Gender-role identity in adolescence and women fertility in adulthood *

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Abstract

In the new era of economics of fertility, the identification of the determinants of fertility has become one of the major challenges. This paper analyzes how the fertility patterns of both female teenagers' own families and peers' families (measured as the number of siblings) affect their future fertility choices. Our analysis distinguishes between the extensive (becoming a mother or not) and the intensive (total number of children) margin of fertility. We provide five main results. First, neither own number of siblings nor peers' number of siblings affect whether a woman becomes a mother or not. Second, women with more siblings and women whose peers had more siblings tend to have more children. Third, the peer effect is stronger for women who reported having a less close relationship with their mothers. Forth, women that were teenagers characterized by high scores and being involved in activities related to popularity experience a negligible peer effect. Further, more communication between teenagers' parents increases the influence of women's own family but reduces the peer effect. These results suggest that fertility patterns of both female teenagers' own families and peers' families are relevant in shaping women's identity-defining role in fertility, specially in the intensive margin; and that the relative importance of these two patterns depends on the quality of the relationships between all actors (between teenagers, between teenagers and their parents, and between teenagers' parents).

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1 Introduction

Research in fertility is experiencing a major shift in late decades. Recent evidence in developed countries about the weakening of the relationship fertility-income, the fading of the quantity-quality trade-off, as well as, the emergence of new empirical regularities, have propelled the rise of a modern era of fertility research (see Doepke et al. (2022)). To this regard, understanding fertility choice and so, identifying fertility determinants represents one of the most important challenges in the field. Current literature has documented the importance of many factors affecting the women's fertility, such as their preferences, labor status, education, family policy, marital status and spouses' characteristics. More recently, some authors have highlighted the influence of cultural norms in shaping fertility decisions (Fernández and Fogli (2009), Fernández and Fogli (2006) and Myong et al. (2021)). As noticed by Olivetti et al. (2020), these analyses are partially founded on the Akerlof-Kranton theory of economic identity (Akerlof and Kranton (2000), Akerlof and Kranton (2011)). According to it, the identity (a person's sense of self) is linked to social categories that are shaped by norms guiding individuals' behaviors. Identifying the factors that configure the identity and so, the set of norms that define it is a key element in explaining the individual's preferences and so, her behavior.

The main contribution of this paper is studying the relevance of the females' identity formation in determining fertility outcomes. Given that individual behavior and choice are influenced by expected behaviors in social groups as determinants of the identity, we focus on the socialization process in adolescence. We evaluate at which extent this process has any impact on females' fertility choices in adulthood. More precisely, we analyze the role that observed fertility patterns during the adolescence of both family and peers' families have in shaping the women's future fertility decisions. To do that we consider two key variables: number of siblings, which captures direct influence of their families (socialization inside the family), and the number of schoolmates' siblings, which captures the influence of peers' families (socialization outside the family). Moreover, we study how these two variables affect both margins of the fertility decision, that is, the extensive margin (motherhood decision) and the intensive margin (number of children of fertility).

Our analysis is based on the fact that adolescence is a relevant period in the formation of identity (see Steensma et al. (2013) for a detailed survey). Identity formation is an individual process in which teenagers explore and acquire identity-defining roles in a variety of life domains as family ideals, gender roles or fertility (see, e.g., Erikson (1968) and Marcia et al. (2012)). In this context, the influence of individuals' behaviors considered relevant for teenagers is crucial to determine their identities and so, their choices and behaviors in adulthood.[1] Following Olivetti et al. (2020), in our sample of females, we focus on their parents' behaviors and their peers' parents' behaviors.[2] We think these adults may exert more influence on them, since they spent a large part of their time at home and at school. We study at which extent observed fertility patterns of both own family and peers' families during adolescence affect females' fertility decisions in adulthood.

The influence of parents (socialization inside the households) has been broadly studied in the literature of fertility. There is a wide consensus that the family size of origin is positively correlated with men's and women's own fertility later in life (see, e.g., Anderton et al. (1987), Murphy (1999), Murphy and Knudsen (2002), Murphy and Wang (2001) and Fernández and Fogli (2006)), however, these papers do not distinguish between extensive and intensive margin of fertility.[3] Studies on the influence of other relevant individuals on the formation of fertility preferences, on the contrary, has been very scarce.[4] To the extent of our knowledge, this paper is the first to explicitly analyze the influence of other adults in shaping the fertility preferences in adolescence. In general, the process of socialization outside households is more complex, because it may capture the influence of many types of actors such as peers, friends, neighbors and colleagues. Among all of these possible types of influences (or peer effects), we focus on the effect of the peers of females in high school. More precisely, we analyze the contribution of the number of peers' siblings in determining the females fertility decisions in adulthood. Our hypothesis is that the influence of females' schoolmates is relevant in shaping their behaviors in adulthood. According to Manski (1993) terminology, this peer effect is a contextual effect. There are many papers that have documented the impact of a certain attribute of schoolmates on several economic outcomes in the long-run.[5] However, none of them has considered the role of this (contextual) peer effect in shaping the fertility decisions, neither in the extensive nor in the intensive margin. This is novel in the literature of fertility.

The fact we are interested in analyzing how females' fertility patterns are affected by some behaviors observed during their adolescence, does not imply that we are assuming that women

[1] In a recent paper Rodríguez-Planas et al. (2022) study how exposure to peers whose mothers hold gender equality beliefs is associated with a reduction in the gender gap of engaging in risky behaviours.

[2] They explore how mothers and peers' mothers affect females' labor supply decisions in adulthood.

[3] The unique paper that considers the impact of family size of origin of both margins is Gobbi and Goñi (2021). They find that the larger the number of siblings that British male aristocrats (that are heirs) have, the lower the number of children that these heirs have. However, the number of siblings has not any effect on the decision of becoming father.

[4] Only Fernández and Fogli (2006) evaluate how the impact of the lagged values of the total fertility rate on the woman's country of ancestry (as a cultural proxy) affects her fertility decisions.

[5] See Olivetti et al. (2020) for a detailed review of the literature.

decide unilaterally having babies. As Doepke and Kindermann (2019), we think that some form of agreement between mother and father is required before a birth can take place. Thus, though we refer to women's fertility decisions, we recognize that those decisions might be the result of a negotiation process.[6] Regardless of this fact, there exists empirical evidence that finds that women's preferences are more relevant than men's preferences and so, that women have a larger impact on the fertility decision in the household than men. This literature suggests that one of the main reasons is the allocation of child care among parents, and it documents that in populations where the child care is more concentrated on women, they are more opposed to have another child and the fertility rates are the lowest.[7] Therefore, we think that fertility behaviors to which females are exposed during their adolescence (parents and peers' parents behaviors) are relevant to understand their preferences and hence, their decisions.[8]

This paper also distinguishes between the extensive margin of fertility (motherhood) and the intensive margin (total number of children or mothers' fertility). Recent empirical evidence shows that these two margins react differently to the same incentives, suggesting that they should be considered as separated decisions. In this respect, Baudin et al. (2015), using a large sample of women aged 45-70 from 1990 U.S. Census, find that, whereas mothers' fertility decreases with education (intensive margin), the childlessness rate of women exhibits a U-shaped relationship with education (extensive margin). The first result is a well-established finding in the literature but not the second one. Regarding the U-shaped relationship in the extensive margin, they argue that initial high levels of childlessness can be explained by the poverty of the lowest educated women who achieve low wages and cannot gather the minimal consumption to be able to procreate. Then, when education (and the wage) raises, childlessness

[6] There exist exceptions from this rule. Certainly, not all children are wanted (some of them are the result of accidental pregnancies, deception, etc.). However, as Doepke and Kindermann (2019) point out, these cases account for a small percentage of births and will not be considered here. On the other hand, miscarriages and abortions make some planned children never happen. In some cases, these events only imply a delay in getting the wished number of children. In fact, there is evidence that suggests that the desired fertility is good predictor of the actual fertility (Schoen et al. (1999), Doepke and Tertilt (2018), Doepke and Kindermann (2019)). In other cases, however, it might imply that women never become mothers, even when they wish it. We calculate the fraction of miscarriages and unintended abortions over the non-mothers in our sample and we obtain that this is less of 4%. Just in case, we checked the robustness of our findings. We re-estimated the extensive margin including these women in the group of "mothers". We observed that our estimation results remained unchanged.

[7] See for instance Doepke and Kindermann (2019), De Laat and Sevilla-Sanz (2011) and Feyrer et al. (2008). Regarding developing countries, men tend to have stronger and larger ideal family sizes than women (Westoff et al. (2010)), which explains why most of unwanted born children are unwanted by women (Ashraf et al. (2014)). However, Ashraf et al. (2014) suggest that an increase in the bargaining power of women leads to a decline in fertility rates in developing countries.

[8] We think that it would also be interesting to consider the husbands' fertility experiences during the adolescence, however, Add health does not collect this data. In order to test the robustness of our results to the husbands' information, we have done an alternative experiment. We re-estimated our model using a sample of married men. In this case we find that the men's extensive margin of fertility is independent of men's parents and peers' parents influences. Regarding the intensive margin, we find that it is affected by men's parents' behaviors, however, unlike women's estimation, there is not peer effect.

decreases until a certain point for which the parenting opportunity cost for educated women (in terms of time endowment and foregone income) becomes too high and they decide to remain childless. More recently, Baudin et al. (2020), extending the analysis to developing countries, also find that universal primary education has different effects on both the intensive and the extensive margins of fertility.

As a previous step of our analysis we check whether the aforementioned fertility patterns documented by Baudin et al. (2015) and Baudin et al. (2020), and so justify a differentiated analysis between the extensive and the intensive margin, are present in our sample. In this paper we use Add Health data, a large and rich longitudinal data set widely used in peer effects studies.[9] This is a very convenient database because contains data about many aspects of the individuals (socioeconomic and familial characteristics, social relationships, etc.) from the adolescence until adulthood in the U.S. The possibility of having information about individuals' peers in high school, together with data about individuals' fertility behaviors in adulthood, makes it possible to analyze how fertility patterns observed during adolescence affect adult females fertility decisions. Fertility information in adulthood (women aged 34-44), joint to fertility patterns of both own family and peers' families, work and marital status, and education attaintment, is obtained from Wave V (2016-2018); whereas information about peers and other background characteristics, is obtained from Wave I (1994–1995), when the females are in high school. Following the works of Fernández and Fogli (2006), Baudin et al. (2015) or Gobbi (2013), we focus our analysis on married woman.[10] Figure 1a shows the relationship between education and mothers' fertility, for married females, and Figure 1b shows the relationship between education and childlessness, for married females.[11] As in Baudin et al. (2015), we observe that there is a negative relationship between mother's fertility and educational attainment (Figure 1a) and a strong U-shaped relationship between childlessness rate and educational attainment (Figure 1b), stressing the distinctness of each margin.[12] Hence, in this paper we investigate whether the extensive margin of fertility behaves differently from the intensive margin when facing the same incentive, like changes in fertility patterns of both families and peers' families

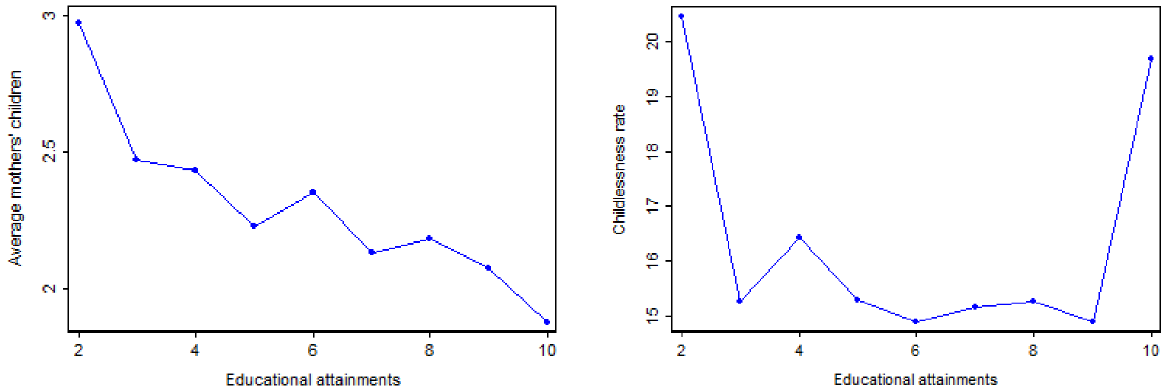
[9]See, e.g., Calvó-Armengol et al. (2009), Bifulco et al. (2011) and Richards-Shubik (2015).

[10]However, along the paper, in order to check the robustness of our findings, we present results for all women (regardless their marital status) in several analysis.

[11]Wave V provides information about the educational attaintment of women when they are adults. The question is the following: "What is the highest level of education that yo have achieved to date?", with a range of response from 1 equals "8th grade or less" to 16 equals "completed a post baccalaureate professional degree (such as law, medical, nursing)" in an ascendent order (less educated to more educated). Due to the fact that there are less than 10 individuals who answered "8th grade or less", we removed category 1 from the figures. Moreover, we aggregate some equivalent responses in order to simplify the number of categories. See more details in Appendix B, Table B.1.

[12]We checked these facts for the whole sample (married and non-married), and they replicate well.

during adolescence.



(a) Mothers' fertility and education.

(b) Childlessness rate and education.

Figure 1: Relationship between childlessness and mothers' fertility and education for married females. Educational attainment is obtained from Wave V. Category 1 ("8th grade or less") is excluded from the figure because it is reported for less than 10 individuals. See more details in Appendix B, Table B.1. Source: Add Health.

Our main results are the following. First, we do not find any significant influence of fertility patterns of both family and peers' families on the extensive margin of fertility for married woman: neither variable siblings nor variable peers' siblings are significant. In contrast, we find a positive impact of fertility patterns of both family and peers' families on the intensive margin of fertility (total number of children) for married women: women with more own siblings or with more number of peers' siblings tend to have more children.[13] Second, regarding the intensive margin, we explore the relevance of potential mechanisms that might underlie our findings as the quality of the relationship between the females and their families, the females and their peers, and the females' parents and their peers' parents. We find that variable *siblings* (own family influence) has a stronger effect when women in adolescence have: worse relationships with their mothers, less closeness with their high school peers, or their parents have more communication with friends' parents. Regarding the peer effect, we find similar results. It is stronger when women in adolescence report having worse relationships with their mothers or less closeness with their high school peers. The group of women reporting less closeness with their peers were teenagers characterized by high scores and being involved in activities related to popularity, which suggests that these teenagers seem more likely to be followed than to follow or imitate peers' behaviors. Finally, unlike *siblings*, the peer effect is

[13]A recent study that analyzes the peer effect distinguishing between intensive and extensive margin and obtains similar results to us is Nicoletti et al. (2018). They evaluate the family peer effects on mother's labor supply and they find the existence of a positive peer effect at intensive margin, but not at extensive margin.

stronger when their parents have less communication with friends' parents.

According to the fertility literature, we include in our estimations several and important individual controls such as race, education, labor status, individual ability measure (PVT), religion, information regarding the mothers (education and whether she was born in U.S.), a socioeconomic variable in high school years (the quality of the residence building) and spouse income. Our estimations show that labor status, education or religious practice are relevant to explain both margins of the fertility decision. Finally, in order to ensure the reliability of our estimates, our empirical strategy also takes into account the problem of self-selection in school and cohorts motivated by unobserved characteristics.

This paper contributes to three different literatures. The first is the literature that documents the importance of the peer effect and cultural norms in shaping female fertility choices. Fernández and Fogli (2009) emphasize that social norms and individuals' beliefs about family size, motherhood and the role of women in the economy are part of the culture of a country. After controlling for several characteristics, they find that woman's culture in U.S., measured as her parents' country of origin, has a strong effect on her fertility decision (the number of children she has). In another paper, Fernández and Fogli (2006), they include women's fertility family experience. The reason is to isolate the effect of the culture from direct personal experiences that can be intergenerationally transmitted to women. They show that both social norms and personal experience have a significant effect on fertility outcomes in the U.S. However, none of these two papers differentiate between mothers and no-mothers. More recently, Myong et al. (2021) evaluate the effect of two social norms associated to the Confucianism (unequal gender division of childcare and the stigma attached to out-of-wedlock births) in childlessness and fertility of mothers in South Korea. They find that the unequal gender division of house working has a negative impact on fertility of married mothers, especially for the most educated; and the social stigma associated to out-of-wedlock births has a positive impact on childlessness for single women. Ciliberto et al. (2016) propose a game to study the influence of co-workers on fertility choices in Denmark. Their estimations show that the peer effect could be positive or negative depending on the age and the education of the workers. They find that, overall, more co-workers having a child reduces the probability of having a child for women but with heterogeneity across age and educational attainment. Hensvik and Nilsson (2010) also explore the existence of co-workers peer effects on the timing to give a birth in Sweden. They find that Swedish women are in average 10.9% more likely to have their first child if any co-worker had a child 13-24 months before, 4% more likely to have their second child if any co-worker with similar characteristics (same sex, same educational attainment and close in age) had a child

12 months before, and 5% more likely to have their third child if any co-worker with similar characteristics had a child 13-24 months before. Finally, related to this, Behrman et al. (2002) study the network effects on the use of contraception methods in rural Kenya. They find that social networks have significant and substantial effects even when controlling for unobserved factors that may also determine the nature of the social networks.

Our paper also contributes to the literature that differentiates between the extensive and the intensive margin of fertility. One of the most relevant contribution in this area is Baudin et al. (2015). They propose a theory to replicate the main empirical facts in U.S.: a U-shaped relationship between childlessness (extensive margin) and education and; a negative relationship between fertility of the mothers (intensive margin) and education. Baudin et al. (2020), using a similar framework, find that the universal primary education in developing countries affects the intensive and the extensive margins differently, that is, reducing the average fertility of mothers, as well as, the childlessness. Gobbi (2013) develops a model to account for the long-run dynamics of both fertility and childlessness in a model of intergenerational transmission of fertility preferences. She finds that a higher gender parity in labor supply and reductions in gender wage gap lead to a decrease in childlessness and a decrease in mothers' fertility, in short run and in the steady state. Myong et al. (2021) find that the fertility of married mothers is negatively related to the unequal gender division of house working, and childlessness for single women is positively related to the stigma of the out-of-wedlock births. Doepke and Kindermann (2019) propose a model in which the woman and the man in each relationship have separate preferences and bargain over household decisions, including fertility. They state that some form of agreement between mother and father is required before a birth can take place. Thus, the decision of each child is different: for a birth to take place, both partners have to prefer an additional child over the status quo. They show that the need for agreement is most pronounced for couples with no children. However, for higher-order children, the woman's intention turns out to be more important than the man's, implying a higher importance of the woman in the intensive margin. More recently, Gobbi and Goñi (2021) analyze the impact of settlements (inheritance contracts) on male British aristocrats that are heirs in the period 1650-1882. They find that these contracts have a positive effect on the extensive margin but do not affect these men's number of children. Finally, Aaronson et al. (2014) evaluate the effect of the introduction of the Rosenwald Rural Schools initiative on the fertility choices of rural black women at the beginning of the XX century. They find that the increase in education among these women is accompanied by a substantial decline in fertility (along both the extensive and the intensive margins). By contrast, women facing improved schooling opportunities for their children (not for themselves) were more likely to become mother but chose to have smaller families overall.

Finally, our paper contributes to the large body of work that documents the relevance of peers' influence on behaviors in the long-run. For instance, Anelli and Peri (2019) find that gender composition of peers in high school may affect individuals' choice of college major and labor market outcomes, academic performance and wages. Bifulco et al. (2011) document that the proportion of peers in high school with college mothers and the proportion of peers from minority race groups shape the decisions of how to behave in school, dropping out, academic performance and college attendance. Bifulco et al. (2014) find that having more high school classmates with a college educated mother has positive effects on college attendance in the years immediately following high school. Black et al. (2013) find that the peers composition in high school affects individuals' long-run outcomes such as IQ scores, teenage childbearing, education, and labor market outcomes. They find that average father's earnings of peers matters for boys, whereas the proportion of females in the grade affect all of them. Carrell et al. (2018) document the importance of the long-run educational and labor market consequences of childhood peers. They show that exposure to disruptive peers in classes or peers linked to domestic violence during elementary school reduces classmates' future earnings. Cools et al. (2019) show that the proportion of males with high educated parents in high schools affects females educational attainments. More recently, Olivetti et al. (2020) find that the proportion of peers with working mothers in high school affects the female's labor participation in adulthood.

The paper is organized as follows: In section 2 the data and variables used are explained; section 3 is dedicated to explain the empirical strategy; section 4 presents results and discuss them and section 5 concludes.

2 Data Description

We use data from the National Longitudinal Study of Adolescent to Adult Health (Add Health).[14] Add Health data set was designed to assess the impact of the family and social environment on individuals' behavior in the United States through their adolescent and adult life, with a special emphasis in health. Add Health provides a vast array of socioeconomic,

[14]Add Health is directed by Robert A. Hummer and funded by the National Institute on Aging cooperative agreements U01 AG071448 (Hummer) and U01AG071450 (Aiello and Hummer) at the University of North Carolina at Chapel Hill. Waves I-V data are from the Add Health Program Project, grant P01 HD31921 (Harris) from Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), with cooperative funding from 23 other federal agencies and foundations. Add Health was designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris at the University of North Carolina at Chapel Hill. No direct support was received from grant P01-HD31921 for this analysis.

familial, social, demographic, behavioral or health data from individuals (and, with minor detail, from their parents) since they are teenagers, and lately in their adulthood, through five waves (the last wave available, Wave V, has more than 20 years of difference with the Wave I). The survey starts collecting information on students in grades 7–12 in the academic year 1994–1995, from a nationally representative sample of roughly 130 private and public schools (Wave I). The data comes from two surveys: an in-school survey and an in-home survey of a sample of students selected from the 1994–1995 in-school survey. The in-school survey collects information about 90,118 individuals, whereas the in-home survey contains information about 20,745 individuals. The sample of teenagers from the Wave I in-home survey was interviewed again in 1995–1996 (Wave II), in 2001–2002 (Wave III), in 2007–2008 (Wave IV), and again in 2016-2018 (Wave V). Thus, Add Health contains highly detailed information about the individuals' background, when they are high school students and teenagers, as well as, when they become adults (e.g., their education, labor status, civil status or fertility information, among others). This longitudinal feature of Add Health makes this database a very useful source for studying the existence of peer effects in economic outcomes in the long-run.

The (quantitative and qualitative) fertility information in adulthood is measured using the individual data from Wave V, when individuals are aged 34–44.[15] In particular, Wave V asks information about if the individual or a partner have ever been pregnant and, if this is the case, the individuals are asked for how many biological children (live births) have had. Therefore, in our analysis we define woman's fertility as the number of children ever born from the women who are mothers, and we define motherhood as the fact a woman reports at least a child ever born. Thus, fertility is a continuous variable ranged from 1 to 9, whereas motherhood is measured as a dummy variable that is equal to 1 if an individual reports 1 or more children ever born, and equal to 0 otherwise. Wave V also provides information on education, marital status, labor status and frequency of attendance at religious services.

Regarding background information, we use Wave I and Wave V. First, Wave V interviews collect information about the number of siblings. As commented in the introduction, empirical evidence shows that family experience plays a key role in the fertility choices (Fernández and Fogli (2006)), and peer effects in high school are important too in order to define economic outcomes in the long-run (Bifulco et al. (2011), Olivetti et al. (2020) or Cools et al. (2019)). In our analysis, this implies considering the fertility patterns of both our women's families and their classmates' families. We follow Fernández and Fogli (2006) and we use the same variable

[15]Wave V included individuals aged 33-44. However, there are only 3 individuals aged 33 that will disappear lately after merging Wave V with Wave I, in-school and in-home questionnaires.

to capture the women's fertility background: the number of siblings that both our sample of women and their peers have.[16] This variable: measures the number of siblings that individuals had, alive or dead; includes adopted and step siblings; and it allows us to know the total number of women's siblings even when they lived in other households.[17] We use this variable to create three dichotomic variables that we will use in the analysis of the extensive margin of fertility: the first one equals 1 if the number of siblings is 1 or more (i.e, if the woman has at least 1 sibling) and equals 0 otherwise (no siblings); the second one equals 1 if the number of siblings is 2 or more and equals 0 otherwise, and; the third one equals 1 if number of siblings is 3 or more and equals 0 otherwise.

Wave I in-home interviews include information about demographic and economic variables of their families. For instance, it includes the education level of both the mother and the father, the labor status of the mother and if both the mother and the father had born in U.S.[18] Sex and race of respondents are taken from Wave I in-school questionnaire. At the beginning of Wave I, in the in-home questionnaire, the interviewer administers a Picture Vocabulary Test (PVT) to evaluate the individual ability. This test is a reduced version of the full-length Peabody Picture Vocabulary Test (PPVT) which is considered as a good measure to assess verbal abilities and receptive vocabulary.[19] Wave I in-home questionnaire also provides a measure of residential building quality that can be used as a proxy of the socioeconomic status. The interviewer is asked about how well is kept the building in which she is living and answers can be: very well kept, fairly well kept (needs cosmetic work), poorly kept (needs minor repairs) and very poorly kept (needs major repairs.). Following Olivetti et al. (2020), we create a dummy variable that takes value 1 if interviewer's response is "very poorly kept", and 0 otherwise.

We choose individuals from Wave I in-school questionnaire than have been followed to Wave

[16]The question included in Wave V is: "Do you have any siblings, either living or deceased? Include biologically related, adoptive, and step-brothers or sisters?" and, in case of affirmative response, "How many brothers and sisters do you have, both living and deceased?". This question is similar to the one asked by the General Social Survey database which is used by Fernández and Fogli (2006): "How many brothers and sisters did you have? Please count those born alive, but no longer living, as well as those alive now. Also include stepbrothers and stepsisters, and children adopted by your parents".

[17]The variable, hence, cannot provide us with the information of how many of them are full siblings, half siblings or step siblings. This information is only available in Wave I, but it only exists for those who live in the same household. Wave I does not collect data about individuals' siblings that are living outside the household, neither the number of them. Using Wave I information would imply missing a lot of information, specially for older girls who probably have older siblings living outside the households. Thus, following Fernández and Fogli (2006) we choose the variable siblings. Moreover, given that our interest is studying the influence of fertility family patterns in the female's decisions, half and step siblings are also part of them. In this respect, Fernández and Fogli (2006) and Murphy and Knudsen (2002) find that the wide definition of siblings (full, step and half siblings) affects women's fertility choices.

[18]We consider if the father had born in U.S. because we will use this information to construct relevant independent variables in the balancing tests (section 3).

[19]See Rowe et al. (1999), Beaver and Wright (2011) and Olivetti et al. (2020).

I in-home questionnaire and to Wave V. This result in a sample size of about 9,227 individuals. We then drop observations with "multiple response" in question about the grade and also students who have fewer than 10 schoolmates in their grades.[20] Our final sample consists of about 8,817 individuals: 5,044 women and 3,773 men in 120 schools. We now analyze at which extent our sample is representative of the whole U.S. population.

Completed fertility is usually calculated between 45 and 50 years old. Given that women interviewed at Wave V are aged 34 to 44 years old, some of the youngest might have not completed their fertility. Hence, in order to check how far our sample of women are from fulfilling their total fertility plans, we use the National Survey of Family Growth (NSFG). This is a nationally representative database of U.S. women that collects information about fertility and marital status history. According to 2017-2019 NSFG, approximately 88% of women aged 45-50 years old have given birth their last child at age 38 or younger, and 74% at age 35 or younger. This implies that, despite having some young women in our Add Health sample, their age-range broadly captures their completed fertility. This observation is also confirmed by CPS June 2020 Fertility Supplement public use microdata. According to it, the average number of children of mothers aged 45-50 is 2.33, which is very similar to the 2.20 reported by mothers aged 34-44 in the Add Health.

Regarding childlessness, in our sample almost three out of four women (aged 34-44 in 2018) are mothers (the childlessness rate is about 27%). U.S. Census Bureau provides data about the percentage of childless woman by age, in 2018.[21] According to it, in average, the percentage of childless woman for women in the interval aged 30-39 is 26.8%. Taking account that approximately the 80% of women in our sample are between 34-39, we can state that the childlessness rate of our sample seems to be very close to the census one.[22] Besides that, if we compare the children ever born values between U.S. Census Bureau and our sample, we also find similarities. Children ever born for women aged 30-39 in census is 1.65. This measure includes women that report 0, i.e., women who are not mothers. Hence, in order to compare with Add Health, we also calculate children ever born for all women (mothers and not) in our sample. We obtain that children ever born results to be 1.62 for women aged 34-44 and 1.6 for

[20]This corresponds to the 5th percentile of the grade-size distribution in this sample, which ranges from a minimum of 1 student to a maximum of 237 students per cohort (school s and grade g). The median grade has 23 students. Our median grade number is significantly smaller than in Olivetti et al. (2020), who obtain a median grade of 205 students. The reason is Olivetti et al. (2020) construct their target variables using the full Wave I in-school data whereas we use Wave V. Because we are interested in the number of siblings (which is located in Wave V), we define our variables in the data set resulting from merging Wave I and Wave V.

[21]See Census Bureau (2018) report.

[22]The childlessness rate for women in our data for the interval aged 34-44 is 26.5%, whereas for women aged 34-39 is about 27%.

women aged 34-39, which are very closed to the 1.65 obtained from the census.[23]

Table 1 summarizes main statistics of our final sample of students. Among females, we observe that the 58% of them are white, the 59% are married, the 81% work for pay and they have, in average, 2.61 siblings. Regarding to the variable *peers' siblings*, the average is 2.55. Regarding the education distribution: 3% of women have less than high school, 50% have high school diploma, junior college or some college, 22% have bachelor, 19% have master degree or graduate school and 6% have PhD degree or postbaccalaureate professional education (such as law school, medical school, nursing). Regarding the variable "attending religious services the last year", the average value for women is 2.59, which means that, in average, the frequency is situated between "a few times" (score 2) and "once a month" (score 3).[24] Regarding labor status, the percentages of women and men working for pay are alike, 81% and 89% respectively. However, men work much more full time (40 hours or more per week) than women, 91% of men versus 74% of women.[25] Around 4% of both females and males report living in a very poorly kept residential building while attending high school.[26] We also have included the variable "income of spouses" for married individuals. Since this information is not directly provided by Add Health, we follow the strategy of Fernández and Fogli (2006), and we calculate it by subtracting the personal income of the observed individual from the total household income.[27] The average value of spouse's income for women is 6.09 whereas for men is 3.70.[28] We also look at the respondents' partner's education.[29] The average value for this variable for women's partners and men's partners is 12.95 and 13.10, respectively (where 13 is equivalent to "1 year of college"). In addition, we observe that the distribution of students among grades is quite uniform. With respect to women's mothers' statistics, 15% of them have less than high school diploma, 56% have a high school diploma, training after high school or some college, whereas

[23]We also obtain the similar results using the motherhood rates. Consider women aged 34-44 in our Add Health sample, for this group the motherhood rate is about 73% and the average number of children (considering only mothers) is 2.2. This implies that the measure children ever born is about 1.61, very similar to the one reported by census. Similarly, for the group aged 34-39, the motherhood rate is 72.7% and the average children is 2.2 (for only mothers), implying a measure of children ever born of about 1.6.

[24]Regarding the education question, 5,036 out of 5,044 women had no missing information. The religion variable come from the following question: "How often have you attended church, synagogue, temple, mosque, or religious services in the past 12 months? 1: never, 2: a few times, 3: once a month, 4: 2 or 3 times a month, 5: once a week, 6: more than once a week". In this question, 4,935 out of 5,044 women had no missing information.

[25]In the work for pay question, 5,027 out of 5,044 women and 3,766 out of 3,773 men, had no missing information.

[26]In this question, 4,983 out of 5,044 women had no missing information.

[27]Wave V considers the total income received by both individuals and households in the last year before taxes. These variables are based on categorical midpoints (the top interval that is based on the most likely average Ligon (1994)). See Fernández and Fogli (2006) for a similar approach.

[28]Income is measured in units of $10,000.

[29]This variable is delivered at the time of Wave III and it is coded from "1 = 6th grade" to "21 = 4 years of graduate school".

30% have at least a college degree. This implies a significant difference with respect to their daughters who are better educated in average. Approximately 83% of the mothers are U.S. born and, according to their children, approximately 91% of these women work for pay (in Wave I).[30] Comparing these statistics with the sample of women in Olivetti et al. (2020), we observe some differences. Whereas we find that 81% of women work for pay and 73% have children, Olivetti et al. (2020) document that 75% of women work for pay, and 60% have children. Moreover, in our sample 58% are white and 59% are married, whereas in Olivetti et al. (2020) these numbers are 72% and 48% respectively. Regarding education, differences are smaller, we find that 47% of women have bachelor or more and Olivetti et al. (2020) finds that 40% have bachelor or more. The reason of these differences is we use Wave V (2016-2018), whereas they use Wave IV (2007-2008).[31]

3 Empirical Model

Because we want to estimate a contextual effect, we use an empirical approach that is very similar to the one presented in Olivetti et al. (2020). According to Manski's terminology (Manski (1993)) the peer effect we analyze is a contextual effect because we focus on one specific characteristic of high school peers: their families' fertility patterns. Our empirical strategy exploits idiosyncratic variation in the family fertility experience across different cohorts (each cohort is composed by individuals in same school and grade). This empirical strategy has been first proposed by Hoxby (2000b) to estimate the impact of classmates gender and race, and subsequently has been commonly used in studying the existence of peer effects in education (e.g., Hoxby (2000a); Hanushek et al. (2002); Angrist and Lang (2004); Friesen and Krauth (2007); Lavy and Schlosser (2011); Lavy et al. (2012)), the probability of completing a college degree (Cools et al. (2019)) and women labor supply (Olivetti et al. (2020)). Now we extend this empirical approach to the analysis of fertility patterns by exploiting cross-cohort variation to estimate the effect of fertility patterns of both own family and peers' families on women's fertility decisions 20 years later. More precisely, we will study the extensive margin of the fertility decision (i.e., becoming mother or the motherhood decision), as well as the intensive margin (i.e., total number of children). Our empirical models can be written in a compact way

[30] Regarding the education of their mothers, 4,645 out of 5,044 women had no missing information; 4,821 had no missing information in U.S. born question and; 4,182 had no missing information in working mother question.

[31] Moreover, unlike Olivetti et al. (2020), we do not drop the observations with missing values in some of our main variables when we present our statistics. The reason behind is that we are studying both the intensive and extensive margin simultaneously and this implies that the number of missing values in the dependant variable changes depending on the exercise. That is, in the intensive margin analysis the children variable considers missing value when women are not mothers, while in the extensive margin analysis women who are not mothers get a value 0 and so, we cannot remove these observations.

Table 1: Sample description

	Females			Males		
	Obs	Mean	Std Dev	Obs	Mean	Std Dev
Motherhood	4,795	0.73	0.44	3,591	0.63	0.48
Children	3,522	2.2	1.02	2,258	2.11	1.04
Siblings	4,925	2.61	2.07	3,684	2.45	1.99
Peers' siblings	5,044	2.55	0.59	3,773	2.52	0.56
% $\geq$ 1 sibling	4,925	0.94	0.24	3,684	0.92	0.27
% $\geq$ 2 siblings	4,925	0.67	0.47	3,684	0.64	0.48
% $\geq$ 3 siblings	4,925	0.41	0.49	3,684	0.37	0.48
% peers $\geq$ 1 sibling	5,044	0.93	0.06	3,773	0.93	0.06
% peers $\geq$ 2 siblings	5,044	0.66	0.12	3,773	0.66	0.12
% peers $\geq$ 3 siblings	5,044	0.40	0.14	3,773	0.39	0.14
Share white	5,044	0.58	0.49	3,773	0.60	0.49
Share married	5,034	0.59	0.49	3,765	0.60	0.49
Share work for pay	5,027	0.81	0.39	3,766	0.89	0.31
Share work for pay full time	4,081	0.74	0.44	3,355	0.91	0.29
Share with less than high school	5,036	0.03	0.16	3,767	0.04	0.19
Share with high school, junior college or some college	5,036	0.50	0.50	3,767	0.57	0.50
Share with bachelor	5,036	0.22	0.42	3,767	0.22	0.41
Share with master degree	5,036	0.19	0.40	3,767	0.13	0.34
Share with PhD	5,036	0.06	0.23	3,767	0.04	0.20
Spouse income (only married)	2,772	6.09	6.75	2,135	3.70	5.31
Partner education	421	12.95	2.17	281	13.10	2.04
Share with mother less high school	4,645	0.14	0.35	3,427	0.13	0.33
Share with mother high school	4,645	0.56	0.50	3,427	0.55	0.50
Share with mother college or more	4,645	0.30	0.46	3,427	0.32	0.47
Share with mother born U.S.	4,821	0.83	0.37	3,582	0.82	0.38
Share with working mother	4,182	0.91	0.29	3,120	0.91	0.28
Share living in very poorly kept residential building	4,983	0.04	0.19	3,730	0.04	0.19
Religion (attend religious services)	4,935	2.59	1.65	3,689	2.30	1.56
Picture Vocabulary Test	4,831	101.44	14.29	3,610	103.65	14.36
Share in grade 7	0.139			0.135		
Share in grade 8	0.134			0.124		
Share in grade 9	0.185			0.182		
Share in grade 10	0.190			0.204		
Share in grade 11	0.194			0.203		
Share in grade 12	0.158			0.152		
No. schools	119			120		

Notes: The table reports descriptive statistics by gender for the main variables used in the analysis. There is a detailed definition of each variable in Appendix B. The sample includes students in grades 7 through 12 with at least 10 peers. Partners' education is coded from 1 (6th grade) to 21 (4 years of graduate school). Income is measured in units of $10,000. Source: Add Health.

as:[32]

$$z_{igs,t+1} = \alpha_g + \beta_s + \delta_s \tilde{g} + \gamma z^m_{igs,t} + \varphi A z^m_{igs,t} + \sum_{k=1}^{K} \theta^k x^k_{igs,t,t+1} + \epsilon_{igs,t+1}, \quad (1)$$

where female students are denoted by i, grade or cohorts are denoted by g, schools are denoted by s and t denotes time. Thus, in the intensive margin model, $z_{igs,t+1}$ denotes the number of children of women in their adulthood (i.e., in period $t+1$) who attended grade g in school s in period t (i.e., when teenagers). Because in the intensive margin we only consider women who are mothers, this variable takes value equal or larger than 1. In the extensive margin, $z_{igs,t+1}$ is a dummy variable that equals 1 if a women is mother (1 or more children) and equals 0 otherwise (no children). Vector α_g is a set of dummy variables that control for grade fixed effects and β_s is a set of dummy variables that control for school fixed effects. Variable $\delta_s \tilde{g}$ denotes a school-specific linear time trend, where $\tilde{g}$ measures the distance between the grade that the woman attends when adolescent and a reference grade. We take as a reference grade the lowest, i.e., grade 7, so $\tilde{g} = g - 7$ for $g = \{7, 8, 9, 10, 11, 12\}$.

In addition, variable $z^m_{igs,t}$ captures the individual i's family fertility pattern. In the intensive margin model, it denotes the number of siblings of each female student; whereas in extensive margin model, it is a dummy variable which indicates if the female has siblings. Because we are interested in capturing how the "intensity" of siblings affects the motherhood decision, we consider three different cases: in the first case the dummy variable equals 1 if the individual has at least 1 sibling and 0 otherwise (no sibling); second, it equals 1 if the individual has at least 2 siblings and 0 otherwise (no siblings or 1 sibling) and; third, it equals 1 if the individual has at least 3 siblings and 0 otherwise (no siblings or 1-2 siblings).

In order to capture the peer effect, that is, the family fertility patterns of the classmates, $Az^m_{igs,t}$ denotes, for each individual i, the average number of siblings of each individual's peers (in the same grade and same school), that is, the average of students' siblings for each cohort (grade g and school s), when student i is eliminated from the distribution.[33] In extensive margin model, $Az^m_{igs,t}$ denotes, for each individual i, the share of her peers that have siblings for each cohort (grade g and school s). More precisely, since we have created three dummy variables, it might represent three cases: first, the share of peers that has 1 or more siblings; second, the share of peers with 2 or more siblings; and third, the share of peers with 3 or more siblings.

[32]Following Fernández and Fogli (2009) and Fernández and Fogli (2006) we use the same equation for the two fertility decisions or margins, that is, for the intensive and the extensive margin.

[33]In order to ensure that there is enough within-group variation in the variable *peers' siblings* we will perform an exercise to determine if it has enough residual variation after controlling for school and grade fixed effects (we will see this along section 3). See Olivetti et al. (2020) for a similar approach.

We also include controls for individual characteristics, $x^m_{igs,t,t+1}$ at time t and time $t+1$, that are alike in both models (intensive and extensive margin models). Finally, $\epsilon_{igs,t+1}$ are i.i.d., mean 0 innovations.

Both fixed and trend effects address the same objective, that is, to control for unobserved characteristics which could be driving the cohort composition and, specially, the variable *peers' siblings*, due to the nature of its construction.

Regarding fixed effects, we use school and grade dummies. The reason of including them in the model is the need to control for unobserved heterogeneity across grades and schools that might affect the allocation of students among these dimensions and so the composition of the cohort. The point is that if there is any school or grade with an unobserved characteristic for the researcher that affects the distribution of students (for instance, through parents' school and neighborhood choices), this would generate a problem of correlated effects. This problem of correlated effects specially affects the variable *peers' siblings* which is endogenous to the sample. If this problem exists, then there is not random composition of cohorts and the estimation of the effect of the variable *peers' siblings* will result biased. Therefore, in order to fix this problem, we include a set of school and grade dummies (other studies that use fixed effects are, for example, Hanushek et al. (2002), Angrist and Lang (2004), Lavy and Schlosser (2011) or Olivetti et al. (2020)).[34]

Similarly, we use school-specific trends to control for potential changes in school effects over time. With school and grade fixed effects we control for unobserved heterogeneity fixed in time, and with the school-specific linear trend we control for unobserved heterogeneity varying throughout time. For instance, the parents might be more concerned about the school choice if their children are at the beginning of their academic life, and changing school frequently is costly. So, this implies that the problem of self-selection would affect more to younger students (those in the lower grades) than the older (those in the higher grades), implying that the self-selection problem is asymmetric among grades. The inclusion of the school-specific trend (through the distance among grades), thus, would reduce this problem and allow us to capture the school-dynamic in a static framework.[35]

Given that we include school, grade and trend effects, we do not need to consider clustered errors in the regressions. It is common in microeconometric analysis to consider clustered errors in the regressions to deal with this problem of unobserved heterogeneity and, normally,

[34]Another possibility to control for the problem of correlated effects is using instrumental variables. However, this approach is more used to solve the "reflection problem" that emerges in networks. See, for instance, Bramoullé et al. (2009), Olivetti et al. (2013), De Giorgi et al. (2010) or De Giorgi et al. (2020). See Bramoullé et al. (2019) for an excellent survey of empirical approaches to peer effect estimations.

[35]See Lavy and Schlosser (2011) and Olivetti et al. (2020).

the cluster is defined by the widest unit of clustering (like variable school).[36] The reason behind is to control for possible dependence between observations inside a cluster which could suppose a source of bias: when unobserved common shocks affect units inside clusters, the errors are correlated within clusters, but not across clusters, generating wrong confidence intervals, and biasing the estimators. However, as it is shown by Abadie et al. (2017) and Cameron and Miller (2015), when controlling for fixed effects for each possible cluster level (in our case, with a set of school and grade dummies and, in addition, with a school specific linear trend), there is no need to consider clustered errors.[37] According to this, because our set of dummies should control for the unobserved factors that cause the correlation within clusters (e.g., correlation within schools), we do not need to use clustered errors. Therefore, we use standard errors at individual level.

There might also be a concern about the correlation of *siblings* and *peers' siblings*. A high correlation (females who have many siblings tend to be in the same cohort [school and grade] that students with many siblings) would indicate the presence of a self-selection problem which, in turn, would result in biased estimators. To check this we analyze the Pearson correlation coefficient between these two variables for both our women and men, married and all regardless marital status. We find that in every case, the coefficient is lower than 0.2 over 1, which would indicate that the relationship between these two variables is weaker than strong.

In order to asses the validity of the empirical strategy, we develop two analysis based in Lavy and Schlosser (2011) and Olivetti et al. (2020): a study of the residual variation of the variable *peers' siblings* and balancing tests. The purpose of the first analysis is to check whether we control correctly for the unobserved heterogeneity we commented above, and the purpose of the second analysis is to test whether observable characteristics of individuals affect self-selection problem.

To carry out the first analysis we need to check if, after removing unobserved heterogeneity (fixed and varying in time), there is enough residual variation. This exercise would indicate us if there is or not unobserved characteristics driving the cohort composition and affecting the variable *peers' siblings*. If there is sufficient residual variation, the cohort composition might be quasi-random and, as a result, the variable *peers' siblings* would be a product of that quasi-

[36]See among others, Cools and Patacchini (2017), Cools et al. (2019) and Olivetti et al. (2020).

[37]Specifically, Abadie et al. (2017) show that when fixed effects at cluster level are included, cluster errors are only justified if there are heterogeneous treatment effects, i.e., if individuals are affected by different policies or states, which is not our case. However, in order check the validity of our results, we confront them with the ones derived from the traditional conservative approach of clustering standard errors. Given that the variable *peers' siblings* varies across schools and grades (that is, cohorts), we use cohorts as the cluster units. Estimation results indicate that clustering errors does not affect our findings. Finally, we repeat our analysis using Eicker-Huber-White errors and we, again, observe that our results remain unchanged.

random cohort selection. This would imply that we could isolate the peer effect without any problem. Table 2 shows the average and standard deviation of the variable *peers' siblings* (in both the extensive and the intensive margin model), before and after applying fixed effects and school specific linear trend. It seems that in all cases there is sufficient variation in the variable *peers' siblings* even applying school, grade and trend effects. These results support the fact that the distribution of the variable *peers' siblings* follow a quasi-random process, and it is not correlated with unobserved characteristics which may affect the cohort selection. For example, at intensive margin, without fixed effects and trend, variable *peers' siblings* has a reasonable variation of 0.59 and 0.56 for women and males, respectively. After applying fixed effects and trend, the unexplained variations represent around 60% of original variation for women, and around 61% of original variation for men. In the case of extensive margin, for both sex and the three variables that measure the peer effect, there are also reasonable unexplained variations after applying fixed effects and trend.[38]

The second analysis we carried out is balancing tests. These tests allow us to asses if the variations in the variable *peers' siblings* is explained for the variations in individual characteristics like race, parents information (single parent, born in U.S. and education), ability measured by Picture Vocabulary Test, socioeconomic status (very poorly kept building) and the household size. If variation in variable *peers' siblings* is not explained by variation in individual characteristics, we can ensure that our specification strategy provides an exogenous source of variation. This means that individual observable characteristics do not affect school choice and so, observable individual characteristics do not cause a self-selection problem. Besides that, Altonji et al. (2005) suggest that the degree of selection on observable variables can provide a good indicator of the degree of selection on unobservable variables. This means that if we ensure that individual observable characteristics do not affect peer effect variable, it is unlikely that there would be unobserved characteristics causing self-selection problem. Table 3 and Table 4 provide results of estimations (OLS) of variable *peers' siblings* in both the intensive and extensive margin case, respectively. Column (1) provides estimation without school and grade fixed effects and without trend, column (2) includes school and grade fixed effects and, column (3) shows school and grade fixed effects and trend.[39] We observe that in both cases (intensive and extensive margin) estimates reveal that the variation in the variable *peers' siblings* does not seem to depend on variation in observable individuals characteristics. Only in the case of

[38]Appendix A also includes the graphs of residuals in all cases.

[39]In the case of the extensive margin model, we only show the balancing test the variable *% peers with 1 or more sibling*. The test of the others two variables that measure the peer effect are included in Appendix B, Tables B.2 and B.3.

Table 2: Variation in target variable and their residuals

Extensive margin	Obs	Mean	Std
Females			
% peers $\geq$ 1 sibling	5,044	0.93	0.056
Residuals: % peers $\geq$ 1 sibling with fixed effects	5,044	0.000	0.044
Residuals: % peers $\geq$ 1 sibling with fixed effects and trend	5,044	0.000	0.044
% peers $\geq$ 2 siblings	5,044	0.66	0.118
Residuals: % peers $\geq$ 2 siblings with fixed effects	5,044	0.000	0.086
Residuals: % peers $\geq$ 2 siblings with fixed effects and trend	5,044	0.000	0.086
% peers $\geq$ 3 siblings	5,044	0.40	0.143
Residuals: % peers $\geq$ 3 siblings with fixed effects	5,044	0.000	0.090
Residuals: % peers $\geq$ 3 siblings with fixed effects and trend	5,044	0.000	0.090
Males			
% peers $\geq$ 1 sibling	3,773	0.93	0.057
Residuals: % peers $\geq$ 1 sibling with fixed effects	3,773	0.000	0.045
Residuals: % peers $\geq$ 1 sibling with fixed effects and trend	3,773	0.000	0.045
% peers $\geq$ 2 siblings	3,773	0.66	0.116
Residuals: % peers $\geq$ 2 siblings with fixed effects	3,773	0.000	0.085
Residuals: % peers $\geq$ 2 siblings with fixed effects and trend	3,773	0.000	0.085
% peers $\geq$ 3 siblings	3,773	0.39	0.139
Residuals: % peers $\geq$ 3 siblings with fixed effects	3,773	0.000	0.087
Residuals: % peers $\geq$ 3 siblings with fixed effects and trend	3,773	0.000	0.087
Intensive margin	Obs	Mean	Std
Females			
Peers' siblings	5,044	2.55	0.593
Residuals: peers' siblings with fixed effects	5,044	0.000	0.360
Residuals: peers' siblings with fixed effects and trend	5,044	0.000	0.359
Males			
Peers' siblings	3,773	2.52	0.562
Residuals: peers' siblings with fixed effects	3,773	0.000	0.343
Residuals: peers' siblings with fixed effects and trend	3,773	0.000	0.343

Notes: The table reports descriptive statistics for the variables which captures the peer effect alongside intensive and extensive margins. Residuals come from a linear OLS regression between the peer effect and fixed effects and trend. Source: Add Health.

the extensive margin, race white can explain some variation in the target variable. However, this effect seems to be very reduced.[40]

Summarizing, the two analysis we have carried out for assessing the robustness of the empirical model show that there is sufficient variation in the variable *peers' siblings* to obtain precise estimations, and the unobserved factors that can be correlated with the peer effect variables do not seem to be confounding the estimations.

4 Results

In this section we present the estimation results of our model for both the extensive and the intensive margin of the women's fertility decisions. We first present results for the extensive margin (tables 5, 6 and 7) and then for the intensive margin (table 8). We carry out identical estimations, the unique difference among them is the definition of the dependant variable (motherhood in the extensive margin and total number of children in the intensive margin) and the definition of variables siblings and the peers' siblings (categorical variables in the extensive margin and average values in the intensive margin). As Fernández and Fogli (2006) we will focus on married women.[41]

We show results of different specifications. Column (1) specification includes only the variables which capture the fertility patterns of both women's own family and peers' families, without fixed effects and trend. In column (2) school and grade fixed effects are added. In column (3) we add race (dummy variable equals 1 if woman is white), individual ability measured by PVT (variable which reflect the Picture Vocabulary Test score), religion (variable measuring frequency of attendance at religious ceremonies) and individual controls when women are adult: labor status (dummy variable equals 1 if woman reports that she is currently working for pay) and education (dummy variable equals 1 if woman reports having bachelor, post baccalaureate formation, master or PhD). In column (4) we add information regarding the women's mothers in Wave I, that is, mother born U.S. (dummy variable equals 1 if mother was born in U.S.) and mother college (dummy variable equals 1 if mother reported having at least a college degree). Moreover, in order to capture the socioeconomic status of individuals in Wave I, we include a dummy variable that equals 1 if respondent lived in a building in urgent need

[40]Race white also affects slightly to the second variable of peer effect, and household size to third peer effect variable. However, these effects are also very reduced.

[41]In order to ensure that the effects of variables siblings and peers' siblings on fertility are not driven by the fact of being married, we run a balancing test with being married as a dependent variable, and siblings, peers' siblings and background information regarding adolescence and adulthood, as regressors. Results show that the impacts of siblings and peers' siblings are not related with being married (see Table B.4 in Appendix B). In addition, we also check that results are not driven by the fact of being married. We re-estimate the model using all women and we observe that main results remained unchanged (see Tables B.5-B.8 in Appendix B).

Table 3: Balancing test *peers' siblings* - all women

	Peers' siblings		
	(1)	(2)	(3)
PVT	-0.005***	0.001	0.001
	(0.001)	(0.001)	(0.001)
Parent born U.S.	0.084***	0.014	0.012
	(0.031)	(0.024)	(0.024)
Single parent	0.194*	-0.006	-0.017
	(0.109)	(0.075)	(0.074)
White	-0.165***	0.001	0.001
	(0.031)	(0.023)	(0.023)
Black	0.167***	-0.006	-0.005
	(0.037)	(0.029)	(0.028)
Parent college	-0.087***	-0.015	-0.015
	(0.021)	(0.015)	(0.015)
Household	0.022***	0.003	0.004
	(0.007)	(0.005)	(0.005)
Very poorly building	0.015	-0.043	-0.045
	(0.069)	(0.047)	(0.046)
Constant	2.957***	2.497***	2.434***
	(0.090)	(0.102)	(0.103)
Fixed effects school	No	Yes	Yes
Fixed effects grade	No	Yes	Yes
Trend	No	No	Yes
N	2,775	2,775	2,775
R Squared	0.087	0.624	0.627

Notes: Standard errors in parentheses. Column (1) does not include school and grade fixed effects or trend. Column (2) includes school and grade fixed effects. Column (3) includes school and grade fixed effects and trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

Table 4: Balancing test *% peers ≥ 1 sibling* - all women

	% peers ≥ 1 sibling		
	(1)	(2)	(3)
PVT	0.000**	0.000	0.000
	(0.000)	(0.000)	(0.000)
Parent born U.S.	0.014***	-0.002	-0.002
	(0.003)	(0.003)	(0.003)
Single parent	0.017	0.015	0.013
	(0.011)	(0.010)	(0.009)
White	0.004	0.006**	0.006**
	(0.003)	(0.003)	(0.003)
Black	-0.011***	-0.000	0.000
	(0.004)	(0.004)	(0.004)
Parent college	-0.003	-0.001	-0.001
	(0.002)	(0.002)	(0.002)
Household	0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)
Very poorly building	0.005	0.001	0.001
	(0.007)	(0.006)	(0.006)
Constant	0.899***	0.925***	0.914***
	(0.009)	(0.013)	(0.013)
Fixed effects school	No	Yes	Yes
Fixed effects grade	No	Yes	Yes
School trends	No	No	Yes
N	2,775	2,775	2,775
R Squared	0.025	0.386	0.394

Notes: Standard errors in parentheses. Column (1) does not include school and grade fixed effects or trend. Column (2) includes school and grade fixed effects. Column (3) includes school and grade fixed effects and trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

to repair. For the married women sample, we include a variable which captures the spouse's income (see section 2 for more details).[42] Finally, the school-specific linear trend is added in column (5).

4.1 Extensive margin

As we explained above, we are interested in capturing how the "intensity" of siblings affects motherhood decision and because of this we use three different measures of this variable. More precisely we use three different dummy variables: the first one equals 1 if the individual has at least 1 sibling, the second equals 1 if the individual has at least 2 siblings, and the third one equals 1 if the individual has at least 3 siblings. Table 5 shows the estimation results when independent variables siblings and peers' siblings are measured according to the first dummy variable, Table 6 shows the results when these variables are measured according to the second dummy variable and, 7 when they are measured according to the third dummy variable.

Our results show that: first, there is not any relationship between having siblings and becoming a mother and; second, there is not a peer effect, that is, the variable peers' siblings seems to have no impact on the decision to become a mother. Among the other variables, we found that being a religious person and having a mother born in U.S. have a positive effect on the probability of becoming a mother. Contrarily, working for pay, having a high PVT score and having a mother with at least four years of college degree negatively affect the decision to become a mother. For instance, Table 7, column (5), shows that working for pay and having a mother with at least four years college degree decrease the probability of becoming a mother in 8% and 3%, respectively, while attending more frequently religious services and having a mother born in U.S increase the probability of becoming a mother in 2% and 7.7%, respectively.

We also run those regressions for all women (married and not married).[43] Whereas variable peers' siblings is not having a significant effect, in this case we find that having siblings (for the three measures) has a positive effect on the decision of becoming a mother.[44] This positive effect on the whole sample of women, compared to the null effect in the case of married might be explained by the fact that married women have a larger motherhood rate than all women.

[42]We find that spouse's income is not significant in any case (in both the extensive and the intensive margin estimations). One reason might be that this variable may not reflect accurately spouse's income. This intuition is based on the results of Fernández and Fogli (2006) which is the approach we followed to build the variable spouse's income. In their analysis the variable spouse's income entered negatively and non significant in the regression, whereas in a previous fertility analysis using U.S. 1970 Census they observed that this variable had a positive effect in fertility (quantity of children including 0). They conclude that the reason of this mixed result might be the quality of the variable spouse's income.

[43]We exclude variable *spouse income* because if we consider married and not married the variable might not reflect properly the spouse income.

[44]See Tables B.5, B.6 and B.7 in Appendix B.

Table 5: Effects of *peers with $\geq$ 1 sibling* - married women

	Motherhood				
	(1)	(2)	(3)	(4)	(5)
$\geq$ 1 sibling	0.031	0.023	0.011	0.009	0.009
	(0.029)	(0.030)	(0.031)	(0.032)	(0.032)
% peers with $\geq$ 1 sibling	0.037	-0.154	-0.172	-0.028	-0.020
	(0.123)	(0.156)	(0.158)	(0.168)	(0.169)
White			0.008	-0.009	-0.009
			(0.020)	(0.022)	(0.022)
Work for pay			-0.070***	-0.081***	-0.081***
			(0.018)	(0.020)	(0.020)
PVT			-0.001	-0.001*	-0.001*
			(0.001)	(0.001)	(0.001)
Bachelor or more			0.027*	0.020	0.020
			(0.016)	(0.018)	(0.018)
Religion			0.017***	0.020***	0.020***
			(0.004)	(0.005)	(0.005)
Very poorly building				-0.051	-0.051
				(0.048)	(0.048)
Spouse income				0.001	0.001
				(0.001)	(0.001)
Mother born U.S.				0.076***	0.076***
				(0.027)	(0.027)
Mother college				-0.030*	-0.030*
				(0.018)	(0.018)
Constant	0.780***	0.994***	1.074***	0.918***	0.919***
	(0.118)	(0.173)	(0.186)	(0.196)	(0.196)
School fixed effects	No	Yes	Yes	Yes	Yes
Grade fixed effects	No	Yes	Yes	Yes	Yes
School trends	No	No	No	No	Yes
N	2,818	2,818	2,697	2,335	2,335
R squared	0.000	0.048	0.062	0.076	0.076

Notes: Standard errors in parentheses. In column (1) are included only the variables which capture the own family and peers' families fertility patterns without fixed effects and trend. In column (2) we add school and grade fixed effects. In column (3) we add individual controls when women are adult, race, labor status, education, individual ability measure (PVT) and religion. In column (4) we add information regarding the mothers in Wave I (mother born U.S. and mother college), a socioeconomic variable in Wave I (very poorly building) and spouse income in Wave V. Finally, in column (5) is added the school-specific linear trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

Table 6: Effects of *peers with ≥ 2 siblings* - married women

	Motherhood				
	(1)	(2)	(3)	(4)	(5)
≥ 2 siblings	0.012	0.004	-0.001	-0.012	-0.012
	(0.014)	(0.015)	(0.015)	(0.016)	(0.016)
% peers with ≥ 2 siblings	0.011	-0.156**	-0.154*	-0.116	-0.116
	(0.059)	(0.079)	(0.081)	(0.086)	(0.086)
White			0.008	-0.010	-0.010
			(0.020)	(0.022)	(0.022)
Work for pay			-0.070***	-0.081***	-0.081***
			(0.018)	(0.020)	(0.020)
PVT			-0.001	-0.001*	-0.001*
			(0.001)	(0.001)	(0.001)
Bachelor or more			0.027*	0.020	0.020
			(0.016)	(0.018)	(0.018)
Religion			0.017***	0.020***	0.020***
			(0.004)	(0.005)	(0.005)
Very poorly building				-0.052	-0.051
				(0.048)	(0.048)
Spouse income				0.001	0.001
				(0.001)	(0.001)
Mother born U.S.				0.076***	0.077***
				(0.026)	(0.027)
Mother college				-0.031*	-0.031*
				(0.018)	(0.018)
Constant	0.829***	0.968***	1.021***	0.983***	0.992***
	(0.039)	(0.097)	(0.118)	(0.124)	(0.125)
School fixed effects	No	Yes	Yes	Yes	Yes
Grade fixed effects	No	Yes	Yes	Yes	Yes
School trends	No	No	No	No	Yes
N	2,818	2,818	2,697	2,335	2,335
R squared	0.000	0.048	0.063	0.077	0.077

Notes: Standard errors in parentheses. In column (1) are included only the variables which capture the own family and peers' families fertility patterns without fixed effects and trend. In column (2) we add school and grade fixed effects. In column (3) we add individual controls when women are adult, race, labor status, education, individual ability measure (PVT) and religion. In column (4) we add information regarding the mothers in Wave I (mother born U.S. and mother college), a socioeconomic variable in Wave I (very poorly building) and spouse income in Wave V. Finally, in column (5) is added the school-specific linear trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

Table 7: Effects of *peers with $\geq$ 3 siblings* - married women

	Motherhood				
	(1)	(2)	(3)	(4)	(5)
$\geq$ 3 siblings	0.027*	0.024	0.021	0.012	0.012
	(0.014)	(0.015)	(0.015)	(0.016)	(0.016)
% peers with $\geq$ 3 siblings	0.036	-0.040	-0.040	-0.056	-0.055
	(0.050)	(0.078)	(0.079)	(0.086)	(0.086)
White			0.011	-0.007	-0.008
			(0.020)	(0.022)	(0.022)
Work for pay			-0.070***	-0.080***	-0.080***
			(0.018)	(0.020)	(0.020)
PVT			-0.001	-0.001*	-0.001*
			(0.001)	(0.001)	(0.001)
Bachelor or more			0.029*	0.021	0.021
			(0.016)	(0.018)	(0.018)
Religion			0.017***	0.020***	0.020***
			(0.004)	(0.005)	(0.005)
Very poorly building				-0.053	-0.053
				(0.048)	(0.048)
Spouse income				0.001	0.001
				(0.001)	(0.001)
Mother born U.S.				0.076***	0.077***
				(0.026)	(0.027)
Mother college				-0.030*	-0.030*
				(0.018)	(0.018)
Constant	0.819***	0.878***	0.922***	0.913***	0.920***
	(0.021)	(0.089)	(0.111)	(0.116)	(0.117)
School fixed effects	No	Yes	Yes	Yes	Yes
Grade fixed effects	No	Yes	Yes	Yes	Yes
School trends	No	No	No	No	Yes
N	2,818	2,818	2,697	2,335	2,335
R squared	0.002	0.048	0.063	0.076	0.076

Notes: Standard errors in parentheses. In column (1) are included only the variables which capture the own family and peers' families fertility patterns without fixed effects and trend. In column (2) we add school and grade fixed effects. In column (3) we add individual controls when women are adult, race, labor status, education, individual ability measure (PVT) and religion. In column (4) we add information regarding the mothers in Wave I (mother born U.S. and mother college), a socioeconomic variable in Wave I (very poorly building) and spouse income in Wave V. Finally, in column (5) is added the school-specific linear trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

We observe that the percentage of married women that are mothers is about 84% compared to 73.5% of all women.[45]

Our results on the extensive margin of fertility seem to be aligned with standard ones documented in the literature. Regarding education and work for pay, Baudin et al. (2015) find in their simulation that 8.1% (4.8% married and 3.3% single) of American women remain childless because of the high opportunity cost of having and raising children, in terms of time endowment and foregone income. Similarly, Baudin et al. (2020), extending the previous analysis to developing countries, estimate that 3.1% of women remain childless also due to the high opportunity cost. Gobbi (2013) finds that both an increase in the gender parity in labor supply and a reduction in the gender wage gap generate a decrease in childlessness and a decrease in mothers' fertility, due to the increase in the opportunity cost of having children and to the subsequent change in the distribution of fertility preferences. Brée and De La Croix (2019) show that the increases in the return on education is one of the leading forces that caused the increase in childlessness in France between the XVII and the XVIII centuries. Regarding other variables, De la Croix and Delavallade (2018) explore the effect of religious practice in South Asia and find that this variable positively affects fertility (without differentiating between extensive and intensive margins). Myong et al. (2021) analyze how social norms derived from the Confucianism affect childlessness and mothers' fertility in South Korea. More precisely, they find that the unequal gender division of house working has a negative impact on fertility of married mothers, especially for most educated, and that the social stigma associated to out-of-wedlock births has a positive impact on childlessness for single women. Finally, regarding peer effects, Hensvik and Nilsson (2010) study the existence of co-workers peer effects on timing to give a birth in Sweden. They find that Swedish women are in average 10.9% more likely to have their first child if any co-worker had a child 13-24 months before.[46]

4.2 Intensive margin

We first show estimation results for the whole sample of married women. Next, in order to explore the relevance of potential mechanisms that might underlie our findings, we estimate the model including different variables which reflect those mechanisms.

Our results show that: first, there is a positive and significant relationship between the number of siblings and the total number of children that married women have. This result is

[45]This number is consistent with both the calculations of Census Bureau (2018) which documents that the average of motherhood rate among women ever married (ages 30-34 and 35-39) is approximately 83.1%. This numbers seem to suggest that family experience (number of siblings) is not a relevant factor for married women to become mothers.

[46]Baudin et al. (2019) provide with an excellent literature revision for the extensive margin of fertility.

Table 8: Effects of *peers' siblings* - married women

	Children				
	(1)	(2)	(3)	(4)	(5)
Siblings	0.073***	0.070***	0.054***	0.056***	0.055***
	(0.011)	(0.011)	(0.011)	(0.012)	(0.012)
Peers' siblings	0.101***	0.095	0.113**	0.118*	0.110*
	(0.036)	(0.058)	(0.057)	(0.061)	(0.062)
White			0.016	0.032	0.034
			(0.055)	(0.061)	(0.061)
Work for pay			-0.366***	-0.356***	-0.358***
			(0.049)	(0.054)	(0.054)
PVT			-0.002	-0.001	-0.001
			(0.002)	(0.002)	(0.002)
Bachelor or more			-0.238***	-0.219***	-0.219***
			(0.044)	(0.049)	(0.049)
Religion			0.101***	0.102***	0.102***
			(0.012)	(0.013)	(0.013)
Very poorly building				0.185	0.184
				(0.136)	(0.136)
Spouse income				-0.002	-0.002
				(0.003)	(0.003)
Mother born U.S.				0.077	0.072
				(0.075)	(0.075)
Mother college				-0.020	-0.020
				(0.050)	(0.050)
Constant	1.782***	1.906***	2.053***	1.927***	1.896***
	(0.092)	(0.272)	(0.325)	(0.340)	(0.340)
School fixed effects	No	Yes	Yes	Yes	Yes
Grade fixed effects	No	Yes	Yes	Yes	Yes
School trends	No	No	No	No	Yes
N	2,378	2,378	2,276	1,982	1,982
R Squared	0.026	0.081	0.145	0.156	0.157

Notes: Standard errors in parentheses. In column (1) are included only the variables which capture the own family and peers' families fertility patterns without fixed effects and trend. In column (2) we add school and grade fixed effects. In column (3) we add individual controls when women are adult, race, labor status, education, individual ability measure (PVT) and religion. In column (4) we add information regarding the mothers in Wave I (mother born U.S. and mother college), a socioeconomic variable in Wave I (very poorly building) and spouse income in Wave V. Finally, in column (5) is added the school-specific linear trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

consistent with Fernández and Fogli (2006) which find that the number of siblings positively affects the number of children of married women (as commented before, authors include mothers and no mothers in their sample). Second, there exists a positive peer effect. In general, the contextual effect of peers' siblings is significant, and it positively affects the women's number of children. The significance is lost only when we add to the basic specification fixed effects, however, when the set of relevant variables (women's variables from Wave V, women's mothers' variables and socioeconomic status when teenager from Wave I) and the trend are added, the significance of the variable reappears at 95% and 90% of confidence. Quantitatively, the estimate in column (5) shows that an increase in one unit in the variable *siblings* leads to an increase of 0.055 in the number of children that mothers have (variable *children*). In order to compare our results with the relevant literature we will also interpret the coefficients as changes with respect to standard deviation when necessary. So, in this case, we find that an unit increase in standard deviation of variable *siblings* increases *children* in approximately 0.11 units, which implies an increase of 5.2% of *children* and an increase of 11.2% of its variation. This result is consistent to Fernández and Fogli (2006), who find that an increase of one standard deviation in the number of siblings is associated with an increase of 0.06 children, which is equivalent to an increase of about 2.4% in the average in their variable children, and an increase of about 21.4% in the variation of this variable. Looking at marginal effects, we also observe that the *siblings* effect is stronger in our analysis than in theirs (coefficients of 0.055 and 0.044 respectively). One reason that may explain why we obtain larger effects of variable *siblings* than they do, is the fact that in their analysis they include women that are not mothers (that is, they do not distinguish between the extensive and the intensive margin). Similarly, the larger change in the variation they find could be because they consider a wide heterogenous sample of women with mothers coming from different countries and cultures.

Likewise, an unit increase in variable *peers' siblings* generates an increase of the number of children in 0.110 units. This means that an unit increase in standard deviation of variable *peers' siblings* generates an increase of the number of children in 0.065 units, which is equivalent to an increase of 2.95% of *children* and to an increase of 6.4% of its variation. The existence of a contextual or long-run peer effect is consistent with findings of other papers in the literature. For instance, Olivetti et al. (2020) show that an unit increase in standard deviation of variable *% peers with working mothers* generates an increase of 7% in the young women's probability of working for pay. In a related strand of the literature, Fernández and Fogli (2009) find that a one standard deviation increase in *women labor participation in the parents' source country* implies an increase of 8% in women's worked hours per week. Bifulco et al. (2011) find that an unit increase in standard deviation of variable *peers with college mothers* is associated with an increase of 7.6% in the probability of women's attending college. And Cools et al. (2019) find that an increase in the number of female peers with at least one parent post-college educated is associated with an increase in the long-run educational attainment of women (measuring that as reaching a bachelor's degree). Regarding fertility, there are some studies that evaluate the effect of social norms and culture on the women's fertility decisions. Fernández and Fogli (2006) find that an increase of one standard deviation in total fertility rate in the woman's country of ancestry (as cultural or norm proxy) leads to an increase of 0.13 children, which implies an increase of 46% in the deviation of variable *children* across countries. Thus, like us, they also find that the norm (the horizontal mechanism) has a stronger effect than the variable *siblings* (vertical mechanism). Specifically, the regression coefficient which measures the marginal effect of TFR on children is 0.089. More recently, Myong et al. (2021) find that the unequal gender division of house working (social norm stemmed from the Confucianism) has a negative impact on the fertility of South Korean married mothers, especially among the more educated. Finally, there is a related literature that analyzes the effect of the current social network on the female's fertility decisions. In this regard, Ciliberto et al. (2016) show that a rise in the number of female co-workers having a child, reduces the women's probability of having a child. However, they observe that the sign of the effect may reverse when controlling by the educational level of both the peers and the women. More precisely, they find a positive peer effect on high educated female workers and a positive peer effect from high educated on low educated women. Moreover, they also find a negative peer effect among women in the same age range, but a positive peer effect among women with different age (younger-older or older-younger). Also Hensvik and Nilsson (2010) explore the existence of co-workers peer effects on the timing to give a birth. They find that women are 10.9% more likely to have their first child if any co-worker had a child 13-24 months before; 4% more likely to have their second child if any co-worker with similar characteristics (same sex, same educational attainment and close in age) had a child 12 months before; and 5% more likely to have their third child if any co-worker with similar characteristics had a child 13-24 months before.

Another variable that has positive and significant impact on the number of children is religious practice. An increase of one unit of standard deviation in *religion* implies an increase of 0.17 children, that is, an increase of 7.7% of the average number of children that mothers have (or, alternatively, an increase of 16.5% in the variation of the variable). In contrast, as expected, labor participation and education are associated with a lower number of children. Our results show that women working for pay and/or with a high education level (bachelor degree, post-baccalaureate education, master degree or PhD) have less children. An increase of one unit in standard deviation of both labor status and high education level implies reductions in 0.14 and 0.11 children respectively, which suppose reductions of about 6.3% and 4.97% in the average number of children (that is, reductions of 13.7% and 10.7% in the variation of these variables respectively). That seems to be aligned with Baudin et al. (2015) arguments, so the opportunity cost of having children is higher for the most educated women, leading to a decrease in fertility of mothers when education raises.

We also find that spouse's income does not have any significant impact in the number of children. This result is consistent with the one found by Fernández and Fogli (2006). They do not have this variable in their database and they have to build it. They point out that the reason of the non-significance of the variable might be the way in which variable *spouse's income* is created. We have the same problem. Add Health Wave V does not include information regarding spouses. Because we approximate spouse's income as them, using the household income and the women income, this might explain we obtain the same result as them.

For the same reason Wave V does not contain information about spouse's education. Only Add Health Wave III provides the information of partners whose women had in that moment. However, notice that Wave III was released in 2001-2002 which implies a difference of 15 years with respect to Wave V. Thus, considering that the level of education of the current spouse is the same as the one documented in Wave III is a very controversial assumption. Just in case, as an experiment, we have estimated our model including this variable. The estimation results are available in Appendix B, table B.9. We observe that: first, this variable turns out to be non-significant and second, our previous results remain unchanged. The unique difference is that variable siblings results to be non-significant one but this might be explained for the reduced sample size (due to the big number of missing values in the new variable). Nonetheless, these results should be interpreted very carefully.

As we did in the analysis of the extensive margin, in order to check the robustness of these results to the variable marital status, we run the same set of regressions for all women: married and non-married. We then drop the variable *spouse income* and include the variable marital status as a dummy variable that equals 1 if woman declare being married. The results show that variables *siblings* and *peers' siblings* remain significants and with the same sign. Specifically, an increase in one unit in variable *siblings* leads to an increase of 0.048 children and, one unit increase in standard deviation of variable *siblings* is associated with an increase of 0.099 children, which represent an increase of 4.5% in the average of *children*, and an increase of 9.7% in its variation. Regarding variable *peers' siblings*, one unit increase in this variable leads to an increase of 0.090 children and, one unit increase in the standard deviation leads to an increase of 0.053 children, which suppose an increase of 2.4% in the average of variable *children* and an increase of 5.2% in its variation. These numbers are similar to the ones we get in the sample of married women. Moreover, the rest of variables have similar effects. So we can conclude that our results are robust to the women's marital status.[47]

4.3 Underlying mechanisms behind the results of intensive margin

After documenting the relevance of the peer effect on the intensive margin of the fertility decision of our sample of women, we want to explore whether this effect remains when we control for several important women's characteristics. More precisely, we consider the effect of three features: the quality of the relationship between our women and their mothers when teenagers; the level of closeness to their peers in the school; and the intensity of the relationship between the parents of both our women and their friends.[48]

4.3.1 Relationship between women and their mothers

We study whether the strength of the peer effect depends on the quality of the relationship that women had with their mothers when attending the school. Many papers in the literature of cultural transmission (see, among others, Patacchini and Zenou (2016) and Patacchini and Zenou (2011)) propose the existence of complementarity between the vertical cultural transmission (at home, by parental figures) and the horizontal one (at the social environment, e.g., friends and peers). This *cultural complementarity* means that the higher is the fraction of the child's friends with the desired trait, the *more* parents put effort into transmitting this trait. However, recent empirical evidence seems to run in the opposite direction, suggesting the existence of a *cultural substitution*, that is, the higher is the percentage of the child's friends with the desired trait, the *less* the parents put effort into that trait. Olivetti et al. (2020) study the influence of mothers and peers' mothers behaviors on females' labor participation conditioned by mother care. They find that women with higher mother care have a stronger influence of their mothers and a null peer effect; whereas women with lower mother care experience a higher peer effect and a null influence of their mothers. In the same line, we want to test which type of relationship exists between the direct family influence and the peers influence in our sample, also controlling by mother care. To do that, we use the following question asked in

[47]See table B.8 in Appendix B.

[48]We also have explored to which extent mother care, school closeness and social closeness affect the size of *siblings*' effect and the peers effect on the extensive margin of fertility. We find that in all cases, likewise the baseline, these two effects remain negligible, with the exception of the control social closeness in the case of having at least 2 siblings, where peer effect and having high social closeness result to be negative.

the in home questionnaire in Wave I: "When you do something wrong that is important, your mother talks about it with you and helps you understand why it is wrong. 1. Strongly agree; 2: Agree; 3: Neither agree nor disagree; 4: Disagree; 5: Strongly disagree." We define *mother care* variable that equals 1 if women answered "1. Strongly agree" (high mother care) and 0 otherwise (low mother care). We then include in the intensive margin estimation this variable, the interaction terms with variables *siblings* and *peers' siblings*, and two variables accounting for the sum of coefficients of variables *siblings* and *peers' siblings*. These last ingredients allow us to study the heterogeneity of siblings and peers' siblings effects by mother care.[49]

Table 9 reports the estimation results for married females and mother care.[50] Note that in this estimation women with low mother care are the reference group so: variables *siblings* and *peers' siblings* are referred to those women with low mother care; variables *siblings x mother care* and *peers' siblings x mother care* capture the possibility that the effects of *siblings* and *peers' siblings* depend on mother care and; variables *siblings (mother care)* and *peers' siblings (mother care)* illustrate the effects of those variables in women with high mother care. Our results show that having high mother care is associated with having more children: *mother care* shows a significant and positive coefficient. We also observe that *siblings* and *peers' siblings* are significant and with positive signs. More precisely, increases of one sibling and one peers' sibling lead to increases in the number of children of 0.058 and 0.228 respectively. These numbers show that *peers' siblings* effect is stronger for women with low mother care than for all women, whereas *siblings*' effect remains almost unchanged (see Table 8). In fact, the interaction *peers' siblings x mother care* is significant (and negative), indicating that this effect is different for women with high and low mother care; whereas *siblings x mother care* is not statistically significant, implying that this effect is similar for all women. More precisely, the coefficient of *siblings (mother care)* is 0.049, implying that one additional sibling leads to 0.049 children in women with high mother care, compared to the increase of 0.058 children in the case of women with low mother care, however, this difference is non significant. Regarding *peers' siblings (mother care)*, the coefficient results to be now negative but not statistically significant, indicating that women with high mother care are not influenced by peers, which implies a strong difference with respect to women with low mother care.

[49]To carry out the heterogeneity analysis Olivetti et al. (2020) split their sample in women with high mother care (mother care equals 1) and women with low mother care (mother care equals 0) and estimate them separately. We did an equivalent experiment, however, the few observations we had in some sub-samples make us not rely on the estimations results. So, following other examples in the literature (see Ringdal and Sjursen (2021), Lundberg et al. (1997) or Akresh et al. (2016)), we opt for including the crossed effects using the whole sample instead splitting it.

[50]From the 1,981 married women in the baseline (column (5) of Table 9), 744 report high mother care (representing 38%) and 1,237 low mother care (representing 62%).

Finally, individual controls remain without any significant change. Hence, our results indicate that high school peers do have influence on women with low mother care but do not on women with high mother care, and that women's number siblings is an important variable regardless the level of mother care. This suggests that a good relationship between mothers and daughters breaks to the peers' influence, which is a similar finding on Olivetti et al. (2020). However, in contrast to them, we do not observe that a good relationship is associated with a stronger mothers' influence. Thus, our results do not seem to support the existence of a clear *cultural substitution* between parents' and peers' influence when controlling by mother care.

4.3.2 School closeness

We now analyze whether the size of the peer effect depends on the relationship that women had with their schoolmates. From we have learnt from the previous exercise, it is reasonable to wonder whether the quality of the relationship of the women with their schoolmates might affect the strength of the peer effect. To do that we use the information provided by the following question: "How strongly do you agree or disagree with each of the following statements? I feel close to people at this school. 1: Strongly agree; 2: Agree; 3: Neither agree nor disagree; 4: Disagree; 5: Strongly disagree". As before, we create the dummy variable *school closeness* which equals 1 if women answered "1: Strongly agree" or "2: Agree" and equals 0 otherwise. We then obtain two groups of women: the group of integrated women who feel close to people at their school (high school closeness), and the group of non-integrated (low school closeness).[51] We then include in the intensive margin estimation the variable *school closeness*, the interaction terms with variables *siblings* and *peers' siblings*, and two variables accounting for the sum of coefficients of variables *siblings* and *peers' siblings*.

Table 10 shows the estimation results. We first observe that *siblings* and *peers' siblings* are significant and positive. In particular, an increase in one unit of *siblings* leads to an increase of 0.079 children. Equivalently, an increase in one unit of *peers' siblings* leads to an increase of 0.222 children. Hence, these results show that both *siblings* and *peers' siblings* effects are stronger for women with low school closeness. In fact, both interaction terms *siblings x school closeness* and *peers' siblings x school closeness* are significant, indicating that these two variables affect differently to women with high and women with low social closeness. In particular, both effects weaken for women with high social closeness: the siblings' effect (*siblings (school closeness)*) is significant but smaller (one unit increase in variable *siblings* produces an increase of 0.038 in children for women with high social closeness, and an increase of 0.079 for

[51] This results in 1,152 women with high school closeness and 748 women with low school closeness in the baseline (column (5) of Table 10).

Table 9: Effects of *peers' siblings* - married women and mother care

	Children				
	(1)	(2)	(3)	(4)	(5)
Siblings	0.073***	0.070***	0.053***	0.058***	0.058***
	(0.011)	(0.011)	(0.014)	(0.015)	(0.015)
Peers' siblings	0.101***	0.095	0.204***	0.236***	0.228***
	(0.036)	(0.058)	(0.067)	(0.070)	(0.070)
Mother care			0.529***	0.709***	0.713***
			(0.198)	(0.208)	(0.208)
Siblings x mother care			-0.005	-0.007	-0.008
			(0.022)	(0.024)	(0.024)
Peers' siblings x mother care			-0.208***	-0.287***	-0.288***
			(0.078)	(0.082)	(0.082)
Siblings (mother care)			0.048***	0.050***	0.049**
			(0.018)	(0.019)	(0.019)
Peers' siblings (mother care)			-0.004	-0.051	-0.060
			(0.074)	(0.078)	(0.079)
Constant	1.782***	1.906***	1.702***	1.631***	1.597***
	(0.092)	(0.272)	(0.338)	(0.350)	(0.351)
Individual controls	No	No	Yes	Yes	Yes
School fixed effects	No	Yes	Yes	Yes	Yes
Grade fixed effects	No	Yes	Yes	Yes	Yes
School trends	No	No	No	No	Yes
N	2,378	2,378	2,179	1,981	1,981
R squared	0.026	0.081	0.153	0.162	0.163

Notes: Standard errors in parentheses. In column (1) are included only the variables which capture the own family and peers' families fertility patterns without fixed effects and trend. In column (2) we add school and grade fixed effects. In column (3) we add a dummy variable mother care, interaction terms of this variable with siblings and peers' siblings and terms which account for the sum of coefficients of siblings and peers' siblings with their respective interaction terms. We also add individual controls when women are adult (race, labor status, education, individual ability measure (PVT) and religion). In column (4) we add information regarding the mothers in Wave I (mother born U.S. and mother college), a socioeconomic variable in Wave I (very poorly building) and spouse income in Wave V. Finally, in column (5) is added the school-specific linear trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

women with low social closeness) and; the peers' effect (*peers' siblings (school closeness)*) is also reduced and is no longer statistically significant. The fact that women with high social closeness are not affected by their peers, seems to suggest that these women might be the ones that their peers look at, and thus, the ones to be followed and imitated. This is consistent with the concept of popularity: popular ladies tend to have significant influence over their peers but not the opposite. According to the literature, the main attributes that characterize female popularity in the school and high school are: having good grades (Buchanan et al. (1976), Adler et al. (1992)); pro-social behaviors and being cooperative and kind (Parkhurst and Hopmeyer (1998), Adler et al. (1992), Lease et al. (2002), Puckett et al. (2008)); leadership (Eder and Kinney (1995), Adler and Adler (1998), Puckett et al. (2008)) and; physical attractiveness and feminity (Vaillancourt and Hymel (2006), Rose et al. (2011) and Mayeux and Kleiser (2020)). We explore these attributes in our sample of women with high social closeness. We first look at the grades. We find that 12.8% of these women got "A" in the last results of the four subjects available in school-questionnaire (English/Language Arts, Mathematics, History/Social Studies and Science) compared to a 8.3% obtained by the group of women with low school closeness, which shows that the first group has a better academic performance. Secondly, we look at the pro-social behaviors. We approximate this attribute calculating the share of women that participate in Honor Society.[52] We find that 17,2% of women with high school closeness were members of the Honor Society, compared to 14,2% of women with low school closeness. Third, regarding admiration, we consider different measures. We find that among the group of women with high school closeness, 16.2% participated in Student Council and 14.6% participated in Yearbook, compared to a 10.6% and 12.0% respectively for the group of women with low school closeness. Forth, as Rose et al. (2011), we approximate physical attractiveness and feminity with participating in cheerleading. We find that 20.5% of women with high school closeness participated in cheerleader teams, compared to a 13.6% for the group of women with low school closeness. Finally, 27.5% women with high social closeness reported feeling very socially accepted, compared to 7.2% women with low social closeness. Therefore, according to the literature, these attributes seem to suggest that women with high school closeness in our sample are popular ones. Popular women may feel confident and close with the people and the environment at the school, probably taking leading roles. These women may become models to follow, so they are less concerned about looking at the behaviors of their high school peers. On the other hand, unpopular women would tend to be more influenced by their peers and

[52] Honor Society is a highly selective group that devotes efforts to community service, at the same time that promotes leadership, character, and scholarship. Being part of Honor Society enhances opportunities to pursue outstanding academic and professional careers.

also their families, willing to be more accepted in such social environment in the high school.

We also observe that variable *school closeness* has a positive significant effect, indicating that females with high school closeness tend to have more children in adulthood than women with low school closeness. According to our previous hypothesis, this would imply that popular females in the high school would tend to have more children in the future. In order to understand this observation we explore which are the main characteristics that make them different from the rest of women in the future. Regarding labor participation, both women with high and low school closeness have similar participation rates, 81.4% and 79.4% respectively.[53] Also, with respect to educational attainment, there is not a big difference on the share of women with at least bachelor's degree, 59.5% and 51.3% for women with high and low school closeness, respectively. However, women with high school closeness are more likely to get a master's degree (20.4%) and a PhD or post-baccalaureate professional education (7.6%) than women with low school closeness (16.8% and 4.8% respectively). Moreover, women with high school closeness have higher levels of income (is 6.0, in units of 10,000 dollars) and spouse's income (6.48) than women with low school closeness (5.46 and 5.88, respectively). These findings are consistent with literature. First, regarding popularity, recent studies find that popular females in the high school are successful in future in terms of education and income (Lleras-Muney et al. (2020), Heckman et al. (2006), Shi and Moody (2017) and Rouse (2012)). Second, newly evidence shows that women in the top of the education distribution do not reduce their fertility. They can make more compatible having a professional career and having children, throughout hiring child care (Wood et al. (2020), Adserà (2017), Hazan and Zoabi (2015) and Kravdal and Rindfuss (2008)). The accessibility to child care is not only explained by the fact that these women have higher wages, but also by the existence of assortative matching in marriage market (Greenwood et al. (2014)) that makes them more likely to get a husband with high education and high income. Therefore, considering women with high school closeness as popular ones might be a plausible hypothesis to explain results of Table 10.

Regarding the rest of individual controls, they remain without any significant change.

Summarizing, having good relationship with the classmates seems to be associated with being popular. These women tend to get high scores and be involved in activities that are related to popularity, like leadership or being collaborative. For these women the peer effect disappears. They seem more likely to be followed than to replicate or imitate peers' behaviors. In future, they have more children once they become mothers and, consistently with the lite-

[53]Part time labor participation (less than 40 hours per week) is also similar among them, 26.0% and 23.4% for women with high and low school closeness, respectively.

rature they reach more educational attainment and income, both characteristics make them capable to combine their professional career and their desire to have children.

4.3.3 Social closeness: relationship between parents

In this section we study whether the intensity of communication between the women's parents and the parents of their friends when teenagers affects the magnitude of peer effect. We investigate here the intergenerational closure hypothesis exposed by Coleman (1988). This hypothesis points out that the relation and the contact between friends' parents generates a social closure which consists of redundant social ties within the same community, that facilitates the emergence of collective norms and the enforcement of sanctions. Thus, the higher the intensity in relationships among these groups of adults is, the easier the transmission of norms and behaviors from parents to children. Olivetti et al. (2020), using Add Health, measure social closeness using the question "Please think about all of your child's friends. How many parents of your child's friends have you talked to in the last four weeks? 0:5; 6 or more" (parent questionnaire in Wave I). There exists peer effect on their labor participation decisions but there is not any parental influence on them, whereas the opposite is true for women with low social closeness. In order to test this hypothesis we re-estimate our model including: a dummy variable of social closeness, two interaction terms with variables *siblings* and *peers' siblings*, and two variables accounting for the sum of coefficients of variables *siblings* and *peers' siblings*. Dummy variable *social closeness* is measured in a similar way as Olivetti et al. (2020), using the median of the distribution: it equals 1 when parents answer 2 or more (high social closeness), and 0 otherwise (low social closeness).[54]

Table 11 shows the results of the estimation. We observe that coefficients of variables *siblings* and *peers' siblings* are positive and significant. This means that, for women with low social closeness, an increase of one unit in *sibling* leads to an increase of 0.040 children and that, one unit increase in *peers' siblings* leads to an increase of 0.176 children. Hence, these results show that *siblings* effect is weaker for women with low social closeness whereas *peers' siblings* is stronger. This is confirmed by interaction terms *siblings x social closeness* and *peers' siblings x social closeness* that, despite not being statistically significant, they are positive and negative respectively. In fact, the coefficient of *siblings (social closeness)* is 0.078, implying that one additional sibling leads to 0.078 children in women with high social closeness, compared to the increase of 0.040 children in the case women with low social closeness. Also, the coefficient of *peers siblings (social closeness)* results to be smaller but not statistically significant, indicating

[54]From the 1,742 married women in the baseline, that is, column (5) of Table 11, 1,096 have high social closeness (representing 63%) and 646 have low social closeness (representing 37%).

Table 10: Effects of *peers' siblings* - married women and school closeness

	Children				
	(1)	(2)	(3)	(4)	(5)
Siblings	0.073***	0.070***	0.077***	0.078***	0.079***
	(0.011)	(0.011)	(0.017)	(0.018)	(0.018)
Peers' siblings	0.101***	0.095	0.205***	0.230***	0.222***
	(0.036)	(0.058)	(0.076)	(0.081)	(0.081)
School closeness			0.480**	0.575***	0.578***
			(0.202)	(0.215)	(0.215)
Siblings x school closeness			-0.046**	-0.040	-0.040*
			(0.022)	(0.024)	(0.024)
Peers' siblings x school closeness			-0.137*	-0.165*	-0.164*
			(0.080)	(0.085)	(0.085)
Siblings (school closeness)			0.031**	0.039**	0.038**
			(0.015)	(0.016)	(0.016)
Peers' siblings (school closeness)			0.068	0.065	0.058
			(0.067)	(0.072)	(0.072)
Constant	1.782***	1.906***	1.594***	1.459***	1.416***
	(0.092)	(0.272)	(0.354)	(0.370)	(0.371)
Individual controls	No	No	Yes	Yes	Yes
School fixed effects	No	Yes	Yes	Yes	Yes
Grade fixed effects	No	Yes	Yes	Yes	Yes
School trends	No	No	No	No	Yes
N	2,378	2,378	2,174	1,900	1,900
R squared	0.026	0.081	0.151	0.162	0.163

Notes: Standard errors in parentheses. In column (1) are included only the variables which capture the own family and peers' families fertility patterns without fixed effects and trend. In column (2) we add school and grade fixed effects. In column (3) we add a dummy variable school closeness, interaction terms of this variable with siblings and peers' siblings and terms which account for the sum of coefficients of siblings and peers' siblings with their respective interaction terms. We also add individual controls when women are adult (race, labor status, education, individual ability measure (PVT) and religion). In column (4) we add information regarding the mothers in Wave I (mother born U.S. and mother college), a socioeconomic variable in Wave I (very poorly building) and spouse income in Wave V. Finally, in column (5) is added the school-specific linear trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

that, in contrast to women with low social closeness, women with high social closeness are not influenced by peers. As in previous subsections, the rest of individual controls remain without any significant change.

Therefore, we can conclude that our results are the opposite of those documented by Olivetti et al. (2020) and aligned to the intergenerational closure hypothesis proposed by Coleman (1988). More precisely, we find that women with high social closeness are strongly influenced by their parents but they are not affected by any peer effect and, women with low social closeness experience a positive high peer effect but a low social influence of their parents.

5 Conclusions

This paper studies the relevance of the socialization process during adolescence in shaping the fertility choices of a recent cohort of married women. We differentiate between the extensive margin (motherhood decision) and the intensive margin (total number of children) in the fertility decision and we evaluate the importance of the peer effect in both margins. More precisely, following the terminology of Manski (1993), we consider a contextual peer effect: we focus on one specific characteristic of high school peers which is their families' fertility patterns. We analyze if the average number of schoolmates' siblings when a woman is teenager affects her fertility choices when adult. Using different specifications, our analysis shows that, even after controlling for various characteristics and family variables of these women, there exists a significant peer effect on the intensive margin, but not on the extensive margin. Looking at the intensive margin, we also explore how the size of the peer effect is affected by selected women's characteristics: the quality of the relationship between the adolescent women and their mothers, the quality of the relationship between the teenagers and their schoolmates and the intensity of the relationship between the teenagers' parents and their friends' parents. We find that for the following three groups: women with worse relationship with mothers when teenagers, women with low school closeness in high-school and women with low social closeness when teenagers (women whose parents talk less with their friends' parents), the magnitude of the peer effect is bigger than for the whole group. Moreover, we also find that the own family experience (own number of siblings) is a key factor in determining the intensive margin of fertility, but not the extensive margin. Like the peer effect, this effect is bigger for women with worse school closeness in high-school, but smaller for women with low social closeness. Finally, in line with the standard results documented in fertility literature, other variables that result to be important in shaping both the intensive and the extensive margin, are the women's labor status, education and religious practice.

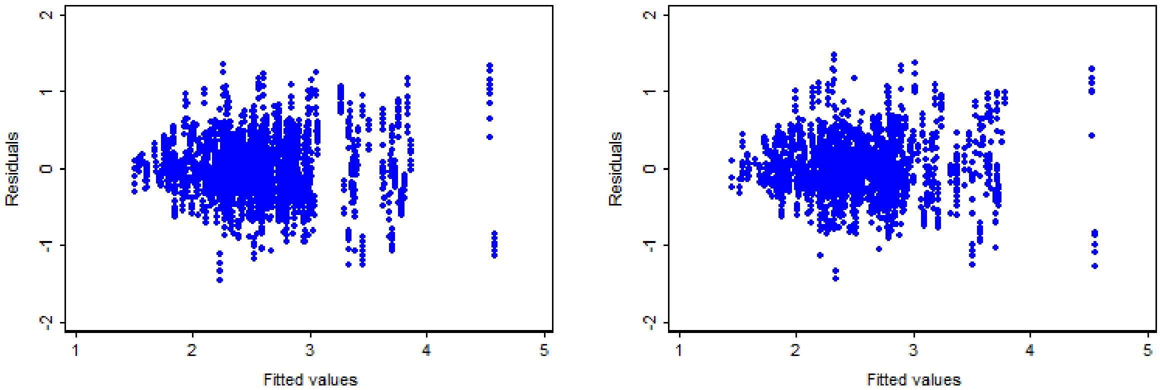
Table 11: Effects of *peers' siblings* - married women and social closeness

	Children				
	(1)	(2)	(3)	(4)	(5)
Siblings	0.073***	0.070***	0.047***	0.041**	0.040**
	(0.011)	(0.011)	(0.017)	(0.018)	(0.018)
Peers' siblings	0.101***	0.095	0.158**	0.189**	0.176**
	(0.036)	(0.058)	(0.080)	(0.085)	(0.086)
Social closeness			0.092	0.119	0.117
			(0.209)	(0.222)	(0.222)
Siblings x social closeness			0.028	0.038	0.038
			(0.023)	(0.025)	(0.025)
Peers' siblings x social closeness			-0.038	-0.066	-0.065
			(0.082)	(0.087)	(0.087)
Siblings (social closeness)			0.075***	0.079***	0.078***
			(0.016)	(0.017)	(0.017)
Peers' siblings (social closeness)			0.120*	0.123*	0.111
			(0.069)	(0.073)	(0.073)
Constant	1.782***	1.906***	1.992***	1.886***	1.870***
	(0.092)	(0.272)	(0.364)	(0.381)	(0.381)
Individual controls	No	No	Yes	Yes	Yes
School fixed effects	No	Yes	Yes	Yes	Yes
Grade fixed effects	No	Yes	Yes	Yes	Yes
School trends	No	No	No	No	Yes
N	2,378	2,378	1,971	1,742	1,742
R squared	0.026	0.081	0.161	0.169	0.171

Notes: Standard errors in parentheses. In column (1) are included only the variables which capture the own family and peers' families fertility patterns without fixed effects and trend. In column (2) we add school and grade fixed effects. In column (3) we add a dummy variable social closeness, interaction terms of this variable with siblings and peers' siblings and terms which account for the sum of coefficients of siblings and peers' siblings with their respective interaction terms. We also add individual controls when women are adult (race, labor status, education, individual ability measure (PVT) and religion. In column (4) we add information regarding the mothers in Wave I (mother born U.S. and mother college), a socioeconomic variable in Wave I (very poorly building) and spouse income in Wave V. Finally, in column (5) is added the school-specific linear trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

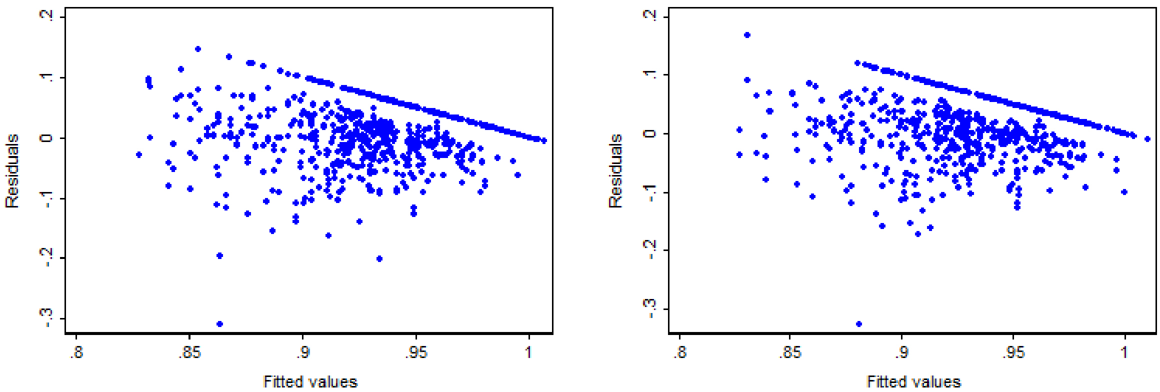
Appendix

A Appendix: Additional figures



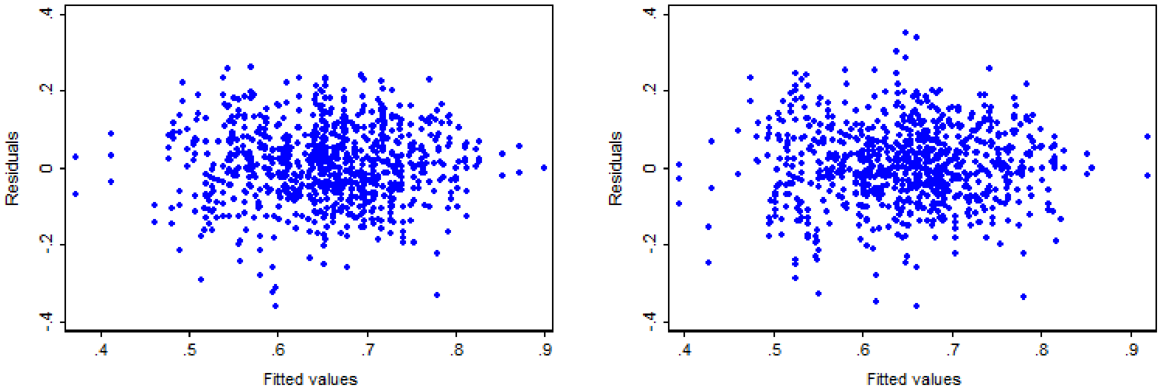
(a) Females. (b) Males.

Appendix Figure A.1: Residuals *peers' siblings* females and males. Source: Add Health.



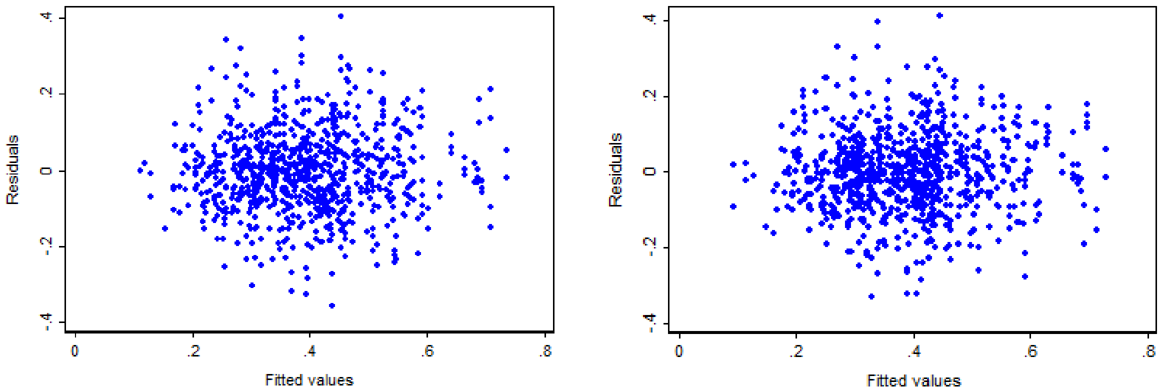
(a) Females. (b) Males.

Appendix Figure A.2: Residuals *% peers with* $\geq$ *1 sibling* females and males. Source: Add Health.



(a) Females. (b) Males.

Appendix Figure A.3: Residuals *% peers with* $\geq$ *2 siblings* females and males. Source: Add Health.



(a) Females. (b) Males.

Appendix Figure A.4: Residuals *% peers with* $\geq$ *3 siblings* females and males. Source: Add Health.

B Appendix: Additional tables

Appendix Table B.1: Recode of educational attainments for facts in fertility and childlessness

Original code	Definition	Recode	Definition
1	8th grade or less	1	8th grade or less
2	Some high school (HS)	2	Some high school (HS)
3	HS diploma	3	HS diploma
4	General Educational Development (GED)	4	GED; some vocational/technical training; some community college
5	Some vocational/technical training (after HS)	5	Vocational/technical training; Associate/junior college degree
6	Some community college	6	Some college
7	Vocational/technical training (after HS)	7	Bachelor's degree
8	Associate/junior college degree	8	Some graduate school
9	Some college	9	Master's degree; some graduate training beyond a master's degree
10	Bachelor's degree	10	Doctoral degree; some post baccalaureate professional edu. (law school, medical school, nursing); post baccalaureate professional edu. (law, medical, nursing)
11	Some graduate school		
12	Master's degree		
13	Some graduate training beyond a master's degree		
14	Doctoral degree		
15	Some post baccalaureate professional edu. (law school, medical school, nursing)		
16	Post baccalaureate professional edu. (law, medical, nursing)		

Notes: The table shows original codes and new codes regarding educational attainments used to build the facts in 1 and provided by Wave V from Add Health. Question coded H5OD11: "What is the highest level of education that you have achieved to date". Source: Add Health and authors' calculations.

Appendix Table B.2: Balancing test % peers with ≥ 2 siblings - all women

	% peers with ≥ 2 siblings		
	(1)	(2)	(3)
PVT	-0.001***	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Parent born U.S.	0.004	-0.010	-0.010
	(0.007)	(0.006)	(0.006)
Single parent	0.031	0.001	0.001
	(0.024)	(0.019)	(0.019)
White	-0.021***	0.011*	0.011*
	(0.007)	(0.006)	(0.006)
Black	0.011	-0.003	-0.003
	(0.008)	(0.007)	(0.007)
Parent college	-0.013***	0.005	0.005
	(0.005)	(0.004)	(0.004)
Household	0.004***	0.001	0.001
	(0.002)	(0.001)	(0.001)
Very poorly building	0.002	-0.007	-0.007
	(0.015)	(0.012)	(0.012)
Constant	0.750***	0.637***	0.637***
	(0.020)	(0.026)	(0.026)
Fixed effects school	No	Yes	Yes
Fixed effects grade	No	Yes	Yes
School trends	No	No	Yes
N	2,775	2,775	2,775
R Squared	0.039	0.483	0.483

Notes: Standard errors in parentheses. Column (1) does not include school and grade fixed effects or trend. Column (2) includes school and grade fixed effects. Column (3) includes school and grade fixed effects and trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

Appendix Table B.3: Balancing test % peers with ≥ 3 siblings - all women

	% peers with ≥ 3 siblings		
	(1)	(2)	(3)
PVT	-0.001***	0.000	0.000
	(0.000)	(0.000)	(0.000)
Parent born U.S.	0.012	0.005	0.005
	(0.008)	(0.006)	(0.006)
Single parent	0.042	0.008	0.007
	(0.027)	(0.019)	(0.019)
White	-0.048***	0.002	0.002
	(0.008)	(0.006)	(0.006)
Black	0.021**	-0.003	-0.003
	(0.009)	(0.007)	(0.007)
Parent college	-0.019***	-0.000	-0.000
	(0.005)	(0.004)	(0.004)
Household	0.007***	0.002*	0.002*
	(0.002)	(0.001)	(0.001)
Very poorly building	-0.011	-0.018	-0.018
	(0.017)	(0.012)	(0.012)
Constant	0.488***	0.397***	0.393***
	(0.023)	(0.026)	(0.027)
Fixed effects school	No	Yes	Yes
Fixed effects grade	No	Yes	Yes
School trends	No	No	Yes
N	2,775	2,775	2,775
R Squared	0.072	0.601	0.601

Notes: Standard errors in parentheses. Column (1) does not include school and grade fixed effects or trend. Column (2) includes school and grade fixed effects. Column (3) includes school and grade fixed effects and trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

Appendix Table B.4: Balancing test being married - all women

	Married vs. Non-married		
	(1)	(2)	(3)
Siblings	0.001	-0.002	-0.002
	(0.005)	(0.005)	(0.005)
Peers' siblings	-0.000	-0.014	-0.010
	(0.016)	(0.026)	(0.026)
Bachelor or more	0.145***	0.137***	0.137***
	(0.020)	(0.021)	(0.021)
Work for pay	-0.097***	-0.094***	-0.092***
	(0.023)	(0.024)	(0.024)
PVT	-0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.001)
Parent born U.S.	0.014	-0.011	-0.010
	(0.027)	(0.032)	(0.032)
Single parent	-0.095	-0.088	-0.083
	(0.094)	(0.097)	(0.097)
White	0.019	0.025	0.025
	(0.027)	(0.029)	(0.029)
Black	-0.328**	-0.317**	-0.317**
	(0.032)	(0.038)	(0.038)
Parent college	0.027	0.021	0.021
	(0.019)	(0.021)	(0.021)
Very poorly building	-0.124**	-0.105*	-0.104*
	(0.059)	(0.060)	(0.060)
Constant	0.690***	0.981***	0.998***
	(0.090)	(0.148)	(0.149)
Fixed effects school	No	Yes	Yes
Fixed effects grade	No	Yes	Yes
School trends	No	No	Yes
N	2,739	2,739	2,739
R Squared	0.095	0.144	0.145

Notes: Standard errors in parentheses. Column (1) does not include school and grade fixed effects or trend. Column (2) includes school and grade fixed effects. Column (3) includes school and grade fixed effects and trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

Appendix Table B.5: Effects of *peers with ≥ 1 sibling* - all women

	Motherhood				
	(1)	(2)	(3)	(4)	(5)
≥ 1 sibling	0.080***	0.071***	0.067**	0.068**	0.069**
	(0.027)	(0.027)	(0.026)	(0.027)	(0.027)
% peers with ≥ 1 sibling	0.304***	0.143	0.160	0.196	0.214
	(0.114)	(0.143)	(0.137)	(0.145)	(0.146)
White			-0.020	-0.035**	-0.036**
			(0.017)	(0.018)	(0.018)
Married			0.277***	0.283***	0.283***
			(0.013)	(0.014)	(0.014)
Work for pay			-0.071***	-0.068***	-0.067***
			(0.016)	(0.017)	(0.017)
PVT			-0.001***	-0.002***	-0.002***
			(0.001)	(0.001)	(0.001)
Bachelor or more			-0.083***	-0.074***	-0.074***
			(0.014)	(0.015)	(0.015)
Religion			0.014***	0.015***	0.015***
			(0.004)	(0.004)	(0.004)
Very poorly building				-0.005	-0.005
				(0.036)	(0.036)
Mother born U.S.				0.090***	0.090***
				(0.023)	(0.023)
Mother college				-0.023	-0.023
				(0.016)	(0.016)
Constant	0.376***	0.614***	0.545***	0.445**	0.446**
	(0.108)	(0.166)	(0.169)	(0.177)	(0.177)
School fixed effects	No	Yes	Yes	Yes	Yes
Grade fixed effects	No	Yes	Yes	Yes	Yes
School trends	No	No	No	No	Yes
N	4,776	4,776	4,563	4,149	4,149
R squared	0.003	0.041	0.145	0.151	0.152

Notes: Standard errors in parentheses. In column (1) are included only the variables which capture the family experience and peers' families experience without fixed effects and trend. In column (2) we add school and grade fixed effects. In column (3) we add individual controls when women are adult, race, marital status, labor status, education, individual ability measure (PVT) and religion. In column (4) we add information regarding the mothers in Wave I (mother born U.S. and mother college) and a socioeconomic variable in Wave I (very poorly building). Finally, in column (5) is added the school-specific linear trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

Appendix Table B.6: Effects of *peers with* $\geq$ *2 siblings* - all women

	Motherhood				
	(1)	(2)	(3)	(4)	(5)
$\geq$ 2 siblings	0.046***	0.037***	0.034**	0.034**	0.033**
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
% peers with $\geq$ 2 siblings	0.078	-0.060	-0.054	-0.063	-0.063
	(0.054)	(0.074)	(0.071)	(0.075)	(0.075)
White			-0.017	-0.032*	-0.032*
			(0.017)	(0.018)	(0.018)
Married			0.278***	0.284***	0.283***
			(0.013)	(0.014)	(0.014)
Work for pay			-0.067***	-0.065***	-0.064***
			(0.016)	(0.017)	(0.017)
PVT			-0.001***	-0.002***	-0.002***
			(0.001)	(0.001)	(0.001)
Bachelor or more			-0.080***	-0.072***	-0.072***
			(0.014)	(0.015)	(0.015)
Religion			0.014***	0.014***	0.015***
			(0.004)	(0.004)	(0.004)
Very poorly building				-0.008	-0.007
				(0.036)	(0.036)
Mother born U.S.				0.090***	0.090***
				(0.023)	(0.023)
Mother college				-0.021	-0.021
				(0.016)	(0.016)
Constant	0.653***	0.834***	0.763***	0.704***	0.719***
	(0.037)	(0.104)	(0.116)	(0.120)	(0.121)
School fixed effects	No	Yes	Yes	Yes	Yes
Grade fixed effects	No	Yes	Yes	Yes	Yes
School trends	No	No	No	No	Yes
N	4,776	4,776	4,563	4,149	4,149
R squared	0.003	0.041	0.145	0.151	0.151

Notes: Standard errors in parentheses. In column (1) are included only the variables which capture the family experience and peers' families experience without fixed effects and trend. In column (2) we add school and grade fixed effects. In column (3) we add individual controls when women are adult, race, marital status, labor status, education, individual ability measure (PVT) and religion. In column (4) we add information regarding the mothers in Wave I (mother born U.S. and mother college) and a socioeconomic variable in Wave I (very poorly building). Finally, in column (5) is added the school-specific linear trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

Appendix Table B.7: Effects of *peers with* $\geq$ *3 siblings* - all women

	Motherhood				
	(1)	(2)	(3)	(4)	(5)
$\geq$ 3 siblings	0.059***	0.055***	0.046***	0.040***	0.040***
	(0.013)	(0.013)	(0.013)	(0.014)	(0.014)
% peers with $\geq$ 3 siblings	0.027	-0.017	-0.021	-0.054	-0.052
	(0.045)	(0.071)	(0.068)	(0.072)	(0.072)
White			-0.015	-0.031*	-0.031*
			(0.017)	(0.018)	(0.018)
Married			0.278***	0.284***	0.284***
			(0.013)	(0.014)	(0.014)
Work for pay			-0.067***	-0.065***	-0.064***
			(0.016)	(0.017)	(0.017)
PVT			-0.001**	-0.001***	-0.001***
			(0.001)	(0.001)	(0.001)
Bachelor or more			-0.078***	-0.070***	-0.070***
			(0.014)	(0.015)	(0.015)
Religion			0.014***	0.014***	0.014***
			(0.004)	(0.004)	(0.004)
Very poorly building				-0.010	-0.010
				(0.036)	(0.036)
Mother born U.S.				0.091***	0.091***
				(0.023)	(0.023)
Mother college				-0.021	-0.021
				(0.016)	(0.016)
Constant	0.699***	0.797***	0.726***	0.679***	0.694***
	(0.019)	(0.097)	(0.110)	(0.114)	(0.115)
School fixed effects	No	Yes	Yes	Yes	Yes
Grade fixed effects	No	Yes	Yes	Yes	Yes
School trends	No	No	No	No	Yes
N	4,776	4,776	4,563	4,149	4,149
R squared	0.005	0.043	0.146	0.152	0.152

Notes: Standard errors in parentheses. In column (1) are included only the variables which capture the family experience and peers' families experience without fixed effects and trend. In column (2) we add school and grade fixed effects. In column (3) we add individual controls when women are adult, race, marital status, labor status, education, individual ability measure (PVT) and religion. In column (4) we add information regarding the mothers in Wave I (mother born U.S. and mother college) and a socioeconomic variable in Wave I (very poorly building). Finally, in column (5) is added the school-specific linear trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

Appendix Table B.8: Effects of *peers' siblings* - all women

	Children				
	(1)	(2)	(3)	(4)	(5)
Siblings	0.056***	0.053***	0.042***	0.048***	0.048***
	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)
Peers' siblings	0.098***	0.056	0.069	0.092*	0.090*
	(0.030)	(0.048)	(0.048)	(0.051)	(0.052)
White			-0.008	-0.021	-0.021
			(0.048)	(0.051)	(0.051)
Married			0.135***	0.122***	0.122***
			(0.040)	(0.043)	(0.043)
Work for pay			-0.338***	-0.351***	-0.353***
			(0.044)	(0.046)	(0.046)
PVT			-0.002	-0.001	-0.001
			(0.001)	(0.002)	(0.002)
Bachelor or more			-0.245***	-0.251***	-0.251***
			(0.040)	(0.043)	(0.043)
Religion			0.067***	0.066***	0.066***
			(0.011)	(0.012)	(0.012)
Very poorly building				0.014	0.014
				(0.100)	(0.100)
Mother born U.S.				0.056	0.055
				(0.067)	(0.067)
Mother college				-0.001	-0.001
				(0.045)	(0.045)
Constant	1.805***	1.978***	2.088***	1.976***	1.948***
	(0.079)	(0.261)	(0.311)	(0.324)	(0.326)
School fixed effects	No	Yes	Yes	Yes	Yes
Grade fixed effects	No	Yes	Yes	Yes	Yes
School trends	No	No	No	No	Yes
N	3,508	3,508	3,359	3,055	3,055
R Squared	0.017	0.058	0.101	0.111	0.111

Notes: Standard errors in parentheses. In column (1) are included only the variables which capture the family experience and peers' families experience without fixed effects and trend. In column (2) we add school and grade fixed effects. In column (3) we add individual controls when women are adult, race, marital status, labor status, education, individual ability measured (PVT) and religion. In column (4) we add information regarding the mothers in Wave I (mother born U.S. and mother college) and socioeconomic variable in Wave I (very poorly building). Finally, in column (5) is added the school-specific linear trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

Appendix Table B.9: Effects of *peers' siblings* including partners' education - married women

	Children				
	(1)	(2)	(3)	(4)	(5)
Siblings	0.069*	0.045	0.024	0.027	0.027
	(0.039)	(0.051)	(0.049)	(0.051)	(0.052)
Peers' siblings	0.007	0.267	0.382*	0.393*	0.394*
	(0.117)	(0.216)	(0.206)	(0.214)	(0.219)
White			0.562***	0.625***	0.626***
			(0.232)	(0.226)	(0.228)
Work for pay			-0.200	-0.214	-0.214
			(0.197)	(0.197)	(0.199)
PVT			0.004	0.006	0.006
			(0.007)	(0.007)	(0.007)
Bachelor or more			-0.462**	-0.374*	-0.374*
			(0.178)	(0.190)	(0.191)
Religion			0.079*	0.019	0.019
			(0.047)	(0.046)	(0.046)
Very poorly building				-0.147	-0.147
				(0.758)	(0.761)
Partner education				-0.014	-0.014
				(0.051)	(0.051)
Mother born U.S.				0.474	0.475
				(0.317)	(0.318)
Mother college				0.164	0.164
				(0.182)	(0.183)
Constant	2.155***	1.973**	0.577	0.253	0.256
	(0.298)	(0.767)	(1.024)	(1.232)	(1.249)
School fixed effects	No	Yes	Yes	Yes	Yes
Grade fixed effects	No	Yes	Yes	Yes	Yes
School trends	No	No	No	No	Yes
N	235	235	230	213	213
R Squared	0.015	0.438	0.527	0.603	0.603

Notes: Standard errors in parentheses. In column (1) are included only the variables which capture the family experience and peers' families experience without fixed effects and trend. In column (2) we add school and grade fixed effects. In column (3) we add individual controls when women are adult, race, labor status, education, individual ability measure (PVT) and religion. In column (4) we add information regarding the mothers in Wave I (mother born U.S. and mother college) and socioeconomic variable in Wave I (very poorly building) and partner education. Finally, in column (5) is added the school-specific linear trend. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Add Health.

Appendix Table B.10: Data description and definitions

Variables	Description
	Wave I
White	Dummy variable equal to one if the respondent reported being white. In school questionnaire, question: S6A.
Black	Dummy variable equal to one if the respondent reported being black. In school questionnaire, question: S6B.
PVT	Score on the student's Picture Vocabulary Test. In home questionnaire.
Very poorly building	Based on the question: "How well kept is the building in which the respondent lives? Very well kept, fairly well kept (needs cosmetic work), poorly kept (needs minor repairs), very poorly kept (needs major repairs)". The variable was coded as one if the interviewer answered "very poorly kept" and zero otherwise. In home questionnaire, question: H1IR11.
Mother college	Dummy variable equal to one if the respondent's resident mother had at least a college degree. In home questionnaire, question: H1RM1.
Mother born U.S.	Dummy variable equal to one if the respondent's resident mother was born in the United States. In home questionnaire, question:H1RM2.
Parent college	Dummy variable equal to one if at least one resident parent had at least a four-year college degree. In home questionnaire, questions: H1RM1 and H1RF1.
Parents born U.S.	Dummy variable equal to one if both parents reported being born in the United States. In home questionnaire, questions: H1RM2 and H1RF2.
Single parent	Dummy variable equal to one if the parent reports not being married. In home questionnaire, parents questionnaire, question: PA10.
	Wave V Mixed-Mode Survey
Children	Number of biological children that individual have had. Question: H5PG7.
Motherhood	Dummy variable equal to one if the individual have been mother. Question: H5PG7.
Siblings	number of siblings (biological, step and adopted), lived or dead, which the individual have. Question: H5WP32.
Peers' siblings	Leave one out mean of peers' siblings in same school and grade.
$\geq$ 1 sibling	Dummy variable equal to one if variable siblings is equal or more than 1 (individual have at least 1 sibling).
$\geq$ 2 siblings	Dummy variable equal to one if variable siblings is equal or more than 2 (individual have at least 2 sibling).
$\geq$ 3 siblings	Dummy variable equal to one if variable siblings is equal or more than 3 (individual have at least 3 sibling).
% peers with $\geq$ 1 sibling	% peers (leave one out mean) with siblings equal or more than 1.
% peers with $\geq$ 2 siblings	% peers (leave one out mean) with siblings equal or more than 2.
% peers with $\geq$ 3 siblings	% peers (leave one out mean) with siblings equal or more than 3.
Married	Dummy variable equal to one if the individual reported being married. Question: H5HR1.
Work for pay	Dummy variable equal to one if the respondent is currently working for pay. Question: H5LM5.
Bachelor or more	Dummy variable equal to one if the individual had at least a bachelor degree. Question: H5OD11.
Religion	Frequency which the individual attended religious services the last year. Question: H5RE2.
Spouse income	Value that reflects the interval of income that spouse has received last year before taxes. The variable is calculated subtracting individual income from household income only considering married individuals. Questions: H5EC1 and H5EC2.
Partner education	Value that reflects the highest grade or year of regular school that the partner in Wave III had completed. Wave III partner questionnaire, section 7, question: H3ED1.
Household	Total number of household members (including the individual). Question: H5HR3

Source: Add Health and authors' calculations.

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