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# Single-Mother Families and the Gender Gap in Children's Time Investment and Non-Cognitive Skills

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## Abstract

This paper analyzes the role of family structure in the gender gap in children's time investment in studying and non-cognitive skills. We focus on Italy, a country that, similar to many other OECD countries, is experiencing both an increasing number of single-parent families (most of which are headed by mothers) and an increasing gender gap in children's cognitive and non-cognitive outcomes. By using a difference-in-differences specification comparing children's outcomes in single- versus two-parent families for boys compared to girls, we analyze the differential effect across gender of living with a single mother on both the amount of time spent studying and the amount of effort put into studying. Our analysis suggests that living in a single-mother family has a more detrimental effect on boys, though all children – regardless of gender – receive fewer parental inputs if they live with a single mother. The greater detrimental effect of living with a single mother for boys seems to be driven by less educated, less well-off families or families with working mothers.

**Keywords:** Children Time Investment, Non-Cognitive Skill, Single-Mother Families

**JEL Classification:** D1, J13

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## 1. Introduction

Over the last forty years, the separation and divorce rates in OECD countries have greatly increased. The divorce rate among OECD countries almost doubled between 1970 and 2012. In 1970, there were 1.1 divorces per 1,000 marriages, and in 2012, the rate was 1.9 (OECD, 2014). Consequently, an increasing number of children live with a single parent, mainly with a single mother. Several studies have shown that this living arrangement has negative consequences for parental investment in children and, ultimately, for children's behavioral and educational outcomes (Hetherington, 1989; Haveman and Wolfe, 1995; Hetherington *et al.*, 1998; Ermisch and Francesconi, 2001a; Carneiro and Heckman, 2003). As a parallel development, over the last several decades, in terms of school outcomes and college enrolment, an increase in the gender gap in favor of girls has also emerged. Starting in the mid-1980s, girls have begun to surpass boys in college enrolment across the U.S, and more recently, a similar trend has been observed across most OECD countries (OECD, 2012). Moreover, girls often perform better at school than boys. According to the results of the PISA (Programme for International Student Assessment) study, boys obtain worse test scores than girls in 70 percent of the 74 countries evaluated (Stoet and Geary, 2015), although there are some differences in the results among the three fields (reading, mathematics and science) included in the tests.<sup>1</sup>

In addition to the gender gap in cognitive skills, boys underperform girls in different measures of non-cognitive skills, such as behavioral problems, approaches to learning, self-control and discipline (Jacob, 2002). Boys are also more likely than girls to have attention and behavioral difficulties or hyperactivity disorders (Szatmari, Offord and Boyle, 1989).

Indeed, a few studies have attributed this gender gap in educational outcomes to differences in non-cognitive skills (Jacob, 2002; Goldin, Katz and Kuziemko, 2006; Becker, Hubbard and Murphy, 2010). In turn, children's non-cognitive skills have been shown to be strongly affected by parental time investment (Carneiro and Heckman, 2003; Cunha and Heckman, 2007) and are thus dependent on family structure and

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<sup>1</sup> Girls significantly outperform boys in reading, whereas boys are slightly better than girls in mathematics. In science, the results generally do not show significant gender differences.

background. Different family structures may result in different parental investments, with consequences for both non-cognitive and cognitive skills and for the amount of the child's time devoted to studying.

The observed reversal in the gender gap in education and in the growth of employment and real wages of high school graduates across the U.S. has consistently been hypothesized as being linked to the rising share of single-parent households (Autor and Wasserman, 2013). Furthermore, previous studies have shown that boys are more affected than girls by family problems, poor family backgrounds and bad social environments (Amato, 2001; Jacob, 2002; Bertrand and Pan; 2013).

The aim of this paper is to contribute to the literature by evaluating how family structure differently affects the time that boys and girls devote to studying and the effort that they put into studying. Despite some evidence regarding non-cognitive skills, to date, no study has analyzed whether boys and girls react differently to family structure in terms of their overall investment in studying. Thus, this paper adds evidence to the different effect that family structure may have across gender, focusing on the child's investment in human capital accumulation outside of school. Our aim is to analyze one of the potential mechanisms that explain the widening gender gap in educational outcomes in favor of girls.

We use Italian data and examine the time that the child invests in reading, studying and doing homework, as reported in the 2008 Italian "Time Use Survey". In addition, we replicate the analysis, using as an alternative outcome a self-reported measure of non-cognitive skill, the child's study effort provided by the 2008 Italian Multipurpose Survey on "Aspects of Daily Life".

We relate a child's time and study effort to the type of family in which the child lives, *i.e.*, whether he/she lives with both parents or with a single mother. We also focus on the different effect of family type across gender. After reporting evidence that single-mother families – compared to families in which both parents are present – provide fewer parental inputs to children, regardless of their gender, we analyze whether boys react differently than girls with less time invested in studying or with a poor effort. Unfortunately, no dataset for Italy provides information on both the time and effort exerted in studying by children and the school results. However, following Cunha and Heckman (2006) and Del Boca *et al.* (2017), our variables can be interpreted as inputs in the child's skill production function, producing both skills for the immediate period

and ultimately the stock of human capital as an adult.<sup>2</sup> In fact, Duckworth and Seligman (2005) show that self-discipline in studying predicts the academic performance of eighth-grade students to a greater extent than IQ.

This paper focuses on Italy for two reasons. First, the percentage of children below the age of 18 living in families with only one parent has steadily increased since the beginning of the century, following the increasing trend in the number of divorced or separated families, which doubled between 1995 and 2009. Only a trivial proportion of children live with only one parent because of reasons other than the voluntary dissolution of the union (*i.e.*, because of a parent's death or because the father did not recognize the child or lives separately from the birthplace of the child<sup>3</sup>).

In 2010, the absolute number of minors involved in separations and divorces in Italy was over 65,000; most of these children were living in a single-mother family (ISTAT, 2012). In 2008, approximately 10 percent of all children were living in a single-parent family. This percentage was similar for other Southern European countries, such as Greece and Spain. However, it was much lower than in the U.K. and the U.S., where in the same year, more than 20 percent of minors were living with a single parent (OECD, 2011).

Second, Italy, similar to many other developed countries, has experienced a gender gap in educational outcomes in favor of females. According to the 2012 PISA test scores, 15-year-old girls performed better than their male peers. Such a gender gap is also confirmed by the marks obtained in the eighth-grade final school exam. There, girls scored a high mark<sup>4</sup> in 45 percent of cases, and boys scored a high mark in 29 percent of cases (ISTAT data warehouse<sup>5</sup>). Simultaneously, in Italy, as in most OECD countries, beginning in the 1990s, the gender gap in university enrolment has reversed in favor of girls, reaching a female/male college enrolment ratio of 1.3 in 2013 (ISTAT data warehouse).

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<sup>2</sup> Cuhna and Heckman (2006) model the technology of skill formation by including only previous parental inputs and the child's stock of skills, assuming that parents fully control the investment of the child. However, they acknowledge that children's own inputs could enter into the skill production function as additional factors. Del Boca *et al.* (2017) model the child's cognitive production function by including current and past child time investment in addition to parental and school inputs.

<sup>3</sup> According to the 2012 Survey on Births (referring to the births that occurred in 2009-2010), only 5 percent of mothers declared that they were not at least cohabiting with the partner at the time of the birth. However, most of them formed a cohabiting couple immediately after the birth of the child. There are very few cases of unattached mothers at childbirth who remain single afterwards, and most of these are adolescents (ISTAT, 2014).

<sup>4</sup> The marks at the end of lower secondary school (eighth grade) in 2008 were classified as follows: excellent, very good, good, sufficient, and failed. We consider "excellent" or "very good" to be high marks.

<sup>5</sup> <http://dati.istat.it>

Since the focus of our paper is on the differential effect of family type between boys and girls, in our empirical analysis, we use a difference-in-differences (DD) specification comparing children's outcomes in single- versus two-parent families for boys compared to girls. In addition, we allow the effect of all regressors to vary across gender. In our case, a major threat to the identification is the selection by gender into different family types (single-mother vs two-parent) if this is correlated with unobservable factors that are also correlated with children's outcomes. We attempt to address this issue by checking the random assignment of gender to family type. In particular, we regress a dummy variable for being a single mother on a dummy variable for boy and on child's age. We find no evidence of a correlation between gender and having a single mother or between gender and other family characteristics, such as parental education, being a single child, or family economic conditions.

Our results show that living in single-mother families has a significantly greater (negative) effect for boys than for girls on the time invested in studying, reading and doing homework. Similar gender differences are found for the outcome of study effort. The increase in the gender gap (boy-girl) due to living with a single mother is stronger for older boys, boys with lower educated or less well-off mothers, or boys with working mothers. These results cannot be explained by the differences in the observed parental inputs between boys and girls because they both receive equally less parental time if they live with a single mother compared to those living with two parents. Therefore, we argue that our results may indicate that boys are more affected than girls by lower parental inputs.

The paper is organized as follows. Section 2 discusses the relevant literature. Section 3 presents the datasets, and Section 4 describes the empirical strategy. Section 5 shows the descriptive statistics for the gender difference in the children's outcomes and the gender differences in the parental inputs received by children living in single-mother and two-parent families. Section 6 discusses our main results. Our conclusions follow in Section 7.

## **2. Background**

Most of the studies that examine gender differences in school outcomes and college enrolment rates explain the phenomenon as a result of the higher incidence of behavioral problems and the lower level of non-cognitive skills among boys, including time devoted to studying (Jacob, 2002; Goldin *et al.* 2006). Actually, lower non-cognitive skills increase the psychological and non-monetary cost of education (Becker *et al.*, 2010). Girls begin school with more advanced social and behavioral skills than their male peers, and this skill advantage increases with age (DiPrete and Jennings, 2012). In fact, female students seem to pay more attention to teachers' instructions and seem to be better organized with homework and exams, therefore obtaining better school outcomes. With higher mean values (and lower variance) in both cognitive and non-cognitive skills, the opportunity cost of attending college is lower for female students (Becker *et al.*, 2010). Fortin *et al.* (2015) also highlight the role of gender differences in students' motivation and ambition for their future career in explaining the gender gap in educational achievement.

One of the reasons for the lower level of cognitive and non-cognitive skills among boys can be attributed to family structure. A vast stream of literature<sup>6</sup> shows that growing up in a single-parent family has a negative effect on educational attainments (Haveman and Wolfe, 1995). For the U.K., Ermisch and Francesconi (2001a and 2001b) find that children who spent time with a single mother during childhood have lower educational achievement and higher chances of experiencing economic inactivity. Miller *et al.* (1999), who studied almost 6,000 eighth-grade students in the U.S., find that children of divorced parents are more likely to engage in deviant behavior. They argue that parental involvement, *i.e.*, the supervision of children and the passing on of positive attitudes towards work and school, is directly linked to family structure. Buchmann and DiPrete (2006) show the existence of gender-specific effects of family background: the reduction in male college completion seems to be due to the growing vulnerability of boys with low-educated or absent fathers.

The psychological literature (Hetherington, 1989; Hetherington *et al.*, 1998) finds that children of divorced parents are more likely to have academic problems, externalized behavior and internalized problems and to be less socially responsible. Although most children are well adapted to the new family structure by two years after a parental divorce, some problems still persist only for boys that report noncompliant

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<sup>6</sup> For a comprehensive review of the relevant literature on the effect of divorce on children, see Gruber (2004).

behaviors in school and difficulties in their relationships with peers. In fact, it seems that boys respond to divorce with increasing conduct disorders, whereas girls more frequently respond with depression. The main cause of these reactions is the lack of one parent and the consequent lower control and supervision exerted by the single parent (mainly, the mother). The stronger reaction of adolescent males to parenting in terms of self-regulation has been explained by gender differences in genetic factors (Belsky and Beaver, 2011).

Economists find similar results. Bertrand and Pan (2013) examine the behavioral and social-emotional skills of boys and girls in the U.S. Their findings show that boys raised by a single mother are more likely to act out in comparison to boys living in a two-parent family and in comparison to girls living with a single mother. Their interpretation is that the lower quantity and quality of parental inputs received by children in single-mother families, compared to children in two-parent families, are more detrimental to boys than to girls. Moreover, single mothers seem to invest more in their daughters than in their sons and to be emotionally closer to them, reducing the disadvantage with respect to girls living with both parents. They also find that, for girls, the relationship between parental inputs and behavioral outcomes is weaker. Similarly, analyzing the effect of disruptive school peers on student outcomes, Kristoffersen *et al.* (2015) find that children with divorced parents report worse behavior than their class peers but only if they are male. De Lange *et al.* (2014) show that PISA test results are lower in schools with a higher percentage of children living with single parents and that the negative effect is greater in countries where single parenthood is less widespread. Recently, Autor *et al.* (2015) have presented a comprehensive analysis of how the higher gender gap across minority groups in the U.S. is explained by family disadvantage, examining opposite-sex siblings. They find that, although there is no male disadvantage due to family socio-economic conditions at birth, the disadvantage in boys' outcomes already appears at the time of entering kindergarten and that it persists and increases until high school graduation. In addition, school and neighborhood quality have a marginal role in explaining the higher gender gap for minority groups with respect to family disadvantage.

A recent study by Slade *et al.* (2017) on the effect of family break-ups and changes on overall health, depression and smoking habits found opposite results: women seem to be more affected than men are. However, the authors suggest that



family structure might be more influential for the behavior and education of boys, while girls are more affected in physical and mental health.

A closely related literature examines parental time with children and how this factor affects the child's human capital accumulation process (Leibowitz, 1974; Cunha and Heckman, 2006). Carneiro and Heckman (2003) report ample evidence suggesting that parental investments in time and goods are important for the cognitive and non-cognitive outcomes of children. Consequently, several studies argue that the detrimental effects of divorce on children are related to the reduced time spent by children with their parents (Jonsson and Gähler, 1997).<sup>7</sup>

A few studies have examined different levels of parental time investment in daughters and sons. Lundberg *et al.* (2007) find that single mothers with only daughters spend more time with them than single mothers with only sons but when they have both sons and daughters, mothers do not favor girls. Similarly, Bertrand and Pan (2013) find that girls receive more time from single mothers than boys in similar families, and Baker and Milligan (2013) find that parents spend more teaching time with girls than with boys.

Several studies have attempted to identify the causal effect of family structure on children's outcomes, controlling for the endogeneity of family characteristics with different methodologies.<sup>8</sup> The results show that, once the potential endogeneity of family structure is controlled, the effects become small or negligible. Since our focus is on the differential effect of living with a single mother by gender, we do not concentrate on the endogeneity of family structure *per se*, but we test the random assignment of the child's gender to single-mother families, though our data do not allow us to fully control for factors that may affect both the child's outcomes and family structure (*i.e.*, parental style) and that may differ by gender. This strategy allows us to show that the probability of living with a single mother is not different between boys and girls.

### 3. Data

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<sup>7</sup> In fact, according to Coleman (1988), the physical presence of the parents, and the attention that they give to their children, is a measure of family social capital, which determines the level of human capital during adulthood.

<sup>8</sup> Ermisch and Francesconi (2001b), Bjorklund and Sundstrom (2006), and Francesconi *et al.* (2010) use sibling fixed effects models, Francesconi *et al.* (2010) instrumental variables, whereas Corak (2001) and Sanz-de-Galdeano and Vuri (2007) utilize difference-in-differences methods.

For our analysis, we rely on two different sources of data: the 2008 Italian “Time Use Survey” and the 2008 Italian “Aspects of Daily Life” survey. Both surveys were conducted by the Italian National Statistical Office (ISTAT) and are part of an integrated system of social surveys – the Multipurpose Surveys on Household – that collects fundamental information on individual and household daily life.

The Italian “Time Use Survey” contains a detailed time diary for all family members above the age of two, in addition to individual and household questionnaires. The survey covers 18,250 households, corresponding to 44,606 individuals. The sample is representative of the Italian population. In each municipality covered by the survey, the households were divided into three groups, and each group was asked to complete the daily diary on a different day: a weekday, a Saturday or a Sunday. For our analysis, we consider diaries completed both during weekdays and weekends.<sup>9</sup> Each family member was asked to fill out a daily time diary in which every activity that occurs during the 24-hour period must be recorded. The activities are described in terms of type, duration (ten-minute episodes or multiples), location where the activity occurred and the people present during the activity. Each activity is recorded by the respondent as either primary or secondary. For our analysis, we consider only primary activities.

The main advantage of using data from time diaries is that the information is more precise and reliable than retrospective information on time use. The other advantage of using data from the Italian “Time Use Survey” is that the time use of young (above the age of two) children is also recorded.

The second data source, the “Aspects of Daily Life” survey, is a representative survey conducted annually that covers a broad set of themes: employment, health, self-reported satisfaction concerning different aspects of life, the use of services and habits. The survey covers 48,861 individuals, corresponding to 19,573 households. Starting in 2008, a special module devoted to children aged 3-17 has been added, including questions about school attendance, attitude towards school, friends, and the type of childcare received.

The two surveys are highly comparable in terms of sample design and representativeness, and they report information on all family members, with a variable indicating family type: two-parent family, single-parent family, family with only one member and no children, etc. We select children from families in which two parents

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<sup>9</sup> The results are qualitatively similar when selecting only weekdays but are less significant, given that the sample size is reduced by two-thirds.

(either biological or step) are present and from families headed by a single mother. We exclude children living in single-father households because, in Italy, children typically live with the mother after parental separation.<sup>10</sup> Therefore, single fathers may be highly selected and not comparable to single mothers, but unfortunately, in our dataset, there are too few cases to be analyzed as a separate group. In addition, if there are parent-child same-gender complementarities in childrearing or factors such as gender role, combining single fathers with single mothers into a unique “single parent” category would attenuate the estimate of the gender gap in children’s outcomes.<sup>11</sup> Such a mechanism would be interesting to test, but unfortunately, this is not possible with our data due to the scarce cases of single-father families.

We restrict the analysis to children in the 6-17 age bracket because the information on non-cognitive skills in the “Aspects of Daily Life” survey is available for children up to 17 years old and we exclude children under age 6, the official school entry age.

In our analysis, we consider two child outcomes: the time devoted by the child to human capital accumulation outside school and the child’s study effort as a measure of non-cognitive skills. In defining human capital accumulation outside school, we consider the time spent by the child reading, studying and doing homework on the day of the survey, excluding the time spent at school, with and without parental supervision. In the dataset, in fact, for each activity performed by the individual, a variable indicates whether other people were present. Therefore, we know whether an adult was present while the child was studying, but we do not know whether this adult was actually supervising/helping the child with homework or whether he/she was merely present, performing different activities. For this reason, we did not exclude or treat separately the child’s time of studying in the presence of an adult. The time a child devotes to study can be considered as a combination of child outcome and parental input, but for our purpose this distinction is not relevant since all time spent in studying is an input in the child’s skill production function. In addition, the evidence provided by the results on child effort suggests that there is an effect of family structure also when we consider

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<sup>10</sup> In 2006, a new law (54/2006) introduced shared custody between parents. However, it took several years for this new arrangement to become prevalent. Until 2008, the vast majority of children were legally under the mother’s custody. In the surveys that we used, divorces and separations occurred before 2008 (the year of data collection), and therefore children living with single fathers represent very few cases (less than 60 in both surveys).

<sup>11</sup> For the U.S., Bertrand and Pan (2013) show that, in single-mother families, boys receive fewer parental inputs than girls. However, as we note in the next section, our data on parental inputs do not show a gender bias in parental investment in children, regardless of family type.

a pure child outcome. Our definition is a more restrictive definition of human capital accumulation than that used in other studies, such as in Del Boca *et al.* (2017), which also includes sports, playing, and social activities. The reason for this restriction is that we want to narrow the scope to activities that may directly affect educational results for which gender differences have emerged.

To define the second child outcome, study effort, we use a variable from the “Aspects of Daily Life” dataset that refers to the self-reported approach to studying that the child took. The variable has five categories: the child is unwilling to study, and he/she does not put any effort into studying; the child studies with interest only the subjects that he/she likes; the child puts the minimum possible effort into studying to reach sufficient results; the child puts effort into studying, and he/she reaches results that are more than sufficient but could do more; and the child puts much effort into studying, and he/she in fact reaches excellent results. The child’s effort level can be reported either by the child or by a family member.<sup>12</sup> In selecting this child’s outcome, we follow Bertrand and Pan (2013), who study how parental inputs and the school environment explain the gender gap in the non-cognitive skills of children in the U.S. Our indicator can be comparable to what Bertrand and Pan (2013) define as “approaches to learning”.<sup>13</sup> Specifically, we build an indicator for high study effort which is set equal to one when the variable takes a value that is greater than the mean value of the sample (which corresponds to the first two categories), and otherwise zero.

#### 4. Empirical Strategy

To analyze the different effect of living in a single-parent family on children’s outcomes by gender, we adopt the following linear regression model.

$$y_i = \alpha + \beta Boy_i + \gamma SingleMother_i + \delta SingleMother * Boy_i + \theta X_i + \lambda Z_i + \mu Boy * X_i + \rho Boy * Z_i + \epsilon_i \quad (1)$$

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<sup>12</sup> Both cases are possible. In the main analysis, we consider all cases. When excluding the cases in which the answer is provided by the child, the results do not change (results available upon request).

<sup>13</sup> Approach to learning is defined by Bertrand and Pan (2013) as follows: “Measures behaviours that affect the ease with which children can benefit from the learning environment. Includes 6 items that rate the child’s assertiveness, task persistence, eagerness to learn, learning independence, flexibility and organization”.

Our model can be interpreted as a difference-in-differences (DD) specification in which we compare children's outcomes between children in single-mother and two-parent families for boys versus girls, and additionally, we interact all regressors with a gender dummy. The coefficient of the interaction between the gender dummy variable and the single-mother indicator ( $\delta$ ) provides the differential effect of living with a single mother between boys and girls. Moreover, we allow all individual and family characteristics to have a different effect across gender on our outcomes.

In addition to gender and family type (*SingleMother<sub>i</sub>*), in our regression, we consider the child's characteristics,  $X_i$  (age<sup>14</sup> and a dummy variable for being an only child), and a vector of family characteristics,  $Z_i$ , such as parental education,<sup>15</sup> employment status,<sup>16</sup> whether one of the parents was 20 years old or younger at the time of the first childbirth, family economic conditions (home ownership and a self-reported indicator of the family economic condition) and area of residence (dummy variables for five macro regions and five dummy variables for municipality size). Employment status can be considered a proxy for parental time with children and for family income.

As stated above, one possible concern over identification in our model is the correlation between gender and family structure driven by unobserved factors. Let us imagine that parents with a daughter tend to separate more than parents with a son for unobserved reasons, which are related to children's behavior (such as time devoted to study or study effort). In fact, Dahl and Moretti (2008) report evidence for the U.S. of a lower likelihood of separating when the first-born is a male. If this were the case, then examining the different effect of living in single-parent families on our outcomes by gender would provide biased results.

To address this concern, we perform a test of random assignment to test that gender is not correlated with family structure, controlling for child's age, since the age can be an important determinant in the parental decision about separating from the partner. The results, reported in Table 1, Column 1 (Panel A for the "Time Use Survey" and Panel B for the "Aspects of Daily Life" dataset) show that we can rule out that the child's gender has any effect on the probability of living with a single mother, our

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<sup>14</sup> We use three age categories: 6-10, 11-14, and 15-17.

<sup>15</sup> To construct the variable of parental education, we consider the four categories provided by the data (no education, compulsory education, high school, college and higher) for each parent. Then, we take the average value of the categorical variable between the parents. In single-mother families, parental education coincides with the value of the single mother.

<sup>16</sup> Employment status is a dummy variable that takes the value one if the parent is employed, otherwise 0.

dependent variable. In Columns 2-4, we use different family characteristics, such as parental education,<sup>17</sup> a dummy variable for being a single child, and a dummy variable for self-reported insufficient economic conditions, as dependent variables. According to these results, there is no evidence of any correlation between gender and other family characteristics. Therefore, in our samples, gender seems to be randomly assigned to different family types. Naturally, the effects of other unobservable factors cannot be entirely ruled out with this specification. There is some evidence, for example, that in the U.S., mothers are emotionally closer to daughters than to sons (Bertrand and Pan, 2013).

[Table 1]

To rule out the role of unobserved factors in sorting into family type, the ideal identification strategy would be a comparison of opposite-sex siblings within a family fixed effect model, as in Autor *et al.* (2015). Unfortunately, such a comparison is not possible with our data because we have too few cases of opposite-sex siblings in single-parent families to be able to identify the effect.

Therefore, our identifying assumption implies that selection into family type is controlled by a set of observables at the family level. Family structure can be strongly correlated with family socio-economic conditions. Although we control for a rich set of family characteristics, it can still be possible that some unobserved factors at the family level partially drive our results, and therefore, we are not able to isolate the true effect of family structure with our identification. Let us assume the case that unobserved parental characteristics are not only related to different attitudes towards separation but also correlated to both different parental behavior towards boys and girls and to children's outcomes. Without controlling for such characteristics, our estimates would be biased, and the direction of the bias would depend on the type of correlation.

To reduce the concern over possible confounding factors, we test how sensitive our identification is to the inclusion of other family characteristics that may be correlated with our main variable of interest and with children's outcomes: the religious participation of the parents or having both parents with foreign nationality (this test is

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<sup>17</sup> A dummy variable set equal to one in case the maximum number of years of education among the partners is higher than the median sample value.

only possible for the Time Use Sample because this information is not available in the Multiscopo dataset). Both factors can be reasonably assumed to affect both the decision to separate and a different parental approach to boys and girls, having potential consequences for their behavior. The results, not shown but available upon request, are robust to the inclusion of these controls, reducing potential concerns of confounding factors.

## 5. Descriptive Evidence

Tables A.1 and A.2 in the Appendix provide the descriptive statistics of the variables used in the empirical analysis. The samples taken from the two surveys are highly comparable. Children aged 6-17 living with a single mother are approximately 12 percent of the “Time Use Survey” sample and approximately 9 percent in the “Aspects of Daily Life” survey. These features are consistent with official data (ISTAT, 2012). In both samples, children living with a single mother have higher educated parents and a lower likelihood of living in a house owned by the family; they are more likely to live in a North-Western or Central region and in larger municipalities. Single mothers are more likely to work than mothers in two-parent families, given that they are typically the only earner. Self-reported economic conditions are worse for single-mother families: 13 percent of single mothers report “totally insufficient” family economic conditions, five percentage points more than two-parent families. Table A.1 shows that there is a slightly lower share of boys living with single mothers, but this finding is confirmed neither by the other survey (Table A.2), nor by our random assignment test (Table 1).

Overall, single mothers seem to be slightly better educated (and this aspect differentiates Italy from the U.S.), more likely to work, but poorer than parents living in couples. This situation could translate into ambiguous effects in terms of the quantity and quality of resources that they can devote to their children.

Our data show that there is a gender difference in terms of our children’s outcomes, as already found in previous studies for other outcomes. Table 2 shows that boys invest significantly less time than girls in reading and studying (Panel A) and put less effort into studying (Panel B). The first three Columns refer to the full sample, whereas the last three refer to older children. Starting from the full sample, girls spend

14 minutes more per day studying/reading than boys, and comparing girls to boys in single-mother families, this difference becomes much higher (25 minutes). Similarly, girls have a 15 percentage point higher probability of putting high effort into studying, and comparing boys and girls with a single mother, this gap rises to 26 percentage points. Finally, comparing children of the same gender in terms of children's outcomes, the difference between living with two parents and living with a single mother emerges only for boys.

Next, we restrict our sample to children older than 10 because, at age 11, Italian children move to middle school (*scuola media*) and the requested time for studying at home increases considerably compared to primary school. The last three Columns of Table 2 show that the gender gap is in fact stronger for older children. For this group, girls living with a single mother study almost half an hour more per day than boys living with a single mother (Panel A) and are approximately 31 percentage points more likely to put higher effort into studying (Panel B). Previous results have also shown that the higher gender gap in non-cognitive outcomes due to family structure increases with age. Bertrand and Pan (2013) find in fact that the boy-girl gap in non-cognitive skills due to the home environment first appears in fifth grade and then widens until eighth grade.

[Table 2]

Given that parental inputs affect both a child's time investment and a child's non-cognitive skill development (Leibowitz, 1974; Carneiro and Heckman, 2003; Cunha and Heckman, 2006), we provide descriptive evidence that children in single-mother families receive systematically less observed parental inputs than those in two-parent families, regardless of gender. We consider three different indicators of parental inputs: the time spent by parents in reading to or with the child as well as in studying or helping him/her with homework; the number of visits to museums in the previous year; and the number of extracurricular activities participated in by the child in the previous year.<sup>18</sup> Table 3 reports all of these measures by gender and family structure (single-mother vs. two-parent family): both boys and girls receive fewer parental inputs

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<sup>18</sup> We follow Cunha and Heckman (2006) in selecting the last two measures, the only available from the survey among the list that they use. The first measure comes from the "Time Use Survey" and the other two from the "Aspects of Daily Life" survey.



if they live in a single-mother family. This is true for parental time received (Panel A), with both boys and girls in single mother families receiving approximately 15 minutes less time than those in two-parent families, and for the share of children participating in extracurricular activities (Panel C), whereas for visits to museums (Panel B) the difference is not significant. Nevertheless, in none of the measures we consider is there a significant difference between boys and girls in terms of observed parental inputs received, also among children living with single mothers.<sup>19</sup>

In addition to parental inputs, we can exclude that boys and girls differ in terms of school quality or time spent at school. In Italy, on average, boys and girls attend the same type of school, with the time being institutionally set as equal for everybody, regardless of gender. This is confirmed by our data; there is no difference in time spent at school reported by boys and girls.

[Table 3]

By examining how children's characteristics and family characteristics affect our measures of parental inputs, the most relevant variables in explaining parental inputs are the child's age, parental education, and area of residence. We regress, separately by gender, each parental input on all of the variables that we use in our main regression.<sup>20</sup> The results show that having better educated parents is positively correlated with the parental inputs received, whereas living in a Southern region or in a non-metropolitan area is negatively correlated with parental inputs. Regarding visit to museums and extracurricular activities, this can be possibly explained by a supply effect. In addition, older children spend less time studying or reading with their parents and participate in fewer extracurricular activities. All results apply to both boys and girls.

## 5. Results

Table 4 shows the results of model (1) using the time devoted by the child to studying and reading (Panel A) and the child's study effort (Panel B) as dependent

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<sup>19</sup> Naturally, this evidence does not rule out that boys and girls differ in terms of unobserved parental inputs.

<sup>20</sup> We regress the three measures of parental inputs reported in Table 3 on all of the regressors included in our main regression (see Tables A1 and A2). The full results are available upon request.

variables. As explained in Section 4, we interact all variables with a dummy variable for boys. For both Panels, we first report a simple linear model with no gender interaction (Column 1 for the full sample and Column 3 for the sub-sample of children older than 10) and then the model in which the gender dummy is interacted with all other variables (Column 2 for the full sample and Column 4 for the sub-sample of children older than 10). We report only the coefficients for the three variables of interest: the dummy variable for gender, the dummy variable indicating whether the child lives with a single mother and its interaction with the dummy variable for gender.<sup>21</sup>

Starting with the results concerning the child's time investment in studying (Panel A), the first Column shows that, conditional on all children and family characteristics, children living with a single mother study less than children in two-parent families; however, the coefficient is not statistically significant. In addition, boys invest on average 14 minutes less than similar girls in studying, reading and doing homework.

Moving to the DD model as described in equation (1), Column 2 shows that living with a single mother increases the (girl-boy) gap in time spent studying per day by 17 minutes. Considering children older than 10, the average gender difference is slightly higher: boys study 19 minutes less than otherwise similar girls (Column 3). The differential effect across gender of having a single mother on time spent studying is almost double in magnitude (approximately half an hour less per day) for the older sample than for the full sample (Column 4), which is in line with previous findings (DiPrete and Jennings, 2012; Bertrand and Pan, 2013).

Living with a single mother turns out to also affect negatively the gender gap in children's study effort (Table 4, Panel B). Boys report a 15 percentage point lower probability of putting high effort into studying (Column 1), which is similar to the unconditional descriptive statistics, whereas living with a single mother makes the gender gap in high study effort rise by approximately 12 percentage points (Column 2) in favor of girls. Differently from children's time investment, restricting the analysis to older children (Column 4), the point estimate is of the same magnitude as the one for the full sample.

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<sup>21</sup> The full version of the table is reported in the Appendix (Table A3).

[Table 4]

## 6.1 Heterogeneity

The effect of family structure on children might be different according to the different household's socio-economic characteristics. Autor *et al.* (2015) provide comprehensive evidence of how the higher gender gap in children's outcomes observed among minority groups in the U.S. is largely explained by family characteristics, such as an absent father or parental education. In particular, we want to test whether the negative effect on boys of living with a single mother is larger in households in poorer economic conditions, where parents are less educated, where the mother is working and where there is more than one child (Tables 5 and 6). These factors, in fact, might be correlated with less resources and parental time invested on children.

We define the group of children with highly educated parents as those having parents with an education that is above the median value. Regarding self-reported family economic conditions, we classify those reporting adequate and very good economic conditions as rich families and those reporting scarce or insufficient economic conditions as poor families. Finally, the sample is divided between children with siblings and only children.

Table 5 reports the results for the time invested in studying outside school for the full sample (Panel A) and for the sub-sample of children older than 10 (Panel B). For the full sample, the greater negative effect of living with a single mother for boys is confirmed for all subgroups, though it is significant and much higher in magnitude only for the group of children with siblings or with working mothers. Living in single-mother families further increases the gender gap in favor of girls, in cases of families with at least one sibling, by approximately 24 minutes per day in time spent studying (Column 5). Similarly, in families in which the mother is working, living in single-mother families increases the gender gap in favor of girls by 42 minutes in time spent studying (Column 7), whereas there is no differential effect of living in single-mother families between boys and girls in case of families with non-working mothers, probably because non-working mothers spend more time with their children than working mothers, as our data indicate.<sup>22</sup>

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<sup>22</sup> Comparing children with working and non working mothers, it turns out that children with working mothers spend 5 hours less in reading and studying with the mothers and the difference is statistically significant.

As in the main analysis, the point estimates are stronger and the significance level is higher for older children. The differential effect across gender of living with a single mother for children between 11 and 17 in lower educated families corresponds to 32 minutes less time invested by boys than by their female counterparts (Column 2), 39 minutes less in cases of families with fewer economic resources (Column 4), and 41 minutes less in cases of families with more than one child (Column 5). In cases of families with working mothers, living in single-mother families makes the gender gap in favor of girls increase to 50 minutes (Column 7), whereas the former effect is not significant in cases of families with non-working mothers (Column 8). This last result is conditional on family economic conditions and parental education, suggesting that the effect may be because mothers have less time to spend with their children.

[Table 5]

The results concerning study effort are similar (Table 6). For the full sample, the boy-girl differential effect of living with a single mother is higher in families with low educated parents, in poor families (in both cases, an approximately 13 percentage point lower probability of putting higher effort into studying for boys with respect to girls in similar families; Columns 2 and 4, respectively), or in families with working mothers (18 percentage points; Column 7). All of these effects are greater in magnitude for the sample of older children. Interestingly, the greatest negative effect of living with a single mother on the boy-girl gap in effort is for those without siblings (27 percentage points), probably because single child boys suffer more from the lack of the father. However, examining older children, the effect is not confirmed, with the point estimates being higher for boys with siblings. The effect of having siblings seems to be twofold: siblings can be a source of support and companionship, but at the same time they compete for parental time. For older children, probably, having siblings is less relevant in terms of support and companionship because they have more opportunities to socialize with peers outside the house. For them, therefore, the reduction in parental time because of the presence of other children in the household overcomes the positive effect coming from having siblings as peers.

Therefore, the results are consistent for both outcomes, with the exception of the results for the sub-sample of children with or without siblings. Overall, restricting our sample to older children, the results are stronger: although we lose precision due to

the reduced sample size, all point estimates are greater than those found for the full sample.<sup>23, 24</sup>

The differential effect between boys and girls of living in single-mother families by the presence/absence of siblings could be further investigated by examining, for example, both sibling gender composition and sibling order to uncover the underlying mechanisms. Unfortunately, our data are not suitable for an in-depth analysis in this direction because the dataset does not include information on children younger than three. The evidence based on our data suggests that the boys who suffer the most are those with either younger siblings or with same-sex siblings.<sup>25</sup> Having a younger sibling may take away more parental time from the older child than vice versa, whereas the role of sibling-gender composition can operate as follows: since, overall, girls suffer less from absent fathers than boys, for boys, having a sister can be a better support compared to having a brother. We believe that further research in this direction would be valuable.

[Table 6]

Our results show that boys react significantly worse in a single-mother parental setting than girls and that this differential effect is substantially higher for boys in less educated, less well-off families or boys with working mothers who have less time available to spend with them. However, we do not rule out the possibility that girls may react differently from boys on other margins. As suggested by the psychological literature, they may, for example, internalize problems more. Unfortunately, our data do not allow us to thoroughly analyze this mechanism, though a preliminary examination suggests that this may be the case. The information about stress levels in children available in the “Time Use Survey” could be an indicator of internalizing problems, but this information is available only for children older than 14, and therefore, the sample size is very limited.<sup>26</sup> Girls have a 15 percentage point higher

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<sup>23</sup> We also analyse heterogeneity in terms of rich and poor regions, with poor regions referring to Southern regions and islands. The greater negative effect for boys of having a single mother is driven, particularly for time investment, by children living in poor regions, which is in line with the rest of the heterogeneity analysis. The results are not shown but are available upon request.

<sup>24</sup> Despite the strong difference in point estimates, due to the small sample size, many of these coefficients are not significantly different from one another, with the exception of the comparison between working/not working mothers, and between low- and high-educated parents.

<sup>25</sup> The results are not shown but are available upon request.

<sup>26</sup> The question asked is the following: “Do you feel stressed out?” Possible answers are: yes, always; yes, often; yes, sometimes; and no, never. In using this variable, we construct an indicator for feeling stressed out that is set

probability of reporting stress than boys (63 vs 47 percent). Interestingly, this difference is driven by children in single-mother families: 69 percent of girls report a positive answer, as opposed to 42 percent of boys. This preliminary evidence, which requires further in-depth analysis, may be suggestive of other still unexplored aspects in which boys and girls differ in reacting to family structure.

## 7. Conclusion

In this paper, we examine the role of family structure in explaining gender differences in children's time invested in studying and the amount of effort put into studying. The recent literature has stressed the link between the widening gender gap in college attendance and the increasing deficit in non-cognitive abilities for boys (Becker *et al.*, 2010). Using a DD framework to identify the differential effect of having a single mother across gender, we consider two different outcomes, both relevant for future school and labor market performances: a measure of a child's own investment in human capital accumulation outside school and a measure of a child's effort studying. Our analysis suggests that living in a single-mother family makes the gender gap increase in favor of girls for both outcomes.

The role of family structure seems to be driven by less educated, less well-off families or families with less time available to spend with children, such as working mothers. In addition, examining the differential effect of family structure across gender, we are able to minimize potential selection bias into single-mother families, given that there is no different incidence of female single-headed families between boys and girls. Although our measures of parental inputs do not reveal any differences across gender, there may be other unobserved parental inputs that play a different role for boys and girls. Therefore, further investigation with other data could provide additional insights into isolating potential unobserved factors at the family level to better understand the mechanism conveyed by our results.

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equal to one if the person replies: "yes, always", "yes, often", or "yes, sometimes", as opposed to answering "no, never". Considering a less restrictive definition, the overall picture is very similar.

The mechanism underpinning the greater negative effect on boys may be explained by parent-child gender complementarity. To analyze this channel, the appropriate analysis should compare the effect on children living in single-father and single-mother families. In addition, the literature to date, including this paper, has always examined the effect of having a single parent without considering the quality of parental inputs, such as the type of activities performed by parents with the children. Having access to data about the quality of parental time and how it differs across single-mother and single-father families would provide additional insights into the mechanism at work.

Despite the limits of our research, our results clearly show that, in educational programs, special attention should be given to boys who come from single-mother families and poorer backgrounds to reduce the gender differences in children's cognitive and non-cognitive outcomes.

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## Tables

Table 1. Test on Random Assignment of Gender to Family Type

	(1)	(2)	(3)	(4)
Dep Variable	Single Mother	Parental Education	Single Child	Insufficient Economic Conditions
<i>Panel A</i>				
Boy	-0.014 (0.009)	0.003 (0.011)	0.006 (0.011)	-0.011 (0.008)
Obs	4,700	4,700	4,700	4,700
Rsq	0.008	0.002	0.001	0.000
<i>Panel B</i>				
Boy	0.003 (0.008)	0.008 (0.010)	0.001 (0.010)	0.000 (0.008)
Obs	5520	5520	5520	5520
Rsq	0.002	0.002	0.000	0.000

Source: Panel A, Time Use Survey. Panel B, Aspect of Daily Life Survey. Additional regressors: dummies for age categories (11-14, 15-17, the excluded category is 6-10).

Table 2. Children's Time Invested in Studying and High Study Effort by Family Structure and Gender

<i>Panel A</i>						
Time Spent by Children Studying (Minutes)						
	Full Sample			Age 11+		
	Girls (1)	Boys (2)	Diff (1)-(2)	Girls (5)	Boys (6)	Diff (5)-(6)
Total	83.889 (79.543)	69.452 (73.588)	14.437 [0.000]	96.379 (86.028)	77.552 (80.250)	18.826 [0.000]
Two Parent Families (a)	83.555 (79.610)	70.514 (74.308)	13.040 [0.000]	96.465 (86.668)	79.109 (81.305)	17.355 [0.000]
Single Mother (b)	86.219 (79.181)	60.821 (66.962)	25.398 [0.000]	95.894 (82.509)	67.011 (72.022)	28.883 [0.000]
Diff (a)-(b)	-2.664 [0.598]	9.693 [0.042]	-12.358 [0.075]	0.571 [0.930]	12.098 [0.056]	-11.527 [0.204]
<i>Panel B</i>						
High Study Effort						
	Full Sample			Age 11+		
	Girls (1)	Boys (2)	Diff (1)-(2)	Girls (5)	Boys (6)	Diff (5)-(6)
Total	0.762 (0.426)	0.616 (0.486)	0.146 [0.000]	0.725 (0.447)	0.538 (0.499)	0.187 [0.000]
Two Parent Families (a)	0.762 (0.426)	0.628 (0.483)	0.134 [0.000]	0.726 (0.446)	0.554 (0.497)	0.173 [0.000]
Single Mother (b)	0.764 (0.425)	0.502 (0.501)	0.263 [0.000]	0.713 (0.454)	0.401 (0.492)	0.311 [0.002]
Diff (a)-(b)	-0.003 [0.917]	0.126 [0.000]	-0.129 [0.002]	0.014 [0.703]	0.152 [0.000]	-0.139 [0.010]

Source: Panel A, Time Use Survey. Panel B, Aspect of Daily Life Survey. Each entry in Panel A corresponds to the mean value of the variable time spent by child in studying and reading. Each entry in Panel B represents the share of children with above average study effort. Standard deviations are reported in parenthesis, p-values are reported in squared brackets. \*\*\* p<0.01 \*\*p<0.05 \*p<0.1. For the entries Diff (1)-(2), Diff (5)-(6), and Diff (a)-(b) we report the p-value of the t-test.

Table 3. Parental Inputs by Family Structure and Gender

<i>Panel A</i>			
Children Time Spent with Parents in Studying/Reading (Minutes)			
	Girls (1)	Boys (2)	Diff (1)-(2)
Two Parent Families (a)	38.966 (74.715)	36.399 (72.494)	2.567 [0.263]
Single Mother (b)	23.675 (46.256)	21.791 (46.990)	1.884 [0.636]
Diff (a)-(b)	15.291 [0.001]	14.608 [0.001]	0.683 [0.915]
<i>Panel B</i>			
Visits to Museums during the Year			
	Girls (1)	Boys (2)	Diff (1)-(2)
Two Parent Families (a)	1.539 (0.687)	1.520 (0.689)	0.019 [0.344]
Single Mother (b)	1.521 (0.779)	1.488 (0.706)	0.32 [0.627]
Diff (a)-(b)	0.018 [0.699]	0.032 [0.481]	-0.014 [0.834]
<i>Panel C</i>			
Share of Children Attending Extra-School Courses			
	Girls (1)	Boys (2)	Diff (1)-(2)
Two Parent Families (a)	0.455 (0.498)	0.483 (0.500)	-0.029 [0.042]
Single Mother (b)	0.398 (0.490)	0.457 (0.499)	-0.059 [0.172]
Diff (a)-(b)	0.056 [0.086]	0.026 [0.426]	0.031 [0.505]

Source: Panel A, Time Use Survey. Panels B and C: Aspects of Daily Life. Standard deviations are reported in parenthesis, p-values are reported in squared brackets.\*\*\* p<0.01 \*\*p<0.05 \*p<0.1. For the entries Diff (1)-(2) and Diff (a)-(b) we report the p-value of the t-test.

Table 4. Effect of Single Parent Family on Difference in Children's Outcomes across Gender.

<i>Panel A</i>				
Time Spent in Studying				
	Full Sample		Age 11+	
	(1)	(2)	(3)	(4)
	Diff-in-Diff		Diff-in-Diff	
Single Mother	-7.642 (5.173)	1.273 (7.549)	-9.487 (6.661)	8.205 (9.466)
Boy	-13.872*** (2.208)	4.887 (15.080)	-19.492*** (3.114)	27.718 (20.744)
BoyxSingle Mother		-17.210* (10.361)		-33.414** (13.236)
Obs	4,700	4,700	2,808	2,808
Rsq	0.047	0.052	0.038	0.047
<i>Panel B</i>				
High Study Effort				
	Full Sample		Age 11+	
	(1)	(2)	(3)	(4)
	Diff-in-Diff		Diff-in-Diff	
Single Mother	-0.004 (0.029)	0.055 (0.039)	-0.034 (0.038)	0.029 (0.052)
Boy	-0.146*** (0.012)	-0.059 (0.083)	-0.184*** (0.016)	-0.166 (0.110)
BoyxSingle Mother		-0.119** (0.059)		-0.125* (0.075)
Obs	5,520	5,520	3,274	3,274
Rsq	0.098	0.107	0.092	0.104

Source: Panel A, Time Use Survey. Panel B, Multipurpose Survey. Additional regressors: dummies for age categories (11-14, 15-17, the excluded category is 6-10), average parental education, home ownership, teenage parent, mother employed, father employed, self-reported family economic conditions (4 categories), 5 macro-regions fixed effects, size of the municipality fixed effects (5 categories). Robust standard errors in parenthesis: \*p<0.10, \*\*p<0.05, \*\*\*p<0.01.

Table 5. Effect of Single Parent Family on Gender Difference in Children's Time Spent in Studying by Family Characteristics.

<i>Panel A</i>		Full Sample							
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Parental Edu		Economic Conditions		Siblings		Working Mother	
		High	Low	Rich	Poor	With Siblings	Single Child	Yes	No
BoyxSingle Mother		-16.834 (32.342)	-15.050 (11.048)	-11.417 (17.716)	-17.340 (13.316)	-23.682** (12.052)	-8.530 (22.193)	-42.470*** (14.029)	7.129 (17.605)
Obs		828	3,872	2,721	1,979	3,838	862	2,667	2,033
Rsq		0.135	0.040	0.059	0.055	0.054	0.098	0.072	0.049
<i>Panel B</i>		Age 11+							
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Parental Edu		Economic Conditions		Siblings		Working Mother	
		High	Low	Rich	Poor	With Siblings	Single Child	Yes	No
BoyxSingle Mother		-23.675 (41.793)	-31.701** (14.198)	-21.985 (21.409)	-39.123** (17.389)	-41.107*** (15.262)	-11.620 (29.642)	-50.738*** (16.915)	-19.356 (24.012)
Obs		458	2,350	1,619	1,189	2,301	507	1,624	1,184
Rsq		0.105	0.034	0.050	0.053	0.048	0.121	0.066	0.051

Source: Time Use Survey. High parental education corresponds to the case of maximum years of education between the parents above the median value. Rich corresponds to “adequate” or “very good” self-reported family economic conditions, poor corresponds to “scarce” or “insufficient” conditions. Additional regressors: Columns (1)-(4): 3 age categories (6-10, 11-14, 15-17), only child, teenage parent, mother employed, father employed, 5 macro-regions fixed effects, size of the municipality fixed effects. Columns (5) and (6): 3 age categories (6-10, 11-14, 15-17), average parental education, home ownership, self-reported family economic conditions, only child, teenage parent, mother employed, father employed, 5 macro-regions fixed effects, size of the municipality fixed effects. Columns (7) and (8): 3 age categories (6-10, 11-14, 15-17), average parental education, home ownership, self-reported family economic conditions, only child, teenage parent, father employed, 5 macro-regions fixed effects, and size of the municipality fixed effects. Robust standard errors in parenthesis: \*p<0.10, \*\*p<0.05, \*\*\*p<0.01.

Table 6. Effect of Single Parent Family on Gender Difference in Children's High Effort into Studying by Family Characteristics.

<i>Panel A</i>		Full Sample							
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Parental Edu		Economic Conditions		Siblings		Working Mother	
		High	Low	Rich	Poor	With Siblings	Single Child	Yes	No
BoyxSingle Mother		0.086 (0.165)	-0.134** (0.063)	-0.075 (0.103)	-0.129* (0.072)	-0.091 (0.069)	-0.266** (0.112)	-0.180** (0.083)	-0.053 (0.096)
Obs		945	4,575	2,753	2,767	4,513	1,007	2,989	2,531
Rsq		0.102	0.089	0.107	0.097	0.112	0.126	0.113	0.098
<i>Panel B</i>		Age 11+							
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Parental Edu		Economic Conditions		Siblings		Working Mother	
		High	Low	Rich	Poor	With Siblings	Single Child	Yes	No
BoyxSingle Mother		0.291 (0.236)	-0.173** (0.081)	-0.091 (0.134)	-0.138 (0.091)	-0.136 (0.089)	-0.089 (0.098)	-0.238** (0.105)	-0.007 (0.119)
Obs		521	2,753	1,607	1,667	2,659	615	1,771	1,503
Rsq		0.136	0.084	0.098	0.101	0.112	0.133	0.118	0.100

Source: Aspect of daily Life. High parental education corresponds to the case of maximum years of education between the parents above the median value. Rich corresponds to “adequate” or “very good” self-reported family economic conditions, poor corresponds to “scarce” or “insufficient” conditions. Additional regressors: Columns (1)-(4): 3 age categories (6-10, 11-14, 15-17), only child, teenage parent, mother employed, father employed, 5 macro-regions fixed effects, size of the municipality fixed effects. Columns (5) and (6): 3 age categories (6-10, 11-14, 15-17), average parental education, home ownership, self-reported family economic conditions, only child, teenage parent, mother employed, father employed, 5 macro-regions fixed effects, size of the municipality fixed effects. Columns (7) and (8): 3 age categories (6-10, 11-14, 15-17), average parental education, home ownership, self-reported family economic conditions, only child, teenage parent, father employed, 5 macro-regions fixed effects, and size of the municipality fixed effects. Robust standard errors in parenthesis: \*p<0.10, \*\*p<0.05, \*\*\*p<0.01.

## Appendix

Table A.1. Descriptive Statistics. Time Use Survey

	Total	Two Parent Family (a)	Single Mother (b)	p-value (a)-(b)
Time Studying-Reading	76.379 (76.835)	76.712 (77.140)	73.866 (74.517)	0.414
Boy	0.520 (0.500)	0.525 (0.499)	0.486 (0.500)	0.091
Age: 6-10	0.257 (0.437)	0.262 (0.440)	0.218 (0.413)	0.000
Age: 11-14	0.252 (0.434)	0.245 (0.430)	0.303 (0.460)	0.003
Age: 15-17	0.257 (0.437)	0.250 (0.433)	0.314 (0.465)	0.001
Parental Education	2.657 (0.633)	2.648 (0.623)	2.722 (0.704)	0.010
Mother Employed	0.567 (0.495)	0.541 (0.498)	0.770 (0.422)	0.000
Father Employed	0.816 (0.388)	0.924 (0.265)	- (-)	-
Single Child	0.183 (0.387)	0.162 (0.369)	0.341 (0.475)	0.000
Home Ownership	0.725 (0.446)	0.747 (0.435)	0.559 (0.497)	0.000
Teenage Parent	0.068 (0.252)	0.067 (0.250)	0.076 (0.266)	0.432
Economic Conditions: Very Good	0.016 (0.125)	0.017 (0.130)	0.007 (0.085)	0.083
Economic Conditions: Adequate	0.563 (0.496)	0.578 (0.494)	0.450 (0.498)	0.000
Economic Conditions: Scarce	0.334 (0.472)	0.324 (0.468)	0.408 (0.492)	0.000
Economic Conditions: Insufficient	0.087 (0.282)	0.081 (0.273)	0.134 (0.341)	0.000
North West	0.221 (0.415)	0.214 (0.410)	0.278 (0.448)	0.001
North East	0.213 (0.409)	0.210 (0.407)	0.232 (0.423)	0.233
Center	0.159 (0.366)	0.152 (0.359)	0.209 (0.407)	0.001
South	0.283 (0.451)	0.296 (0.457)	0.183 (0.387)	0.000
Islands	0.124 (0.329)	0.127 (0.333)	0.098 (0.298)	0.052
Metropolitan Area	0.196 (0.397)	0.201 (0.401)	0.196 (0.397)	0.750
Population 0-2000	0.108 (0.310)	0.074 (0.263)	0.104 (0.305)	0.015
Population 2001-10000	0.262 (0.440)	0.241 (0.428)	0.260 (0.438)	0.300
Population 10001-50000	0.266 (0.442)	0.287 (0.453)	0.268 (0.443)	0.293
Population 50000+	0.169 (0.375)	0.196 (0.397)	0.172 (0.377)	0.111
Obs	4,700	4,149	551	

Table A.2. Descriptive Statistics. Aspects of Daily Life Survey

	Total	Two Parent Family (a)	Single Mother (b)	p-value (a)-(b)
No Effort into Studying	0.030 (0.172)	0.027 (0.163)	0.060 (0.238)	0.000
Study only Favourite Subjects	0.109 (0.312)	0.109 (0.311)	0.111 (0.315)	0.851
Effort into Studying: Just Sufficient	0.173 (0.378)	0.170 (0.376)	0.202 (0.402)	0.069
Effort into Studying: Higher than Sufficient	0.360 (0.480)	0.358 (0.479)	0.376 (0.485)	0.412
Effort into Studying: Very High	0.328 (0.470)	0.336 (0.472)	0.251 (0.434)	0.000
Boy	0.505 (0.500)	0.504 (0.500)	0.512 (0.500)	0.703
Age: 6-10	0.407 (0.491)	0.413 (0.492)	0.349 (0.477)	0.005
Age: 11-14	0.342 (0.474)	0.340 (0.474)	0.363 (0.481)	0.295
Age: 15-17	0.251 (0.434)	0.247 (0.431)	0.288 (0.453)	0.042
Parental Education	2.622 (0.633)	2.616 (0.625)	2.679 (0.701)	0.030
Mother Employed	0.541 (0.498)	0.522 (0.500)	0.729 (0.445)	0.000
Father Employed	0.812 (0.390)	0.897 (0.304)	0.000 (0.000)	0.000
Single Child	0.182 (0.386)	0.160 (0.367)	0.392 (0.489)	0.000
Home Ownership	0.721 (0.449)	0.733 (0.443)	0.605 (0.489)	0.000
Teenage Parent	0.073 (0.260)	0.070 (0.254)	0.104 (0.305)	0.007
Econ. Conditions: Very Good	0.011 (0.103)	0.012 (0.108)	0.000 (0.000)	0.013
Econ. Conditions: Adequate	0.488 (0.500)	0.502 (0.500)	0.348 (0.477)	0.000
Econ. Conditions: Scarce	0.407 (0.491)	0.398 (0.489)	0.499 (0.500)	0.000
Econ. Conditions: Insufficient	0.095 (0.293)	0.088 (0.284)	0.153 (0.360)	0.000
North West	0.185 (0.388)	0.181 (0.385)	0.223 (0.416)	0.02
North East	0.211 (0.408)	0.215 (0.411)	0.175 (0.380)	0.032
Center	0.162 (0.368)	0.159 (0.366)	0.186 (0.390)	0.115
South	0.331 (0.471)	0.334 (0.472)	0.303 (0.460)	0.16
Islands	0.111 (0.314)	0.111 (0.314)	0.113 (0.317)	0.878
Metropolitan Area	0.181 (0.385)	0.179 (0.383)	0.202 (0.402)	0.196
Pop 0-2000	0.078 (0.268)	0.080 (0.272)	0.056 (0.229)	0.045
Pop 2001-10000	0.301 (0.459)	0.302 (0.459)	0.294 (0.456)	0.691
Pop 10001-50000	0.277 (0.447)	0.277 (0.448)	0.274 (0.447)	0.9
Pop 50000+	0.163 (0.369)	0.162 (0.368)	0.175 (0.380)	0.451
Obs	5,520	4,999	521	



Table A3. Effect of Single Parent Family on Difference in Children's Outcomes across Gender.

Dep. Variable	Time Studying or Reading (1)	High Study Effort (2)
Single Mother	1.273 (7.549)	0.055 (0.039)
Boy	4.887 (15.080)	-0.059 (0.083)
BoyxSingle Mother	-17.210* (10.361)	-0.119** (0.059)
Age: 11-14	33.920*** (3.720)	-0.053*** (0.018)
Age: 15-17	32.436*** (4.293)	-0.140*** (0.022)
BoyxAge: 11-14	-12.639** (4.942)	-0.064** (0.027)
BoyxAge: 15-17	-12.570** (5.892)	-0.122*** (0.031)
Parental Edu	9.564*** (2.937)	0.074*** (0.014)
BoyxParental Edu	2.211 (3.981)	0.044** (0.021)
Single Child	-2.974 (4.256)	-0.013 (0.021)
BoyxSingle	4.992 (5.729)	0.003 (0.032)
Home Ownership	-5.752 (3.921)	0.034* (0.019)
BoyxHome Ownership	3.216 (5.205)	-0.040 (0.028)
Teenage Parent	-18.082*** (5.583)	-0.049 (0.037)
BoyxTeenage Parent	21.759*** (8.403)	-0.055 (0.051)
North East	-8.665* (5.042)	-0.025 (0.025)
BoyxNorth East	5.630 (6.845)	0.065* (0.038)
Center	-8.595 (5.317)	-0.049* (0.027)
BoyxCenter	5.233 (7.228)	0.090** (0.040)
South	-1.550 (4.892)	-0.033 (0.024)
BoyxIsland	-4.184 (6.582)	0.052 (0.036)
Islands	-2.513 (6.397)	0.005 (0.031)
BoyxIsland	-3.375 (8.313)	-0.015 (0.045)

Pop 0-2000	-0.816	0.060*
	(6.446)	(0.035)
BoyxPop:0-2000	-10.334	-0.071
	(8.322)	(0.052)
Pop 2001-10000	-4.428	0.040
	(5.226)	(0.025)
BoyxPop:2001-10000	-4.445	-0.059
	(6.955)	(0.037)
Pop 10001-50000	0.622	0.062**
	(4.951)	(0.025)
BoyxPop:10001-50000	-3.380	-0.094**
	(6.851)	(0.037)
Pop 50000+	-2.597	0.070**
	(5.630)	(0.028)
BoyxPop:50000+	-0.867	-0.050
	(7.733)	(0.042)
Econ. Conditions: Scarce	8.376	0.089***
	(6.028)	(0.033)
BoyxEcon. Conditions: Scarce	-11.800	-0.109**
	(8.379)	(0.047)
Econ. Conditions: Adequate	0.502	0.114***
	(6.184)	(0.034)
BoyxEcon. Conditions: Adequate	-9.007	-0.097**
	(8.558)	(0.048)
Econ. Conditions: Very Good	8.953	0.059
	(14.979)	(0.080)
BoyxEcon. Conditions: Very Good	-17.573	-0.060
	(22.624)	(0.117)
Mother employed	-1.626	0.036**
	(3.739)	(0.018)
BoyxMother Employed	-3.620	-0.012
	(5.000)	(0.027)
Father Employed	4.690	0.048
	(6.407)	(0.030)
BoyxFather Employed	-6.875	0.008
	(8.763)	(0.045)
Constant	43.391***	0.424***
	(11.147)	(0.055)
Obs	4,700	5,520
Rsquared	0.052	0.107

Source: Column (1), Time Use Survey. Column (2), Aspects of Daily Life Survey. Robust standard errors in parenthesis: \*p<0.10, \*\*p<0.05, \*\*\*p<0.01.