

# Invest in Women

How A Mother's Education Affect Her Children's Future

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# Background Overview

## 0.0.1 Understanding the associations between a mother’s education and her children’s social and economic mobility

According to Time Magazine, women are the majority of the U.S. laborforce with the healthcare and retail industries being the leaders in female employment. Experts argue that the high numbers of female employees in these industries is tied to the demand “from economically-empowered female consumers” who benefit from these same industries. This does not mean that women across all age-groups are involved in the work-force at high rates. In fact, at ages 25-54 (which is considered prime working age) the civilian workforce participation rate was 76.8% for women while that of men was 89.2% as of Dec. 2019. Women also tend to hold low-paying or part-time positions like assistant, home health aides, maids, etc. Despite these trends, women have had very high education mobility compared to men. Notably, this seemingly radical mobility is largely due to the rapid increase in coed colleges and the establishment of universal education in the U.S. Regardless of how it happened, the Bureau of Labor Statistics affirms that the educational attainment of women of prime working age saw a dramatic increase from 1970 to 2016:

“In 2016, 42 percent of these women held a Bachelor’s degree and higher, compared with 11 percent in 1970. In 2016, 6 percent of women had less than a high school diploma—that is, did not graduate from high school or earn a GED—down from 34 percent in 1970.”

These amazing statistics highlight an interesting question about the effect of a mother’s education on her child’s educational and financial outcomes. If women are such a relevant part of the workforce, how do they affect their children’s mobility? How is their education level relevant to that of their children? How does a woman’s social class affect her son’s or daughter’s outcomes differently? Because women in the U.S. are no longer (purely) defined by a husband’s social or class status, it may be interesting to explore how their level of education and social class affect their children’s outcomes. Beller (2009) in the article “Bringing Intergenerational Social Mobility Research into the Twenty-first Century: Why Mothers Matter,” challenges the standard of inequality and social mobility research, wherein mothers’ background or economic participation is neither common nor important. Beller argues that “models that incorporate both mothers’ and fathers’ characteristics into class origin measures” provide a better fit than conventional models for both men and women.

## Research Question

Inspired by Beller (2009), I would like to take a look at the ways in which educational attainment and/or social class of mothers affect(s) their children's outcomes. I hope to construct a few models to explore these main questions:

- (a) Overall, to what extent does mother's education matter for a child's socioeconomic status? How does it compare to father's education?
- (b) Overall, to what extent does mother's education matter for a child's education outcome? How does it compare to father's education?
- (c) For whom does mother's education matter most? Sons? Daughters? Children raised in single-mother households? Or only daughters raised in single-mother households?

To explore these questions I build models that explore the association between a mother's education and her children's outcome and introducing explanatory variable controls such as father's education, college completion, parental family income, parental family income quantile, child's sex, etc. I observe how the mother's education affect her child's educational and financial outcome as a whole and also when controlling for some of these other factors. I put special emphasis in the relationship mothers have to daughters outcomes versus that of sons in different family structures, and theorize the reasons behind any patterns I may find. Ultimately, this project explores the ways in which women influence social mobility for future generations.

## Data & Methods

This project uses the National Longitudinal Survey (1979 cohort) to explore the role of mothers in the social and economic mobility of their children. From the large original dataset I took a sample that allowed me to better explore the questions of interest. The dataset was sliced so the sample would only include children who were ages 14 to 18 in 1979. This was done in part due to the nature of the data, which did not include year-by-year detail on children younger than 14 and because we wanted to explore a mother’s effect while the child was still a minor. Education was measured in years of education completed. For the mother’s and father’s education variable, we use the highest number of years completed by 1979. For the child’s education, a new variable is constructed that calculates the number of years of school completed by the time the child is 25 years old. A new variable was created to account for whether or not the father’s educational information was missing. This binary variable is introduced in the last few models exploring the mediated effect of the mother’s education. The income variable is transformed using a log to account for the right skew the raw numbers cause. For the graphic, however, an exponent is applied to facilitate the visual understanding of the relationship. The variable for child’s sex is also recoded so that 1 refers to female in the binary.

I construct several OLS regression models to estimate the association between explanatory variables and expected outcomes, in this case, the education or income of the child. The research focuses on ‘mother’s education’ as the key explanatory variable. In most cases, a woman’s educational attainment, unlike occupation or earnings, is “temporally” prior to her marriage (or motherhood) and thus not directly affected by her husband/partner’s socioeconomic status. This means that we are able to treat other indicators of a child’s SES (e.g., parental occupation/income) as potential mediators that transmit the effect of mother’s education. So, when we control for these other indicators of parental SES such as family income, the regression coefficient of mother’s education could be interpreted as a direct effect net of of these other pathways (Zhou, 2020).

Similarly, the educational attainment, occupation, cognitive ability of the child could also be seen as mediators, i.e., intervening variables between mother’s education and child income. In our dataset, we account for child’s highest grade completed by age 25, which affects child’s income and is affected by mother’s education. I also include sex and the child’s family income in 1979 as control explanatory variable since previous research indicates a strong relationship between these variables and a child’s economic and educational outcome. Finally, I also evaluate father’s education as a potential mediator pathway. Father’s education is associated with mother’s education via assortative mating and, as intergenerational mobility research indicates, is also likely to affect child outcomes.

# Analysis

## 0.0.2 Mother's Overall Effect

Table 1: Mother's Education Impact on her Children

	<i>Dependent variable:</i>	
	Log Family Income in 2016	Child's Education by Age 25
	(1)	(2)
Mother's Edu	0.108*** (0.007)	0.374*** (0.013)
Constant	9.841*** (0.083)	8.847*** (0.154)
Observations	3,522	3,396
R <sup>2</sup>	0.064	0.199
Adjusted R <sup>2</sup>	0.064	0.199
Residual Std. Error	622.107 (df = 3520)	1,137.007 (df = 3394)
F Statistic	240.532*** (df = 1; 3520)	844.799*** (df = 1; 3394)

*Note:*

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

As Table 1 shows, the overall effect of mother's education on her child's outcome is strong and statistically significant. Mother's education shapes her children's own education prospects. Perhaps it all starts at a young age when educated mothers get to teach their children some of the skills that make them successful in primary and secondary education. As these children enter educational institution, they have some inherent advantages: 1) the benefit of an early education through exposure to mother's vocabulary and critical thinking, and 2) continuous support from their mother in their educational journey. As a result, children of educated mothers can expect on average better educational outcomes and better financial outcomes. There is a strong correlation that a quality education leads to higher economic output. This relationship is also fairly large and significant between mother's education and child's income.

For the sake of comparison, we explore the numerical relationship between fathers' education and children's output as well. The relationship is quite similar to that of the mothers further proving the idea that both should be studied further to better understand questions of mobility.

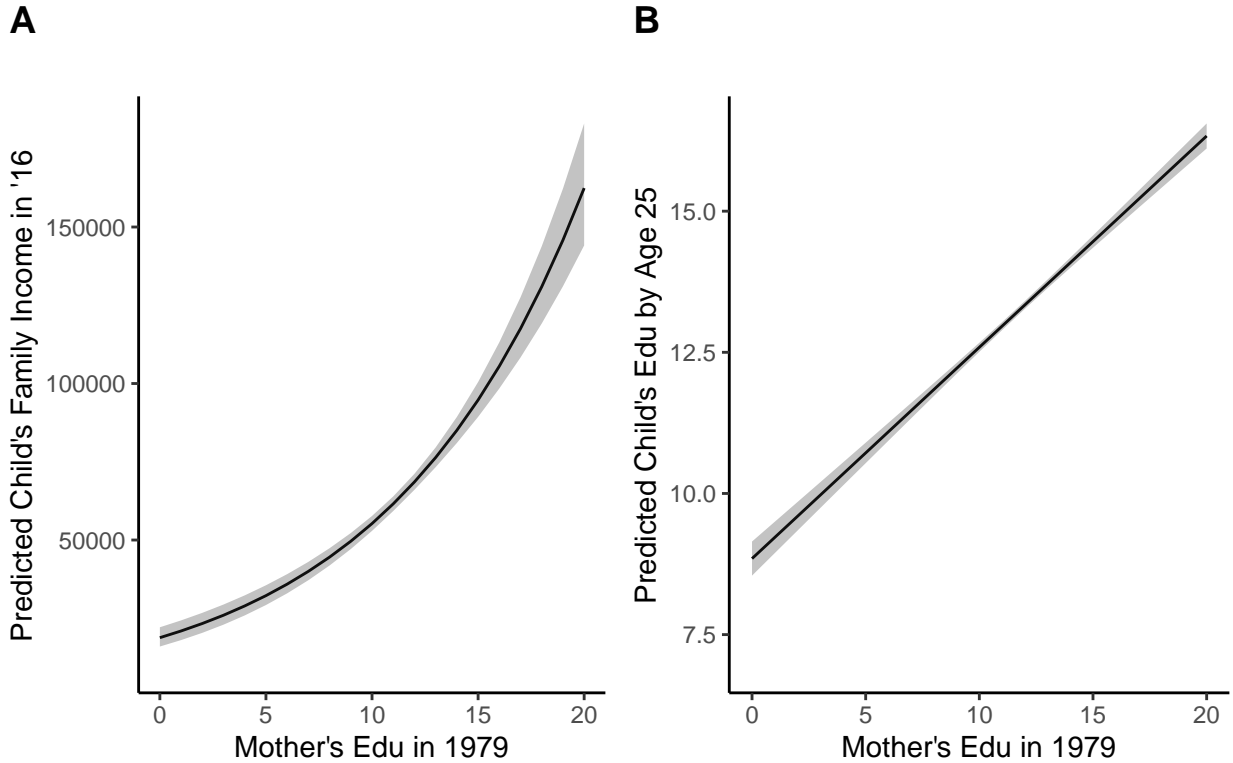
Table 2: Father's Education Impact on his Children

	<i>Dependent variable:</i>	
	Log Family Income in 2016	Child's Education by Age 25
	(1)	(2)
Father's Edu	0.083*** (0.005)	0.258*** (0.009)
Constant	10.148*** (0.061)	10.218*** (0.113)
Observations	3,264	3,149
R <sup>2</sup>	0.081	0.204
Adjusted R <sup>2</sup>	0.080	0.204
Residual Std. Error	618.091 (df = 3262)	1,134.524 (df = 3147)
F Statistic	285.841*** (df = 1; 3262)	805.636*** (df = 1; 3147)

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

**Figure 1: Overall Effect of Mother's Education on Child's Outcomes**



### 0.0.3 Mother's Education & Child's Income Mediators

Certainly, a mother's education has an effect on her child's economic and educational outcomes, but our previous model does not portray a direct relationship or effect. To better understand the direct effect of mother's education, we have to examine potential mediators and include them in our model. The first OLS model in Table 3 explores the relationship between a mother's education and child's income in 2016 controlling for family income in 1979, child's sex, and highest grade completed by age 25. The second model also includes the mediator of father's education. Notably, in order to use the father's education variable, I created a new binary variable which accounts for whether (1) or not (0) the data for the father is missing. In addition, I substitute all the missing values in the father's education variable with the average years of education ( $\sim 10.7$ ). This allows me to isolate the direct mother's effect while accounting for other mediators that are also related to the child's outcome.

Table 3: Mother's Education and her Children's Family Income in 2016: Mediated Effect

	<i>Dependent variable:</i>			
	Log Family Income in 2016		Highest Grade by Age 25	
	(1)	(2)	(3)	(4)
Mother's Edu	0.004 (0.008)	-0.006 (0.009)	0.274*** (0.015)	0.188*** (0.016)
Fam. Income 1979	0.00001*** (0.00000)	0.00001*** (0.00000)	0.00004*** (0.00000)	0.00003*** (0.00000)
Sex: Female	-0.190*** (0.037)	-0.185*** (0.037)	0.012 (0.074)	0.046 (0.072)
Child's Highest Edu by Age 25	0.206*** (0.010)	0.201*** (0.010)		
Father's Edu		0.015** (0.006)		0.126*** (0.012)
Father Edu Missing		-0.194** (0.077)		-0.414*** (0.149)
Constant	8.364*** (0.133)	8.401*** (0.133)	9.104*** (0.199)	8.784*** (0.200)
Observations	2,820	2,820	2,820	2,820
R <sup>2</sup>	0.245	0.248	0.236	0.267
Adjusted R <sup>2</sup>	0.243	0.246	0.235	0.265

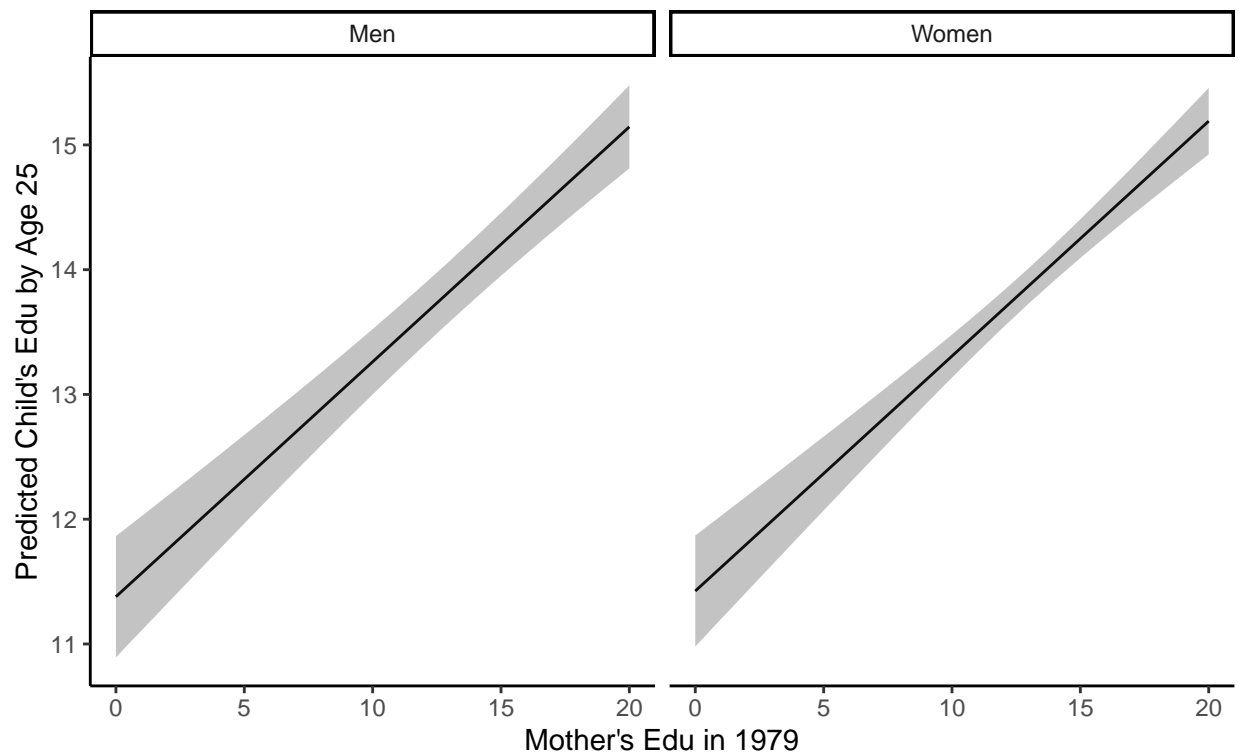
Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Interestingly, adding the controls nearly nullifies the mother's effect on her child's financial outcome, which becomes largely statistically insignificant. The most obvious relationship is now of that between the child's education by age 25 and his or her financial outcome, which is not only strongly positive, but also statistically significant with a p value of less than 0.01. When adding the father's education variable, we still see some significant effect, but it is very small in magnitude. Now, if the father's education is missing, then we see a substantial negative effect on the child's outcome, which is statistically significant with a p value of less than 0.05.

Despite the lack of statistical significance in the effect of mother's education on financial outcome, models 3 and 4 show a very large and statistically significant association between mother's education and child's education outcome. This effect is not only large in magnitude, but also has a p value of less than 0.01. In model 4, when father's education is added as a control, the magnitude of the mother's effect decreases, but it is still quite large and equally statistically significant. Notably, in model 4 like in model 2, a father's absence leads to a large negative impact on the child's outcome.

**Figure 2: Direct Effect of Mother's Education on Child's Educational Outcome Mediated by Sex, Family Income, and Father's Education**





#### 0.0.4 Heterogeneity: For Whom Does Mother's Education Matter Most?

Now that we have established that a mother's education strongest and most significant effect is related to her children's educational outcome, we explore how this effect vary by gender and type of household. Does a mother's education affect more her daughter's or her son's educational outcome? Does it affect them more if she is a single mother?

Table 4: Mother's Education Heterogeneous Effect on her Children's Educational Outcome: Mediated Pathways

	<i>Dependent variable:</i>			
	Child's Highest Edu by Age 25			
	(1)	(2)	(3)	(4)
Mother's Edu	0.264*** (0.044)	0.155*** (0.044)	0.268*** (0.017)	0.183*** (0.019)
Father's Edu		0.127*** (0.012)		0.126*** (0.012)
Father Edu Missing		-0.365** (0.159)		-0.352** (0.161)
Fam. Income 1979	0.00004*** (0.00000)	0.00004*** (0.00000)	0.00004*** (0.00000)	0.00004*** (0.00000)
Sex: Female	-0.092 (0.326)	-0.218 (0.320)	-0.006 (0.074)	0.029 (0.073)
Single Mom Household	0.223** (0.096)	0.267*** (0.095)	-0.023 (0.356)	0.109 (0.354)
Interaction: Mother's Edu-Female	0.007 (0.027)	0.021 (0.027)		
Interaction: Mother's Edu-Single Mom Household			0.022 (0.030)	0.014 (0.030)
Constant	9.164*** (0.520)	9.067*** (0.511)	9.107*** (0.224)	8.740*** (0.223)
Observations	2,783	2,783	2,783	2,783
R <sup>2</sup>	0.239	0.269	0.240	0.269
Adjusted R <sup>2</sup>	0.238	0.267	0.238	0.267

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Table 4 shows that a single mother's education effect on her children is indeed larger and more significant than that of a mother in a two-parent household. This is specially exemplified by model 2, where lacking

paternal education information significantly diminished the outcome of the child with a p value of less than 0.05 and having a single mom household improved the outcome of the child with a p value of less than 0.01. This set of models also show that the effect of mother's education on daughters is positive, but diminished, compared to that of sons, when gender is interacted with mother's education. It also indicates that further research may be necessary to better grasp the relationship between a mother's education and her children's outcome in the context of a single-parent home. However, it appears that mothers' education becomes remarkably more important when a father is absent. Despite the difficulties associated with having only a small subset of the dataset qualify as single-mom households, these results suggest future opportunity for research in the area.

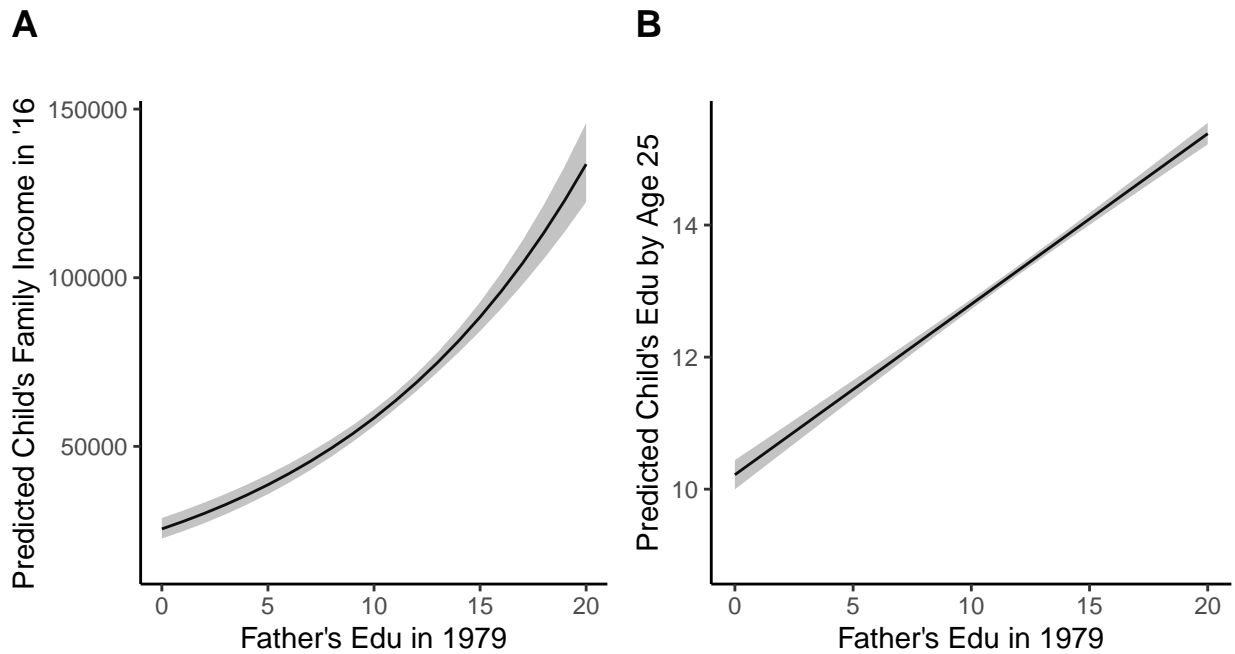
## Conclusions

We now know that mother's education plays an equally important role as the father in the social and economic mobility of their child. The numbers are even more compelling for a child's education, but given the large association between a person's education and their financial outcome, it is certainly fair to say that women do indeed play a large role in their children's financial mobility as well. This trend seems to be amplified in single-mother households, but further research may be necessary to uncover the intricacies between these overlapping relationships.

Women play an important role in their children's potential for economic and educational mobility. Perhaps most notable is their effect on their children's education outcome. Moms seem to have a special role in cultivating their children's intellectual curiosity and development to the point where their own educational success is reflected in that of their children. Researchers of child development may find these findings and those of parallel studies intriguing as they develop creative tools to maximize the ways in which mothers and fathers (regardless of their educational background) can positively impact their kids' outcomes.

## Appendix

**Figure 3: Overall Effect of Father's Education on Child's Outcomes**



This model contains missing data from single-mother households where no father info is available.

Figure 3 visualizes the relationship between the two outcomes of interest and father's education. It can be compared to Figure 1, which shows the mother's effect.

## References

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