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EDUCATIONAL ATTAINMENT IN BLENDED FAMILIES

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ABSTRACT

In this paper we compare the educational attainment of birth and non-birth children of women in the Panel Study of Income Dynamics (PSID). We find that children raised by step, adoptive or foster mothers obtain significantly less education on average than do the birth children of the same women. Controlling for the women's fixed effects, the non-birth children of a woman receive on average one year less schooling than do her birth children, with the educational break occurring at the time children finish high school and begin college.

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1. Introduction

A large body of research finds that children who grow up with only one birth parent are disadvantaged across a large range of outcomes, as compared with children who grow up with both birth parents. They are less likely to complete high school and college, less likely to find stable employment in young adulthood, more likely to divorce, more likely to have children outside marriage, and more likely to have poor mental health in adulthood (McLanahan and Sandefur 1994, Amato and Keith 1991, Cherlin et al. 1998, Biblarz and Raftery 1999). Results are similar for boys and girls, for children whose parents separate in early childhood as well as adolescence and, somewhat surprisingly, for children who live with a birth parent and a step parent.

To account for the association between family structure and low achievement, researchers have proposed several mechanisms, including the lack of economic resources (McLanahan 1985), lack of social capital (Coleman 1988, Nock 1988), and inadequate parenting due to high levels of stress and instability (Hetherington, Cox, and Cox 1978, Wu and Martinson 1993). Several analysts have argued that the negative effects associated with parent-absence are due to factors that predate family dissolution, such as parental conflict (Cherlin et al. 1991). While each of these arguments has some empirical support, there is no consensus about which factors are most important or whether the effects are causal.

Nearly all of the previous research on family structure has focused on father absence, in part because single-mother families have been more common than single-father families, and in part because of concern over the matriarchal family raised in the *Moynihan Report* (1965). More recently, however, sociologists and economists have begun to examine the effects of mother

absence on children and to compare these effects with those of father absence. Using data from four national surveys, Biblarz and Raftery (1999) show that mother-absence is much more detrimental than father-absence to children's educational and occupational attainment. They find that once parents' socioeconomic status is taken into account, children raised by single mothers are much better off than children raised by single fathers or fathers and stepmothers, and are just as likely to succeed as children raised by both birth parents. Biblarz and Raftery conclude that the pattern of effects across family types and over time is consistent with an evolutionary perspective which emphasizes the importance of the birth mother in the provision of children' resources (Trivers 1972). According to this view, children raised by their birth mothers do better than children raised apart from their birth mothers. Furthermore, being raised by a single birth mother is better than being raised by a birth mother and step father since step fathers compete with children for mother's time and lower maternal investment.[1]

Recent work on the determinants of children's human capital investments suggests that the absence of a child's birth mother puts the child at risk. Those investments that are typically made by a child's mother—in food, health, and education, for example—are made at a lower level when the child is raised by a non-birth mother. Case, Lin and McLanahan (1999, 2000) find, holding constant household income, size and age composition, as well as parents' educations and socio-economic status, that significantly less money is spent on food at home when the household contains a child that is a step, adoptive or foster child of the mother figure in the household. Using data from the Panel Study of Income Dynamics (PSID) over an 18 year period, they find that on

[1]See, for example, Beller and Chung (1992) on the effect of step fathers on the probability of finishing high school and attending college.

average, if a birth child of the mother were replaced by a step child, the household would spend 5 percent less on food eaten at home. The food expenditure questions in the PSID are asked at the level of the household, and it is not possible using these data to say whether the lower spending on food translates into lower food consumption for the non-birth child, or lower food consumption for all household members.

To focus directly on investments made in individual children, Case and Paxson (2000) uses data from the 1988 National Health Interview Survey Child Health Supplement (NHIS-CH) to examine the health investments made in step, foster and adopted children relative to birth children. They find, controlling for household size, income and other characteristics, that children living with step mothers are significantly less likely than children living with birth mothers to have routine doctor and dentist visits, or to have a place for usual medical care, or for sick care. If children living with step mothers have *regular contact* with their birth mothers, however, their health care does not suffer relative to that reported for children who reside with their birth mothers.

These studies are useful in that they are focused on investments made in children, rather than on children's outcomes. However, because the NHIS follows only one child in a household and the PSID food question is asked at the household level, it is not possible to identify whether the findings in these studies are attributable to a lower level of parenting skills among women who become step mothers, or to the difficulty parents and children face in negotiating rights and obligations in blended families or, as Biblarz and Raftery conclude, to a biological imperative in which a woman invests more in her own birth children than in her step children.

In this paper we add to what is known about the relative investments made in step

children, by comparing the educational attainment of birth and non-birth children of women observed raising both in the PSID. By comparing the outcomes of children of the *same* mother, we are able to go beyond previous research, which has identified the effect of step mothers by comparing the children of different mothers. Controlling for mother fixed effects, we find that children raised by step, adopted or foster mothers obtain on average significantly less education than do the birth children of those same women. The non-birth children of a woman receive on average one year less schooling than do her birth children, with the educational break generally occurring at the time children finish high school and begin college. Consistent with a model based on biological imperatives, we cannot reject that the lower educational attainment of a woman's non-birth children is identical for step, adopted and foster children.

Our analysis allows us to rule out some of the explanations for why children raised by step parents fare less well than children raised by birth parents. If step mothers were on average less able mothers, or if step children obtained less schooling because it is more difficult to set norms and negotiate family life in blended families, then we would expect to see the birth children of a woman with step children also obtaining less education. However, this is not what we observe. The birth children of a woman raising step (or adopted or foster) children receive on average the same years of education as the birth children of women raising only birth children.

Economic models of the determinants of educational attainment often assume that a decisionmaker, often the child's parent, weighs the relative merits of investing in each child's education, and invests so as to optimally trade off the efficiency of the investment of (possibly fixed) resources with the equity of the allocation between his or her children. (See Bergstrom 1997 and Behrman 1997.) Generally these models assume that parents are neutral in their regard

for each child. While this assumption may be plausible when all children in the household are birth children of the parent figures, it seems less realistic when some children are birth children and others are step children. Our findings are consistent with an economic model of educational investment in the absence of child neutrality.

Investments in offspring has long been a focus of study among evolutionary biologists and psychologists. Trivers' (1972) theory of sexual selection is built upon the observed differential investments made by mothers and fathers, where parental investments are defined as "anything done by the parent for the offspring that increases the offspring's chance of surviving while decreasing the parent's ability to invest in other offspring." (Trivers 1974, p.249.) Trivers hypothesizes that because a male's contribution is of sperm only, while a female pays a much higher price in first carrying and then feeding the baby, that men must compete for women, because the latter are the scarce resource in reproduction.[2] The key to this thesis is the differential level of investments made by mothers and fathers, a point we return to when analyzing our results below.

We begin with a discussion of the PSID data, and our coding of child-parent relationships. We then present results on educational attainment by type of mother, and follow with a more detailed analysis of educational attainment by mother-father type.

2. Data and variable construction

The PSID 1968-1985 Relationship file contains information on all pair-wise relationships for all individuals who were ever part of, or derived from, the same original 1968 households. We

[2]For an excellent discussion, see Blaffer Hrdy 1999, Chapter 2.

identify all individuals who were ever a birth, adoptive, step, or foster child during the years from 1968 to 1985.[3] We exclude children who had reached age 20 by 1968, because we want to observe these respondents' relationships to their parents when they were children. Our results are robust to choosing an age 18 cut-off in place of an age 20 cut-off.

Parental assignments are based on a hierarchy of attachment between parent and child. We identify children as having been raised by their birth mothers if they are observed living with their birth mother and never living with a different type of mother. In this way, our "birth parent" indicators signify that the child was raised solely by a birth parent. For children who lived apart from a birth parent, we assume that the level of attachment between parent and child is strongest for adopted children, less strong for step children, and less still for foster children. If a child reports having lived with a foster mother, but not with a step or adoptive mother, we code this child as having been raised by that foster mother. If a child reports ever having lived with a step mother, but not with an adoptive mother, we assign the step mother as the mother who raised the child. If a child reports having lived with an adoptive mother, we code the child as having been raised by that adoptive mother. Fathers are assigned in an analogous fashion. Appendix Table 1 presents the precise assignment rules we follow.

This assignment is ad hoc, and one could argue for alternative assignment rules. As a check on the robustness of our results, we also made assignments based on the length of time in the 1968-85 period that we observed the child living with any given woman, and assigned as the child's "mother" the woman we observed the child living with for the longest period of time. Our results are robust to this alternative assignment. The assignments of mothers and fathers change

[3]The appendix contains a more detailed description of variable construction.

very little using this alternative rule.

Our outcome variable, years of completed education, is the educational attainment observed for individuals between the 1968 and 1997 survey. To be included in the analysis, the child must be at least 23 years old in 1997, to limit the risk that the child hasn't yet completed his or her education. Our results are robust to choosing an age 25 cut-off.

Table 1 presents the data we use in our analysis. The children we follow were born between 1948 and 1974 and have on average completed 12.7 years of schooling. Eighty percent of them have completed at least 12 years of schooling; 30 percent have completed at least 14 years; and 14 percent have completed at least 16 years of schooling. Half of the sample is male, and half come from the SEO sample of the PSID, which contains an over-sample of low-income households. Roughly 80 percent of children are assigned their birth mother as their "mother figure" and 60 percent are assigned their birth fathers as their "father figure." Two percent of children are assigned to step mothers, and six percent to step fathers. Between one and two percent of parents are adoptive.

We also included children whose relationship to a parent is "unclear" (i.e., could be a biological, adoptive, step or foster relationship). Most "unclear" relationships are coded as such because the individuals were living in a household that was not interviewed in 1985. The 1985 interview collected complete marital, fertility and adoption histories of all men and women in the PSID, which makes it possible to determine the exact relationship (birth, step, adoptive, foster) between each child and parent. If the household was not interviewed in 1985, we have to rely on information collected from the yearly surveys to link children with parents, and this information is not as complete as the marital, adoption and fertility histories. Before 1983, the PSID did not

distinguish among biological, adoptive, and step relationships in the yearly survey; between 1983 and 1985, the PSID separated the step relationship from biological and adoptive relationships but did not distinguish between the latter two categories. In what follows, we include the "unclear" parents for completeness. However, we will not try to interpret the coefficient on parental status "unclear," as it is some combination of parents of different types. Results presented below are robust to the removal of all children with "unclear" mother status.

3. Educational Attainment

We compare the educational attainment of children raised by different types of mothers in Table 2. Each row presents means of educational attainment for households with more than one child, in which the mother figure raised birth children and step children (row 1); birth children and adopted children (row 2); birth children and foster children (row 3); or birth children only (row 4). The educational attainment of birth children, in each type of household, is presented in the first column. There is on average no difference in the educational attainment of children raised by their birth mothers, regardless of whether these woman also raised step children (12.70 years of education for birth children), adopted children (12.78), foster children (12.76), or only birth children (12.81). However, there are significant differences between the educational attainment of birth children and step children in households where women raised both. On average, step children obtained 0.75 years less schooling than birth children (column 3). In households with adopted and birth children, the adopted children obtained on average 0.62 years less schooling and, in households with foster and birth children, the foster children obtained 1.33 years less schooling on average than the birth children. In all three cases, the difference between the birth

and non-birth children's educational attainment is significant. We can't reject that the step, adopted and foster children all fall behind by one year of schooling on average.

Table 2 presents *prima facie* evidence that the birth children of a woman who also raises non-birth children face no risk of lower educational attainment. If a step mother were a less able mother, or if her family were more chaotic, we would expect the birth children in these families to suffer along with the step children. In all of the family structures presented in Table 2, the significant differences are between birth and non-birth children, as opposed to birth children in different types of families.

Table 3 presents regressions results of determinants of children's education, controlling for mother fixed effects. (There are on average 2.5 children per mother.) We regress years of completed education on indicators that the child is raised by an adoptive, step, or foster mother or by a woman whose status is "unclear," with the omitted category taken as birth mother. The regressions also control for mother's and father's educational attainment, the year of the child's birth, an indicator that the household is part of the PSID SEO sample, and an indicator that the child is male. Mother's educational attainment and the household's SEO status are absorbed by the mother fixed effects in column one. The coefficient on father's education is small and insignificant when we control for mother's fixed effects, suggesting that there may be little difference in the educational attainment of the fathers of children raised by the same woman, and/or that this variable is noisily measured.

Table 3 makes clear that, relative to a woman's birth children, her step, adopted and foster children receive significantly less education than birth children. Consistent with the comparison of means in Table 2, the fixed effect estimates show that non-birth children receive roughly one year

less education than birth children. An F-test (row 5) cannot reject that the coefficients on step, foster and adopted children are equal.

The coefficients on mother-type in column one are identified off of the difference in the educational attainment of a step child (e.g.), relative to the birth child, for mothers who are raising both types of children. If a mother has *only* step children, her step children do not contribute information to the step child indicator coefficient; information on their educations will be absorbed in the mother's fixed effect. The observations that contribute to the coefficients on step, adopted and foster children are from woman who raise more than one type of child.

Fixed effect estimation has the largest effect on the coefficient for adopted children, among the family structure variables, tripling the coefficient relative to the OLS estimates presented in column 2 (−0.998 in place of −.351). In the OLS regression, all adopted children contribute to the coefficient while, in the fixed effect estimation, the coefficient on adopted children is identified off of the difference in adopted children's educations in families where there is at least one child who is adopted and one who is not. Adopted children observed in the PSID on average received 12.81 years of completed schooling, which is not significantly different from that received by birth children. However, this mean masks an important difference between households with and without birth children: when a woman raises adopted children but no birth children of her own, on average her adopted children obtain 13.29 years of schooling. On the other hand, if a woman is raising birth children and adopted children, on average the adopted children receive 12.16 years of schooling (as reported in Table 2).

This difference—between the unconditional mean of educational attainment of adopted children and the mean conditional on the presence of a woman's birth children—helps us to

reconcile our results with those on adopted children in Case and Paxson (2000). Case and Paxson can follow only one child per household in the NHIS-CH. They can only observe and report the unconditional mean of health investments for adopted children, which is generally insignificantly different from that for birth children. It is not possible to know whether the conditional means of health investments would show the pattern we find here for educational investments.

We explore the point at which non-birth children fall behind in their educations in Table 4, where we examine whether children complete at least 12 years (column one), 14 years (column two), and 16 years of schooling (column three). All three regressions control for mothers fixed effects. That a child is raised by an adoptive, step, or foster mother has no significant effect on the probability of finishing high school. The coefficients on all three indicators are negative, but insignificant. In contrast, family structure plays a significant role in determining whether children go on to college. The mother-indicators are significant predictors of the probability that a child receives at least 14 years of schooling, reducing that probability by twenty to thirty percent. The results are very similar when we estimate the probability of obtaining 14 or 16 years of schooling conditional on completing 12 years of schooling.

Taken together, the results in Table 4 suggest that living with a birth mother is protective of college attendance. This may be for several reasons. Completion of high school may not be a very strong indicator of a child's skills or knowledge in the United States, where most children are graduated if they stay in school. College attendance is apt to be a better measure of academic strength. Children raised with birth mothers may be better students, having received more scholastic help from their mothers during primary and secondary schooling. A complementary explanation for non-birth children being less likely to attend college is that college education can

be expensive, while generally high school education is not. Our results are consistent with a model in which women are more willing to invest in their birth children's college educations.[4] It is possible that college scholarship rules discriminate against step families, by counting the incomes of absent parents in determining student need. However, if this were the most important determinant of step children's educational attainment, we would expect to see the effects for children living with step fathers to be as large as those for children living with step mothers, which is not the case (see discussion below). This explanation also does not explain why we find significant effects for adopted children, who would not have an absent parent's income that could be added to a formula when determining student need.

3.1 Distinctions among non-birth fathers

In the regressions presented in Tables 3 and 4, the omitted category was that of birth child of the mother. Such a child may have a birth, step, adoptive, foster or "unclear" relationship with the father figure in the household. In Tables 5 and 6, we allow the relationship between mother and child to depend upon the type of father figure present. Biblarz and Raftery discuss reasons why the presence of a step father may affect the investments a woman makes in her children, noting in particular that a stepfather's "concern with his own reproductive fitness is in competition with the stepchildren for the mother's resources, increasing the risk of abuse to children in families with a step-parent." (p. 326)

In Table 5, we allow for differences in the investments made by different mother-father

[4]Alternatively, all non-birth children may be scarred by events earlier in their lives, and that scarring may lead children to obtain less schooling. The merits of this alternative hypothesis are discussed in Section 4.

pairs, by controlling for all possible parental types, taking as the omitted category children raised by a birth mother and birth father.[5] As in Tables 3 and 4, when we control for mothers fixed effects, observations contribute to the different parental types only if the mother who raised this child had at least one other child of a different mother-father type.

The results in Tables 5 are consistent with those presented earlier; a child raised by a step, adoptive or foster mother is at risk for lower educational attainment. This is true, regardless of the child's relationship with his or her father. Consistent with Biblarz and Raftery and Wojtkiewicz (2000), we also find that children raised by a birth mother and step father are also at risk for lower educational attainment. As is true for children raised by non-birth mothers, being raised by a step father has a significant effect on the probability that a child attends college (column two, Table 6). The negative effect on educational attainment of being raised by a birth mother and step father is roughly half the size of that for step mother and birth father, and is significant for years of completed education.[6]

4. Discussion

Past studies have focused primarily on father absence, which is the more common parental

[5]The following rare cases were omitted from the analysis: children with a step mother and step father (5 cases); step mother and adoptive father (1 case); adoptive mother and birth father (2); adoptive mother and step father (1); adoptive mother and foster father (1); foster mother and birth father (6); foster mother and step father (2); foster mother and unclear father (9); unclear mother and foster father (5); unclear mother and adoptive father (6).

[6]These results are consistent with Wojtkiewicz (2000) who, using the National Educational Longitudinal Survey (NELS), documents that the negative effect on college attendance of being raised by a birth father and step mother is twice as large as the effect of being raised by a birth mother and step father.

absence. Generally these studies have categorized "step parent" households to be those with either a step mother or a step father, and have not sought to distinguish between step mother households and step father households. In addition, previous research has not provided an adequate explanation for why remarriage doesn't appear to improve children's outcomes.

This paper, along with the other papers by Case et al., shows that mother absence is much more important than father absence, both in terms of investments made in children and in terms of child outcomes. In previous work, we have shown that parental investments are lower in step mother families than in birth mother families, which has identified a potential mechanism for explaining the differences in child well being. Since these past studies follow only one child in a family, or are measured at the level of the household, they do not tell us whether the lower investment is generalized to all children or whether it is a specific to non-birth children. In this paper, we provide evidence that non-birth children have poorer outcomes than their siblings who are raised by both birth parents. This suggests that investments are child-specific. In what follows, we explore several explanations for these results.

4.1 An explanation based on evolutionary psychology

The results presented here are consistent with those of evolutionary psychologists Daly and Wilson (1985, 1987), who have carefully documented the greater risk faced by step children for child abuse and child homicide. This risk is not due to economic insecurity or family size, both of which are predictors of abuse, but which do not vary between step and birth parent households. Daly and Wilson (1985) collected data on roughly 1300 households in Hamilton, Ontario, obtaining information on the living arrangements of the population at large. They then compared

these living arrangements with those of abused children, using information obtained from the two children's aid societies of Hamilton-Wentworth. They found step parent households significantly over-represented in the abuse sample, relative to the population at large. Consistent with the results presented above on outcomes within families, Daly and Wilson found that step parents were selective in their abuse, abusing their step children but not their birth children. In the sample of abused children in Hamilton, there were ten households that contained both step children and children of the "present marriage." In nine of those ten households, only the step child was abused.

Daly and Wilson (1998) explains their findings in terms of *discriminative parental solicitude.* They note:

> Because parental love carries with it an onerous commitment, it would be strange if merely pairing up with someone who already had a dependent child were sufficient to fully engage the evolved psychology of parental feeling. And it is not sufficient. Step-parents do not, on average, feel the same child-specific love and commitment as genetic parents, and therefore do not reap the same emotional rewards from unreciprocated 'parental' investment...Successful discrimination of one's own offspring from unrelated young is not the only allocation problem facing parental investors, but it can be a crucial one. Indiscriminative allocation of parental benefits without regard to cues of actual parentage would be an evolutionary anomaly (pp.38-39).

This may help to explain the difference in educational attainment between adopted children raised with a woman's birth children and those raised with only other adopted children. The 'child-specific love and commitment' toward adopted children may be greater on the part of parents who have had no birth children of their own.

4.2 An alternative hypothesis: have non-birth children been scarred?

By showing that outcomes are child specific, the present research allows us to rule out two major competing hypotheses for the lower attainment of children in step mother families: namely that step mothers are less able parents (which implies that all their children do poorly) or that the environment in blended families is less conducive to effective parenting. The empirical evidence presented in this paper is not consistent with either of these arguments since the birth children in blended families appear to do as well as the birth children raised by two birth parents.

The major competing hypothesis that we cannot rule out with this research is that children who live apart from their birth mothers are scarred in some way through early experiences, and these scars account for the fact that they do less well in school than children who are raised by their birth mothers. Although we cannot rule out the scarring hypothesis, several pieces of empirical evidence are inconsistent with its predictions. First, children who are adopted into families with only other adopted children would have to be less scarred than children adopted into families where there are birth children of the mother present also, since adopted children in families without birth children obtain more education than birth children raised alone, while adopted children in families with birth children obtain less education. Second, the scarring caused by divorce, in the case of step children, or parent absence or death, in the case of adoption or foster parenting, would have to be equally large: the coefficients on the probability of achieving 14 years of schooling are of very similar size for step, adopted and foster children, and we cannot reject that they are equal to one another (Table 4, F-statistic=1.79, with a p-value=0.17).

To be consistent with the empirical results presented here, there would also have to be some reason why the scarring were deeper for children who were raised by non-birth mothers, relative to those raised by non-birth fathers. Results in Tables 5 and 6 show that children raised by

adoptive fathers and foster fathers are at no risk for lower educational attainment, if they are being raised by their birth mothers.

Finally, the fact that parental investments in food are lower in households with a non-birth child and that step-children obtain lower levels of health investments suggests that the current environment of non-birth children may be less nurturing and less conducive to healthy child development than the current environments of birth children. We cannot rule out scarring as an explanation for our findings, but the scarring would have to be of a very particular sort.

4.3 The Role of Mothers

Children raised by adoptive fathers or foster fathers are not at risk for lower educational attainment, provided that they are raised by their birth mothers, while children raised by adoptive, step or foster mothers are at risk—even when their birth fathers are present. That mothers play a more important role than fathers in the rearing of children is consistent with the fact that a woman must make a larger commitment in bearing a child. A woman is more limited in the number of children she can parent, both because of she must carry each child and because women have a shorter reproductive span, which may affect the relative intensity with which she raises the children that she does bear.

Corroborating evidence on the relative importance of mothers and fathers in the rearing of children comes from several sources. Judge (1995) analyzes a sample of wills probated in Sacramento County California between 1890 and 1984 and finds that men left significantly larger fractions of their estates to their wives than wives did to their husbands. The text of the husbands wills “included such phrases as ‘knowing her [wife] to be trustworthy and that she will provide for

my boys...their education and a start in life.' "(p. 306) Women, on the other hand, preferred to have resources handed directly over to their children upon their own demise, which Judge argues may well be because widowers were significantly more likely to remarry than were widows, and to father additional children, who would compete with the woman's own children for resources later in life.

Blaffer Hrdy (1999) presents evidence on the differences in the physiological responses of men and women to the sound of a hungry baby crying. That women respond more immediately to the sound of a hungry baby, she writes, "does *not* mean that fathers are not able to do so...or that baby primates cannot form primary attachments to a male. Rather, a seemingly insignificant difference in thresholds for responding to infant cues gradually, insidiously, step by step, without invoking a single other cause, produces a marked division of labor by sex" (p.213).

Whether it is due to some combination of the limitations women face in the number of offspring they can successfully bear, or to differences in the physiological responses of women and men to young children's needs, it appears that investments in children are more likely to be made by women, and that birth mothers protect investments in birth children above those in non-birth children.

Finally, the relative importance of the mother's role in raising children has long been recognized in the major psychological theories of child development, including Bowlby's "attachment theory" which focuses on the importance of the mother-child dyad in the internal development of the child and Bronfenbrenner's ecological theory which focuses on the mother-as-primary-caregiver and the systems of support in which she and the child are embedded. Fathers are virtually absent from these theories, except insofar as they support mothers (financially and

emotionally). And until recently, fathers have been absent from most of the empirical studies. Although researchers are now beginning to ask what fathers do to promote child development, the shift in orientation is very new, and the empirical evidence that “fathers matter” is mixed at best.

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Appendix

Description of Data Used in the Analysis

The analysis is based on a data set supplemental to the PSID, the 1968-1985 Relationship File. This file contains information on dyadic relationships (including biological, adoptive, step, and foster relationships) of all individuals who were ever part of or derived from the same original 1968 household. In total, the file comprises 426,608 pairs of the relationships over the 18 years. We use the following steps to identify the analytic sample.

First, we identify all individuals who were ever biological, adopted, step, or foster children in the PSID families and their parents. The 1968-1985 Relationship File consists of two sources of information. One is information on the marriage and childbirth that was retrospectively collected in 1985 (HIS). The second source of information is taken from the yearly survey, from 1968 to 1985 (RTH). The HIS file allows us to identify the relationships among all household members. In the RTH file, only household member's relationship to the head of the household is identified. We took information on the parent-child pairs from the HIS file. If the information is missing in the HIS file, we used the information from the RTH file. We also included children whose relationship to their parents is unclear (i.e., could be biological, adoptive, or step relationships). Most of relationships are unclear because these individuals were living in a nonresponding household in the 1985 survey and we have to rely on information collected in the yearly surveys. Before 1983, the PSID did not distinguish among biological, adoptive, and step relationships in the yearly survey; between 1983 and 1985, the PSID separated the step relationship from biological and adoptive relationships but still combined the latter two categories. In the end, we identified 19,057 "children" of all ages in the PSID.

Second, there are a handful of children who had more than one parent with the same type of status (i.e., step, foster, birth, adoptive) in the same year or various years. We assigned these children to only one parent with any given status based on whom the child lived with for the longest time between 1968 and 1985. In addition, some children had more than one woman with the status of "unclear" mother figure, or multiple "unclear" father figures. We assigned these children to a unique "unclear" parent using the same rule described above (i.e., based on the parent figure that the child lived with for the longest time). If there is a tie, we assigned these children to the parent with unclear status whom children lived with during their teenage years. At the end of this step, all children have at most one parent of each status (i.e., biological, adoptive, step, foster, or unclear) but children may have more than one type of mother or father. For example, a child may have lived with a biological mother from 1968 to 1980 and with a stepmother from 1981 to 1985. Then this child has two mothers, one biological and one step.

In order to estimate models that control for mother's effects, we have to assign children to a unique mother whom they lived with during the period 1968 and 1985. We use the following rule to make the assignment: (1) Children are defined as living with their birth mother when they lived with a birth mother and with no other type of mother before age 20. (2) Children are defined as

living with their adoptive mother when they ever lived with an adoptive mother before age 20, regardless of whether these children ever lived with other parents with different status. (3) Children are defined as living with their stepmother when they never lived with an adoptive mother but ever lived with a stepmother before age 20. (4) Children are defined as living with their foster mother when they never lived with an adoptive mother or a stepmother but ever lived with a foster mother before age 20. (5) Finally, children are defined as living with a parent with unclear status if they were only observed living with a parent whose status was unclear, or if they lived with a biological parent for some period of time and with a parent with unclear status for some period of time. Appendix Table 1 shows the assignment rule followed.

We dropped three children for whom we do not have age information. We also dropped the following children from the analysis: 1,123 children who reached age 20 before 1968; 4966 children who had not reached age 23 by 1997; 3216 children who were age-eligible, but who left the PSID before their final educational attainment was recorded; 1979 children for whom a father figure is not identified; 76 children for whom a mother figure is not identified; 7 children whose educational attainment is coded as "missing;" and 1 child whose father figure's education is missing. In sum, we keep 7,686 children in the analysis.

Appendix Table 1. Assignment of a Mother Figure

Living Arrangement (1968 to 1985)	Mother Assigned
B (birth mother) only	B
A (adoptive mother) only	A
S (step mother) only	S
F (foster mother) only	F
U (mother with "unclear" status) only	U
BA	A
BS	S
BF	F
BU	U
AS	A
AF	A
AU	A
SF	S
SU	S
FU	F
BAS	A
BAF	A
BAU	A
BSF	S
BSU	S
BFU	F
ASF	A
ASU	A
AFU	A
SFU	S
BASF	A
BASU	A
BAFU	A
BSFU	S
ASFU	A
BASFU	A

In column one, the "BA" refers to a child who lived with both his or her birth mother and an adoptive mother at some point in the period 1968 to 1985. In column 2, the assignment of "A" means that this child was assigned his or her adoptive mother as mother figure for the analysis.

Table 1. PSID Sample Characteristics

Outcome variables	variable means
Educational attainment	12.73
Indicator: at least 12 years of schooling	.819
Indicator: at least 14 years of schooling	.301
Indicator: at least 16 years of schooling	.141
Control variables	
Respondent is male	.510
Year born	1962
Indicator: SEO sample	.504
Indicator: birth mother	.832
Indicator: adoptive mother	.013
Indicator: step mother	.020
Indicator: foster mother	.007
Indicator: mother status "unclear"	.128
Mother's education	11.54
Indicator: birth father	.581
Indicator: adoptive father	.019
Indicator: step father	.063
Indicator: foster father	.014
Indicator father status unclear	.324
Father's education	11.15

Notes to Table 1.
Number of observations = 7686. The sample is restricted to individuals greater than or equal to age 23 in 1997, whose relationships with a mother figure and father figure was recorded up to a maximum age of 20 during the period 1968 to 1985 (the period during which the PSID reported relationships between all dyads in the household). To be included in the analysis, a child must have a mother figure and a father figure.

Table 2. A comparison of educational outcomes by household type

Households containing:	Mean education of the **birth** children in households of this type (Std error of mean)	Mean education of the **step** (adopted, foster) children in households of this type (Std error of mean)	Difference between the **birth** and **step** (adopted, foster) childrens' educ [Col 1 – Col 2] (Standard error)
Step and birth children of the mother	12.70 (0.16)	11.95 (0.14)	0.75 (0.21)
Adopted and birth children of the mother	12.78 (0.23)	12.16 (0.27)	0.62 (0.35)
Foster and birth children of the mother	12.76 (0.18)	11.43 (0.24)	1.33 (0.30)
Only Birth children of the mother present	12.81 (0.02)		

Notes to Table 2:
Each row presents means of educational attainment for households with more than one child, in which the mother figure raised birth children and step children (row 1); birth children and adopted children (row 2); birth children and foster children (row 3); or birth children only (row 4).
Children's maximum educational attainment is that observed between 1968 and 1997. The sample is restricted to individuals greater than or equal to age 23 in 1997, whose relationships with his or her mother figure was recorded up to a maximum age of 20 during the period 1968 to 1985 (the period during which the PSID reported relationships between all dyads in the household).

Table 3. Educational attainment and relationship to mother with and without mothers' fixed effects

Explanatory variables:	Dependent variable: Years of Completed Education	
Mother fixed effects included?	YES	NO
Indicator: adopted child of mother	−.998 (.300)	−.351 (.187)
Indicator: step child of mother	−.598 (.210)	−1.09 (.150)
Indicator: foster child of mother	−1.27 (.320)	−.933 (.243)
Indicator: mother's status is "unclear"	−.690 (.148)	−.745 (.063)
F-test: adopted = step = foster mother (p-value)	1.68 (.1871)	5.00 (.0068)
Mother's educational attainment	--	.147 (.009)
Father's educational attainment	−.003 (.041)	.129 (.007)
Year born	−.014 (.005)	−.053 (.003)
Indicator: Household SEO status = 1	--	−.239 (.045)
Indicator: Individual is male = 1	−.292 (.044)	−.239 (.042)
Number of obs	7686	7686

Notes to Table 3:
Standard errors in parentheses. The omitted category is birth children of the mother figure. These children may have birth, step, adoptive, foster, or 'unclear' father figures. Sample restricted to persons who were at least 23 years old in 1997, whose relationships with parent figures were measured between 1968 and 1985 (the period during which the PSID reported relationships between every dyad in the household). Average number of children per mother figure = 2.5.

Table 4. Determinants of high school graduation and college achievement with controls for mothers fixed effects

	Dependent variable:		
Explanatory variables:	=1 if Respondent has at least 12 years of schooling	=1 if R. has at least 14 years of schooling	=1 if R. has at least 16 years of schooling
Mother fixed effects included?	YES	YES	YES
Indicator: adopted child of mother	−.082 (.064)	−.275 (.074)	−.128 (.056)
Indicator: step child of mother	−.030 (.045)	−.158 (.052)	−.050 (.039)
Indicator: foster child of mother	−.113 (.069)	−.322 (.079)	−.106 (.060)
Indicator: mother's status is unclear	−.153 (.032)	−.120 (.037)	−.044 (.028)
F-test: adopted = step = foster mother (p-value)	0.58 (.5575)	1.79 (.1665)	0.74 (.4756)
Father's educational attainment	.016 (.009)	.002 (.010)	−.008 (.008)
Year born	−.002 (.001)	−.003 (.001)	−.003 (.001)
Indicator: Individual is male = 1	−.043 (.009)	−.057 (.011)	−.024 (.008)

Notes to Table 4:
Standard errors in parentheses. Number of observations = 7686. The omitted category is birth children of the mother figure. These children may have birth, step, adoptive, foster, or 'unclear' father figures. Sample restricted to persons who were at least 23 years old in 1997, whose relationships with parent figures were measured between 1968 and 1985 (the period during which the PSID reported relationships between every dyad in the household). Average number of children per mother figure = 2.5.

Table 5. Educational attainment and parental relationships, with mothers' fixed effects and indicators for relationships with parents

Explanatory variables:	Dependent variable: Years of Completed Education	
Mother fixed effects included?	YES	NO
Indicator: birth mother, adoptive father	.666 (.415)	−.539 (.237)
Indicator: birth mother, step father	−.503 (.187)	−.674 (.091)
Indicator: birth mother, foster father	.069 (.523)	−.797 (.239)
Indicator: birth mother, father status = "unclear"	−.334 (.191)	−.463 (.052)
Indicator: step mother, birth father	−.785 (.272)	−1.21 (.163)
Indicator: step mother, father status = "unclear"	−1.39 (.496)	−1.68 (.405)
Indicator: adoptive mother, adoptive father	−.931 (.349)	−.464 (.207)
Indicator: adoptive mother, father status = "unclear"	−1.66 (.658)	−.803 (.452)
Indicator: foster mother, foster father	−1.93 (.377)	−1.39 (.287)
Indicator: mother status= "unclear," birth father	−.702 (.309)	−.318 (.102)
Indicator: mother status= "unclear," step father	−2.09 (.581)	−1.78 (.291)
Indicator: mother status= "unclear," father status= "unclear"	−1.03 (.236)	−1.26 (.081)
Mother's educational attainment	--	.153 (.009)
Father's educational attainment	−.012 (.043)	.116 (.007)
Number of obs	7648	7648

Notes to Table 5:

Standard errors in parentheses. The omitted category is birth child of both the mother figure and father figure in the household. Sample restricted to persons who were at least 23 years old in 1997, whose relationships with parent figures were measured between 1968 and 1985 (the period during which the PSID reported relationships between every dyad in the household), who report have a father figure and a mother figure. In column 1, an F-test that all step mother, adopted mother and foster mother coefficients are identical = 1.96 (p-value=.0983). Also included in the regressions are the respondent's birth year, an indicator that the respondent belongs to the SEO sample of the PSID, and an indicator that the respondent is male. Average number of children per mother figure = 2.5. The following rare cases were omitted from the analysis: children with a step mother and step father (5 cases); step mother and adoptive father (1 case); adoptive mother and birth father (2); adoptive mother and step father (1); adoptive mother and foster father (1); foster mother and birth father (6); foster mother and step father (2); foster mother and unclear father (9); unclear mother and foster father (5); unclear mother and adoptive father (6).

Table 6. High school graduation and college achievement

Explanatory variables:	Dependent variable: =1 if Respondent has at least 12 years of schooling	=1 if R. has at least 14 years of schooling	=1 if R. has at least 16 years of schooling
Mother fixed effects included?	YES	YES	YES
Indicator: birth mother, adoptive father	.087 (.089)	.026 (.102)	.104 (.078)
Indicator: birth mother, step father	−.078 (.040)	−.103 (.046)	−.058 (.035)
Indicator: birth mother, foster father	.095 (.112)	.110 (.129)	−.084 (.098)
Indicator: birth mother, father status = "unclear"	−.062 (.041)	−.009 (.047)	−.039 (.036)
Indicator: step mother, birth father	−.061 (.058)	−.189 (.067)	−.078 (.051)
Indicator: step mother, father status = "unclear"	−.220 (.106)	−.211 (.123)	−.102 (.093)
Indicator: adoptive mother, adoptive father	−.146 (.075)	−.228 (.086)	−.102 (.065)
Indicator: adoptive mother, father status = "unclear"	.075 (.141)	−.411 (.163)	−.296 (.123)
Indicator: foster mother, foster father	−.227 (.081)	−.440 (.093)	−.202 (.071)
Indicator: mother status= "unclear," birth father	−.108 (.066)	−.134 (.076)	−.079 (.058)
Indicator: mother status= "unclear," step father	−.435 (.125)	−.260 (.144)	−.183 (.109)
Indicator: mother status= "unclear," father status= "unclear"	−.228 (.051)	−.132 (.058)	−.077 (.044)
F-test: coefficients for all step = adopted = foster mothers (p-value)	1.50 (.2005)	1.57 (.1805)	1.09 (.3584)

Notes to Table 6: Standard errors in parentheses. Number of observations = 7648. Omitted category is birth child of both the mother figure and father figure in the household. See notes to Table 5 for sample restrictions. Also included in the regressions are the respondent's birth year, father's education, and an indicator that the respondent is male.