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Is the Gender Gap in College Enrollment Influenced by Nonmarital Birth Rates and Father Absence?

There is considerable academic and popular concern about the increasing gender gap in higher education enrollment in the United States. Males now constitute just 43% of the postsecondary enrollment. This research focused on nonmarital birth and father absence as predictors of lower levels of college enrollment for boys versus girls. The authors present two studies. In Study 1, using population data on college attendance and nonmarital birth rates, they found a strong positive association between nonmarital birth rates and the gender gap in college enrollment 18 years later. In Study 2, they examined individual-level data on father absence from birth and college enrollment among young adults. The results indicated that males were at greater risk than females of not attending college if they had experienced father absence from birth. Taken together, the 2 studies suggest that changes in family structure may have contributed to the widening gender gap in higher education.

Researchers are trying to understand the increasing gender gap in higher education enrollment in the United States. According to the National Center for Education Statistics (NCES), males constituted just 43% of the postsecondary enrollment (Aud et al., 2013) and 43% of students graduating with 4-year degrees (National Center for Health Statistics, 2013). This trend is expected to continue in the near future, with college enrollment expected to grow 16% for women and only 8% for men from 2009 to 2020 (Hussar & Bailey, 2011). According to media reports, some colleges are making special efforts to recruit and retain male students (Lewin, 2006; Marklein, 2005). Although researchers have been exploring a wide range of social and economic factors that may contribute to the gender gap in higher education, thus far relatively few have examined how family structure may contribute.

The current investigation was stimulated by the observation that the college enrollment gender gap in the United States began to emerge about 18 years after the beginning of major population shifts in family structure. In this article, we offer evidence that the increase in nonmarital birth rates and subsequent father absence may be a contributor to the growing gender gap in higher

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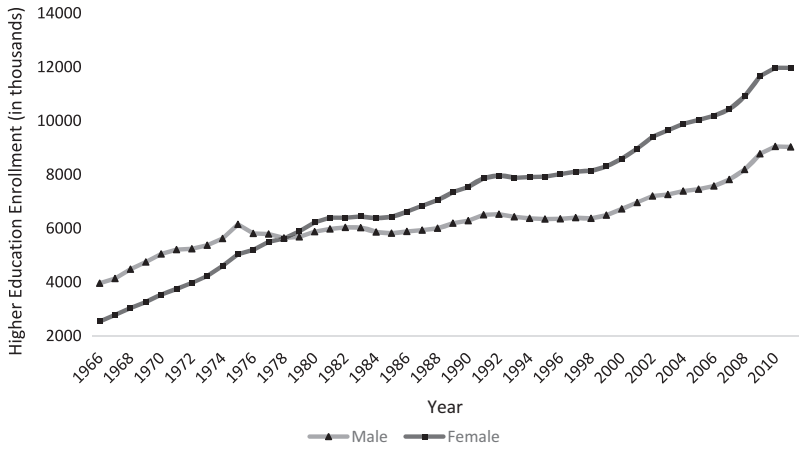
Figure 1. Enrollment in Higher Education in the United States for Men and Women, 1966–2010.



education. We gained this evidence this through two studies: the first with population-level data and the second with individual-level data.

Background

Although men have historically outnumbered women in higher education within the United States, women gained parity in the late 1970s, an achievement consistent with other gains in the public realm. In the mid-1980s, however, the genders began to diverge at an escalating rate, with a consistent increase in enrollment for women and a relatively flatter rate of increase for men (see Figure 1). In recent years, the gender gap has grown wider and become more pervasive demographically. Using data from the American Council on Education, King (2006) found that the gender differential favoring women was present for all racial and socioeconomic groups, whereas in 1995–1996 it was not found among White students. In fall 2010, 45% of White undergraduates were male, in comparison to only 42% of Hispanic undergraduates and 37% of African American undergraduates (NCES, 2012).

The causes and importance of men's relative underrepresentation in postsecondary education, a trend occurring in much of the industrialized world, are subject to debate in the media and among academics. Commentaries in popular books and media have ranged from armchair speculations, such as the idea that traditional education is not "boy friendly," to denial that there should be any concern about women's greater success in obtaining higher education credentials (see Jaschik, 2007, and Lewin, 2006). Research on the subject has had two major foci. The first is economic. For example, Dougherty (2005) argued that the differential gain in wages among women relative to men from higher levels of schooling would give women an extra incentive to pursue higher education. In the same vein, DiPrete and Buchmann (2006) found that it was not wages per se but a differential gain in women's chances of overall material well-being that was associated with a greater return on women's investment in higher education beginning in the 1980s.

The second focus of research has been the individual differences in learning styles and behavior between boys and girls. Jacob (2002), using longitudinal data on a U.S. cohort of eighth-grade students in 1988 who were interviewed every 2 years through 1994 in the National Education Longitudinal Study of 1988 (see https://nces.ed.gov/surveys/nels88/), found that the gap in higher education attendance could be explained in part by higher noncognitive skills among girls. Although boys and girls scored similarly on measures of cognitive ability, boys scored lower on factors such as attendance, behavior problems, missing a grade, and saying they dislike school. These noncognitive factors, along with a greater college premium (higher wages) for female college graduates, explained much of the gender differential in

higher education enrollment in Jacob's study. Recently, Conger and Long (2013) reported evidence for gender sorting into different high schools, with boys going to high schools with poorer track records of graduates going on to college. McDaniel (2010) further documented differences in academic expectations across a wide range of countries, with girls now having consistently higher expectations to attend higher education than boys.

A limitation of this line of research is that by measuring gender differences in areas such as learning styles at just one point in time, studies can explain college enrollment patterns in a given cohort, but they cannot account for *changes across cohorts* in patterns of gender participation in higher education. Explaining the recent increase in the gender gap in higher education enrollment requires evidence of change in the experiences or circumstances of cohorts of young people entering their college-eligible years. The current research study offers this kind of evidence because we examined whether changes in nonmarital birth rates are associated with increases in the gender gap in enrollment in higher education.

As we mentioned earlier, the present study emerged from the observation that the gender gap in higher education opened about 18 years after major changes in family structures began in the late 1960s. In particular, we observed the trend line showing that the generation growing up with higher rates of nonmarital births was coming of college age at the same time that the gender gap emerged. We have pursued this lead by examining the relationship between nonmarital birth rates and subsequent college enrollment rates when birth cohorts reached age 18.

Of course, even if there is an association between changes in nonmarital birth rates and later gender differentials in enrollment in higher education, correlations between macro level changes are subject to spurious interpretations. Making an explanatory argument would require evidence of a link at the individual level. Therefore, we used data from the U.S. National Longitudinal Study of Adolescent Health (Add Health; http://www.cpc.unc.edu/projects/addhealth) to examine the relationship between father absence from birth—a key risk factor generally initiated by nonmarital birth—and young adults' likelihood of having attended college.

Family Structure and Higher Education Enrollment

Lower academic achievement has been one of the most consistent findings in the research literature on child outcomes from single-parent families (Heard, 2007; Krein & Beller, 1988; McLanahan & Sandefur, 2006; Potter, 2010). Boys and girls from single-parent families have lower grades and lower standardized test scores. They are more apt to drop out of high school. Although lower income and education among single parents account for a large portion of this academic achievement gap, the negative outcomes for children remain present even after controlling for social class factors (McLanahan & Sandefur, 2006).

Studies of family structure and college enrollment have demonstrated the same pattern of findings. Painter and Levine (2000) found that parental divorce during the high school years of children reduced the likelihood of attending college by 16%. Goldscheider and Goldscheider (1998) reported that more than 20% of young adults from intact two-parent biological families left home for college versus 10%–15% from other family forms. Although lower family income is clearly an important explanatory factor, Ploeg (2002) found the same deficits after controlling not only for family income but also for grant aid received.

Only a few studies have specifically examined family structure and gender differences in college attendance. Krien and Beller (1988), using the National Longitudinal Surveys (http://www.bls.gov/nls/), found that living in a single-parent family had a greater negative impact on boys' eventual educational attainment and that the impact increased the more years the boy had lived in a single-parent family. Jacob (2002) found that family structure was a stronger determinant of college attendance for boys than for girls; specifically, growing up in a single-parent family decreased the probability of college attendance by 3 percentage points for boys, but did not affect girls. In examining the effects of remarriage after single parenting, Beller and Chung (1992) found that remarriage, though associated with greater high school completion, made going on to college less likely, especially for boys.

In a study that went beyond general measures of family structure to assess father absence specifically, Buchmann and DiPrete (2006) examined college completion rates for cohorts

represented in the General Social Survey (http://www3.norc.org/GSS+Website/) from 1972 through 2002. They found a reversal in the gender specific aspects of father status for generations from the mid- to late 20th century, with males born after 1965 being relatively more influenced than females by the father presence versus absence and by father educational level. These findings were updated and extended with General Social Survey data from 2008 and the National Education Longitudinal Study cohort from 1973 to 1974 (DiPrete & Buchmann, 2013). Buchmann and DiPrete concluded that most of the shift in educational attainment in later cohorts stemmed from "the growing vulnerability of boys in families with low-educated or absent fathers. These boys were increasingly disadvantaged in educational attainment" (p. 125). In sum, although the literature is far from conclusive, a small body of research suggests that family structure in the form of single parenting and father absence may have a differential effect on boys' likelihood of not attending higher education.

Theoretical Explanations

Human capital theory (Becker, 1978; Krein & Beller, 1988) can help explain why children from single-parent families have lower educational outcomes than children from two-parent families. Children's educational attainment is viewed as a goal toward which parents invest time and income. These resources, or inputs, are more limited in single-parent families than in two-parent families, for two reasons: (a) the single parent (most often the mother) has less individual time and income to devote, and (b) the other parent (most often the father) devotes less time and income to his children's academic achievement, perhaps especially for college education, which is seen as more optional than primary and secondary education. Human capital theory, however, does not explain gender differences in the effects of parental investment.

There are currently no compelling theoretical models to explain gender differences in children's outcomes related to family structure. However, the *gender role socialization perspective* (Biller & Kimpton, 1997) proposes that girls depend more on their mothers, and boys on their fathers, in forming their cognitive abilities and educational aspirations. Although empirical support for this idea is limited, Hetherington, Cox, and Cox (1978, 1982) have found that 5-year-old boys, but not girls, whose fathers had been absent for 2 years because of divorce, scored lower on a range of intelligence tests. Guidubaldi, Cleminshaw, Perry, Nastasi, and Lightel (1986) found that boys, after a divorce, were more affected by father absence on a range of intellectual abilities than were girls, although girls too were affected.

Buchmann and DiPrete (2006) offered a theoretical explanation that uses both the human capital and the gender role socialization perspectives, along with a life course perspective. They proposed that boys may be more sensitive than girls to lower levels of family human resources, including father absence, in regard to the development of behavioral skills needed for academic achievement. Buchmann and DiPrete further proposed that boys may depend more on the modeling and support of fathers for their educational aspirations than do girls and that boys therefore became more vulnerable to not completing college during a time in history when family trends moved more fathers away from their children's everyday lives and when greater educational opportunities opened up for women.

This explanation is bolstered by findings from the General Social Survey reported by Buchmann and DiPrete (2006) and DiPrete and Buchmann (2013). In mid–20th-century cohorts girls' college attainment was more affected by absent fathers, but in the late 20th century the effect reversed, with boys showing greater vulnerability. DiPrete and Buchmann argued that in an era of restrictive gender norms, girls needed, even more than boys, the human capital of a two-parent, father-present family to pursue higher education, whereas now that college attendance norms are more egalitarian, boys' special vulnerability to lower human capital and father absence is influencing the gender gap in higher education. In other words, gender stereotypes once masked the greater risk of father absence for boys' college attainment, but it now is more evident. Further evidence for a gender shift in a "father effect" comes from the finding that limited father education (high school or less) inhibited girls' college attainment more than boys in previous cohorts, but has affected boys more than girls in recent cohorts (DiPrete & Buchmann, 2006).

As mentioned, we conducted two studies to test the link between the growing gender gap in

higher education enrollment and changing family structures associated with father absence. In the first study we used population-level data; in the second study we examined individual-level data from Add Health.

Study 1: Population Level

This study focused on nonmarital birth rates because these rates provide the best cohort test of the association between family structure changes and the gender gap in higher education; specifically, there are annual population data on parental marital status of newborn children, and each birth cohort, respectively, reaches college age at the same time. Annual divorce rates, in contrast, do not identify a cohort of children who experienced a parental divorce at the same age. A parental divorce when a child is age 2 versus 16 may have a different effect on higher education prospects. An additional advantage of focusing on nonmarital births is that this group of children has the highest risk for reduced family resources, including father absence, during their growing-up years (Aquilino, 2006; Seltzer, 1991; Seltzer & Bianchi, 1988).

If nonmarital births have a differential impact on academic outcomes based on the gender of the child, then population changes in nonmarital childbearing should precede changes in the gender gap in higher education enrollment. Thus, our strategy was to correlate nonmarital birth rate and subsequent gender differences in college enrollment.

Data Sources

Data on college enrollment in the United States were gathered from charts generated from the website of the NCES (https://nces.ed.gov/), which indicated the total fall enrollment of all undergraduate students in degree-granting higher educational institutions. Education enrollment data were taken from tables generated online from the NCES. Data were taken from the following sources: the U.S. Department of Education, NCES, "Biennial Survey of Education in the United States"; "Opening Fall Enrollment in Higher Education," 1963–1965; the Higher Education General Information Survey; the "Fall Enrollment in Colleges and Universities" surveys, 1966–1985; and the Integrated Postsecondary Education Data System (IPEDS) "Fall Enrollment Survey" (IPEDS-EF:86–99) and Spring 2001 through Spring 2011 Enrollment component. Enrollment difference was calculated as the real difference between the number of female and male students enrolled in higher education in a given year. Nonmarital birth rate data were gathered from the *National Vital Statistics Report* and represent the percentage of total births to unmarried women age 15 or older.

Because nonmarital births occur approximately 18 years before college becomes an option for most young adults, and thus would not have an immediate impact on college enrollment, we lagged the nonmarital childbearing rate 18 years before the college enrollment gender difference scores. Because we were most interested in the gender gap when it began to emerge in the mid-1960s, we correlated nonmarital birth rates in the United States from 1948 to 1993 with the college enrollment gender difference from 1966 to 2011.

We also examined the U.S. findings for African Americans separately, to determine whether the same trends occurred for a group that has had historically higher rates of female than male college attendance. On the basis of enrollment data availability in *The Digest of Educational Statistics* (Snyder & and Dillow, 2013), we examined African American data for birth rates from 1970 to 1993 and college enrollment for 1988 to 2011. Comparable historical data were not available for other racial minority groups.

Analytic Strategy

The most straightforward way to demonstrate the statistical relationship of interest is a lagged Pearson correlation; however, population correlations over time can suffer from autocorrelational problems (i.e., values and their errors at one time point being correlated with values and errors at previous or future time points). An initial analysis using the Durbin–Watson statistic indicated a statistically significant autocorrelation between the lagged nonmarital birth rate and the gender gap in education in the United States. Therefore, we added time series regression modeling that controlled for two additional lags of birth rate (19 and 20 years) to control for autocorrelation within the data.

Results

Figure 2 depicts the lines representing the nonmarital birth rate and the gender gap in higher education enrollment within the United States after the mid-1960s. The Pearson correlation between the nonmarital birth rate from 1948 to 1993 and the gender gap in higher education enrollment from 1966 to 2011 was high ($r = .932$). This represents a near-perfect linear relationship between changes in the nonmarital birth rate and changes in the gender gap in higher education enrollment 18 years later. The higher the nonmarital birth rate grew, the lower the ratio of males to females became as each birth cohort reached age 18. The correlation for African Americans was even higher ($r = .948$).

The time series autoregressive model showed that the high bivariate correlations were not simply due to autocorrelation. Nonmarital birth rates retained a strong positive association with the gender gap in higher education 18 years later ($R^2 = .91$; $b = 819.67$, $t = 3.60$, $p = .001$).

Discussion

Study 1 showed a strikingly strong link between nonmarital birth rates and college enrollment 18 years later. However, the data sets we used did not allow for controls on alternative explanations such as changing gender role expectations and the opening up of elite colleges and universities to women in recent decades. Similarly, we did not examine macroeconomic forces that may influence gendered expectations of the value of higher education. We addressed the principal limitation of the study—the possibility that the population-level findings are spurious if effects are not present at the individual level—in Study 2.

Study 2: Individual Level

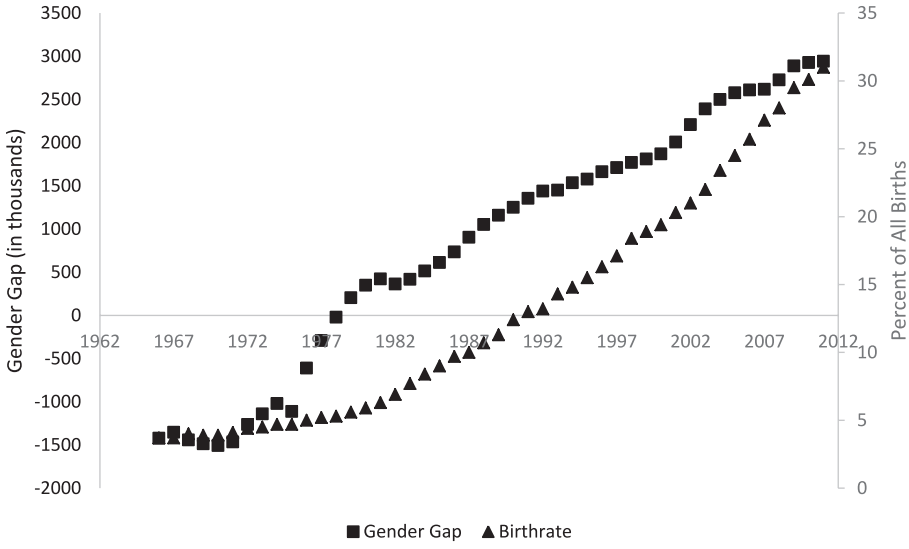
Using data from Add Health, Waves I and IV, we examined the differential effect on males and females of nonmarital birth on later higher educational enrollment in the United States. Add Health is a nationally representative sample of youth in the United States ($N = 90{,}118$) who were enrolled in middle or high school in 1994–1995. The first wave included a subsample of 20,745 adolescents who were interviewed in their homes, with 17,700 of their primary caregivers, on a wider variety of topics, including family structure and education. Wave IV was conducted in 2008–2009 (with a 2007 pretest of 193 subjects) when the respondents were between ages 24 and 32 years and included 15,701 of the original Wave I in-home subsample. We dropped cases who were missing family structure information at Wave I and educational attainment information at Wave IV, resulting in an analytic sample of 15,680.

Respondents were asked at Wave I to indicate whether a father figure lived with them and, among other choices, whether the father figure was a biological father. Respondents who indicated living with a biological father were coded 1, representing that they had had a biological father present in their lives. Respondents who did not live with a biological father were asked a series of follow-up questions, including "Did you ever live with him?" Respondents answering "Yes" were also coded 1, indicating some father household presence from birth. Respondents who answered "No" or "Don't know" were coded as 0, indicating and absence of father from birth. Although it would have been interesting to explore the impact of a nonbiological father figure, the data set did not have information on their presence from birth, just the presence of a father figure during adolescence. Higher educational enrollment was assessed in Wave IV by asking respondents, "What is the highest level of education that you have achieved to date?" Responses of "Some college" and higher were coded 1 representing having enrolled in higher education; other responses were coded 0, representing not having enrolled in higher education.

Analytic Strategy

The analytic strategy for this study required a tool not commonly used in social science research. The reason is that standard regression and logistic regression models are not appropriate when the dependent variable consists of the difference between ratios. In this case, the outcome variable was the difference between the ratio of college enrollment for boys versus girls with father absence and the ratio of college enrollment for boys versus girls with father presence. Consultations with statisticians pointed us to Altman and Bland's (2003) innovative use of the relative risk ratio (RR). In its basic form, relative risk compares the likelihood of a particular event for different groups of people. The RR is used to compare two groups on the prevalence

FIGURE 2. THE GENDER GAP IN HIGHER EDUCATION AND NONMARITAL BIRTH RATES IN THE UNITED STATES.



Note. Gender gap was measured in thousands; the nonmarital birth rate was measured in percentage of all births. A gender gap less than 0 indicates that more males than females enrolled; a gender gap greater than 0 indicates that more females than males enrolled.

of an event by assessing whether the occurrence of the event in the two groups is independent (Rosner, 2006). It is commonly used in the epidemiological literature; for instance, regarding risk of disease between smokers and nonsmokers (Gandini et al., 2008). RR is calculated by dividing the percentage of one group (in this case, males [M/m]) who experienced the event (in this case, higher education enrollment) by the percentage of another group (females [F/f]) who experienced the event:

$$\mathrm{RR} = \left(\mathrm{M}_{\mathrm{enrollment}}/\mathrm{M}_{\mathrm{total}}\right) / \left(\mathrm{F}_{\mathrm{enrollment}}/\mathrm{F}_{\mathrm{total}}\right).$$

We began by computing two RRs: one looking at the risk of enrollment for males compared to females when a biological father was present ($\mathrm{RR_f}$) and one looking at the risk of enrollment for males compared to females when no biological father was present ($\mathrm{RR_{0f}}$). An RR of 1.0 indicates no greater or lesser likelihood of enrollment for either males or females—in other words, the event of enrollment would be independent of gender (Rosner, 2006). An RR less than 1.0 indicates that males have an enrollment rate of a factor equivalent to the RR that of females (e.g., if RR = 0.9, 9 males would enroll for every 10 females enrolled). The statistical significance of the RR was estimated by a 95% confidence interval (CI).

Then came the key step in the analysis: to determine whether the two RRs were different—in other words, to see whether the gender gap between males and females is greater when no biological father is present. We used Altman and Bland's (2003) method for testing differences between two independent RRs. Log transformations of the RRs were used for greater normal approximation. The test of interaction is given by the following equation:

$Z = d \;/\; SE(d)$, where d is the difference between the logs of the RRs $[\log(\mathrm{RR_{0f}}) - \log(\mathrm{RR_f})]$ and $SE(d) = \mathrm{sqrt}\{SE[\log(\mathrm{RR_{0f}})\text{^}2] + SE[\log(\mathrm{RR_f})\text{^}2]\}$.

Converting d back from the log scale [$\exp(d)$] gives the estimated interaction effect, or the ratio of the relative risks (RRR). The 95% CI for d can also be converted back from the log scale to easily assess the statistical significance of the interaction effect.

As mentioned, a limitation of the statistical RRR tool is that it does not allow for internal controls for potential confounding variables; however, conventional regression-based

statistical tools, which do allow for control variables, are not appropriate for analyzing the difference between ratios. We offer two solutions to this concern: (a) examining potential confounds in the sample (presented next) and then (b) repeating the central statistical analyses on a smaller subsample set of siblings in the Add Health data set. The latter procedure, although it lacks statistical power because of the small sample size, does allow for a high level of control over confounds because each male–female sibling pair came from the same family.

We first tested for differences between all males and females at Add Health Wave I on potential confounding demographic variables. We used Add Health data weights (Chantala, 2006) to achieve a sample representative of the adolescent population in the United States at the time of Wave I. The demographic variables used were family income, responding parent-figure highest education, and respondent race. Family income was divided into six subgroups: (a) < $15,000, (b) $15,000–$29,999, (c) $30,000–$49,999, (d) $50,000–$74,999, (e) $75,000–$99,999, and (f) > $100,000. The education of the responding parent figure was classified according to the following four categories: not a high school graduate, a high school graduate or equivalency, some college or trade school, and college education or more. Race was delineated by four categories: (a) African American, (b) Hispanic, (c) White, or (d) other.

Males and females as two subgroups of the sample were very similar on the demographic variables we examined. The few statistically significant differences were low in magnitude and not likely to be confounding factors in this study. More females' parental figures did not complete high school (18.8–17.5%, $p < .05$) and were less likely to be in the some college/trade school category (29.0–30.6%, $p < .05$). More females were Black (23.0–21.2%, $p < .05$), and more males checked "other" as a race (9.2–8.1%, $p < .05$). A slightly higher percentage of males had family incomes in the $30,000–$49,999 range (27.3–25.8%, $p < .05$). We concluded that these small demographic gender differences were not likely to affect the results of the study.

Results

The core findings are presented in Table 1. The first step examined gender differences when there was a biological father present at some point in the respondent's life. Here the relative risk of enrollment in higher education for males compared to females was $RR_f = 0.875$, 95% CI [0.854, 0.896], meaning that males enrolled at 87.5% the rate of females, a statistically significant difference as indicated by the confidence interval not overlapping 1.0. In the second step, when there was no father present from birth, the relative risk of enrollment in higher education for males compared to females was $RR_{0f} = .803$, 95% CI [.748, .863], meaning that males enrolled at only 80.3% the rate of females, a statistically significant difference. The gender gap was 7.2 percentage points lower for males when there was no biological father present. In the key test to determine whether this difference in proportions was statistically significant, we compared the RRRs. The result was RR = .918,

Table 1. *Relative Risk Ratios (RRs) for Father Presence Versus No Father Presence on College Enrollment*

	Enrolled in College		Not Enrolled in College		Total
No father present		%		%	
Males	560	49.2	578	50.8	1,138
Females	909	61.3	575	38.7	1,484
Father present					
Males	3,914	63.1	2,291	36.9	6,205
Females	4,940	72.1	1,913	27.9	6,853

	Risk of Enrollment for Males Compared to Females	
	RR	95% confidence interval
No father present	0.803	[0.748, 0.863]
Father present	0.875	[0.854, 0.896]
Ratio of the relative risks	0.918	[0.851, 0.990]

95% CI [.851, .990], indicating that the gender difference shown in the relative risk comparison was statistically significant. Males were disproportionately less likely than females to attend college if they came from a family in which the father had been absent from birth.

To further deal with the problem of potential confounds, we examined differences in likelihood of college enrollment between male and female sibling pairs in Waves I and III of the Add Health sibling data sets. (We used Wave III instead of Wave IV in order to maximize the sample size, given attrition rates.) Given the magnitude of the RR in the core analyses and the limited number of sibling pairs with father absence from birth ($n = 69$), we did not anticipate having enough power to find statistically significant differences, we but did expect a similar effect size (RRR) based on the assumption that the core analyses were not hampered by confounding variables. As mentioned, using sibling pairs offers a high level of control for sociodemographic confounds.

In preparing the sibling data for analysis we dropped cases missing the educational and family structure information. We then matched only full-sibling male–female pairs. If there were more than two full siblings for a household such that there could be two or more permutations of male–female pairings, we randomly selected the males and females for the pairings. This left a sample of 488 pairs (488 males, 488 females), with 69 pairs having no father present and 419 having a father present. We repeated the core statistical procedure on this subsample.

In the first step of the analysis, the relative risk of enrollment in higher education for males compared to females when there was a biological father present at birth was $RR_f = .899$, 95% CI [.818, .988], meaning that males enrolled at 89.9% the rate of females, a statically significant difference. When there was no biological father present, the relative risk ($RR_{0f} = .667$, 95%CI [.484, .918]) was also statistically significant, with males enrolling at 66.7% the rate of females. Enrollment rate was 23.2 percentage points lower for males when there was no biological father present. (Note that this difference was more than three times higher than the 7.2 points in the full sample.) However, the difference between the two relative risk ratios (RR = .741, 95% CI [0.531, 1.034]) fell just outside of statistical significance.

General Discussion

Taken together, Studies 1 and 2 offer evidence at both the population and individual levels for a relationship between changes in family structure associated with father absence and the growing gender gap in higher education attainment. The population-level finding, although bivariate in nature and therefore subject to other interpretations, suggests that the original observation guiding the study—the connection between changes in family structure and the subsequent gender gap in higher education—was strongly present at the lagged correlational level. The gender gap favoring females began to open up 18 years after the emergence of increasing levels of nonmarital births in the United States.

The individual-level findings support the idea that the population findings might be valid and not spurious. We found that father absence from birth was associated with a 7.2-percentage-point difference in risk of not attending higher education among males versus females. To put this difference into perspective, it is very close to the gender gap found in the general population, in which males constitute 43% of college enrollees (i.e., 7% below 50% parity; Aud et al., 2013). Stated differently, the magnitude of the gender difference based on father absence from birth is nearly identical to that found currently in the U.S. population. Buttressing our confidence in this finding were the results for the sibling sample where the relative risk for males was 23.2 percentage points lower than for their sisters when they both had grown up in father-absent families. Although there was insufficient power in the sibling sample size to have statistical confidence in a difference of this size, the sibling analysis suggests that the main finding was not an artifact of sociodemographic confounds, which are tightly controlled when using sibling data.

A limitation of Study 2 was the lack of a clearly defined variable in the Add Health data set for nonmarital birth of the respondent. For that reason, we used father absence from birth, which had the advantage of directly tapping our central explanatory concept but did not map as directly as desirable with the population-level data on nonmarital births. In addition, sample attrition may have confounded the findings, and the sibling subsample provided limited statistical power.

In terms of theoretical explanations for the study's findings, human capital theory, with its focus on family educational choices in the presence of limited resources, explains why the growing number of father-absent, single-parent families contributes to the likelihood that neither sons nor daughters will go to college. This theory can be applied not only to the United States but also to European countries, where research has found academic achievement disadvantages for children in single-parent families even in the presence of a stronger social safety net than in the United States (Hampden-Thompson & Pong, 2005; McNab & Murray, 1985; Murray & Sandqvist, 1990).

However, different effects for boys and girls are more difficult to explain theoretically with human capital theory. Although in the current study we did not address long-standing historical trends, DiPrete and Buchmann (2013) offered a line of explanation consistent with our findings. It has two parts. First, boys may be more sensitive to father absence because same-sex role models are especially important in the noncognitive domains related to achievement. Second, the distinctive influence of father absence on boys' college attainment became apparent only when the higher education playing field for girls became more equal in the last third of the 20th century.

A comprehensive understanding of the growing gender gap in higher education would also take into account social network effects, or *social contagion* influences, which Christakis and Fowler (2007, 2008) have described in the domains of health and social well-being. From this perspective, as more boys grow up without their father in the home, and as women (especially in low-income and working-class communities) are viewed as the more stable achievers, boys and girls alike would come to see males as having a lower achievement orientation and less aptitude for higher education. In the context of persistent influences of family structure, public policy, and macroeconomic forces, at some point social norms regarding academic goals become self-reinforcing within peer groups and perhaps even with parents. Stated simply, college becomes something that many girls, but only some boys, do—the opposite of the earlier cultural norm.

Empirical support for this re-norming hypothesis comes from McDaniel's (2010) six-nation comparison of expectations to complete tertiary education. Boys in the United States have shown a remarkable trend: Between 1970 and 2003, they decreased their expectations to complete college, whereas girls increased their expectations. In the other five countries, including Sweden, both boys and girls increased their expectations of completing tertiary education, with girls increasing at a greater rate than boys. This suggests that there is something unique occurring with boys in the United States.

There is growing social concern about the educational gender gap and worry that boys are not prepared well in the noncognitive domains that are necessary for academic achievement (Jacob, 2002). The results of this study suggest that educators pay particular attention to the needs of boys who have experienced the absence of a father while growing up. For them, the male peer culture of low academic expectations may trump the efforts of school professionals. Programs may need to target male norms directly so that boys can reflect on and consider modifying the attitudes and beliefs that surround them. For example, if schools are considered "female-oriented" environments, then boys may hold themselves back academically in order to retain a strong gender identity and membership in their peer group, and boys with an absent father may take the lead in this resistance. The first author is involved in a pilot project with urban African American male high school students, most of whom have experienced father absence, with a goal of influencing peer norms about relationships with teachers and girls.

Policymakers should note the strikingly high correlation between the nonmarital birth rate and the 18-years-later gender gap in higher education attendance found in this study. The steady increase in nonmarital births is contributing to a widening social class divide, which Putnam (2015), Sawhill (2014), and others see as undermining opportunities for current and future generations. Sawhill called for policies and programs that encourage young people to become "planners" of their family formation, delaying parenting and preferably being married first, instead of "drifters" who have children young and without stable marriage prospects. This study suggests that this kind of cultural change may be particularly urgent to improve the prospects of boys to achieve a college education and benefit from the career success associated with higher education.

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