Family, Gender, and Educational Outcomes in Elementary and Middle School

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Abstract

It is now well established that girls typically outperform boys in school and have higher levels of educational attainment. Recent research suggests that the gender gap in educational attainment is related to family resources, in that the attainment gap appears to be smaller in families with more highly educated parents. Using data from the National Longitudinal Surveys of 1979 and 1997 along with data from the ECLS-K, we provide evidence that the gender gap in educational performance at various points in the educational career is smaller in families with more highly educated parents, and that the gender gap in behavior problems – which has been linked to educational attainment in previous research – may also be smaller in these families. The presence of a biological father in the household may also be linked to the size of the gender gap in behavior problems in elementary and middle school.

Family, Gender, and Educational Outcomes in Elementary and Middle School

One of the most consistent findings in the study of educational attainment is that family background plays a central role in determining how much education a person receives. Early theories regarding parental investment in education argued that boys were advantaged within families. Family economy perspectives viewed educational attainment as a rational product of family decision-making; when faced with labor markets and family systems that privilege males, a family's first priority should be the education of sons (Becker, 1991; Becker and Tomes, 1979; Papanek, 1985; Rosenzweig and Schultz, 1982). In contrast, feminist theories attributed the historical tendency for American parents to favor sons over daughters in labor market–relevant investments to a patriarchal culture(Epstein, 1970; Hess and Ferree, 1987; Walby, 1986).

These theories clearly require revision in light of the now well-known advantage that girls have over boys in both educational performance and attainment (for a review see Buchmann et al., 2008). This advantage is, of course, true "on average." However, there is substantial heterogeneity in the performance and attainment of both girls and boys, and it is now conventional wisdom that greater resources within the family environment, the neighborhood, and the school foster higher levels of educational achievement for both genders.

Recent research finds that gender inequalities are not uniform across family backgrounds. Buchmann and DiPrete (2006) recently found that the relationship between family background and college completion has changed for men and women over the second half of the 20th century. Parents with a high school education or less appeared to favor sons over daughters in cohorts born in the middle of the 20th century, but this male advantage declined and then reversed in households with less-educated parents or those with an absent father. Entwisle et al. (2007) found that the gender gap in reading at the start of elementary school is larger for children from disadvantaged backgrounds relative to middle-class children. These patterns, as argued by Buchmann and DiPrete (2006), reflect a growing vulnerability of sons of less-educated or absent fathers.

Given the dramatic changes in the gender gap in education and the evidence that boys from disadvantaged backgrounds may be at particular risk of lower educational outcomes, in this paper we consider whether the gender achievement gap itself varies by the socioeconomic standing and demographic characteristics of the family. Using data from the Children of the National Longitudinal Study of Youth (NLSY) 1979, the NLSY 1997, and the Early Childhood Longitudinal Study - Kindergarten Cohort (ECLS-K), we find evidence that – depending on the outcome measure – males either reduce their disadvantage or gain an advantage relative to females when raised in families with more highly educated fathers and/or when the father is present in the household. The pattern of coefficients varies somewhat across the models and datasets considered in this

paper, but the general conclusion is that the male deficit in educational achievement tends to be smaller in families with greater socioeconomic resources, and perhaps also when the father is more involved in the raising of the children.

Prior Research

Gender gaps in educational outcomes vary across cognitive and non-cognitive measures. Gender differences in test scores have remained relatively stable over the past 30 years (Hedges and Nowell, 1995). Various national assessments indicate that boys score higher on math tests while girls score higher on reading tests (Nowell and Hedges 1998; Gallagher and Kaufman 2005). Yet this varies over the life course. In early grades, girls and boys generally perform similarly in math and reading, and a growing male advantage in math and a growing female advantage in reading emerge as they move through school (Maccoby and Jacklin, 1974;Willingham and Cole, 1997). Girls have a consistent advantage over boys in terms of school-based measures of achievement and behaviors. Girls have long earned higher grades than boys (Alexander and Eckland 1974; Mickelson 1989), have fewer emotional and behavioral problems, are less likely to be diagnosed with learning disabilities and have better social skills and classroom behaviors than boys (see Buchmann et al., 2008 for a review). In sum, while boys have an advantage on standardized math tests, girls are advantaged on reading tests as well as in grades and behaviors in schools.

Gender gaps in behavior and academic achievement may arise from processes linked to family socioeconomic background, especially parent's education. Using data from the Baltimore Beginning School Study (BSS), Alexander et al. (2003) determined that the gender gap in retention rates was larger for poor children (i.e. those eligible for free or reduced price lunch) than for non-poor children. Other scholars have also found a social class component to the gender gap in reading (Bianchi 1984; Burbridge 1991; Mickelson 2003). Entwisle et al. (2007) report a significant gender gap in conduct marks and in reading scores and reading score growth from first to fifth grade for poor children, though all these gaps are negligible for non-poor children.

The gender-role socialization perspective argues that gender-specific role modeling is important for educational outcomes, as girls look to their mothers and boys look to their fathers as they develop their educational and occupational aspirations and plans (Downey and Powell, 1993; Powell and Downey, 1997; Rosen and Aneshensel, 1978). The process of educational attainment is much the same for men and women (Kalmijn, 1994), and research shows that the effects of mother's education and occupation are as important for sons as for daughters (Korupp et al., 2002) Despite this, some research suggests that parents are more closely involved in the education of their daughters than their sons (Carter and Wojtkiewicz, 2000) and treat sons

and daughters differently.

A number of scholars have argued that family socialization processes play a potentially important role in creating the now well-recognized gender gap in academic performance. Entwisle et al. (2007)argue that families typically give young boys more independence than young girls, which creates gender differences in the amount of time that young children spend playing in the neighborhood. They argue that the time spent in playing in the neighborhood with other boys in complex and spatially demanding games could be a source of the male mathematics advantage. Lopez's(2003) ethnographic study of low-income, second generation Dominican, West Indian and Haitians similarly found evidence that parents give more independence to boys and exert more social control on girls. Interaction with other children outside the nuclear family may strengthen alternative norms for male behavior that are more likely to be at odds with adult standards for behavior and therefore are treated as undesirable by both parents and teachers.

Socialization perspectives emphasize the importance of same-sex role models for children as well as how parents enforce gender-typed behaviors in their children. Given that men's disadvantage in college completion is larger in homes with low-educated fathers and absent fathers (Buchmann and DiPrete, 2006), it is important to consider how family structure affects the gender gap in educational outcomes earlier in the life course. If boys are more vulnerable to having an absent father or to experiencing family transitions (i.e. parent's cohabitation or remarriage), the rising proportion of homes headed by single-parents and the rising proportion of blended families could contribute to the male educational disadvantage.

Family structure is important for all children's outcomes. Children who grow up in single-parent families and children with step-parents have lower educational attainment than those who grow up with both biological parents (McLanahan and Sandefur, 1994) Furthermore, children living with either two biological parents or a single mother have higher educational attainment than children living with a step-parent or with a single father (Biblarz and Raftery, 1999; Boggess, 1998; Wojtkiewicz, 1993). Living apart from one's biological father is associated with worse educational and life outcomes for children, including lower academic achievement and greater behavioral problems, regardless of race, education or if a mother remarries (McLanahan and Sandefur, 1994; Carlson and Corcoran, 2001; Cherlin, 1999; Amato, 1994).

The "family-structure" version of the gender-role socialization perspective argues that because of fathers' importance as a role model for sons, boys suffer more greatly than girls when a father is absent (Powell and Parcel, 1997). Father's are thought to be role models for sons, and fathers may spend more time with sons because of greater internal rewards for fathers and higher external pressures (Harris and Morgan, 1991). Harris and Morgan (1991) find that daughters receive less attention from fathers than do sons, but daughters with brothers are advantaged relative to other girls and sons are advantaged by being the only boy in a sibship. Father's presence in the home and involvement decreases negative outcomes for boys more

than girls, from reducing behavioral problems to increasing college completion (Carlson, 2006; Buchmann and DiPrete, 2006).

While we know that father's education and presence in the household should be important for educational outcomes, especially for boys, part of the difficulty is that father's effects involve two conceptually distinct ideas. One concerns the different ways that fathers behave toward their daughters and sons, and the extent to which this heterogeneity in behavior is ordered by father's education. A second concerns the differential response of sons and daughters to fathers, and the extent to which this response is affected by father's education. Another complication comes from the temporally variable character of family structure in contemporary society. Many children experience one or more periods of their lives when their father is not living in the household, and in some of these periods there is no father-substitute in the family either. The absence of the father can have a direct (and possibly gender-specific) effect on children. In addition, father's absence from the household will often affect the form and extent of his interaction with his children. The connection between father's absence and father's involvement with his children can be sensitive to his own education, the characteristics of the mother, and the pattern of interaction he had with his children prior to the separation.

In the following sections, we explore the question of whether family structure and family socioeconomic characteristics differently affect the educational performance of boys and girls using data from three major longitudinal studies: the Children of the NLSY79, the NLSY97, and the ECLS-K. We use a variety of modeling strategies to assess the question of whether the gender gap in academic achievement and in problem behaviors varies with the education of the father and with his presence in the household for children in elementary school, middle school, and high school.

Data and Methods

The Children of the NLSY79 data contain detailed information about all children born to the female respondents of the NLSY 1979. The original NLSY sample included approximately 6,300 young women aged 14-21 years in 1979, and re-interviews were conducted annually through 1994 and biennially thereafter. Beginning in 1986, a supplement was added to assess all children of the female respondents. This supplement has been conducted biennially since 1986, with new children added in the first survey year after their birth. An additional self-administered questionnaire is included for adolescents aged 10-14 years. As of 2006, the children of the female respondents represent over 90 percent of all children even to be born to this cohort of women. We matched data on mothers and children for the years 1994 to 2006 for all children aged 7 to 14 years-olds.

The child surveys include assessments of cognitive ability, temperament, social skills, and behavior problems. In this paper, we examine both cognitive and behavioral outcomes. To measure children's cognitive ability, we use the math and reading subtests of the Peabody Individual Achievement Test (PIAT). PIAT measures a wide-range of academic achievement for children aged five or over, and is widely known and used in research. The reading test measures word recognition and pronunciation ability. The math test measures basic math skills and concepts. We used standardized scores, with means of 100 and standard deviations of 15.

To measure behavioral problems, we use the Behavior Problems Index (BPI), developed by Zill and Peterson (1986). The BPI, which is appropriate for children aged 4 or over, includes 28 measures of children's behavioral problems that a child may have exhibited in the past 3 months, as reported by the child's mother. A common response scale is used for each item (not true, sometimes true, often true). Scores are summed across items, with higher scores indicated a higher level of problems. We used the total BPI (standardized), which reflects both externalizing and internalizing behaviors.

The NLSY97 is an ongoing longitudinal study of young people who were born between the years of 1980 and 1984, which makes them between 22 and 27 years old in the most recently available interview (wave 10), which was fielded between October 2006 and July 2007. All members of the NLSY97 cohort were given the armed services vocational aptitude battery of tests (ASVAB) in the 1997 survey, when the respondents were aged 12 - 17 years old. The ASVAB is a military enlistment test battery which consists of 12 subtests that were administered using an adaptive testing procedure which matched the difficulty level of the individual items to the ability levels of the respondents. The NLSY97 staff then produced a summary age-specific percentile score from four key subtests, namely mathematical knowledge, arithmetic reasoning, word knowledge, and paragraph comprehension. Respondents in the NLSY97 were also asked to report on their grades in eighth grade, and their "overall" grades when they were in high school at the point when they either had finished or were no longer in high school.

The ECLS-K is a study of a nationally representative sample of 21,260 kindergartners that attended kindergarten in the 1998-1999 school year, of which 11,919 were followed through eighth grade.[1] The first data collection was at the start of kindergarten. Major followups took place at the end of kindergarten, the end of first grade, the end of third grade, the end of fifth grade, and the end of eighth grade. In each of these followups, information was obtained from the parents about the family situation and home behaviors of the children, and (in the later grades) from the children themselves. Our analyses make use of students' test scores in reading and math in eighth grade, along with earlier reports from parents about socioeconomic

[1] In keeping with NCES requirements when analyzing restricted data, all sample size numbers reported in this paper have been rounded to the nearest 10.

status, family structure, and academic-related behaviors of their children. The ECLS math and reading tests use item response theory (IRT) to place students on a common scale for mathematics and reading. NCES cautions against the estimation of absolute change in test scores because of the possibility that the metrics at different areas of the test score distribution are not comparable. We therefore measure reading and math achievement using within-panel standard deviation scores, where the standardization is done relative to the estimated population distribution.

Within-Family Variation in Academic Outcomes

NLSY-97 data support the hypothesis that families potentially can make a difference in the performance of boys in particular as well as their children in general. Because these data were collected from siblings, it is possible to estimate the extent to which the gender advantage on academic performance varies within families by comparing brothers and sisters. The NLSY-97 supports the argument that the female advantage varies by family. Figure 1 shows the estimated variation in the advantage of girls on the ASVAB tests in the NLSY-97. The figure shows that the average girl in the subsample of NLSY-97 families that contained both sample boys and sample girls (brothers and sisters) had a 2.3 point advantage on this test, which was calculated as a percentile score from 0-99. This gap was statistically significant, as it is in the overall NLSY-97 sample. However, the size of this gap varied more than would be expected by chance alone. Some families had larger gender gaps, while others had small gaps or even a male advantage.

Similarly, we compared the self-reported grades on the NLSY-97 in 8th grade. Figure 2 shows a statistically significant difference of about 0.6 points in GPA between girls and boys. As with test scores, however, the within-family variation in this difference was bigger than would be expected on the basis of chance alone. In some families the grade point average difference was larger than 0.6 while in other families it was smaller, with a small minority of families having estimated differences in favor of sons rather than daughters. These results support the idea that families can make a difference in the gender gap, and specifically, can make a difference in how well their sons perform relative to their daughters.

Family Characteristics and Academic/Behavioral Outcomes

We next analyzed the impact of family characteristics on academic and behavioral outcomes using the children of the NLSY79 and two different modeling strategies. First, we used OLS regression on the sample of male and female respondents across the age range 7-14. Then, we used fixed effects regression to compare Children of NLSY79 mothers at the point in time when they were in the same two year age range. Table 1

Figure 1: Comparing Sister-Brother Differences on the ASVAB

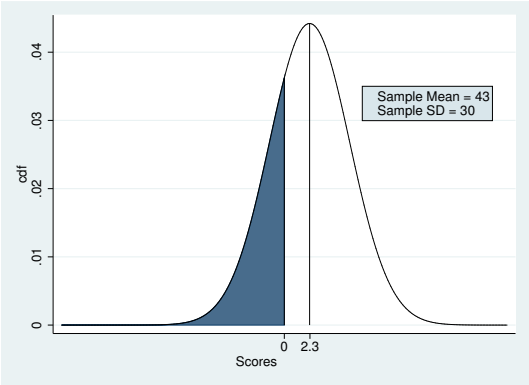
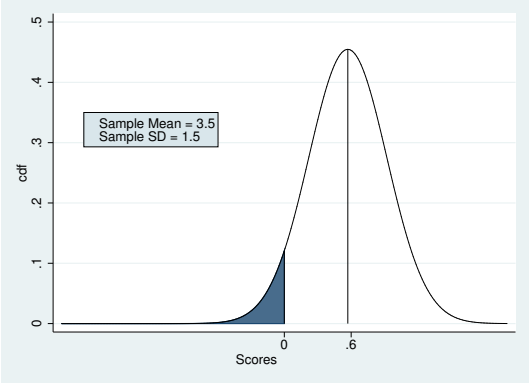


Figure 2: Sister-Brother Differences on Self-Reported GPA



shows the results from the OLS regression analyses, using robust standard errors clustered on the mother. Table 2 reports results from the fixed effects regression. The columns of these tables contain results for three outcome variables: math, reading, and behavior problems. The covariates in the OLS regression included average family income (logged, and adjusted to 2006 dollars), the age category of the child, gender, mother's education, whether the mother has a current spouse or partner, whether the partner is a spouse and (if not) whether the partner lives in the house, the education of the partner/spouse[2], and whether the child lives in the same household as the biological father. In addition, we included interactions between gender and whether the spouse/partner has a college degree or more, and between gender and whether the child lives in the same household with the spouse/partner.

The relevant coefficients in the two models are generally similar. They both show that mother's education and spouse/partner's education have a strong association with math scores, reading scores, and behavior. In both the OLS regressions and the fixed effects models, the main effect of being female is positive for reading

[2]Mothers report on the education of their current partner or spouse, not on the education of the fathers of each of her children. We used education of spouse/partner in the models rather than education of the dad both to reduce the number of missing values, and because the education of the current spouse or partner may directly affect the educational development of the children in the household.

Table 1: OLS Regression, Children of the NSLY79

	Math	Reading	Behavior Problems[a]
Average family income (logged)	1.635***	1.300***	-1.793***
	-5.83	-4.4	(-5.68)
Mom's age at childbirth	0.173***	-0.0554	-0.348***
	-4.82	(-1.68)	(-8.25)
Female	-0.0548	1.564**	-3.262***
	(-0.11)	-3.01	(-5.48)
Mom HS	2.643***	3.397***	-1.831**
	-5.46	-6.57	(-2.86)
Mom Some College	4.349***	5.076***	-1.847*
	-7.86	-9.16	(-2.55)
Mom BA+	7.693***	7.184***	-3.129***
	-10.69	-10.46	(-3.58)
Dad/partner missing on education	0.807	0.922	1.359
	-0.38	-0.46	-0.56
Dad/partner < HS	0.264	-0.195	3.117*
	-0.22	(-0.14)	-2.15
Dad/partner HS	1.375	1.065	1.222
	-1.27	-0.84	-0.92
Dad/partner Some College	2.894*	1.698	0.983
	-2.47	-1.29	-0.71
Dad/partner BA+	5.563***	4.565**	0.0292
	-4.34	-3.22	-0.02
Dad/partner BA+ * female	-1.451	-0.358	2.087*
	(-1.77)	(-0.48)	-2.33
Child lives with biological dad	0.386	1.087	-2.005**
	-0.59	-1.7	(-2.59)
Lives with dad * female	-0.974	-0.29	0.65
	(-1.37)	(-0.43)	-0.83
N	21999	21034	22601

Other control variables: whether current partner lives in home, whether current partner is spouse, race/ethnicity, and age of the child.

[a]Higher values represent greater behavior problems

(girls do better) and negative for behavior problems (girls have less of them). In the OLS regression, boys gain an advantage (t value = 1.8) on math scores when the partner/spouse has a BA or higher education, and boys make up much of the behavior deficit when the father figure is highly educated (t value = 2.1). Based on the point estimates, boys gained an additional advantage when the man in the house was their biological father, though the additional gain approaches significance only for the mathematics test score (t = 1.4). The general pattern of results was similar for the fixed effects regressions (see Table 2). In the fixed effects models, the male advantage gained from having a highly educated father figure was statistically significant at conventional levels for both math and reading tests, while the male advantage from having the biological father in the house was statistically significant on the behavior problems index.

Table 2: Fixed Effects Regression, Children of the NLSY79

	Math	Reading	Behavior Problems[a]
Average family income (logged)	0.595**	0.282	-0.502*
	-2.89	-1.36	(-2.35)
Mom's age at childbirth	0.100***	-0.213***	-0.396***
	-4.3	(-9.10)	(-16.32)
Female	-0.268	1.448***	-3.350***
	(-0.84)	-4.48	(-9.90)
Mom HS	-0.632	-1.324	-1.564
	(-0.77)	(-1.60)	(-1.84)
Mom Some College	0.214	-0.0577	-1.048
	-0.25	(-0.07)	(-1.17)
Mom BA+	-0.745	-0.739	-1.3
	(-0.60)	(-0.59)	(-1.01)
Dad/partner missing on education	2.004	1.297	-1.0
	-1.46	-0.92	(-0.71)
Dad/partner < HS	2.097*	0.45	0.204
	-2.17	-0.46	-0.2
Dad/partner HS	1.187	0.329	0.804
	-1.32	-0.37	-0.85
Dad/partner Some College	0.766	0.353	0.535
	-0.78	-0.36	-0.53
Dad/partner BA+	1.883	2.329*	0.0241
	-1.67	-2.05	-0.02
Dad/partner BA+ * female	-1.996***	-1.118*	0.568
	(-3.63)	(-2.04)	(1.0)
Child lives with biological dad	0.0337	-0.144	-0.689
	-0.07	(-0.31)	(-1.42)
Lives with dad * female	-0.581	0.311	0.945*
	(-1.32)	-0.7	-2.05
N	21999	21034	22601

Other control variables: whether current partner lives in home, whether current partner is spouse, race/ethnicity, and age of the child.

[a]Higher values represent greater behavior problems

Table 3: Armed Forces Vocational Aptitude Battery, NLSY97

		OLS		Random Effects	
		coef	t	coef	z
female		2.8	3.8	3.1	3.1
Biological Dad's Education	(missing=ref)				
	< HS	-4.7	3.9	-4.2	-1.9
	High School	3.2	2.9	5.4	2.7
	Some College	8.8	6.8	11.1	4.4
	BA +	16.7	10.7	22.5	7.8
Biological Mom's Education	(missing = ref)				
	< HS	-9.5	-5.8	-9.2	-3.2
	High School	1.2	0.7	-.91	-.3
	Some College	4.9	2.9	2.9	1.0
	BA +	13.7	7.8	8.1	2.5
Female * Dad has BA+		-2.7	-1.7	-6.1	-2.4
Hispanic		9.0	8.3	13.5	6.4
Non-black/Non-Hispanic		18.5	22.3	22.5	12.4
Constant		26.7			
N		7005		1705	

The NLSY97 and the ECLS-K provide additional evidence about the extent to which family resources reduce gender disparities in educational outcomes in middle and high school. We used the NLSY97 to compare the outcomes for males and females on middle school grades, high school grades, and scores on the armed services vocational aptitude battery (AFVAB), which was administered to sample members during the summer and fall of 1997 and the winter of 1998. Table 3 shows regressions of the AFVAB in the first wave of the NLSY97 on the biological father's education (with the baseline category being missing, including because the biological father is absent), the biological mother's education, measures of being black or being Hispanic, gender, and an interaction between gender and whether the biological father had a BA. The left set of columns report results from ordinary least squares regression on the NLSY97 sample, while the rightmost set of columns report the results of mixed effects models on the sample of respondents with siblings in the data, using a random effect for each set of siblings. A similar set of analyses were conducted using self-reported grades in eighth grade (Table 4) and high school (Table 5).

As can be seen, the effect of female on the AFVAB is positive and statistically significant. Not surprisingly, respondents with more highly educated parents performed better on the AFVAB. However, the interaction between female and father's education is statistically significant at the 0.10 level for the regression and at the .02 level for the sibling analysis. In both cases, the advantage of being female disappears when the father is highly educated.

Next, we analyzed the impact of father's education on grades in middle school. Girls have roughly twice the odds of boys of getting Bs or better in 8th grade, net of race and the education of the biological mother

Table 4: Self-Reported Eighth Grade Grades, NLSY97

		OLS				Random Effects	
		Model 1		Model 2			
		coef	t	coef	t	coef	z
female		-.75	12.8	.72	12.5	.60	9.4
Biological Dad's Education	(missing=ref)						
	< HS	-.28	-2.8	-.15	-.15	-.066	-.5
	High School	.18	2.0	.07	.8	.25	2.3
	Some College	.49	4.9	.24	2.5	.46	3.3
	BA +	1.1	8.8	.56	4.5	.93	5.7
Biological Mom's Education	(missing = ref)						
	< HS	-.49	3.7	-.17	-1.2	-.24	-1.6
	High School	-.18	-1.4	.14	-1.1	-.10	-.6
	Some College	-0.01	-.1	-.19	-1.4	.06	.4
	BA +	.39	2.9	-.13	-1	.32	1.7
Female * Dad has BA+		-.30	-2.6	-.20	-1.8	-.25	-1.5
Hispanic		.41	5.2	.02	.2	.34	3.1
Non-black/Non-Hispanic		.46	7.4	-.17	-2.4	.57	5.7
Constant		4.6		3.7		2.7	
Armed Services Test -Spline 1				.03	5.6		
Armed Services Test - Spline 2				-.015	-.7		
Armed Services Test - Spline 3				.05	1.1		
N		6853		5720		2093	

and father, and on average lead boys by 0.75 points on a GPA-type (4.0 scale) measure of grades. As shown in Table 4, girls lose 40% of their advantage on a GPA-type grades measure when we focus the comparison on girls and boys of highly educated fathers. If we add a control for scores on the armed services vocational aptitude battery (entered as a cubic spline) alongside controls for race and the educational attainment of father and mother, we continue to find that girls have a strong advantage over boys in course grades, which amounts to 0.71 GPA-type points. However, this advantage is reduced by an estimated 28% when the comparison involves boys and girls with college-educated fathers (see table 4).

As a next step, we examined how the gender gap in high school grades varied with the education of the father for the NLSY97 sample. As Table 5 shows, the male-specific benefit from having a college educated father is hardly visible in the full sample, though it remains apparent (at the .10 significance level) in the sibling analysis.

Finally, we measured the gender-specific impact of having a highly educated father on test scores and grades in 8th grade using the ECLS-K. The ECLS-K data contain separate measures of performance on reading and math standardized tests. Girls perform better on reading tests on average than do boys in all grades studied in the ECLS-K data. Table 6 shows that girls perform somewhat better (about .04 of a standard deviation) than boys on the 8th grade reading test, and that this difference is highly statistically significant. However, nearly all of this difference is eliminated when comparing girls and boys of college-

Table 5: Self-Reported Overall High School Grades, NLSY97

		OLS		Random Effects	
		coef	t	coef	z
female		-.75	13.8	.71	11.7
Biological Dad's Education	(missing=ref)				
	< HS	-.20	-2.1	-.21	-1.8
	High School	.19	2.3	.15	1.4
	Some College	.5	5.3	.35	2.6
	BA +	.91	8.0	.83	5.3
Biological Mom's Education	(missing = ref)				
	< HS	-.46	3.8	-.17	-1.1
	High School	-.02	-.18	-.18	-1.2
	Some College	.11	.9	.15	1.1
	BA +	.45	3.6	.37	2.2
Female * Dad has BA+		-.06	-.6	-.30	-1.9
Hispanic		.42	5.8	.40	3.7
Non-black/Non-Hispanic		.50	8.8	.63	6.6
Constant		4.4		2.6	
N		7251		1994	

educated fathers.

Consistent with other sources as such as NAEP, girls perform worse than boys on the ECLS-K math test in every grade past kindergarten DiPrete and Jennings (2009). Net of other factors, however, the male advantage in math as of eighth grade is larger when the father is college educated (see table 6).[3]

Conclusion

No one questions the fact that the gender gap in educational attainment is a product of social as well as possibly biological factors; the gender gap has changed dramatically during a short period of historical time when biology has not changed at all. A much more vigorous debate about the relative roles of biology and social factors exists with respect to cognitive achievement, where, for example, differences in mathematics performance have persisted without much change for two decades (**?**), but there is substantial cross-national variation in the distributions of achievement (Penner, 2008), and indirect evidence that school environments matter particularly much for girls in producing outstanding performance on mathematics tests (**?**).

We have focused in this paper on the potential of families to affect the size of the gender gap across a variety of outcomes that are all linked to educational attainment. Evidence from several different sources of data supports the argument that family environments affect the relative educational attainment of males and females at least partly because family environments affect gender differences in behaviors that are strongly

[3]We find no significant difference in the gender effect for children of college educated fathers when the outcome is parent-reported grades in 8th grade. This is the measure that is most comparable to the measure of grades used in the NLSY97.

Table 6: Reading and Math Scores (in standard deviation units) in Eighth Grade, ECLS-K.

	Reading		Math	
	coef	t	coef	z
Female	.042	4.4	-.01	-1.2
No biological dad in house in Kindergarten	-.02	-1.3	-.046	-3.7
No father/step-father in house in Kindergarten	-.008	-.4	.016	.9
SES in Kindergarten	.058	11.0	.056	13.0
age in Kindergarten	.013	3.8	.004	1.3
Parental help with reading & math in 3rd grade	-.011	-1.5	-.006	-.8
Avg hours of TV on weekdays, 3rd & 5th grades	.0003	.07	-.001	-.3
Does homework 5+ days/week in 3rd & 5th grades	-.007	-.8	-.003	-.3
Female * Dad has BA+	-.039	-2.8	-.032	-2.2
English as Second Language	-.02	-1.3	-.017	-1.3
Hispanic	-.023	-1.7	-.003	-.2
Black	-.096	-5.7	-.10	-5.8
Asian	.009	0.7	.034	2.1
Constant	.03		.047	
N	7740		7780	

linked to educational attainment.

We have uncovered evidence that parental education, and perhaps also the presence of the father in the household may differentially affect the performance of boys. We have emphasized the impact of the education of the father or step-father on the size of the gender gap in educational performance and on behavior problems. The models in their current form are not intended as a test for whether the education of the father matters more than does the education of the mother; that is a task for future research.[4] The precise mechanism by which these effects occur is also not answered by the analyses presented here. It is possible that more educated fathers are more intensively involved in the raising of their children, or in particular of their sons. It is also possible that the presence of a highly educated father influences identity-development of pre-adolescent boys, and in particular the extent to which they identify masculinity as compatible with a strong academic orientation. Another important issue concerns the extent to which parental and in particular paternal influences occur continuously through childhood, or whether there are particular periods during childhood or adolescence when male performance and behavior are particularly sensitive to the level of resources in the family. These are all important topics for further research.

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[4]We are currently investigating this question.

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