preference on fertility levels is driven by the low-educated population (Hypothesis 2).*

As Turkey enters the last phase of demographic transition, fertility preferences of

women are greatly shaped by two-child norm. For instance, the ideal number of children for women who completed at least high school education is reported as 2.5 while it raises up to 3.3 children for women with less than secondary education. Moreover, stronger desire to stop childbearing is becoming increasingly more evident among women who have two living children. According to latest wave of TDHS collected in 2018, 69 percent of women with two children declared that they do not want to continue childbearing. The same rate is measured as 27 percent for women with one child. As two-child norm is becoming more widespread mothers with three and more children constitute a group with specific motivations (Yavuz, 2006). Indeed, in a social context that has been increasingly characterized with two-child norm, pursuing for a son can be considered as a special motivation behind having the third child. Hence, I postulate that *the impact of son preference is visible in transition to third birth, albeit with a declining trend as cohorts get younger (Hypothesis 3).*

Data

I make use of six available waves of Turkish Demographic and Health Survey (hereafter TDHS) that are collected every five years between 1993 and 2018. TDHS is a nationally representative survey that collects data on fertility, marriage, reproductive health, gender and several socioeconomic indicators and it has been conducted in Turkey every five years since 1993. The target population of this survey is ever-married women aged between 15 and 49, while the last two waves (2013 and 2018) include single women as well. However the questions on fertility are only collected for ever-married women. I pool all waves together and then select women with at least one child, regardless of their marital status. From these groups, I exclude cases in which children that are not alive and mothers with twin children in order not confound the order of births. Among the remaining respondents, 28120 of them carry complete information on all the variables that are used in the analysis and they constitute the final number of observations of the analytical sample.

Dependent and independent variables

Three different, however complementary, *dependent variables* are used in the main analysis. The first one is the total number of living children. Considering the information on number of children, I generate two other binary dependent variables indicating whether the respondent have prog to the second and third births. In particular, these variables identify (i) whether the respondent has transitioned from first to the second birth and (i) whether the respondent has transitioned from second to the third birth. As the *main independent variable*, I rely on gender of the first child. First, I re-calculate the order of births after having removed non-living children. Then I generate a dummy variable that takes 1 if the firstborn child is a female and 0 if the firstborn is a male. Moreover, as complementary to the main independent variable, I create another dummy variable coded 1 if the respondent gave birth to two consecutive daughters and 0 if the firstborn is a daughter and the second one is a son. This variable substitutes gender of the firstborn as main independent variable in the analyses estimating the probability of having the third child. In order to measure how the gender of the firstborn (or the first two parities) affects fertility behavior across different generations, I generate a categorical variable consisting of five-year birth cohorts. In total, I generate 6 five-year birth cohorts as follows: *1954-1958, 1959-1963, 1964-1968, 1969-1973, 1974-1978, 1979-1983*. Birth cohort plays a moderating role in the relationship between son preference and fertility dynamics. Table 3.1 reports the summary statistics of the dependent variables and moderators used throughout the analysis by gender of the firstborn.

Control variables

In the absence of prenatal manipulation through sex selective abortion, the gender of the firstborn child is considered to be randomly assigned. However, the childbearing decision in the first place could be correlated with some obversed socio-economic and demographic characteristics. Moreover, the group of parents who progress to second and further parities can be even further selective. To mitigate this potential selection bias, I control for several background characteristics including: age of the respondent (continuous), age at

	Gender of the firstborn				
	Male	Female	Difference (male-female)	P-value	N
Cohorts					
1949-1953	0.092	0.099	-0.01	0.06	28122
1954-1958	0.154	0.151	0.00	0.57	28122
1959-1963	0.190	0.184	0.01	0.28	28122
1964-1968	0.214	0.224	-0.01	0.06	28122
1969-1973	0.195	0.194	0.00	0.83	28122
1974-1978	0.156	0.147	0.01	0.09	28122
Dependent variables					
N of children	2.525	2.747	-0.22	0.00	28122
Prob. of second birth	0.791	0.816	-0.22	0.00	28122
	Gender of the first two children				
	Daughter & son	Two daughters	Mean difference		
Prob. of third birth	0.493	0.638	-0.15	0.00	11235

Table 3.1: Summary statistics of dependent variables and moderators by firstborn gender

first birth (continuous), educational attainment of the respondent (1=less than secondary level, 2=secondary education, 3=tertiary education), partner's age (continuous), partner's educational attainment (1=less than secondary level, 2=secondary education, 3=tertiary education), native language (1=Kurdish, 0= Turkish and other languages), type of residence (0=rural, 1=urban) and region of residence (1= West, 2=South, 3=Central, 4= North, 5=East). Table 3.2 reports the summary statistics of control variable by the gender of the firstborn. There are no statistically significant differences between women or households with firstborn daughters and their counterparts with firstborn daughter, with regards to any control variable used within the regression analysis.

Methods

The evolution of son preference over birth cohorts is examined by relying on multivariate analysis with Ordinary Least Squares (OLS) estimator with. As the predictor of son preference, I use the gender of the firstborn child. The gender of the firstborn is a random event without prenatal manipulation via sex selection abortion.

I investigate how the effect of firstborn gender on fertility behavior evolved over birth

	Gender of the firstborn				
Variables	Male	Female	Difference (male-female)	P-value	N
Mother					
Age	34.94	35.06	-0.13	0.22	28122
Age at first birth	21.25	21.19	0.06	0.26	28122
Secondary and above	0.186	0.193	-0.01	0.20	28122
Kurdish	0.134	0.136	0.00	0.66	28122
Partner					28122
Age	37.56	37.73	-0.17	0.20	28122
Secondary and above	0.302	0.298	0.01	0.60	28122
Household					28122
Urban	0.727	0.720	0.01	0.19	28122
West	0.417	0.408	0.01	0.20	28122
South	0.132	0.134	0.00	0.53	28122
Central	0.226	0.229	0.01	0.51	28122
North	0.075	0.075	0.00	0.83	28122
East	0.151	0.153	0.00	0.60	28122

Table 3.2: Summary statistics of control variables by firstborn gender

cohorts in three steps. In **first step**, I estimate the differential effect of firstborn daughter on the total number of children by birth cohorts through introducing an interaction term between firstborn gender dummy and birth cohort variable (Model 1). Moreover, I provide two sets of robustness checks by restricting the analytical sample to women who gave their first birth by age of 30 and 25, respectively (Model 2 and 3) [3]. As **second step**, I separate this effect by education level via estimating two different models, one for less educated sample (respondents who have less than secondary education) and another for the more educated (respondents holding secondary or higher degree). In the **third step**, I replicate the estimation in the previous step with two other outcome variables; (i) transition from first birth to second (probability of having the second child) and (ii) transition from second to third birth (probability of having the third child). As the outcome variable used in this step is in binary form, I replace the OLS estimator applied in previous steps with linear probability model. Rather than focusing on the total number of children, this step aims at investigating the effect of son preference on the third births separately as the two-child norm remains persistent in Turkish context, even during the period of fertility decline

[3]Here one should note that 87 percent of the sample have already given birth by 25 and 97 percent of it by the age of 30

(Kagitcibasi and Ataca, 2005). Below I present the model I used for the **first step**:

$$Y_{irt} = \alpha_0 + \beta(Female_{irt} * BirthCohort_{ir}) + \gamma X_{irt} + \theta_r + \varepsilon_{irt} \tag{3.1}$$

where Y_{irt} is the total number of children of mother i, who is living in region r, and was interviewed in survey year t. $Female$ is an indicator of a firstborn female, and X represent set of control variables such as mother's age and years of education, age at first birth, mother tongue, husband's age and years of education and type of residency and θ_r stands for region fixed effects. I add these control variables in order to increase the precision of the coefficient of interest, β.

Results

Descriptive evidence on demographic and cultural change

Figure 3.1 shows completed cohort fertility rate (CFR) at the education breakdown for women who were born between 1945 and 1978.[4] The difference between education groups in terms of fertility levels are visible throughout the cohorts. Looking at the less-educated women, CFR declined substantially from 4 children to 3, as cohorts got younger. For women holding at least a secondary degree, CFR followed rather a stable trajectory around 2 children. However, CFR of the highly-educated drops slightly below 2 children level starting from 1967 cohort. Accordingly, Figure 3.1 implies that the influence of two-child norm is becoming less evident on the realized fertility levels for women with secondary and higher education. On the other hand, transition to third birth is becoming less common among women with less than secondary education, particularly for younger cohorts.

The consistent fertility decline, specially among the lower-educated population, may imply that Turkish society not only has undergone a demographic transformation, but also has experienced a substantial cultural change in terms of gender and family values and practices. Therefore, to contextualize the fertility decline in Turkey, I investigate

[4]I calculate completed cohort fertility by restricting the analytical sample to respondents who are at least 40 years-old.

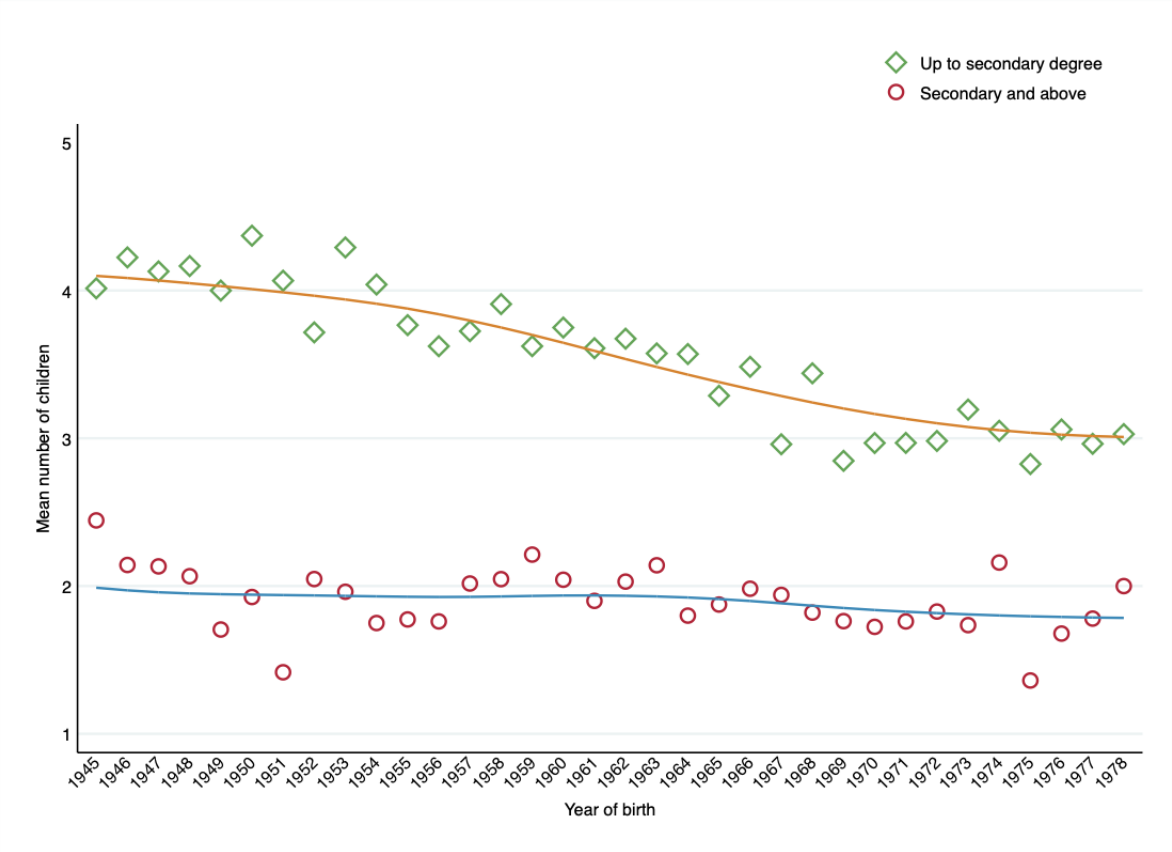


Figure 3.1: Completed cohort fertility by year of birth and by education level

how certain traditional attitudes and practices regarding women's status evolved across different birth cohorts.

I focus on two traditional practices in family formation; bride price and arranged marriage. These family formation practices are acknowledged as "indicators of traditionalism" (Cindoğlu et al., 2008) and can be used to evaluate how traditionally unions are formed in Turkey (Yavuz, 2006). Bride price is the payment to the bride's family (can be in cash or in kind) undertaken by husband or his family prior to marriage. This practice is considered as a reflection of patriarchal values that undermines the social status of wives and female children. Moreover, it affects groom's attitude toward their wives' fertility and restricts women's reproductive autonomy (Ilkkaracan et al., 1998). Arranged marriages, on the other hand, usually decided by families and young women are disproportionately forced to get married without their own consent (Cindoğlu et al., 2008). Marriages arranged by families reinforce traditional views on husband-wife relations but they become

less common as urbanization takes over. Furthermore, I make use of two statements on women's status that are collected since 1998 wave of TDHS. The first statement is "It is better to educate male child rather than the female child" and here I aim to capture the evolution of value of daughters vis-a-vis sons. The second proposition is "The important decisions should be made by male family members" and it will used to investigate how perception towards women's autonomy within the family and household evolved across generations.

Figure 3.2 descriptively shows the evolution of above-mentioned traditional practices and gender attitudes across birth cohort broken down by education. The general picture shows a clear convergence between less-educated and highly educated women in terms of traditional family formation practices and attitudes towards women's status, as cohorts gets younger. For instance, while almost none of the highly-educated women in all birth cohorts receive bride price before marriage, the proportion of less-educated women receiving bride price has dropped from almost 40 percent for the 1954-1958 cohort to below 20 percent for the 1979-1983 cohort. Similar trends is also observed for the both propositions on women's status. On the other hand, the ratio of unions formed via arranged marriage is consistently declining both for high and low-educated women who were in 1964 and onward.

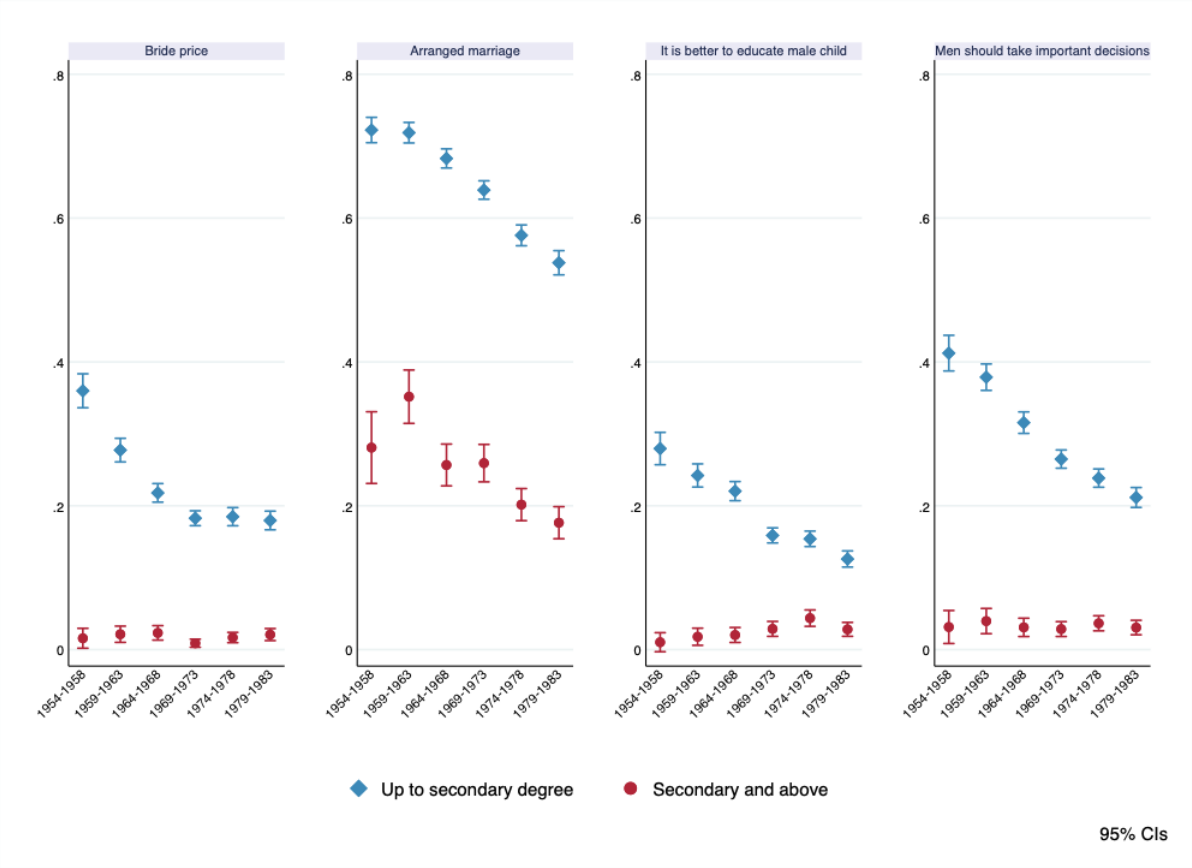


Figure 3.2: The evolution of selected traditional practices and values by education level

Total number of children

Figure 3.3 presents the marginal effect of having a firstborn daughter on total number of children by five-year birth cohorts compared to having a firstborn son. After having controlled for relevant socio-demographic characteristics, having a firstborn daughter increases the total fertility by almost 0.3 children for women who were born between 1964 and 1968. However, starting from the cohort 1969-1973, the effect of having firstborn daughter on the total number of children steadily decreases. For the 1979-1983 cohort, the effect is estimated as 0.12 children [5]. To scrutinize the analysis, I employ two robustness checks; (i) restricting sample to women who give their first birth by 30 and (ii) restricting sample to women who give their first birth by 25. By this means, the analytical sample includes couples who had sufficient of time to conceive more than one baby, if they

[5]See Column 2 (Model 1) in the Table B.1

are willing to. Accordingly, the both robustness checks confirm the initial results with the full sample. With these findings, I provide evidence in favor of Hypothesis 1.

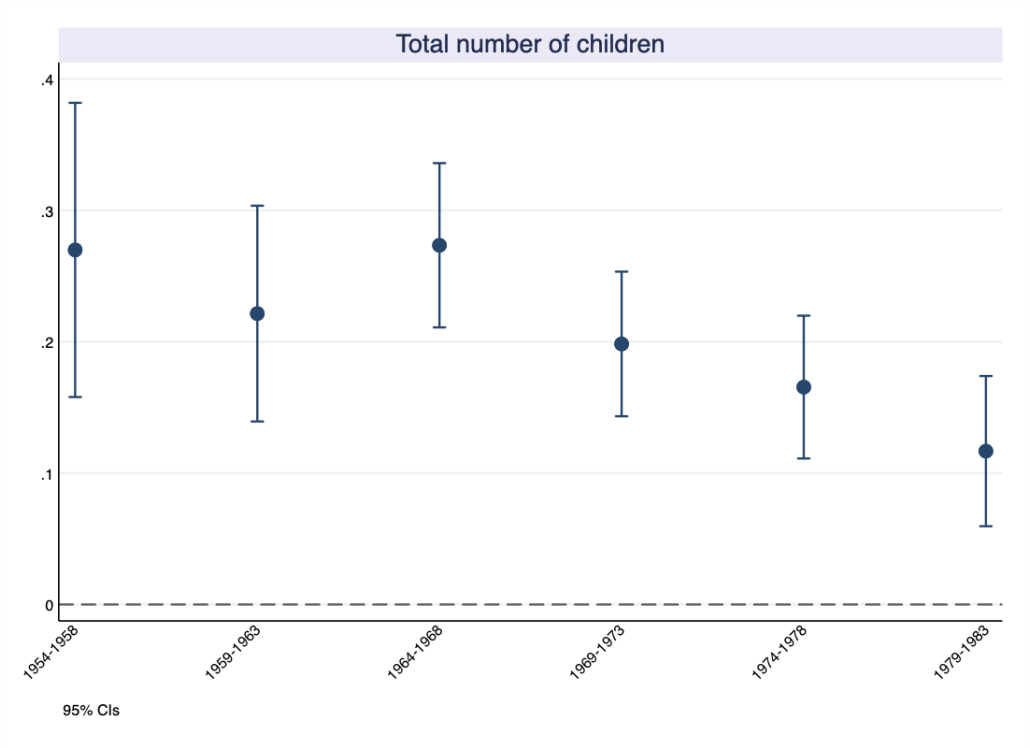


Figure 3.3: The average marginal effect of having a firstborn daughter vs firstborn son on total number of children by birth cohorts

As next step, I estimate the evolution of son preference by education level comparing the respondents with less than secondary education to the respondents holding at least a secondary degree. In Figure 3.4, I present the average marginal effect of having firstborn daughters on the total number of children by birth cohorts and level of education, as opposed to having firstborn sons. At first glance, the gender of firstborn has significant effect on the total number of children for the less educated group which is visible across all birth cohorts. However, the magnitude of the effect is getting smaller from 1969-1973 cohorts onward. In particular, while the average marginal effect of having a firstborn daughter increases the total number of children by 0.3 for less educated women who were born between 1964 and 1968, it decreases down to 0.13 additional children for 1979-1983 cohort[6]. This finding is consistent with the aggregated results presented in Figure 3.3 and

[6]See Column 1 and 2 of the Table B.2

in Appendix Table B.1. The findings partially support Hypothesis 2.

For women holding at least a secondary degree, the gender of the first child does not appear to have a significant effect on the total number of children, at least for the majority of the birth cohorts. Significant and positive effects are estimated for women who were born between 1969-1973 and 1979-1983. However, the magnitude of the positive and significant effects remain rather small around 0.1 additional child (See Table B.2).

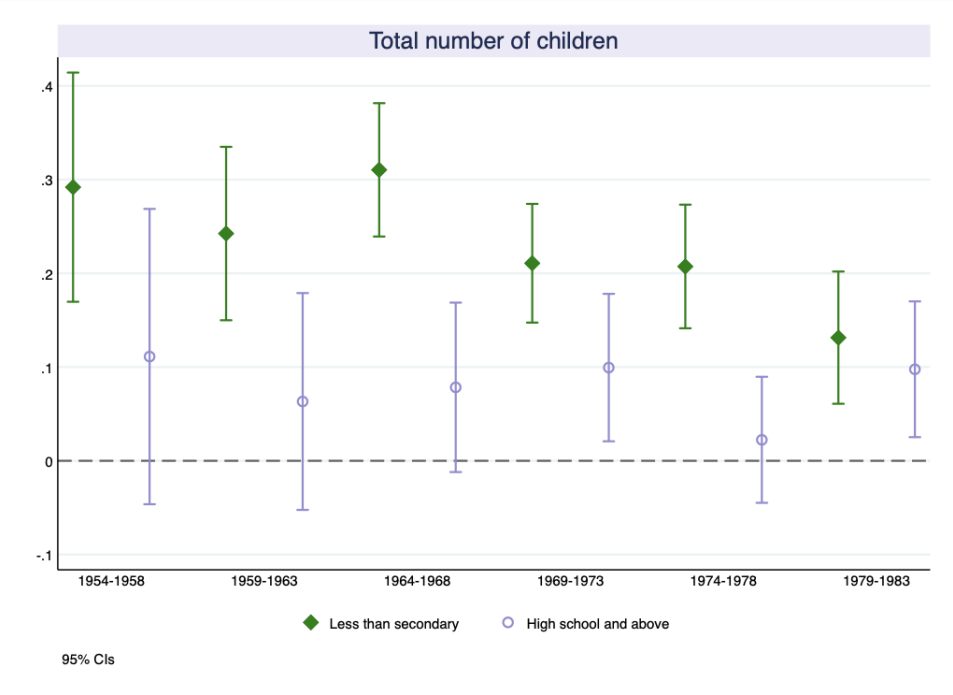


Figure 3.4: The average marginal effect of having a firstborn daughter vs firstborn son on total number of children by cohort and level of education

Transition to second and third births

Based on the insights obtained from CFR trends in Figure 3.1, I further the analysis on fertility behavior with two additional steps, (i) estimating the probability of transition to third birth for women less than secondary education conditional on the gender composition of the first two children and (ii) estimating the probability of transition to second and third birth for women holding at least secondary degree conditional on the firstborn gender/gender composition of first two children. Here the aim is to show whether son preference influence women to deviate from the widespread fertility level or norm observed

in the social category they belong to.

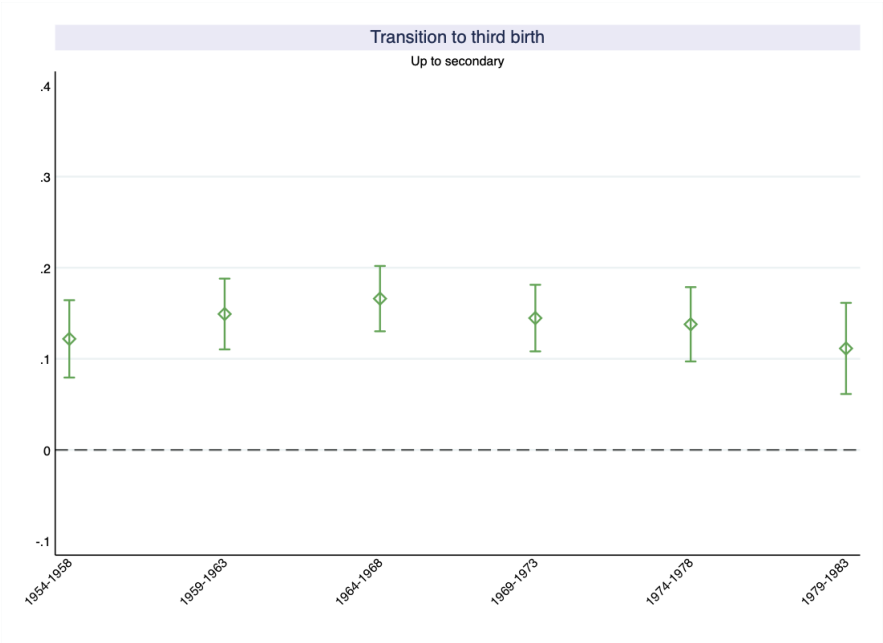


Figure 3.5: Probability of having the third birth conditional on having a firstborn daughter for women with less than secondary education

Figure 3.5 plots the average marginal effect of having two consecutive daughters on the probability of transitioning to third birth as compared to mothers with firstborn daughter and secondborn son for the less educated women. Accordingly, transition to the third birth is significantly and persistently determined by having two daughters in a row. In particular, the effect reaches its peak for the women who were born between 1964 and 1968; they are 16.6 percent more likely to transition to the third child if they had two subsequent daughters as compared to their counterparts with one daughter and one son (See Column 2, Panel A of Table B.3). However, the magnitude of the effect shows a declining trend for the following cohorts. For the youngest cohort (1979-1983) of the analysis, having two subsequent daughters increases the likelihood of having a third child by 11.1 percent (See Column 2, Panel A of Table B.3). The declining trend in probability of having the third child is showing a consistent pattern with Figure 3.1 where the CFR drops below 3 for less-educated women who were born after 1969.

Furthermore, Figure 3.6 plots the findings on transition to second and third birth for women holding at least a secondary degree. While the *left panel* shows the average

marginal effect of having a firstborn daughter on probability of having the second child compared to having a firstborn son, the *right panel* reports the average marginal effect of having two successive daughters on the probability of having the third child as compared to mothers who have a daughter as first and a son as second child, respectively.

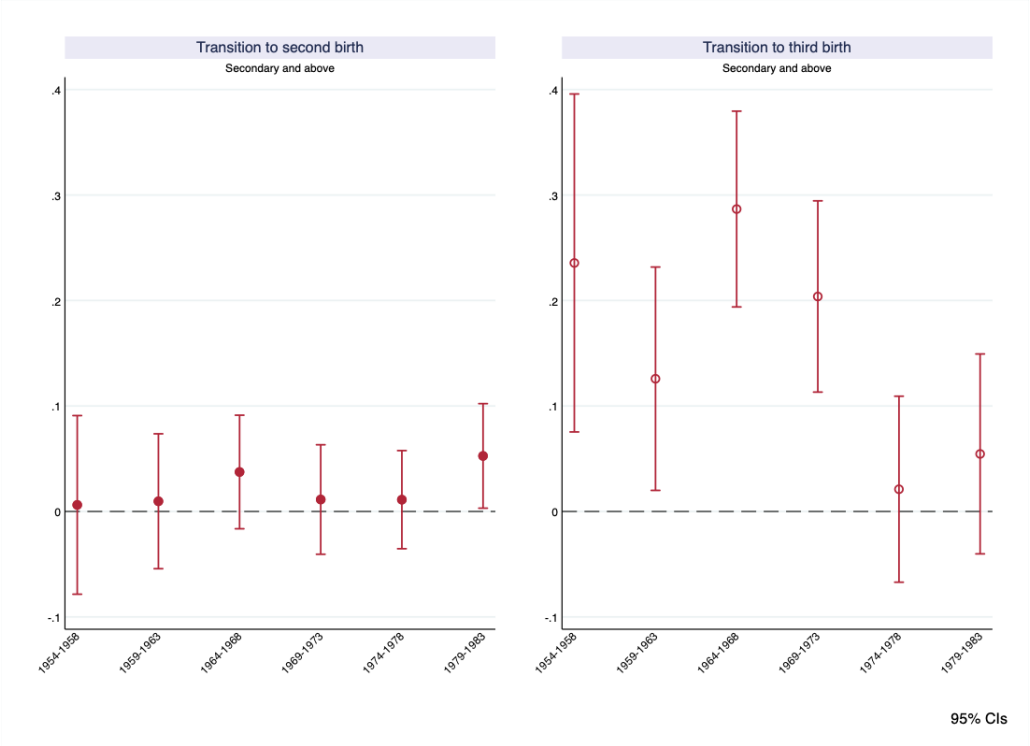


Figure 3.6: Probability of having the second and third birth conditional on the gender composition of first child(ren) for women with at least secondary degree

Looking at the women with secondary or above education level on the left panel, until the the youngest cohort (1979-1983) the effect of firstborn gender on transition to second birth is not statistically different for women with firstborn daughters compared to women with firstborn sons. For the 1979-1983 cohort, women with firstborn daughters are, on average, 5.3 percent more likely to have a second child than women with firstborn sons (See Column 1, Panel B of Table B.3). Moreover, estimates in right panel indicates that until the 1974-1978 cohort, mothers who have two daughters in a row have significantly higher probability to pursue to have the third child compared to mothers who have a daughter as first and a son as second child. This likelihood reaches at its peak level for the 1964-1968 cohort by 28.7 percent (See Column 2, Panel B of Table B.3). However, the

impact of two successive daughters on the probability of having the third child becomes insignificant for the two youngest cohorts, 1974-1978 and 1979-1983. As a result, we find supporting evidence in favor of Hypothesis 3, particularly for highly-educated women.

Conclusions

To what extent can son preference shape parents' fertility decisions as societies are increasingly characterized by more gender equal opportunities, values and policies? The present study is an effort to answer this question in the context of Turkey through investigating the evolution of son targeting fertility behavior across birth cohorts. In so doing, it investigates how the gender of the first child affects the total number of living children, and to what extent this effect persists in younger generations for women who were born between 1954 and 1983. Moreover it provides evidence on two complementary questions (i) whether the evolution of DSB followed a different trajectory by educational attainment and whether the fertility patterns of two educational groups converge over generations? (ii) to what extent the effect of DSB persists as the two-child norm is becoming more widespread even among less-educated population in Turkey?

First, I descriptively show how difference between low and highly educated women in terms gendered family formation practices and gender attitudes significantly narrowed down across birth cohorts. This evidence is consistent with how the rapid urbanization has paved the way of higher educational attainment, fertility decline (Yavuz, 2006; Greulich et al., 2016; Erman and Behrman, 2021) and ultimately a cultural shift regarding value of daughters and women's status (Kagitcibasi and Ataca, 2005). Two mechanisms were argued to have played substantial role behind women's improved social status; (i) women's movement in Turkey, which has gain significant momentum after 1980s and strengthen the political solidarity between women from various social backgrounds (Ozcurumez and Cengiz, 2011); (ii) EU accession process that offered an opportunity for improvement of women's status primarily in legal terms by abolishing discriminatory items in civil code (Arat and Pamuk, 2019).

Furthermore, the findings of regression analysis indicate that, even though having a

firstborn daughter is persistently associated with having higher number of children in total, the magnitude of this effect is getting smaller among the younger cohorts. In other words, the influence of son preference is becoming less significant on determining total fertility level for younger generations. Moreover, when stratifying by education, similar declining influence of son preference on total number of children across birth cohorts is estimated among women with less than secondary education. While for women with at least secondary degree, having a firstborn daughter is positively associated with total number of children for 1969-1973 and 1979-1983 cohort, respectively. The results by level of education imply that the weakening son-targeting fertility behavior is mainly lead by younger generation of less-educated women which is consistent with their greater contribution in overall fertility decline (see Figure 3.1) in Turkey as well (Greulich et al., 2016).

To contextualize the weakening of son preference within the diffusion of two-child norm, I additionally focus on the influence son preference on transition to third births. In this analysis women who had two successive daughters were compared to women who had a firstborn daughter and a secondborn son. For respondents who have less than secondary education, having two daughters in a row is significantly and persistently increases the probability of having the third child as compared to respondents with one daughter and one son, respectively. The magnitude of the effect follows a slight declining trend which might signal that younger generations' motivation to pursue third birth less strongly determined by son preference. However, the picture for women holding at least a secondary degree is different; even though having two daughters in a row is significantly increases the probability of having the third child in older cohorts, this effect is estimated as insignificant for the two youngest cohorts, 1974-1978 and 1979-1983, respectively. This finding is in line with what the literature finds on Egypt suggesting that influence of having two daughters in a row on transition to third birth tends to wane among when women reaches to higher levels of education (Vignoli, 2006). As CFR of the younger cohorts are measured slightly below replacement rate, I further the analysis of son preference on transition to second birth for highly-educated women. Here, a clear picture of two-child norm emerges; up until 1979-1983 cohort, the gender of the first child does not have a

significant effect on the probability to have the second child. However, for the youngest cohort (1979-1983), women who have firstborn daughter are more likely to pursue the second birth as compared to their counterparts with firstborn sons. At first, this might seem somewhat conflicting with the rest of the findings that suggest a general weakening of DSB. However, there can be at least two underlying reasons for this "unexpected result". First, this cohort might still be too young to have a completed fertility period and the ones who have already pursued to the second birth might have been married and had their first child earlier than the ones who have one child, or they might have quit labor market or have never been employed in the first place. These characteristics are correlated with stronger desire for son preference (Pande and Astone, 2007). Moreover, it is also known that couples' who aim to bear a son tend to have shorter birth intervals than couples who do not (Milazzo, 2014). As a result, mothers who have already gave the second birth in 1979-1983 cohort are more likely to be characterized with son preference than the ones who have not. Second, particularly for the younger cohorts, son preference could be more consequential for those who are willing or who are able to pursue higher levels of fertility. In order words, the meaning attributed to or the motivations behind reaching higher fertility can be different for younger cohorts than older cohorts. Therefore, this result might also signal that, even though two-child norm is persistent across birth cohorts and education levels, transition to second birth for highly-educated women could be becoming more selective.

Finally, I acknowledge using an ever-married sample, due to data availability of TDHS [7], constitutes a potential limitation for the present study have some limitations. Even though childbearing is almost universally subsequent to union formation in Turkey, the age of first marriage and therefore age of first birth is getting higher particularly for the younger cohorts (Ergöçmen, 2012). Since the postponement of age of first birth is correlated with lower levels of fertility, I might be overestimating the effect of firstborn gender on total number of children especially for cohorts that have not completed their fertility periods yet. Hence, findings on the youngest cohort of the analysis, 1979-1983,

[7]Single women were added to survey only from 2013 onward and fertility questions are only asked to ever-married women

should be approached cautiously.

Chapter 4

Loneliness during the pregnancy seeking process: Is medically assisted reproduction a risk factor?

joint work with Alice Goisis

Introduction

Parenthood at later ages is becoming more common as the mean age at first birth and the share of women giving birth at advanced ages have been steadily increasing since the mid-1980s (Billari et al., 2007; Beaujouan, 2020). With parenthood being postponed, reproductive experiences are getting more diversified due to longer than expected waiting times to pregnancy, the increased risk of subfertility, and the wider utilization of medically assisted reproduction (hereafter MAR) (Schmidt et al., 2012; Beaujouan et al., 2019). MAR technologies, which include treatments such as ovulation induction, artificial insemination, in-vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI), provide a potential solution for couples who bear the burden of infertility. The access to and availability of MAR has increased remarkably over time such that over 8 million

babies were born via medical intervention since the first IVF birth in 1978. By 2050, the cumulative number of births via MAR conception is projected to be over 25 million (Faddy et al., 2018). In Europe, as of 2017, MAR-babies constituted 3.1% of the total live births in the Europe (Wyns et al., 2021) with the lead of Denmark at 8%.

The growing number of individuals undergoing and conceiving through MAR have stimulated research on the consequences of MAR, including the mental well-being of those who undergo the treatments. Prior studies show that MAR is an emotionally and physically draining process which can have detrimental effects on women's mental health through increased levels of stress, anxiety and depression (Hjelmstedt et al., 2003; **?**; Joelsson et al., 2017; Huang et al., 2019). Reduced time dedicated to social relationships and quality of the partnership have been identified as one of the potential drivers behind the worsening mental health of couples undergoing MAR (Wischmann et al., 2009; Nicoloro-SantaBarbara et al., 2018; Tosi and Goisis, 2021). This could suggest that loneliness, broadly defined as the perceived deficiency in social relationships both in terms of quality and quantity (de Jong Gierveld et al., 2006), could be directly and indirectly linked to MAR. Individuals who try to conceive via MAR are exposed to social pressure and infertility stigma (Passet-Wittig and Bujard, 2021) which could lead them to experience a reduction in their family, friends, and larger social networks (Peterson et al., 2006). Furthermore, undergoing MAR, by restricting time and financial resources to dedicate to friends, family, and leisure time (Wang et al., 2007), can increase the risk of feeling lonely through lowering partnership quality and satisfaction (Nicoloro-SantaBarbara et al., 2018) and worsening individuals'mental health which is strongly associated with frequent experience of loneliness (Kearns et al., 2015).

To our best knowledge, no prior study has investigated this relationship which constitutes a gap in knowledge since loneliness is a significant aspect of population health and an important indicator of social well-being that can exacerbate the risk of morbidity and mortality (Fekete et al., 2018). The vast majority of the loneliness literature focuses on individuals in mid- and later life given the higher prevalence of loneliness in that period of the life course. However, loneliness can also be experienced earlier in life (Nyqvist et al., 2016; Beutel et al., 2017) and identifying critical stages of the life course - such as

the pregnancy seeking process - when individuals might be at higher risk of experiencing loneliness is important given that experiencing it earlier in life can translate into poorer physical and mental health outcomes later in life. Moreover, the social and emotional support that social relationships bring along are central to and protective of mental well-being Turner and Brown (2010) such that loneliness – as a precursor of poorer mental health - could be integral to the MAR and mental well-being association.

Using data from the Generations and Gender Survey (GGS), in this study we make a two-fold contribution to the growing social science MAR literature. First, we uncover the relationship between undergoing MAR and loneliness by investigating whether the pregnancy-seeking process is differentially associated with individuals' feeling of emotional and social loneliness by the mode of conception (MAR vs. natural conception). Additionally, we explore whether this relationship varies by gender and by whether the treatment results in a live birth or not. Despite the growing social science literature on the role of men in reproduction, a considerable share of studies focusing on infertility and MAR treatments focus around the female experience since the medical knowledge and practices have centered on female infertility (Halcomb, 2018). Less is known about how undergoing a fertility treatment as a couple affects men's well-being yet couple dynamics and quality are the crucial determinants of loneliness. This not only leads to a gap in knowledge, but also reinforces gender inequality in reproductive responsibilities by emphasizing men's secondary role in reproductive matters. On the other hand, there are few studies exploring whether the pregnancy-seeking process resulted with a live birth or not and how it moderates the outcome of interest even though the success rate of fertility treatments is relatively low (ESHRE et al., 2010). The outcome of the treatment is a relevant aspect to factor in since the social expectations on childbearing and stigma surrounding infertility could put couples more under pressure and eventually, at risk of feeling lonely.

The second contribution is methodological. Previous studies on MAR and childlessness rely on cross-sectional data sources which are prone to simultaneity bias (Greil et al., 2019). To address this limitation, we draw on the two-wave longitudinal data of the GGS which allow us to rule out potential time-invariant confounding factors that are both

correlated with undergoing MAR and loneliness. Moreover, making use of panel data is particularly important to address selection issues in the analytical sample both stemming from the differential socio-economic background and baseline loneliness level of MAR and natural conception users. On average, couples who undergo MAR have higher levels of education (Barbuscia et al., 2019). At the same time, MAR patients might be feeling lonelier at the baseline due to distress and stigma surrounding infertility. We mitigate these empirical concerns by running a multivariate analysis controlling for baseline level of loneliness and individual socio-demographic characteristics.

Theoretical Framework

Medically Assisted Reproduction and Loneliness

According to de Jong Gierveld et al. (2006), loneliness is an unpleasant or inadmissible lack of interpersonal relationships either qualitatively or quantitatively. In other words, loneliness might result from either the number of social relationships being smaller than desirable or due to the lack of intimacy in the existing relationships. Loneliness is mainly classified in two types: emotional loneliness stemming from the absence of close emotional attachment (e.g. partner or best friend) and social loneliness originating from the deprivation of broader group of contacts or engagement in larger social network (e.g. family, friends, colleagues, neighbors etc.) (Weiss, 1973). The feeling of emotional loneliness intensifies due to the deterioration in relationship quality or dissolution of a union while social loneliness arises due to absence of wider social networks in which the individual feels accepted and welcomed. Loneliness can also arise as a consequence of how individuals respond to their social situation which can be influenced by recent life events and availability of opportunities (Kearns et al., 2015).

Figure 4.1 illustrates the mechanisms through which MAR experience is linked to loneliness. Undergoing MAR could be directly associated with loneliness as the experience of infertility could be related to a strong sense of stigmatization and social isolation due to the inability to fulfill social expectations on parenthood (Williams, 1997; Johansson

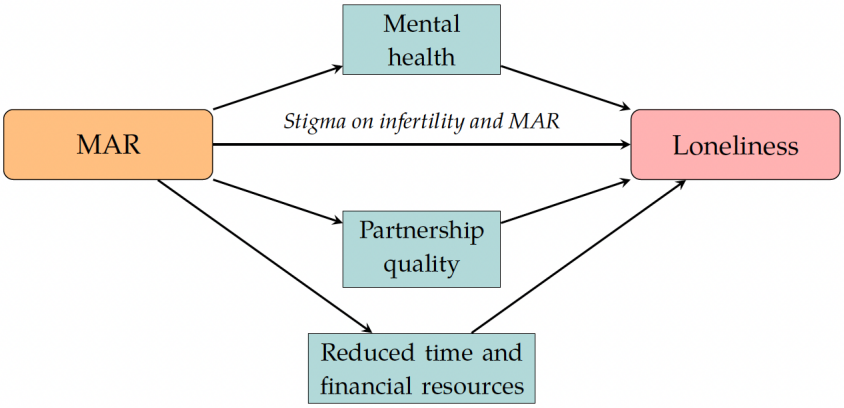


Figure 4.1: Summary of the mechanisms through which MAR is associated with loneliness

and Berg, 2005; Greil et al., 2010). As loneliness has been linked to lack of acceptance by the community that one lives in (Beutel et al., 2017), MAR couples might at higher risk of bearing loneliness and social isolation. Moreover, as it is challenging to build and maintain social relationships for individuals who feel stigmatized by their environment (Hsieh and Liu, 2021), the stigmatization of infertility could lead MAR patients to avoid self-disclosure and seek for social support (Faccio et al., 2019; Passet-Wittig and Bujard, 2021).

Undergoing MAR could be indirectly related to loneliness via three mechanisms. First, through relationship quality since individuals undergoing MAR are more likely to experience instability in or reduction in the quality of their relationship compared to couples who are trying to conceive naturally, due to the prolonged nature and the demands of the treatment (Holter et al., 2006; Wang et al., 2007). Second, MAR treatments are costly in terms of time and money and couples might find it challenging to reconcile their professional life with frequent doctor visit and the strict requirements of MAR (Courbiere et al., 2020). Therefore, undergoing MAR can prevent individuals to have adequate resources to dedicate to friends, family, and have a fulfilling leisure time (Parry and Shinew, 2004; Nicoloro-SantaBarbara et al., 2018; Tosi and Goisis, 2021). Third, mental health could mediate the association between MAR and loneliness. Previous studies have shown that undergoing MAR can increase feelings of anxiety and stress due to the adverse effects of hormonal therapies and relatively low success rate of the treatments (Hjelmstedt et al.,

2003; Verhaak et al., 2007; Greil, McQuillan, Lowry and Shreffler, 2011; Huang et al., 2019) and due to experiencing a bodily deficiency that is medically diagnosed and legitimated (Greil, 1997; Jacob et al., 2007; Jutel, 2009; Johnson and Fledderjohann, 2012) Furthermore, poorer mental health as well as enduring problems of stress, anxiety and depression are strongly associated with frequent feeling of loneliness (Kearns et al., 2015). *Based on these hypothesized mechanisms, we expect that individuals who try to conceive via MAR are more likely to experience an increase in loneliness during the pregnancy-seeking period compared to couples who try to conceive naturally (Hypothesis 1A).*

On the other hand, MAR patients represent a selective part of the population (Inhorn and Birenbaum-Carmeli, 2008) as they tend to higher levels of education than individuals who conceive naturally. This could be linked to the fact that higher-SES individuals are more likely to postpone childbearing and thus to need medical solution to overcome infertility (Räisänen et al., 2013). Moreover, MAR treatments can, in many contexts, be costly and thus be more easily accessible from higher income groups (Präg and Mills, 2017). In terms of coping with loneliness, higher-SES individuals have wider resources and better access to mental and medical support which could help them reduce the risk of loneliness (Allen et al., 2014). Moreover, individuals with higher SES are equipped with better social capital, stronger social engagement, wider social networks, and higher levels of trust in the society that they live in, which can protect them from feeling socially lonely (Nyqvist et al., 2016). Alternatively, *we do not expect any difference in terms of loneliness experience, between individuals who try to conceive via MAR and the ones who try to conceive naturally (Hypothesis 1B).*

Next, we present two modifiers, gender and live birth, which manifests themselves through the aforementioned mechanisms (See Figure 1).

Variation by gender

Reproduction is a gendered experience mainly occurring in women's bodies, including fertility treatments that are disproportionately designed to overcome female infertility (Inhorn and Birenbaum-Carmeli, 2008; Almeling, 2015). The gendered context of repro-

duction also manifests itself in distinct social expectations on parenthood for women and men. As pronatalism remains a dominant ideology in today's societies, parenthood becomes more socially binding for women than men and motherhood is perceived as almost indispensable in female identity (Bell, 2019). Furthermore, the availability of MAR per se, and therefore the possibility to overcome infertility, might even reinforce the "motherhood mandate" (Thompson, 2002; Inhorn and Birenbaum-Carmeli, 2008).

Evidence from empirical studies validate the gendered expectations on childbearing and gendered implications of MAR. For instance, women bear a stronger physical burden of MAR than men and they demonstrate stronger psychological reactions during the treatments (Hjelmstedt et al., 1999). Since gendered socializations on procreation affects the way infertility is perceived, women undergoing MAR report higher levels of infertility-related stigma compared to their male partners (Slade et al., 2007) which could eventually make them feel more socially lonely and isolated. Moreover, women who receive IVF treatments are more likely to perceive themselves as being less confident than their partners in coping with infertility (Ying et al., 2015) which could discourage them from talking about their experiences and receiving social support. Therefore, we hypothesize that *women who undergo MAR are likely to experience a higher increase in loneliness during the pregnancy seeking process compared to their male counterparts (Hypothesis 2A).*

On the other hand, undergoing MAR can be a mutual challenge for couples, so that they could be similarly influenced by the process. Partners who undergo MAR are found to be equally emotionally stressed while sharing similar hopes and positive feelings for the future (Boivin et al., 1998). Men experience similar short-term decline in their emotional well-being as compared to their female partners in the case of an unachieved pregnancy at the end of the treatment (Holter et al., 2006). Looking the issue from a longer time-window, Tosi and Goisis (2021) show that mental and subjective well-being of both partners similarly worsens while the couple is undergoing MAR treatments and equally recover when they become parents via MAR. Partnership quality is suggested as an important mechanism behind the mutual experience of MAR among couples that could render both sides emotionally lonely in case of dissatisfaction or dissolution. Hence, alternatively, we expect that *women and men who undergo MAR are likely to experience similar change*

in loneliness during the pregnancy seeking process (Hypothesis 2B).

Variation by live birth

Although MAR is considered as an innovative and effective solution for individuals who bear the burden of infertility, the success rate, i.e., the share of cycles which result in live birth remains relatively low (ESHRE et al., 2010). For example, a population-based study from the UK finds that 31.2 percent of women who have undergone IVF treatment have live birth after the first complete cycle, while the cumulative live birth rate increases up to 57.1 percent after the completion of three cycles (McLernon et al., 2016). Due to the low success rates of MAR and repeated cycles of unsuccessful attempts, most individuals who undergo MAR experience an "emotional rollercoaster" and "never enough" feelings (Greil et al., 2010). Therefore, when exploring the experience of loneliness during MAR process it is essential to take into account the outcome of the treatment. As parenthood remains central to most people's social identities, transition to "non-parenthood" can be a stressful experience (McQuillan et al., 2003). Indeed, a recent qualitative study finds that the feeling of being lost and lonely are pervasive among women who had a failed IVF attempt compared to a successful attempt (Holter et al., 2021). Furthermore, women who fail to conceive after having undergone (often several) treatments are more likely to suffer from distress, anxiety and depression compared to women whose fertility treatments resulted in live birth (Holter et al., 2006; Milazzo et al., 2016). Defining oneself as infertile and potentially remaining childless entails negotiations not only with medical professionals but also within the couple and their larger social environment (Greil, McQuillan and Slauson-Blevins, 2011). Due to unexpected stressors and potential stigmatization carried by infertility, couples may experience changes in their social networks, family relationships and even potential threats to their future together (Peterson et al., 2006). Moreover, childlessness can be considered as "deviant behavior" since the desire for childbearing is perceived as a norm within our societies and might prevent couples from seeking social support (Slade et al., 2007). As a consequence, the feeling of loneliness is expected to vary by whether the MAR treatment results in a live birth or not and we anticipate that

couples whose MAR treatments do not result in a live birth are more likely to endure an increase in loneliness during the pregnancy seeking process compared to couples whose MAR experience results in live birth. (Hypothesis 3).

Data

Analytical Sample

We make use of the first two waves of Generations and Gender Survey (GGS) collected in 2004-2011 and in 2007-2015, respectively [1]. The GGS is a longitudinal and nationally representative survey which collects retrospective information on numerous socio-demographic indicators including fertility, fecundity, infertility treatments and partnership quality from individuals aged between 18 to 80 living in European countries (Vikat et al., 2007). The time interval between two waves is three years for all the participating countries.

We select countries that collected information on loneliness and mode of conception in both waves, namely Bulgaria, Georgia, Germany, Austria and Poland [2]. We detect respondents who are partnered and who are not pregnant but willing to have a baby at Wave 1 [3] (n=2822). Among these respondents, 2,669 (95%) have complete information on all the variables that are used in the analyses, and they constitute the final number of observations of the analytical sample. Here one should note that GGS's fertility and fecundity modules is collected from female respondents or male respondents with female partners who are younger than 50 and who have already had sexual intercourse with a person of the opposite sex. In addition, the question regarding mode of conception is asked to respondents who have a co-resident or a non-resident partner at the time of survey.

[1] Note that participant countries are interviewed in different years but within the indicated time interval

[2] We excluded Lithuania from our sample due high levels of attrition (around 52%).

[3] We select respondents with a co-resident or non-resident partner because the question on mode of conception is only asked to partnered participants. This leads to a minor gender imbalance (52.5% women vs. 47.5% men) in the analytical sample as women are more likely to be partnered.

Dependent variable

The dependent variable is a shortened 6-item version of De Jong Gierveld Loneliness Scale which provides a reliable measurement for overall, emotional, and social loneliness. This scale consists of 6 questions, the first 3 designed to measure emotional loneliness, the remaining 3 for social loneliness and the total score of 6 items yield for overall loneliness score. Emotional loneliness, stemming from the lack of an intimate relationship or a close emotional attachment (de Jong Gierveld and Tilburg, 2006), is measured through the following statements: (i) I experience a general sense of emptiness (ii) I miss having people around (iii) Often, I feel rejected. The response options are "yes", "more or less" and "no". For each statement regarding emotional loneliness, positive (yes) and neutral (more or less) answers receive 1 point while negative (no) answers 0. On the other hand, social loneliness, arising from the lack of broader social network instead (e.g., friends, colleagues, relatives and neighbors) (de Jong Gierveld and Tilburg, 2006), is quantified via following propositions: (iv) There are plenty of people that I can lean on in case of trouble (v) There are many people that I can count on completely (vi) There are enough people that I feel close to. The response options are same with the ones of emotional loneliness, however in this case negative (no) and neutral (more or less) answers for each statement receive 1 point while positive (yes) answers 0. Both emotional and social loneliness sub scales range between 0 (not lonely) and 3 (severely lonely). Finally, we calculate overall score of loneliness, ranging between from 0 (not lonely) to 6 (extremely lonely), by summing the emotional and social loneliness sub scales.

Independent variable

The main independent variable identifies the mode of conception at Wave 1 through the following question: "Are you (or your current partner/spouse) doing any of the things listed on this card to help you (your partner or spouse) get pregnant?". The available responses are: (1) receiving medication, (2) methods for ascertaining timing ovulation (3) in-vitro fertilization (IVF) or micro-fertilization (ICSI), (4) surgery, (5) artificial insemination, (6) other medical treatment, (0) did not use or do anything. Based on this question

we generate a MAR dummy that takes 1 if the respondent, or their spouse/partner, uses any methods among 1,3,4,5,6 and it takes 0 if they ascertain timing of ovulation (2) or do not use or do anything to help getting pregnant [4].

Control variables and mediating factors

We control for several variables to mitigate the potential bias stem from confounding factors in measuring the effect of mode of conception on change in loneliness during pregnancy-seeking process. As time-invariant individual characteristics, we adjust for a set of socio-demographic factors which include age (and age squared), gender, educational attainment (1=less than secondary level, 2=secondary education, 3=tertiary education), number of children (measured in continuous form) in Wave 1 and country of residence. Moreover, we adjust for two potential mediating factors (see Theoretical Framework and Figure 4.1): subjective financial distress (as an indicator of reduced time and financial resources) and union dissolution (as an indicator of partnership quality), respectively. We construct the subjective financial hardship variable through the question "Thinking of your household's total monthly income, is your household able to make ends meet?" proposing the following responses; (a) with great difficulty, (b) with difficulty, (c) with some difficulty, (d) fairly easily, (e) easily, (f) very easily. Based on this, we generate a dummy variable takes the value 1 if the household's subjective financial capability worsened in between two waves, while it takes the value 0 if the household's subjective financial capability remained stable or got better. Union dissolution dummy variable is coded as 1 if the respondent has undergone a union dissolution and 0 otherwise.

Interaction variables

We examined two factors by which the relationship between loneliness and the mode of conception can vary. First, we explored whether feeling of loneliness during the pregnancy-seeking process differs for women and men. To do this, we introduce a dummy that takes

[4]Breakdown by the type of treatment: Receiving medication (66,9%), IVF (6,1%), Surgery (1.5%), Artificial Insemination (2.6%), Other medical treatment (6.1%), Uses method but type is not specified (16.9%)

1 if the respondent is female, 0 if the respondent is male. Second, we tested whether the respondent's pregnancy seeking process resulted with a least one live birth or not. To do so, we compare the number of children reported in Wave 1 and 2 and generate a dummy variable that takes 1 if the respondent had a child in between two waves and 0 otherwise. These two variables are interacted with the MAR dummy and included in the model as interaction terms in separate steps of the analysis.

Table 4.1 reports the descriptive statistics of all variables used in the main analysis by mode of conception. Looking at the Panel A, the feeling of emotional and social loneliness do not vary by mode of conception at Wave 1. On the other hand, when we look at Wave 2 loneliness scale, social loneliness of individuals who undergo MAR is observed to be slightly higher than natural conceivers (p value =0.009). Moreover, education level of respondents who conceive naturally or via MAR does not appear to be substantially different from each other. This finding does not corroborate with the prior literature suggesting that individuals who undergo MAR group tend to be socioeconomically advantaged even in the countries where fertility treatments are highly subsidized (Barbuscia et al., 2019; Goisis et al., 2020). However, this evidence is largely based on couples who had a live birth which could conceal socioeconomic differences between the ones who have undergone an unsuccessful MAR attempt and the ones who conceived via MAR (Köppen et al., 2021). Indeed, the latter is expected to have higher-SES since undergoing MAR may require several attempts that are costly in terms of money and time. In Appendix C.1, we show that this is the case for our analytical sample as couples who conceive through MAR have higher education level compared to their MAR counterparts who did not have a baby, and to couples who try to conceive naturally.

In terms of mediating factors, the mean experience of subjective financial hardship does not statistically differ by mode of conception, while the individuals who undergone MAR are slightly more likely to experience a union dissolution (p value =0.009) than individuals who try to conceive naturally.

Regarding the interaction variables, 41 percent of respondents who have undergone MAR and 45 percent of the respondents who conceive naturally had a baby in between two waves. Moreover, 66 percent of the respondents who have undergone MAR are women

whilst only 45 percent of the respondents who try to conceive naturally are female. The gender imbalance in MAR conception is notable and additional analyses suggest it is explained by the fact that ; (i) men are more likely to skip question on mode of conception (ii) men are more likely to say their partner do not use or do anything to help her get pregnant (See Appendix Table C.2).

In Panel B of Table 4.1, we present the percentage of respondents who try to conceive naturally and via MAR by the country of residence. Unsurprisingly, the percentage of natural conception is significantly higher than MAR conception in each country. On the other hand, the percentage of individuals who try to conceive via MAR is remarkably higher in Germany, which can be attributed to their relatively accessible fertility treatment policies [5] compared to other participating countries e.g., Bulgaria, Georgia, Austria and Poland.

Contextual variables

A list of statements is proposed to understand how the respondent perceives the opinions of their social environment on their childbearing in Wave 1 of GGS. The respondents were asked to what extent they agree on the following statements: "Most of your friends think that you should have a/another child", "Your parents think that you should have a/another child", "Most of your relatives think that you should have a/another child". The answers range between strongly disagree (1) and strongly agree (5). The subjective nature of the question can be insightful to understand how the respondent perceives the standpoint of their social network on childbearing. However, since the question was asked only at the baseline survey, we are neither able to track the change in respondent's perception on social pressure in between two waves, nor provide a breakdown by giving live birth or not. Nonetheless, to contexualize the MAR experience, we descriptively analyze the level of perceived social pressure on childbearing by mode of conception at the onset of the main analysis.

[5] For detailed information on fertility treatments policies in Europe, see European Atlas of Fertility Treatment Policies at `https://fertilityeurope.eu/european-atlas-of-fertility-treatment-policies/`

	NC	MAR	Difference
	Mean		*P-value*
Panel A			
Loneliness scale			
Emotional loneliness (W1)	0.46	0.54	0.23
Emotional loneliness (W2)	0.48	0.52	0.56
Social loneliness (W1)	1.18	1.16	0.82
Social loneliness (W2)	1.22	1.38	0.12
Overall loneliness (W1)	1.63	1.7	0.67
Overall loneliness (W2)	1.69	1.9	0.16
Socio-demographics			
Number of children (W1)	0.98	0.41	0.00
Age (W1)	31.8	33.3	0.01
Less than secondary education	0.08	0.08	0.9
Secondary education	0.57	0.55	0.62
Tertiary education	0.35	0.37	0.66
Mediating factors			
Subjective financial hardship	0.32	0.38	0.14
Union dissolution	0.14	0.2	0.09
Interaction variables			
Female	0.45	0.66	0.00
Live birth	0.45	0.41	0.42
Panel B			
Country			
Bulgaria	0.94	0.06	0.00
Georgia	0.93	0.07	0.00
Germany	0.84	0.16	0.00
Austria	0.94	0.06	0.00
Poland	0.94	0.06	0.00
N	2473	196	

Table 4.1: Descriptive statistics of independent variables by mode of conception

Empirical Strategy

As first step, we estimate whether undergoing MAR to conceive is associated with higher change in emotional, social, and overall loneliness compared to natural conception or not (Hyp 1A and Hyp 1B). We use Ordinary Least Squares (OLS) estimator with a lagged

dependent variable. by estimating the effect of the mode of conception on loneliness at Wave 2 by controlling for baseline (Wave 1) level of loneliness which constitutes our baseline model (Model 0). Then, following a stepwise approach, we introduce a set of time-invariant socio-demographic controls and country fixed-effects (Model 1). Below we present the equation of Model 1:

$$Loneliness_{i2} = \beta_1 MAR_{i1} + \beta_2 Loneliness_{i1} + \beta_{(3-7)} X_{i1} + \lambda_c + \varepsilon_i$$

where $Loneliness_{i2}$ stands for emotional, social or overall loneliness scale in Wave 2, MAR_{i1} indicates the dummy for undergoing MAR in Wave 1, $Loneliness_{i1}$ presents baseline emotional, social or overall loneliness scale, X_{i1} represents socio-demographic controls, such as age, age squared, educational level, gender, number of children, λ_c represents country fixed effects of the country of residence in Wave 1 and ε_i stands for the idiosyncratic error term. Then, we test whether the relationship between MAR and loneliness is explained by time-varying mediators subjective *financial hardship* and *union dissolution* (Model 2-Model 4).

In a second step, we estimate whether the association between mode of conception on the feeling of loneliness varies by gender through adding an interaction term between MAR status and gender of the respondent (Hyp 2A and Hyp 2B). As last stage, we introduce an interaction term between MAR and whether the pregnancy seeking resulted with live birth or not to examine whether the relationship between mode of conception and loneliness differs by childbearing status in between two waves (Hyp 3). For the first step, we report the coefficient of MAR dummy while for the subsequent steps we estimate the marginal effect of not having given birth to at least one child and being female compared to their counterparts (i.e. having given birth to at least one child and being male).

Attrition in GGS is relatively high. To correct for potential bias due to attrition, we weight our sample with country-specific weights provided in Wave 2. These weights allow us to adjust the sample in terms of age, sex, household structure and region at baseline (Fokkema et al., 2016) and correct the estimates for attrition rates of population subgroups (Tosi and Grundy, 2019).

Results

Descriptive evidence

For context, we test whether the perceived social pressure on childbearing varies by the mode of conception. In Figure 4.2, we show the mean level of agreement with the following statements (i) "Your parents think that you should have a/another child"; (ii) "Most of your relatives think that you should have a/another child" and (iii) "Most of your friends think that you should have a/another child" by mode of conception. The proportion of respondents who undergo MAR agrees that their parents, relatives, and friends think that they should have a/another child is significantly higher than respondents who try to conceive naturally. This can be due to individuals who undergo MAR being relatively older (see Table 4.1, pvalue=0.01) and having, on average, fewer children (see Table 4.1, pvalue=0.00) than individuals who try to conceive naturally.

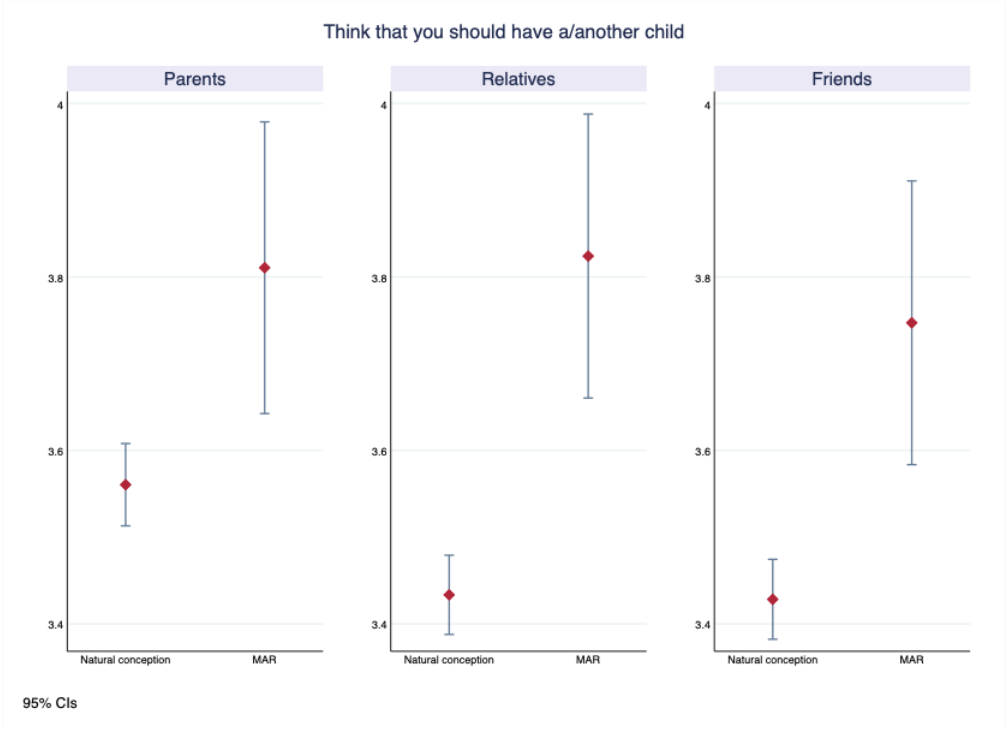


Figure 4.2: Perceived social pressure on childbearing by mode of conception

	(M0) Emotional	(M1) Emotional	(M0) Social	(M1) Social	(M0) Overall	(M1) Overall
MAR	0.017	-0.037	0.166*	0.170*	0.175	0.131
	-0.065	-0.067	-0.093	-0.093	-0.127	-0.126
Baseline loneliness	✓	✓	✓	✓	✓	✓
Socio-demographics	No	✓	No	✓	No	✓
Country fixed effects	No	✓	No	✓	No	✓
N	2,669	2,669	2,669	2,669	2,669	2,669
	0.072	0.104	0.128	0.189	0.15	0.202

Table 4.2: The association between mode of conception and change in loneliness during pregnancy seeking process

Changes in loneliness feeling in between two waves

Table 4.2 reports the results obtained by estimating Model 0 and Model 1. Model 0, which only adjusts for the relevant baseline loneliness level, shows that undergoing MAR is associated with a increase in social loneliness of almost 0.17 points (significant at the 10 percent level). The association remains robust (0.17 points increase, significant at the 10 percent level) when we include adjustment for socio-demographic controls in the M1. The findings support Hypothesis 1A against Hypothesis 1B for the feeling of social loneliness. In contrast, for emotional and overall loneliness Hypothesis 1B is confirmed.

Interaction effects

Figure 4.3 presents the average marginal effects of the mode of conception on loneliness by gender of the respondent (Hypothesis 2A and Hypothesis 2B). The full results are reported in Appendix Table C.3 . The reference category for each mode of conception are male respondents. Regardless of the mode of conception, women experience a higher shift in emotional loneliness and a lower change in social loneliness during the pregnancy seeking period compared to their male counterparts, but the effects are not statistically different than zero. The findings support Hypothesis 2B against Hypothesis 2A suggesting that the effect of MAR on change in loneliness does not differ by gender. However, one should

note that confidence intervals are particularly large for individuals who try to conceive via MAR and it is challenging to precisely the differences by gender, which are relatively small in terms of magnitude.

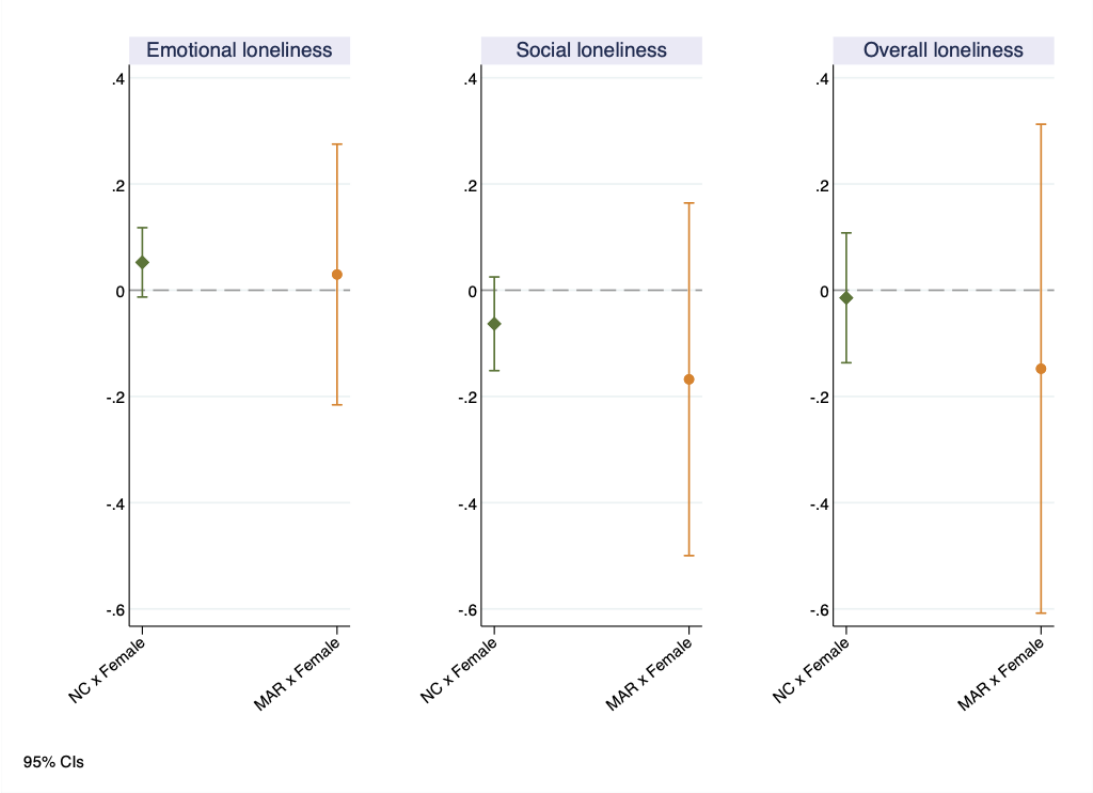


Figure 4.3: Average marginal effects of the mode of conception and by gender of the respondent

Figure 4.4 plots the average marginal effects of the mode of conception on loneliness by (Hypothesis 3). The reference category for each mode of conception are respondents who have had at least one child in between the two periods. Respondents who did not have a child after having undergone MAR experience a significantly higher increase in social loneliness compared to those who underwent MAR and had a live birth. Accordingly, not having a baby as a result of MAR increases social loneliness by almost 0.44 points as compared to their counterparts who had a live birth (See Appendix Table C.4). Changes in emotional and overall loneliness do not show statistically significant differences by whether they give birth or not. Within the natural conception group, we do not observe any statistically significant difference by the live birth pregnancy-seeking process both in emotional and social loneliness. As a result, we find supporting evidence in favor of

Hypothesis 3.

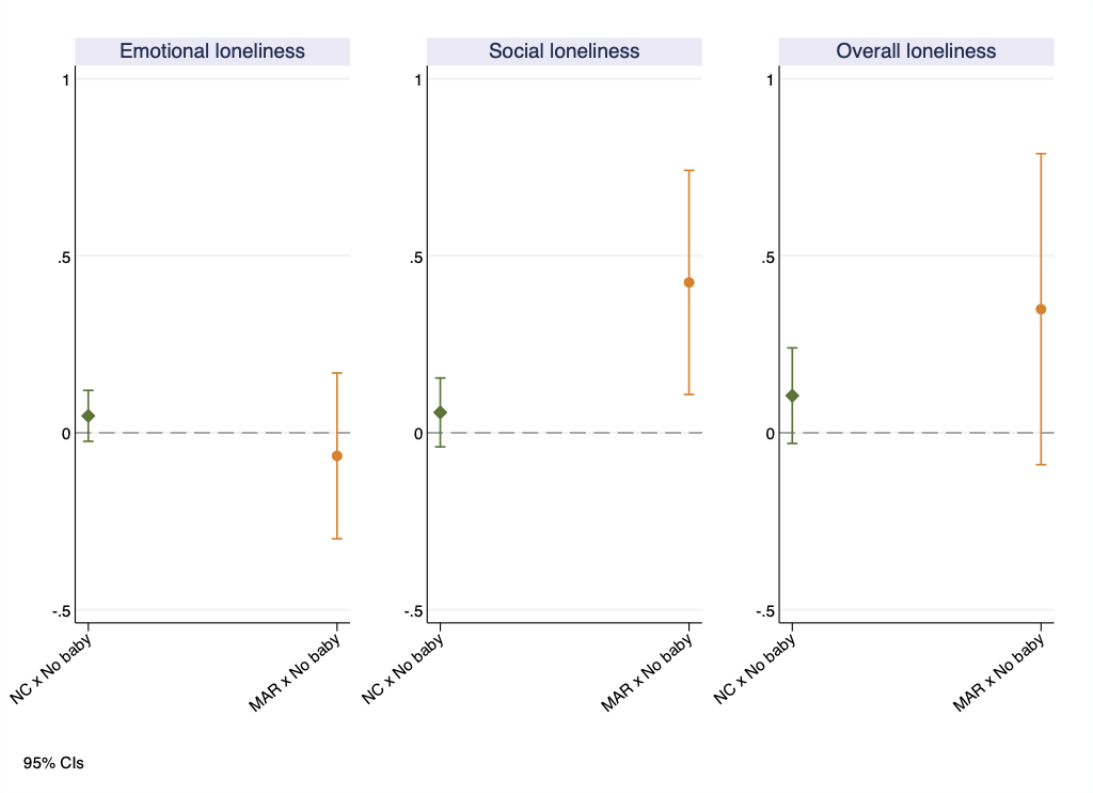


Figure 4.4: Average marginal effects of the mode of conception and by gender

Mechanisms

We introduce two mediating factors, union dissolution and subjective financial hardship and, in a stepwise approach (See Table 4.3). First, we introduce the experience of union dissolution between two waves, in M2 and find that changes in social loneliness is attenuated to a minor extent by the disruptions in partnership (0.166 points, significant at 10 percent level). Looking at M3, while subjective financial hardship is positively and significantly associated with emotional and overall loneliness, it does not explain changes in social loneliness. Therefore, when controlled for job loss, undergoing MAR increases social loneliness by 0.168 points, very similar to findings in M1. Lastly, both mediators are simultaneously included in M4 and results from previous estimates hold (0.165 points, significant at 10 percent level for social loneliness).

VARIABLES	M2 Emo.	M3 Emo.	M4 Emo.	M2 Soc.	M3 Soc.	M4 Soc.	M2 Over.	M3 Over.	M4 Over.
MAR	-0.039	-0.04	-0.043	0.166*	0.168*	0.165*	0.125	0.125	0.119
	(0.067)	(0.066)	(0.066)	(0.092)	(0.093)	(0.092)	(0.126)	(0.126)	(0.125)
Union diss.	0.162***		0.156**	0.211***		0.207***	0.369***		0.358***
	(0.062)		(0.062)	(0.077)		(0.077)	(0.113)		(0.112)
Sub. fin. hardship		0.098**	0.093**		0.057	0.05		0.168**	0.155**
		(0.039)	(0.038)		(0.052)	(0.051)		(0.073)	(0.072)
Baseline lone.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Socio-demo.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
N	2,669	2,669	2,669	2,669	2,669	2,669	2,669	2,669	2,669
R squared	0.108	0.107	0.111	0.192	0.19	0.193	0.207	0.204	0.209

Table 4.3: The association between mode of conception and change in loneliness during pregnancy seeking process (with mediating factors)

Sensitivity Analysis

We conducted two sensitivity analyses with multiple imputation to replace missing values in the socio-demographics, subjective financial capability and partnership history. Appendix Table C.5 shows that while the direction are similar to main analysis in Table 4, the MAR effect on social loneliness becomes slightly larger (from 0.17 points to 0.18) and significant at the 5 percent level when adjusted for socio-demographics. Moreover, when two mediating factors are introduced, the magnitude of the MAR effect on social loneliness is estimated 0.176 points, as opposed to 0.165 in Table 5 and it becomes significant at 5 percent level.

Conclusions

As the the utilization of MAR has grown steadily in recent decades and its coverage is expected to increase in the future (Raymer et al., 2020), the mode of conception is becoming an increasingly important factor in reproductive studies. In this study, using the longitudinal data from GGS, we provide insights on the association between MAR and loneliness during pregnancy seeking period, an unexplored aspect of infertility treatments.

Yet, loneliness is a relevant aspect of public health, and a predictor of social well-being which can be experienced at various stages of the life-course.

We show the experience of loneliness during the pregnancy seeking period depends on the mode of conception. Precisely, individuals who try to conceive via MAR experience a higher increase in social loneliness than individuals try natural conception, while emotional and overall loneliness remains statistically unchanged. The effect of MAR experience on increase in social loneliness is considerably large (0.036 standard deviation), which is almost 60 percent of the effect of union dissolution on social loneliness, (0.062 standard deviation, see Appendix Table C.5).

The results do not show any gender differences which could suggest that undergoing infertility treatment is a couple experience rather than an individual one, which has similar emotional and social consequences on both partners. On the other hand, while the stigma surrounding infertility and childlessness is stronger for women, they pronounce the problem of infertility more openly and frequently and receive more social support in return (Martins et al., 2014; Nagórska et al., 2019). As a consequence, women's disadvantaged status in terms of loneliness at the initial phase of the treatments can be mitigated with the help of their stronger social support network. This could provide an alternative explanation as to why the estimated change in loneliness does not differ by gender during the pregnancy seeking period. Future research should shed light on how the MAR experience vary by gender through exploring the variety of the coping mechanisms that they consult to at different stages of the treatment.

Moreover, we find that the association between MAR and social loneliness level is mainly driven by individuals who could not have a baby between our two observation points. In other words, the whether the pregnancy seeking period results in a live birth or not is integral to the feeling of loneliness among the couples who try to conceive via MAR. Our results confirm the previous study of (Holter et al., 2021) which finds that the dominant emotional reaction among women who undergo an ineffective IVF attempt is feeling of being lost and lonely.

To account for the changes in social loneliness during the pregnancy seeking period, we analyzed the effect of two mediating factors, the experience of union dissolution and

subjective financial hardship in between two observation points. We show that while union dissolution is positively and significantly predicts the change in social loneliness during the pregnancy seeking period, it attenuates the association between MAR and social loneliness slightly. On the other hand, experiencing financial hardship during the pregnancy seeking period does not mediate the worsened social loneliness of individuals undergoing MAR. We are not able to test other two mechanisms, namely mental health and stigma surrounding infertility. However, we descriptively show that individuals who undergo MAR perceive stronger social pressure on childbearing from their parents, friends and relative than the ones who try to conceive naturally (See Figure 4.2) at the onset of the survey. Even though we are not able to observe the date at which respondents have started undergoing MAR, we know that they were already receiving infertility treatment at the time of the survey. These descriptive findings suggest that worsened social loneliness during the pregnancy seeking period can be attributable to stronger exposure to social pressure from their inner circle. This evidence is consistent with the existing literature's findings showing that individuals who undergo MAR are exposed higher stigma surrounding infertility and childlessness (Slade et al., 2007; Greil, McQuillan, Lowry and Shreffler, 2011)

This study has some limitations. First, the sample of individuals who undergo MAR is small with 196 observations. This produces larger confidence intervals for MAR couples as compared to couples who try to conceive naturally, and it might obscure potential difference in terms loneliness in between two groups which could have been more visible if we were to have a larger sample. Second, again due to limited number of observations, we are not able to explore the interaction between childbearing status and gender which could allow otherwise us to uncover whether the loneliness burden of an ineffective MAR experience differ from men to women. In addition, limited number of observations prevent us from investigating how MAR experience might depend on the country in which it takes place. The context can shape the MAR experience and its further implications as the accessibility of the infertility treatments and the generosity of the welfare state varies by country. At the same time, even in Germany – the country which received the highest point in terms of accessibility and regulation of MAR in our sample, according to European Atlas of Fertility Treatment Policies - high-income couples are more likely to seek for

medical help for childbearing (Köppen et al., 2021). Third, since the longitudinal form of GGS data is only available in two waves, we are not able to observe the pre-pregnancy seeking period loneliness level of the respondents. This is a limitation particularly for couples who undergo MAR to conceive who might have been dealing with infertility issue for a longer period compared to couples who try to conceive naturally, and this might be reflected on their baseline loneliness levels. In other words, respondents who were trying to conceive before the survey period might have already experienced a substantial change in loneliness. For instance, looking at the baseline loneliness levels reported in Table 1, individuals who undergo MAR experienced higher emotional and overall loneliness than natural conceivers, albeit the mean difference is insignificant. Fourth, we restrict our analytical sample to respondents who are "willing to have a baby" at the moment of interview. Conceptually, willing to have a baby may correlate but not necessarily fully overlap with seeking a pregnancy. Therefore, we might be selecting respondents who are not actively seeking to achieve a pregnancy and it might introduce biases in our analysis comparing the change in loneliness by mode of conception as they are expected to be more frequent among respondent who try to conceive naturally.

Nevertheless, these limitations are partially offset by the strengths of our study. The present study broadens the perspective of MAR research firstly by introducing the aspect of loneliness, and then through considering couples whose MAR experience did not result in a live birth. This sub-population is neglected in the prior studies mostly due to data availability. Therefore, relying on a rich longitudinal data which allows us to identify diverse MAR experiences and account for potential confounding factors reinforces the relevance of our work.

Appendix A

Appendix - Chapter 2

A.1 Results without control variables

A.1.1 Generations and Gender Survey

Outcome variables	(1) Linear RD[1]	(2) Bandwidth	(3) Obs.	(4) Mean	(5) Linear RD [2]	(6) Bandwidth	(7) Obs.	(8) Mean
Age at leaving home	0.748	50	1734	21.24	0.909	36	1304	21.2
	(0.597)				(0.701)			
Probability of marriage	0.029	53	2084	0.83	0.026	38	1609	0.83
	(0.035)				(0.042)			
Age at first marriage	0.431*	59	1862	23.20	0.420	43	1409	23.03
	(0.258)				(0.285)			
Age at first birth	1.059***	48	1641	24.27	0.288	35	1220	24.18
	(0.383)				(0.428)			
(Log) number of children	-0.013	56	2169	1.53	-0.026	40	1668	1.54
	(0.039)				(0.043)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.
[1] MSE-optimal bandwidth selector
[2] CER-optimal bandwidth selector.

Table A.1: Average effect of the abortion ban on life-course events

Outcome variables	(1) Linear RD[1]	(2) Bandwidth	(3) Obs.	(4) Mean	(5) Linear RD [2]	(6) Bandwidth	(7) Obs.	(8) Mean
Age at leaving home	1.672***	40	734	19.79	1.565***	29	562	19.94
	(0.484)				(0.557)			
Probability of marriage	0.006	58	1088	0.84	0.010	42	835	0.83
	(0.036)				(0.040)			
Age at first marriage	1.216***	67	1003	21.69	0.993**	48	766	21.6
	(0.382)				(0.407)			
Age at first birth	1.232***	53	908	22.94	1.111**	38	705	22.74
	(0.452)				(0.493)			
(Log) number of children	-0.075*	63	1150	1.6	-0.059	45	889	1.59
	(0.040)				(0.047)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.
[1] MSE-optimal bandwidth selector
[2] CER-optimal bandwidth selector

Table A.2: The effect of the abortion ban on women's life-course events

Outcome variables	(1) Linear RD[1]	(2) Bandwidth	(3) Obs.	(4) Mean	(5) Linear RD [2]	(6) Bandwidth	(7) Obs.	(8) Mean
Age at leaving home	-0.774	75	1181	22.53	-0.796	54	905	22.62
	(0.760)				(0.870)			
Probability of marriage	0.047	57	1157	0.82	0.047	41	875	0.82
	(0.060)				(0.074)			
Age at first marriage	-0.650**	85	1294	24.82	-0.829**	61	981	24.85
	(0.328)				(0.333)			
Age at first birth	0.263	72	1130	25.82	0.288	52	872	25.8
	(0.402)				(0.428)			
(Log) number of children	0.061	52	1087	1.46	-0.026	40	800	1.47
	(0.081)				(0.043)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.
[1] MSE-optimal bandwidth selector
[2] CER-optimal bandwidth selector

Table A.3: The effect of the abortion ban on men's life-course events

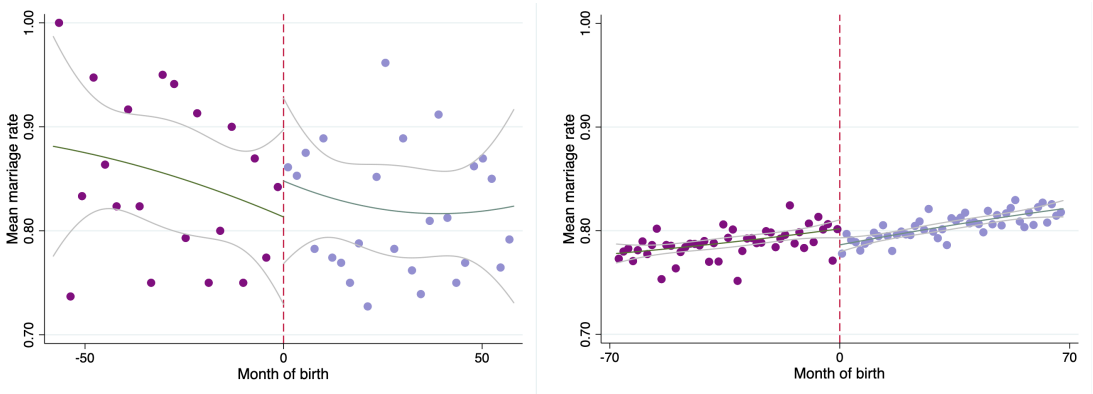
A.1.2 Census

Outcome variables	(1) Linear RD[1]	(2) BW	(3) Obs.	(4) Mean	(5) Linear RD [2]	(6) BW	(7) Obs.	(8) Mean
Prob of marriage (men)	0.000	54	130142	0.78	-0.000	38	95011	0.78
	(0.005)				(0.006)			
Prob of marriage (women)	-0.014***	69	160568	0.8	-0.014**	49	115943	0.8
	(0.005)				(0.006)			
Age at first marriage	0.520***	67	113471	22.61	0.462***	48	82507	22.62
	(0.121)				(0.135)			
Age difference	-0.265**	42	69003	3.45	-0.271**	30	51370	3.47
	(0.115)				(0.123)			
Education difference	-0.019**	27	45513	0.04	-0.029***	19	32962	0.04
	(0.009)				(0.009)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.
[1] MSE-optimal bandwidth selector
[2] CER-optimal bandwidth selector

Table A.4: Average effect of the abortion ban on marriage market outcomes

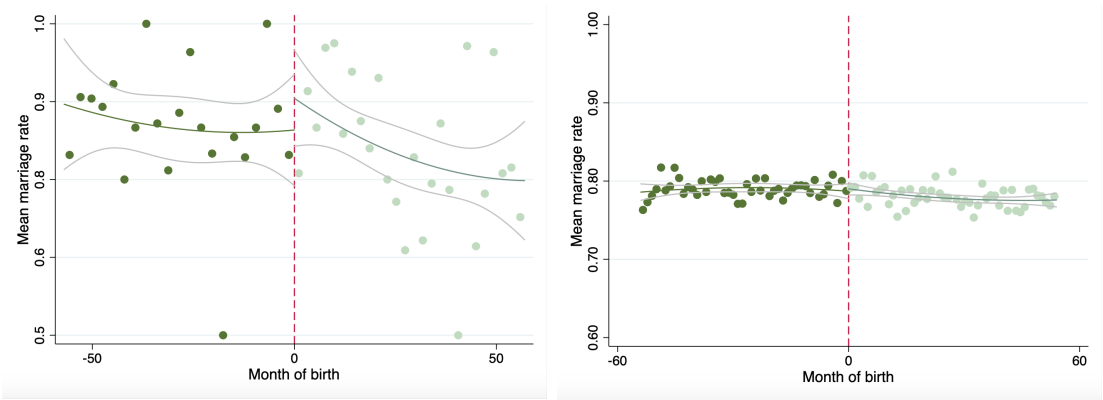
A.2 Comparison of the findings from GGS and Romanian Census



(a) GGS

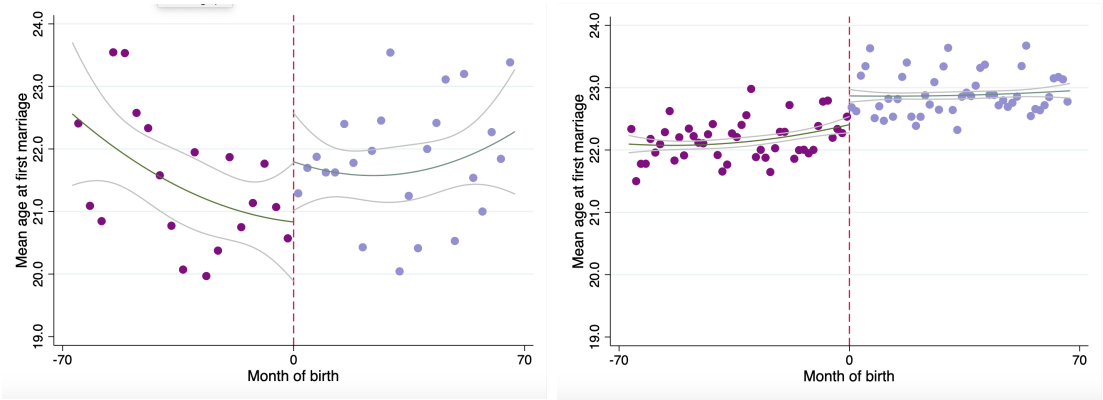
(b) Census

Figure A.1: Probability of marriage among women



(a) GGS (b) Census

Figure A.3: Probability of marriage among men



(a) GGS (b) Census

Figure A.5: Age at first marriage among women

Outcome variables	(1) Linear RD[1]	(2) BW	(3) Obs.	(4) Mean	(5) Linear RD [2]	(6) BW	(7) Obs.	(8) Mean
Prob. of marriage (men)	0.000	50	121417	0.78	-0.000	36	90367	0.78
	(0.005)				(0.005)			
Prob. of marriage (women)	-0.016***	56	130644	0.8	-0.015***	40	96878	0.8
	(0.005)				(0.005)			
Age at first marriage	0.461***	68	113471	22.61	0.384***	49	84023	22.62
	(0.065)				(0.063)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. In all specifications, month of birth is included as a control variable.
[1] MSE-optimal bandwidth selector
[2] CER-optimal bandwidth selector

Table A.5: Results obtained from Romanian Census 2011 data using the optimal bandwidths calculated for GGS data

A.3 Analysis for post-1989 period

Outcomes variables	(1) Linear RD	(2) Bandwidth (MSE)	(3) Obs.	(4) Mean
Age at first marriage	0.121	40	752	24.39
	(0.443)			
Age at first birth	1.576**	41	814	26.26
	(0.652)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. In all specifications, month of birth is included as a control variable.

Table A.6: The effect of the abortion ban on the age of first marriage and birth for post-1989 period

Outcomes variables	(1) Linear RD	(2) Bandwidth (MSE)	(3) Obs.	(4) Mean
Age at first marriage	0.274	41	261	23.05
	(0.935)			
Age at first birth	0.732	53	390	25.23
	(1.296)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. In all specifications, month of birth is included as a control variable.

Table A.7: The effect of the abortion ban on women's age of first marriage and birth for post-1989 period

Outcomes variables	(1) Linear RD	(2) Bandwidth (MSE)	(3) Obs.	(4) Mean
Age at first marriage	0.195	43	534	25.31
	(0.443)			
Age at first birth	1.413**	50	585	26.84
	(0.652)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. In all specifications, month of birth is included as a control variable.

Table A.8: The effect of the abortion ban on men's age of first marriage and birth for post-1989 period

A.4 Results at the intersection between gender and parental SES

Outcome variables	(1) Linear RD[1]	(2) Bandwidth	(3) Obs.	(4) Mean	(5) Linear RD [2]	(6) Bandwidth	(7) Obs.	(8) Mean
Age at leaving home	-0.587	69	698	22.35	-0.848	50	534	22.52
	(0.819)				(0.908)			
Probability of marriage	0.033	60	761	0.81	0.044	43	591	0.82
	(0.059)				(0.066)			
Age at first marriage	-0.725*	46	498	24.63	-0.487	34	372	24.89
	(0.438)				(0.519)			
Age at first birth	0.580	49	521	25.59	1.407***	35	396	25.66
	(0.451)				(0.452)			
Number of children (log)	0.046	48	640	1.48	-0.000	35	472	1.49
	(0.073)				(0.077)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. In all specifications, month of birth is included as a control variable.
[1] MSE-optimal bandwidth selector
[2] CER-optimal bandwidth selector

Table A.9: The effect of the abortion ban on the life-course events of men with lower parental education

Outcome variables	(1) Linear RD[1]	(2) Bandwidth	(3) Obs.	(4) Mean	(5) Linear RD [2]	(6) Bandwidth	(7) Obs.	(8) Mean
Age at leaving home	-1.236	79	448	23.33	-0.844	58	343	23.66
	(1.165)				(1.326)			
Probability of marriage	0.184***	42	301	0.83	0.168***	30	221	0.86
	(0.060)				(0.052)			
Age at first marriage	-1.411**	67	393	25.1	-0.966*	50	299	24.93
	(0.596)				(0.547)			
Age at first birth	-0.614	70	379	26.3	-0.427	51	290	26.24
	(0.820)				(0.819)			
Number of children (log)	0.153*	51	366	1.42	0.153*	37	278	1.44
	(0.087)				(0.086)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. In all specifications, month of birth is included as a control variable.
[1] MSE-optimal bandwidth selector
[2] CER-optimal bandwidth selector

Table A.10: The effect of the abortion ban on the life-course events of men with lower parental education

A.5 Tables on educational attainment mechanism

	(1) Pre-ban	(2) Post-ban	(3) Diff (1)-(2)	(4) Obs
High-school	0.632	0.734	-0.10***	65,051
Female & Low parental-SES	0.172	0.182	-0.01	65,240
Male & Low parental-SES	0.487	0.412	0.08***	65,240
Female & High parental-SES	0.129	0.163***	0-0.03***	65,240
Male & High parental-SES	0.212	0.243***	-0.03***	65,240

Note: * p<0.1, ** p<0.05, *** p<0.01. The mean is calculated within the maximum optimal bandwidth which is estimated as 32.

Table A.11: Selected summary statistics - Romanian Census 1992

	(1) Linear RD[1]	(2) BW	(3) Obs.	(4) Mean	(5) Linear RD[2]	(6) BW	(7) Obs.	(8) Mean
Panel A: Low parental SES								
High school	0.023*	27	23284	0.63	0.022*	19	17434	0.64
	(0.013)				(0.012)			
University	0.038**	59	750	0.04	0.053***	43	573	0.04
	(0.018)				(0.020)			
Panel B: High parental SES								
High school	0.044***	23	11320	0.84	0.028***	17	8695	0.84
	(0.011)				(0.009)			
University	-0.150**	115	772	0.23	-0.146*	84	581	0.22
	(0.018)				(0.084)			

Note: Clustered standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. In all specifications, month of birth is included as a control variable. The probability of completing high school is estimated using Romanian Census 1992 while the probability of completing university is estimated using Generations and Gender Survey 2005

[1] MSE-optimal bandwidth selector

[2] CER-optimal bandwidth selector.

Table A.12: Probability of completing high school and university for men by parental background

Appendix B

Appendix - Chapter 3

B.1 Marginal effects

Cohorts	Model 0	Model 1	Model 2	Model 3
1954-1958	0.322***	0.270***	0.279***	0.276***
	(0.071)	(0.057)	(0.058)	(0.062)
1959-1963	0.277***	0.221***	0.220***	0.252***
	(0.054)	(0.042)	(0.043)	(0.046)
1964-1968	0.271***	0.272***	0.282***	0.298***
	(0.043)	(0.032)	(0.033)	(0.036)
1969-1973	0.202***	0.198***	0.209***	0.225***
	(0.038)	(0.028)	(0.029)	(0.031)
1974-1978	0.155***	0.165***	0.168***	0.177***
	(0.037)	(0.028)	(0.028)	(0.031)
1979-1983	0.169***	0.117***	0.116***	0.112***
	(0.037)	(0.029)	(0.030)	(0.033)
Controls	No	✓	✓	✓
Region fixed effects	No	✓	✓	✓
N	29,527	28,018	27,220	24,204

Table B.1: The average marginal effect of having a firstborn daughter vs firstborn son on total number of children by birth cohorts

Cohorts	Up to secondary	Secondary and above
1954-1958	0.292***	0.111
	(0.062)	(0.080)
1959-1963	0.242***	0.063
	(0.047)	(0.059)
1964-1968	0.310***	0.080*
	(0.036)	(0.046)
1969-1973	0.211***	0.099**
	(0.032)	(0.040)
1974-1978	0.207***	0.022
	(0.034)	(0.034)
1979-1983	0.131***	0.098***
	(0.036)	(0.037)
Controls	✓	✓
Region fixed effects	✓	✓
N	23,060	4,961

Table B.2: Average marginal effects of having firstborn daughter on total number of children by birth cohorts and educational level

	Second birth	Third birth
Panel A: Up to secondary education		
1954-1958		0.122***
		(0.022)
1959-1963		0.149***
		(0.020)
1964-1968		0.166***
		(0.018)
1969-1973		0.145***
		(0.019)
1974-1978		0.138***
		(0.021)
1979-1983		0.111***
		(0.026)
Controls		✓
Region fixed effects		✓
N		9,615
Panel B: Secondary or above education		
1954-1958	0.006	0.236***
	(0.043)	(0.082)
1959-1963	0.010	0.126**
	(0.033)	(0.054)
1964-1968	0.037	0.287***
	(0.027)	(0.047)
1969-1973	0.011	0.204***
	(0.026)	(0.046)
1974-1978	0.011	0.021
	(0.024)	(0.045)
1979-1983	0.053**	0.055
	(0.025)	(0.048)
Controls	✓	✓
Region fixed effects	✓	✓
N	4,961	1,581

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.3: The marginal effect of firstborn gender on probability to have second and third child

Appendix C

Appendix - Chapter 4

C.1 Descriptive evidence

	NC x Had a baby	MAR x Had a baby	NC x No baby	MAR x No baby
Education level				
Secondary or below	0.67	0.60	0.66	0.66
Higher	0.33	0.40	0.34	0.34
N. obs	953	78	1570	118

Table C.1: Level of education by mode of conception and outcome of the pregnancy seeking period

	Female	Male
	(%)	
Mode of conception		
Natural conception	92.5	87.8
MAR conception	4.3	9.5
Missing	3.2	2.7
Total	100	100

Table C.2: Mode of conception by gender

C.2 Marginal effects

VARIABLES	(1) Emotional	(2) Social	(3) Overall
NC x Female (ref: NC x Male)	0.059	-0.056	-0.001
	(0.037)	(0.05)	(0.07)
MAR x Female (ref: MAR x NC Male)	0.029	-0.172	-0.152
	(0.126)	(0.195)	(0.250)
Controls	Yes	Yes	Yes
Observations	2,669	2,669	2,669
Mean difference (NC)	0.02	0.04	0.05
Mean difference (MAR)	-0.01	0.23	0.22

Table C.3: Average Marginal Effect of Mode of Conception on Loneliness by Gender

VARIABLES	(1) Emotional	(2) Social	(3) Overall
NC x No baby (ref: NC x Had baby)	0.056	0.070	0.125
	(0.039)	(0.058)	(0.077)
MAR x No baby (ref: MAR x Had baby)	-0.054	0.437***	0.373
	(0.130)	(0.175)	(0.249)
Controls	Yes	Yes	Yes
Observations	2,669	2,669	2,669
Mean difference (NC)	0.02	0.04	0.05
Mean difference (MAR)	-0.01	0.23	0.22

Table C.4: Average Marginal Effect of Mode of Conception on Loneliness by Childbearing Status

C.3 Sensitivity analysis

VARIABLES	Emotional	Social	Overall	Emotional	Social	Overall
MAR	-0.026	0.182**	0.153	-0.032	0.176**	0.142
	(0.063)	(0.085)	(0.118)	(0.063)	(0.085)	(0.118)
Sub. Financial hardship				0.087***	0.042	0.141**
				(0.033)	(0.045)	(0.062)
Union dissolution				0.147***	0.209***	0.351***
				(0.047)	(0.063)	(0.087)
Emotional (W1)	0.243***			0.244***		
	(0.019)			(0.019)		
Social (W1)		0.260***			0.260***	
		(0.019)			(0.019)	
Loneliness (W1)			0.308***			0.309***
			(0.019)			(0.019)
Socio-demographics	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,725	2,725	2,725	2,725	2,725	2,725

Table C.5: Sensitivity analysis with multiple imputation

VARIABLES	Emotional	Social	Total
Panel A			
Union dissolution	0.067	0.062***	0.077
Panel B			
MAR	-0.011	0.036*	0.02
Baseline loneliness	Yes	Yes	Yes
Socio-demographics	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Observations	2,669	2,669	2,669
R-squared	0.108	0.191	0.207

Table C.6: The association between union dissolution and loneliness and the association between mode of conception and loneliness. Standardized beta coefficents.

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