The Growing Female Advantage in American Higher Education:
Do Family Processes Explain the Trend?

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ABSTRACT

This paper presents clear evidence of a female-favorable trend in college completion in the United States, and then assesses the degree to which family processes can explain this trend. Analyses of the repeated cross-sections of the General Social Survey indicate that a considerable portion of the relative female gain is due to changes in the effect of the same-sex parent’s education on the child’s probability of completing college. At the middle of the twentieth century, daughters had the same chances for college completion as sons only in the minority of households where both parents were college educated. In households with less-well educated parents, sons consistently achieved higher rates of college completion. But this pattern changed for cohorts born after the mid-1960s, such that the education level of the same-sex parent became a more important determinant of educational attainment, and females attained more education than males when neither parent was college educated.
The Growing Female Advantage in American Higher Education:
Do Gains in Parental Resources Explain the Trend?

Recent evidence suggests that females in the United States have made substantial gains in all realms of education and now generally outperform males on several key educational benchmarks. According to a study commissioned by Congress, “in school and in college, females are now doing as well as or better than males on many of the indicators of educational attainment, and the large gaps in educational attainment that once existed between men and women have in most cases been eliminated” (Bae et al. 2000:2). In 1972, more males than females enrolled in college (53% versus 46%); by 1997 the reverse was true, with 70% of females enrolling in college compared to 64% of males. Women are also more likely than men to persist in college, obtain degrees, and enroll in graduate school (Bae et al. 2000:7-8). The U.S. Department of Education predicts this “new gender gap” in college enrollment and completion will increase over the next decade. This trend toward female advantage in higher education has attracted the attention of college administrators, policymakers and the media (see e.g., Koerner 1999), but very little research has been done either at a theoretical or empirical level to explain this emerging trend.

While some early studies examined gender differences in educational attainment (Alexander and Eckland 1974; Hout and Morgan 1975), the bulk of recent research on gender differences in the status attainment process has focused on occupational attainment and earnings (Reskin 1990; DiPrete and Grusky 1990; England 1992; Bernhardt, Morris and Handcock 1995), rather than educational attainment. Jacobs (1996) attributes this neglect to the fact that gender was usually not a significant predictor
of educational attainment. But recent evidence suggests that gender has become an increasingly important predictor of educational attainment in several industrialized countries. In the comparative volume on educational attainment by Shavit and Blossfeld (1993), studies of the U.S, Germany, Hungary, Poland, and Sweden found that women’s mean educational attainment in recent cohorts has surpassed those of men. Eurostat statistics (Eurostat 2002) meanwhile demonstrate that higher proportions of females than males currently attain tertiary education in most EU member countries. Recent research also finds higher educational aspirations among females than males in several industrialized countries (Buchmann and Dalton 2002) and a substantial rise in the occupational aspirations of U.S. women in recent decades (Shu and Marini 1998).

Of the few studies on gender-specific trends in educational attainment, most focus on historical periods prior to the recent decades when trends toward the female advantage in higher education emerged (Walters 1986; Kalmijn 1994; Goldin 1995). Walters (1986) used time-series models on aggregate data to argue that female gains in higher education enrollment between 1952 and 1980 were largely due to changes in the occupational distribution, but she reached the same conclusion about men’s higher education gains, which were also substantial during this period. Using retrospective data provided by adult respondents born before the 1960s, Kalmijn (1994) estimated a set of transition models for high school completion and higher educational attainment. He assessed whether mothers’ and fathers’ status influence sons and daughters equally and whether mothers’ socioeconomic influence on sons’ and daughters’ attainment has changed over time. Kalmijn concluded that “the process of educational attainment is much the same for men and women” (1994:272) but, like Walters, Kalmijn studied a
period before the female-favorable gap in higher education emerged. More recently, Charles and Luoh (2002) analyzed trend data from the Current Population Survey and found no evidence that the educational trend favoring women is due to relative increases in labor market opportunity for women as measured by trends in the female returns to college relative to male returns to college.\(^1\) In sum, relatively little is known about the recent rising female advantage in higher education, despite its obvious importance both as an educational event and as a potential cause of future trends in labor market outcomes.

This paper redresses this lack of knowledge in two respects. First, we use data from the Current Population Surveys (CPS) to measure the overall trends in postsecondary educational attainment of white and black males and females using age-cohort models. Second, we use data from the General Social Surveys (GSS) to determine whether intergenerational, family-level processes explain an important component of these trends for whites.\(^2\) Much of the female-favorable trend might be explainable in terms of system-level changes in educational or employment opportunities for women (e.g., DiPrete and Grusky 1990; Goldin 1992). A main effects system-level explanation would imply a social or cultural force that affects equally the entire population (period effects) or all members of a given cohort (cohort effects). But we see no reason to expect system-level effects to be homogenous. A more likely possibility is that system-level changes have heterogeneous effects because they work in interaction with the social, economic, or cultural characteristics of individuals and families. In this paper, we examine whether family-level determinants affect the process of change in the relative educational attainment of women and men. We examine two family-based hypotheses
for the female-favorable trend in higher education: (1) the trend is due in part to rising average levels of parental education, since girls attain comparable levels of education relative to boys when parents are highly educated, and (2) the trend is due in part to changes over time in gender-specific effects of parental-level resources on educational attainment. On their own, neither of these family-based explanations would predict women to outpace men in their rates of college completion, but in conjunction with broader system-level processes, family-based mechanisms may have generated a major component of the female favorable trend in higher education.

We find little evidence to support the first hypothesis. However, changes in the gender-specific effects of parental resources explain an important part of the observed trend toward a female advantage in higher education. At the middle of the twentieth century, daughters had the same chances for college completion as sons only in the minority of households where both parents were college educated. In households with less-well educated parents, sons consistently achieved higher rates of college completion. But this pattern changed for cohorts born after the mid-1960s, such that the education level of the same sex parent became a more important determinant of educational attainment, and females attained more education than males when neither parent was college educated. We discuss several plausible reasons for this changing relationship between characteristics of the family of origin and the likelihood of college completion for women and men.

**FAMILY-LEVEL PROCESSES AND GENDER DIFFERENCES IN EDUCATIONAL ATTAINMENT**

Several theories emphasize the role of family-level processes in determining gender differences in educational attainment. Some perspectives seek to explain the
abundant evidence that parents have historically invested more heavily in the education of sons than of daughters. For example, family economy perspectives view educational attainment as a rational product of family decision-making based on expected returns to the family from investments in education; in cases where labor markets and family systems privilege males, a family’s first priority should be the education of sons (Becker 1991; Becker and Tomes 1979; Rosenzweig and Schultz 1982; Papanek 1985). In contrast, feminist perspectives on gender inequality attribute the historical tendency for American parents to favor sons over daughters in labor-market relevant investments to a patriarchal culture (Epstein 1970; Walby 1986; Hess and Ferree 1988). Because women have typically earned less money than men in the labor market, family economy arguments and feminist arguments emphasizing patriarchy are difficult to separate empirically; they both predict unequal educational investment by parents in their sons and daughters. Moreover, both perspectives predict rather uniform parental investment behaviors across families.

In contrast, some theoretical perspectives emphasize that parental investment patterns are not uniform across families, but instead depend upon the characteristics of parents and families themselves. According to what we term the education egalitarian perspective, parents who are more educated tend to hold egalitarian values and may strive to ensure that sons and daughters are educated equally. Many studies document more egalitarian gender-role attitudes among individuals with higher levels of education both in the U.S. (Thornton and Freedman 1979; Cherlin and Walters 1981; Thornton, Alwin and Camburn 1983) and some European countries (Alwin, Braun, and Scott 1992; Dryler 1998). Other research suggests that gender-role orientations have gradually shifted from
traditional to more egalitarian over the past few decades but that considerable
heterogeneity still exists in the American population (Twenge 1997; McHugh 1997;
Axinn and Thornton 2000; Brewster and Padavic 2000). Furthermore, traditional gender-
role orientations in parents have been empirically linked to poorer academic performance
for girls relative to boys (Updegraff, McHale and Crouter 1996).

The gender-role socialization perspective stresses the importance of gender-
specific role modeling, so that girls look to their mothers and boys to their fathers as they
develop their educational and occupational aspirations (Rosen and Aneshensel 1978;
Downey and Powell 1993). Some research posits that complicated gender-specific
processes generate differentially strong connections between the educational and
occupational experiences of fathers and sons (Blau and Duncan 1967; Hout 1988), and
between mothers and daughters (Rosenfeld 1978; Goldthorpe 1980; Shu and Marini
1998; see also Thomas 1994). There is also a “family-structure” version of the gender-
role socialization hypothesis. According to this hypothesis, boys differentially benefit
from the presence of a father, and differentially suffer from the absence of a father in the
household (e.g., Powell and Parcel 1997; Sommers 2000).5

Some of these perspectives are more useful than others for predicting how family-
level processes relate to gender-specific trends in higher education. The family economy
perspective does not yield clear predictions concerning how gender-specific investment
patterns change over time or their impact on gender trends in higher education. This is
due to: 1) the lack of clarity about recent historical changes in the relative returns to
education for women and men, 2) uncertainty about trends in gender-specific
intergenerational transfers back to the parents from adult male and female children, and
3) deeper uncertainty about the meaning and historical stability of a family’s utility function.

The education egalitarianism perspective makes a straightforward prediction about gender-specific trends in higher education. If girls benefit more than boys from having highly educated parents (i.e., if the “rate of return” to parents’ education is higher for girls than for boys), it follows that the combination of a stable higher rate of return for girls and historically rising levels of parental education would produce trends on rates of college attendance and completion that favor women. In other words, changes in the composition of parents’ education should lead to a partial closing of the gender gap in higher education, which has traditionally favored males.

The gender-role socialization perspective potentially implies gender-specific educational trends through both compositional and structural mechanisms. If mother’s education or employment has a larger effect on daughter’s education than on son’s education, and if father’s education or employment is likewise more beneficial for sons than for daughters, then a female favorable trend in higher education would result from upward trends in parental socioeconomic resources to the extent that the maternal trends are stronger than the paternal trends, or to the extent that the female-specific advantage from mothers is greater than the male-specific advantage from fathers. A different composition-based trend would occur to the extent that sons suffer greater educational harm than daughters in households without a father, because the proportion of households headed by women increased throughout the last half of the twentieth century (Cancian and Reed 2001).
The gender-role socialization perspective may imply trends through a process of structural change as well. It is possible that the saliency of a mother’s status on daughter’s educational achievement depends upon cultural portrayals of appropriate achievement goals for women. Increasing acceptance of women having careers might increase the saliency of the mother as a career role model and increase the impact of mother’s education on daughter’s educational attainment, which in turn could produce a female-favorable trend in college graduation.6 Alternatively, changes in the cultural meaning of a high school education, in combination with other cultural processes, may have advantaged daughters. In the 1950s, a high-school educated father might have had high educational expectations for his sons, and may have invested more in education for his sons than for his daughters. But as the opportunities for enrolling in college grew, we presume that more ambitious men would have obtained a college education. Erosion in the average level of ambition among the population of high-school educated fathers may have eroded the advantage of sons over daughters and led to a female-favorable trend in higher educational attainment.

Finally, it is possible that mechanisms other than socialization could produce a trend via change in the gender-specific effects of parental resources on higher educational attainment. For example, the expansion of higher education, or even the expansion of the community college system, which could serve as a springboard to enrollment and graduation from a four-year college, could generate a female-favorable trend if these changes favored girls from low SES families over their brothers.7

In sum, both education egalitarianism and gender-role socialization perspectives provide hypotheses regarding gender-specific trends in rates of college completion,
though they differ in whether the trend arises because of compositional changes in population distributions, changes in coefficients (reflecting changes in the salience of family of origin characteristics), or changes in both. After a detailed examination of the shape of college completion trends for men and women in recent decades, we assess these hypotheses with data from the General Social Survey.

**GENDER-SPECIFIC TRENDS IN COLLEGE GRADUATION**

To examine the shape of trends in gender-specific college graduation rates, we analyzed data from the March Supplement to the Current Population Survey (CPS) for calendar years 1964 through 2002, for a sample of 504,497 men and women between 25 and 34 years old who identified themselves as white or African American. For 1964-1991, the CPS measured education as the highest grade completed; thereafter it uses a mixture of years of education and certification to measure educational attainment. For the analyses reported here, respondents in survey years before 1992 are coded as graduating from college if they report that they completed 16 or more years of education. Respondents in survey years 1992 through 2002 are coded as college graduates if they report having a bachelor’s degree, master’s degree, professional school degree, or doctorate.

Figure 1 displays trends in college graduation for white respondents aged 25-29 and aged 30-34, while Figure 2 displays the corresponding information for African Americans. Generating trends for the African-American male population with CPS data is problematic because many young black males are incarcerated, and therefore are excluded from the CPS sampling frame. To address this issue, we made rough calculations of the impact of the incarcerated population on the trend in graduation rates.
by combining data on incarceration rates for black males from Western and Pettit (2000) with data from Bureau of Justice statistics on the gender composition of the jail and prison population. These data are available for the 1982 to 1996 period, so for these years, we display both the unadjusted trend and the trend adjusted for incarceration rates. The top panel of figure 1 plots trends for whites in terms of birth cohort; the bottom panels plot trends in terms of survey year. For African Americans, we only display the results by survey year in order to accommodate the incarceration adjustment.

FIGURE 1 ABOUT HERE

The CPS data show that women have increased their rate of college graduation more rapidly than men, though the change has not been linear. White men and women born between 1940 and 1950 increased their rate of college graduation by about the same amount. Rates of college completion for men peak with the 1950 cohort. The decline that follows this peak is probably due in part to the end of the Vietnam war-related draft, which had enhanced levels of college attendance among young men as a strategy to avoid military service in Vietnam (Freeman 1976; Card and Lemieux 2001). The timing of the drop also coincides with the decline in the wage premium to college that labor economists have attributed to the large supply of new college-educated job seekers from the early baby boom cohorts (Freeman 1976). White female graduation rates dipped at the same time that male rates declined but the decline for women, who were not subject to the Vietnam-war draft, was not as large.

Note that the trends for males and females diverge in subsequent years. Starting with the cohorts born around 1955, whose members were about 22 years old in 1977, female college graduation rates resumed the steady rise that characterized the birth
cohorts from 1940 through the early 1950s. In contrast, the male rate of college completion remained on a plateau for about ten years and only resumed its rise with the birth cohorts of the early 1960s. The differing trajectories beginning around the 1953 cohort caused the female graduation rate to surpass the male graduation rate for cohorts born in the mid-1960s or later. Despite increasing graduation rates for the most recent male cohorts, the female advantage in college graduation continued to grow through the most recent cohorts observable in the CPS data.

In figure 2, the trend lines that are unadjusted for incarceration show that African American male and female graduation rates were roughly equal and both male and female African Americans graduated from college at much lower rates than whites. Graduation rates rose slowly for blacks born between 1940 and the early 1950s, as indicated by the trend lines from the earliest survey years in the mid-1960s through the late 1970s. Growth subsequently stopped and may have reversed slightly. After about 10 cohorts, rates resumed a slow rise in the early 1990s. When the incarceration adjustment is taken into account, the trend lines show female rates of college completion that are higher than male rates. The data further suggest that among African Americans the gender gap has been widening in favor of women during the 1990s, though data limitations prevent a definitive conclusion about this trend.

**FIGURE 2 ABOUT HERE**

**EXPLAINING THE RISING GENDER GAP**

In order to determine how family processes affected the female-favorable trend in college completion, either alone or in combination with broader system-level changes, we analyze data from the cumulative cross-sectional General Social Surveys from 1972
through 2002. Like the data from the CPS, the GSS data provide clear evidence that female rates of college completion have risen from the 1940 birth cohort through the 1982 cohort and surpassed male rates of completion for cohorts born in the mid-1960s (results not shown). Despite their smaller sample size, the GSS surveys have an advantage over CPS data for our purposes because they contain data on family background. The 24 annual General Social Surveys administered between 1972 and 2002 provide information on the educational attainment of respondents and their fathers and mothers, the socioeconomic status of their fathers, and several other measures of family background (National Opinion Research Center 2003). The availability of data from 1972 to 2002 makes the GSS valuable for examining trends in higher education by gender during the period when the shift from a male advantage to a female advantage in college completion occurred.

We restrict the analysis of college graduation to white respondents between the ages of 25 and 34 in each survey year (the black GSS sample is too small to support a similar trend analysis). We initially exclude older cohorts because the historical period of their childhood and adolescence, which was dominated by the Great Depression and World War II, is so different from the post-war period. Later in the paper, we address the question of whether the findings for younger cohorts apply to the older cohorts as well. The dependent variable in the analyses is college completion, operationalized as the completion of at least 16 years of education. Definitions of the family variables are provided in appendix A.

We begin by examining the relationship between parents’ education, family structure, and rates of male and female college completion for two specific historical
periods. The first period covers birth cohorts born in 1965 or earlier and includes people who grew up during the period before the point at which women overtook men in their rates of college completion. The second period covers birth cohorts between 1966 and 1977 and includes those who grew up during the period when women began to overtake men in their graduation rates. These results are presented in Table 1.

TABLE 1 ABOUT HERE

Panel A shows that males born in 1965 or earlier are more likely than females to have completed college for all but one of the family types displayed. Only when both parents had at least some college education were women as likely as men to have completed college. When either fathers or mothers had high school education or less, sons did better than daughters. When no father was in the household at age 16, sons still did better than daughters. This pattern is consistent with the education egalitarianism hypothesis. Interestingly, these data show little support for the gender-role socialization hypothesis, which predicts higher graduation rates for daughters of educated mothers. In fact, the female disadvantage is larger for families where mothers had some college and where fathers had a high school education or less (37.7 - 23.9 = 13.8) than it was in families where fathers had some college and mothers had a high school education or less (41.6 - 34.6 = 7.0).

Panel B of Table 1, however, shows a different pattern for the 1966-1977 birth cohorts. In cases where both parents had at least some college education, completion rates for males and females look very similar to those of the earlier cohorts. But in all other cells, the changes in graduation rates are quite large, and generally to the advantage of females. Where fathers had a high school education or less, daughters increased their
rates of college completion, while the graduation rates of sons dropped, regardless of mothers’ level of education. The graduation rates of sons also dropped considerably in families with no father present. Furthermore, Panel B in Table 1 suggests the emergence of a strong gender-role socialization effect. Only in families where fathers had some college and mothers had a high school education or less do males maintain a considerable (5.2 percentage point) educational advantage over females. In contrast, daughters had a 14.6 percentage point advantage over sons in families where mothers had some college and fathers had a high school education or less. A structural shift appears to have taken place over time in order to produce the apparent change in associations between parents’ education, family structure, and college completion rates across the two periods.

While informative, Table 1 provides no tests of the statistical significance of the apparent interaction between family background, cohort, and gender. To address this gap, we estimated a logistic regression of college completion on the effects of family background. In Table 2, we include only the core variables from Table 1. Later in the paper, we test for a structural shift using a larger set of family variables and alternative measures of parental education.

TABLE 2 ABOUT HERE

Model 1 includes dummy variables for cohort (1= 1966-1977 cohorts, 0=1938-1965 cohorts), gender (1=female), mother’s education (1= at least some college, 0=high school or less), father’s education (1= at least some college, 0= high school or less), and no father present in the household at age 16. It also includes all possible two-way interaction effects between these variables. Model 1 confirms the impressions from an
inspection of Table 1: Females in the later cohorts have significantly higher odds of completing college than do females in the earlier cohorts.

In addition to the variables from Model 1, Model 2 adds a two-way interaction between gender and the combination of no father present or father’s education being high school or less, and adds a three-way interaction among gender, the combination of no father present or father’s education being high school or less, and cohort. These two interaction variables explain in a statistical sense all of the interaction between gender and cohort that was exhibited in model 1. As indicated by the two-way interaction effect, males who had no father present in the household at age 16 or whose fathers had a high school education or less had significantly higher odds of completing college than similarly-situated females. However, the three-way interaction effect indicates that the early advantage for males of this origin category becomes a major disadvantage for later cohorts, such that males born after 1965 with either no father present or low-educated fathers have significantly lower odds of college completion than do similarly-situated females. Model 2 does not provide evidence that females in the later cohorts obtained a gender-specific advantage from mother’s education; the estimated effect of the three way interaction is positive (.221) but is smaller than its standard error.

Model 3 presents the fully interactive specification. It allows the effects of father’s education and father present at age 16 to differ and thereby includes all two-way and three-way interaction effects, which are presented in Table 2, using standard loglinear contrasts (i.e. the effects of each set of contrasts are constrained to sum to zero). This model has virtually the same substantive implications as model 2. There is strong evidence of a structural shift in the gender-specific effects of parents’ human capital on
the educational attainment of their same-sex children. The interaction between father’s education, gender, and cohort (.242) is highly statistically significant, which indicates that the salience of fathers’ college education for their sons’ likelihood of college completion increased in later cohorts, and the joint effect of three-way interaction effects involving father’s education and father’s presence in the household are statistically significant at the 0.01 level ($\chi^2=9.115$ with 2 degrees of freedom).\textsuperscript{11}

The choice of a specific cut point marking the period before and after this change is somewhat arbitrary. In this paper we present analyses using the 1965/1966 cut point. However, as the statistical tests at the bottom of Table 2 indicate, replications of these analyses using 1964/1965 and 1966/1967 cutpoints produced similar results. Moreover, the bottom panel of Table 2 shows that the statistically significant interaction effects involving the father’s situation, gender, and cohort persist when cohort is specified as a linear variable measured by the birth year. In sum, the finding of a structural shift in the gender-specific effects of father’s education on the probability of completing college is robust to the particular way that cohort is specified.

In the absence of a structural shift, the educational egalitarianism observed during the first period would have created a female-favorable trend in college completion. The strength of this trend can be seen through a simulation based on model 3 in Table 2. Of the GSS respondents born between 1940 and 1945, only 15% had mothers with at least some college education. About 10% had no fathers in the house at age 16, and only 18% had fathers who had some college education. In contrast, of the GSS respondents born between 1970 and 1975, 43% had mothers with at least some college education, and 41% of respondents had fathers in the house at age 16 with at least some college education. If
nothing else changed between these two sets of cohorts except for the distribution of families who had a father present and for the distribution of parental education, the coefficients for the early cohort model would have implied a reduction of the male-female educational gap, from 6.3 percentage points in favor of men (27.3% for men versus 21.0% for women) to 4.4 percentage points in favor of men (38.0% for men to 33.6% for women). However, this potential mechanism for change was gradually eroded by the structural shift in the effect of father’s education on son’s college completion. Even as the educational egalitarianism of college-educated parents remained essentially stable across the post-war decades covered by the GSS data, the disadvantage for sons of high-school educated fathers grew relative to daughters. This growing disadvantage constituted a reversal from the mid-century pattern, when the rate of return to father’s college education was higher for daughters than sons, to the pattern of the current period, when the rate of return to father’s college education is higher for sons than daughters. This reversal refutes the trend prediction of the educational egalitarianism hypothesis.

The results in Tables 1 and 2 indicate that the pattern of rising female advantage in college completion varies by socioeconomic background. To illuminate this point further, we compare the actual changes in the proportion of men and women completing college with the predicted changes from a model that assumes a homogeneous rate of change regardless of socioeconomic background. To obtain the baseline, we estimated a logit model for the probability of completing college as a function of age, gender, father’s education or no father present, mother’s education, and cohort group. This model contained interaction effects between gender and father’s education, gender and mother’s education, and gender and cohort group, but included no other interaction effects.
involving cohort group. In Table 3, the predictions from this model of change between earlier and later cohorts are compared to the actual proportions of respondents who completed college. By differencing the female change and the male change, we obtained the actual and predicted female gain relative to male gain in college completion. These relative changes are reported in columns 3 and 4 of Table 3. Column 5 reports the discrepancy between the actual relative change and the relative change predicted by the model assuming a homogeneous rate of change regardless of socioeconomic status.

TABLE 3 ABOUT HERE

As seen in column 2, the model of homogeneous change predicts male declines and female gains in the proportion completing college across all family categories. But as column 5 indicates, the discrepancy between the actual female-male gap and the predicted female-male gap from the baseline model were especially large when mother had college education and father was absent (.072) or had high school or less education (.199). The actual gap was smaller than the predicted gap from the baseline model whenever father was present and had a college education. Clearly the gender gap in college completion has emerged unevenly; its development varies with the status of the origin family.

To summarize the results to this point, we find no strong evidence that the female-favorable trend in college is being driven by compositional changes in the family situation that would give women a specific advantage over men in the educational attainment process. In other words, the educational egalitarianism hypothesis provided an accurate description of outcomes for cohorts born at mid-century, but the trend prediction from this hypothesis is wrong. In families where both parents are college
educated, male and female college completion rates are high and roughly constant throughout the observation period. But in families where fathers are absent or have low education, there has been a shift from a male advantage in the earlier period to a female advantage in the later period. Moreover, the female-favorable trend in college completion was not produced by a socio-cultural-economic force that affected everyone in the same way. Rather, the emergence of a female advantage in college completion has occurred unevenly across different socioeconomic groups and appears to stem predominantly from changes in the educational attainment process for children from less-advantaged families.

As we noted earlier, previous research found little evidence of gender-specific effects of parental resources. Recall that Kalmijn (1994) tested the gender-role socialization hypothesis by examining the interaction effects between gender and a set of family status variables (number of siblings, father’s years of education, mother’s years of education, whether the mother worked when the respondent was young, father’s occupational status of father, and mother’s occupational status) for respondents who were at least 24 years old using the 1987-88 National Survey of Families and Household data. He concluded that the addition of these interaction effects “produces only modest improvements” and therefore “the process of educational attainment is much the same for men and women.” (Kalmijn 1994, p. 272). His conclusions rest upon chi-square tests for the gender and parental resource interaction effects on the transition to high school diploma, the transition to college attendance conditional on high school graduation, and college completion conditional on college attendance, with the interaction effects significant at the .05 level only for the college attendance transition.12
Our analysis differs from Kalmijn’s in several respects. Most notably, our central finding is that a shift has taken place in the interaction between gender and parental status, which implies a three-way interaction between parental variables, gender, and cohort, while Kalmijn’s analysis focuses on the significance of two-way interaction effects between family of origin variables and gender. Other important differences include the historical timing of the data collection (Kalmijn’s data lacks birth cohorts born after 1960), Kalmijn’s use of retrospective data collected at a single time point, Kalmijn’s inclusion of respondents older than age 35, his restriction of the sample to respondents in two-parent families, and to those who provided information about their father’s education and occupation (data more likely to be missing when father was absent during childhood), and his use of transition models to analyze each educational transition conditional on successfully making the previous transition. Which of these many differences accounts for the discrepant conclusions? In order to answer to this question, we reanalyzed the GSS data with a broader set of covariates (see the table notes for details) and a specifications that paralleled Kalmijn’s approach.13

Table 4 contains chi-square tests for the significance of the two-way interaction effects between gender and parental resources, and the three-way interaction effects between gender, parental resources, and cohort. Model A estimates apply to the unconditional probability of college completion, first using only families with father present and survey years before 1989 (Model A1), and then using all the data. The left side of the table presents results using data for the post-1938 cohorts in the 25-34 age range (the focus of our analyses). Because Kalmijn had no upper age restriction, the right side of the table shows results using data for respondents 35 or older, regardless of birth
cohort. In each case, we present results from models using parent education measured as years of school completed and as a dummy variable (some college or more). We alternatively specified cohort as a linear effect (following Kalmijn) and as a step function with a 1965/1966 breakpoint (following our prior analyses).¹⁴

TABLE 4 ABOUT HERE

The results of this analysis demonstrate that interaction effects between gender and parental resources are clearly part of the process of higher educational attainment, but these interaction effects are complex, and their strength depends upon how the model is specified. Even for the sample based on data from 1989 or earlier, the effect of parental resources varies with gender. The two-way interaction effects between gender and parental resources with this sample exist when parental education is measured as years completed, but not when the dummy variable measure is used. The statistical strength of the interaction effect increases when the full data are used (see model A2), which is attributable at least partly to the larger sample size of the full data. The A2 set of models shows that the two-way interaction effects exist both in the 25-34 year-old sample analyzed above as well as in the 35 year-old and older sample when parental education is measured as number of years completed. Also note that the three-way interaction between gender, parental resources, and cohort is significant whenever cohort is measured as a linear variable. The same pattern exists in the older age group, with chi-square statistics typically being larger for the older group. In the Kalmijn model, parental resources interaction effects are specified over a set of five variables (father present, father’s education, mother’s education, father’s occupational status, and whether mother worked when the respondent was a child) rather than the more parsimonious interaction
effects tested in Table 2. The absolute value of the chi-square statistic using this larger
set of three-way interaction effects is little changed from results of our earlier analyses
that used only father’s education and father present. This fact suggests that the structural
shift involving these two variables (and principally the structural shift involving father’s
education) accounts for much of the change in the educational attainment process.
Finally, while not a highlight of the analyses in the current paper, the right side of Table 4
shows that the gender-specific effect of parental resources was changing across cohorts
for the older sample as well as the younger sample in similar ways, even if not
necessarily for similar reasons.

Models B and C decompose the unconditional process of college completion into
the two components of attending college, given high school completion, and completing
college, given completion of at least one year of post-secondary education. The results
suggest that the two-way interaction effects involving gender and parental resources, and
the three-way interaction effects involving gender, parental resources and cohort are
spread across both transitions. For the younger sample, the three-way interaction effects
do not achieve statistical significance for either transition; but again note that these are
relatively weak tests that spread the chi-square across 5 degrees of freedom rather than
across one or two degrees of freedom as was the case for the analyses of Table 2. For the
older sample, the three-way interaction effects attain statistical significance only for the
transition from high school to college. Taken together, these results reflect the complex
non-linear process of historical change in the gender-specific effects of parental resources
on educational attainment. Referring back to Table 3, we repeat our assertion that the
statistically significant structural shifts found in Table 2 and Table 4 correspond to an
important historical change in the relationship between parental resources and the likelihood of completing college for males and females.

**DISCUSSION**

This paper provides clear evidence of the trend toward rising rates of female participation in higher education over time in the United States. The initially lower odds of entry and completion of higher education for females relative to males have been reversed, and in recent cohorts females’ odds of college completion substantially exceed those for males. Moreover, we find that a considerable portion of white females’ gains in higher education is attributable to a changing relationship between the characteristics of the family of origin and the educational attainment of sons and daughters.

In light of these findings, it is clear that the situation is more complex than either education egalitarianism or gender-role socialization arguments predict. The education egalitarian hypothesis attributes female favorable trends in college completion to rising average levels of parental education. We observed patterns in line with this argument for early cohorts, and we found that the egalitarianism of college-educated parents was essentially stable across the post-war decades. However, the trend implications of the educational egalitarianism hypothesis fail because of the growing inequality of outcomes between males with absent or low-educated fathers and similarly situated females. Gender-role socialization perspectives predict that compositional shifts in maternal education or employment rates could produce female-favorable trends in higher education if these changes had a larger impact on daughters than sons. Additionally, structural shifts might arise via a growing importance of mother’s education for daughter’s educational attainment. The data do not provide strong support for either conjecture. Instead, most of the structural shift appears to involve father’s education. It
is expressed as a rising return to son’s educational attainment from father’s educational resources, but in substantive terms it means that sons from families where fathers had a high school education or less were increasingly disadvantaged in educational attainment.

Why would the probability of the son of a high school educated father completing college drop over time even as the probability rose for his daughter? The GSS data cannot provide a definitive answer to this question, but we can speculate about some possible mechanisms, which could then be the basis for further research. One possibility is that the trend is linked with a change in other factors of family life that are linked to father’s education. Back in 1940, a high-school educated father was rather high in the educational hierarchy of the American adult population where, according to the GSS data, fewer than 20% of fathers had some college education. Many of these fathers were first or second generation immigrants who, by many accounts, had a strong mobility orientation for their children (Hirschman 1983). In contrast, high-school educated fathers of the most recent cohorts are lower in the educational hierarchy and may differ in their mobility orientation as compared to their counterparts from the 1940s. Note, however, that research on whether value differences can explain differences in achievement across racial and ethnic groups has typically found at best a weak impact (Rosen 1959; Featherman 1971; Kao and Thompson 2003). The dominant finding, which dates back to Blau and Duncan (1967), is that educational differences are the primary factor accounting for group differences in achievement. These research findings do not apply directly to the present case, which concerns the extent to which a particular level of parental education has a changing gender-specific impact on achievement in the next generation,
but it does point to the importance of considering structural factors as possible explanations for the trend.

A second possibility is that the changing relative position of sons is linked to the deterioration in the value of high school education in the labor market. Other scholars have shown deteriorating wages for males with a high school education or less starting in the 1970s, which encompasses the time when the respondents comprising the later group of cohorts were entering adolescence. The decline in the financial situation of these families of origin may have been linked with increases in family stress and marital stability, since research has shown that financial decline is linked with marital stress and divorce (Hoffman and Duncan 1995; South and Lloyd 1995; Weiss and Willis 1997). This explanation would imply that rising levels of earnings inequality in the U.S. have had particularly negative consequences for male educational attainment.

Yet why would the changing implications of low education for fathers have a larger impact on sons than on daughters? If sons and daughters were using the same type of rational calculus, they might equally have concluded that high school education does not pay high monetary rewards and thereby been motivated to raise their educational aspirations. Charles and Luoh (2002) found no evidence that the wage returns to female college education were rising faster than the wage returns to male college education, while Grusky and DiPrete (1990) found that the status returns to college were growing faster for males than females because of sharp declines in the status returns to high school for new male entrants into the work force. Thus there is little reason to expect that rational calculations of returns to higher education can explain the patterns found above.
A third possibility is that the changing gender-role orientations of parents are somehow being expressed through the changing impact of father’s education on college completion that we report in this paper. However, while a theoretical case for such a link can be made, it is a tenuous one. It would start with the (at one-time correct) observation that girls should have the biggest gender deficit in the families with less-educated parents, who are on average less egalitarian in their gender-role attitudes than more-educated parents. It would then take account of the strong societal trend toward gender-egalitarian attitudes noted earlier. If this trend is largely driven by an increase in egalitarianism among the less educated (who had the strongest traditional orientation to begin with), one might conclude that female-favorable trends in these lower educated families would outstrip the female-favorable trends in the more educated families, where gender egalitarian attitudes were stronger in earlier years. While the GSS does not have data on the gender-role orientation of respondents’ parents, it does have data on gender-role orientations of respondents back to 1977. Our analysis of these data (not reported here) confirms the education gap in gender-role orientations (with the more educated being more egalitarian), and also confirms a strong trend toward more egalitarian attitudes. Nonetheless, the gap in egalitarianism between college and high school educated men did not shrink between 1977 and 2002. The stability of this gap tends to undercut the possibility that changing gender-role orientations are the explanation for our findings.

A fourth possibility is that that girls and boys do not apply the same rational calculus in forming their educational expectations because they calculate the return to education differently. Girls more so than boys may have considered education to be a resource for the marriage market as well as the labor market. They may have realized
that their chances of marrying a college educated man would rise sharply if they themselves went to college. If they perceived the decline in their high school-educated fathers’ economic fortunes, this may have provided girls with further incentive to raise their aspirations in the marriage market. Sons would be less likely to have a “marriage” orientation toward education and might therefore make different decisions (DiPrete and Buchmann 2004).

While the above argument is plausible, a complete explanation probably goes beyond the matter of educational expectations, since the likelihood of attending college depends upon performance in high school as well as on educational aspirations. Perhaps the selection factors and declines in material resources discussed above had a more negative impact on the behavior and academic performance of boys than girls. Existing evidence supports the conjecture that female-favorable trends in attainment are due—at least in a proximate sense-- to trends in academic achievement, whereby girls outperform boys in school and engage in behaviors that increase their likelihood of college enrollment. For example, Hedges and Nowell (1995) find a larger variance in test scores for males than females on some achievement tests, a gradual reduction of the male advantage in math and science tests, and distinct female advantage on tests of reading and writing ability. Some research also suggests that compared to boys, girls possess higher levels of “non-cognitive” skills (e.g., paying attention, being organized) that facilitate academic achievement and increase their probability of college enrollment (Jacob 2002). Other evidence indicates that in the past decade, female high school students are outpacing their male counterparts in terms of the number of college preparatory courses and the number of Advanced Placement (AP) examinations they take (Bae et al. 2000).
Some of these gender differences may derive from a gender-specific structural change in
the effect of father’s education on adolescent behaviors and academic performance. This
change could also operate through other family processes, such as parenting styles.
Research is needed to confirm or deny the plausibility of these conjectures.

Still another possibility is that pathways into higher education for the children of
less-educated parents have changed in a gender-specific way. The second half of the
twentieth century witnessed a dramatic expansion in the community college system as
well as in the four year college system. Statistics from the October 2002 Current
Population Survey show that the gender gap in enrollment in favor of women in two-year
colleges is even larger than in four year colleges. One reason for this gap may be that
the kinds of educational programs available in two-year colleges offer greater appeal to
women than to men, and also offer a gateway to four year colleges that provides
daughters from less-educated families with an advantage relative to sons. The GSS data
do not allow a determination of whether respondents made a transition from two-year to
four-year colleges and so this speculation cannot be tested here, but this conjecture
deserves systematic analysis with appropriate data.

Note that the results discussed above apply only to whites. Data limitations in the
GSS prevent a comparable analysis of blacks. However, the CPS data presented in
Figure 2 show that a gender gap in higher education also exists in the black population.
The gender gap among blacks could be due to some of the same mechanisms as the
gender gap among whites, or it could be due to very different mechanisms. Future
research using historical data sources with larger samples of African Americans should
address the important question of how gender gaps in higher education for blacks are similar or different from those for whites.

Finally, nothing in this paper contradicts the possibility that changing relative educational achievement is also driven by processes that are not directly tied to the family. Indeed, we expect that system level changes in cultural orientations towards gender are an important part of the story, and these changes can work independently of family effects as well as in interaction with them. Gender differences in socioeconomic outcomes are a result of a mixture of socio-cultural forces and—quite possibly—biological forces. This mixture probably involved a complex set of gender-specific advantages and disadvantages. In the less gender-egalitarian culture of the middle 20th century, the net result was a female disadvantage, but perhaps the decline in discrimination against daughters unmasked the fact that the balance of other forces favored females. This story is plausible, but additional research is needed to determine whether it is true.

As we noted earlier in this paper, the growing gender gap in college completion is a trend that has been observed in many industrialized countries. It is highly likely that this trend has common as well as country-specific causes. The presence of mobility data for many countries (Ganzeboom, Luijxk and Treiman 1989) makes it possible to attempt at least a crude replication of the analyses of this paper for other countries where similar trends have occurred. A comparative approach also makes possible a more rigorous assessment of the effects of macro-level factors, which may change at different rates in different countries. The growing gap in college completion may have profound impacts
on society that are only beginning to be appreciated. Both the causes and consequences of this trend deserve greater scrutiny.
APPENDIX A: VARIABLE DEFINITIONS.

Family background variables include parental education and occupational status as well as household structure. Note that the survey defines “mother” and “father” broadly. These measures are not limited to biological parents, but include stepparents, adoptive parents, and anyone functioning as the respondent’s guardian. In this paper we use the term “father” to mean any male guardian, and “mother” to mean any female guardian.

Father’s education and mother’s education measure the years of education of the respondent’s father and mother as reported by the respondent.

Father some college and mother some college are dichotomous variables that measure whether a respondent’s mother or father have 13 or more years of education.

Father’s college degree and mother’s college degree are dichotomous variables measuring whether a respondent’s mother or father have 16 or more years of education.

Father’s occupational status is the total socioeconomic index of occupational status (TSEI) developed by Stevens and Featherman (1981). TSEI scores are based on the occupational category of the respondent’s father, which was obtained by the 1970 and 1980 Census three digit occupational classifications contained in the GSS data.16

Father present is assigned a value of one if the father was present in the household when the respondent was 16.17

Mother worked is assigned a value of 1 if the mother worked for as long as a year when the respondent was 16.

Siblings reports the number of siblings of each respondent. To eliminate a skewed distribution of this variable, all respondents reporting more than three siblings are assigned a value of three.
REFERENCES


Shu, Xiaoling and Margaret Mooney Marini. 1998. “Gender-Related Change in Occupational Aspirations.” *Sociology of Education* 71:44-68.


Charles and Luoh (2002) argued that the rising female-favorable gap may be a consequence of rising “uncertainty” in the returns to college education for men. Their measure of uncertainty (the variance of earnings for college-educated males) amounts to an argument that rising inequality in male college-level earnings is depressing male education and generating a gender gap in educational attainment. However, their proposed explanation appears to be contradicted by data from other industrialized countries, which shows the same emerging gender gap in many countries (Eurostat 2002) that have not experienced the upward trends in wage inequality found in the U.S. (Blau and Kahn 2002).

The small sample of Black respondents in the GSS precludes a meaningful trend analysis of college graduation for Blacks.

Alternatively, Butcher and Case (1994) argue that if families have an aversion to earnings inequality between their children, then they would invest more in their daughters in the presence of sons.

That women have experienced discrimination during the course of American history is hardly in doubt. But it does not follow that discrimination extended to all spheres of life, nor does it follow that the extent of discrimination followed a monotonic trend. Considerable evidence indicates that gender gaps in education have alternately grown and shrunk during the past 150 years. The primary difference between the experience of women and men born in the late 19th century was not in the opportunity for college, but rather the opportunity for the college-educated to combine work, marriage, and fertility (Goldin 1992).

While some researchers favor one or another of these gender-role socialization hypotheses, others are skeptical. Kalmijn (1994) and Korupp, Ganzeboom and Van Der Lippe (2002) maintain that the effects of mother’s education and occupation are as important for sons as for daughters. Similarly, McLanahan and Bumpass (1988) suggest that in father-absent households, it is the daughters who suffer special harm; by marrying earlier to fill the void created by the absent father, their educational attainment is depressed (see also Powell and Downey 1997; Krein and Beller 1988 for equivocal findings concerning the family structure version of the gender-role socialization hypothesis).

This effect could operate directly through the mother’s own employment experience, such that mother’s education has a bigger impact on daughter’s education if the mother is employed outside the home. Alternatively, there could be a broader cultural impetus for girls to see themselves as being educated in order to enter the labor market, and to look to their mothers’ educational experiences as they form their own educational expectations.

We thank Richard Arum for pointing out this possibility.

In this case and for other variables used in this study where possible, we made use of the Unicon recodes of CPS variables, which are designed to increase comparability across the range of survey years studied in this paper.

Because of the lack of information on race by sex trends in the prison population, we assume that the gender composition is the same for whites as for blacks. We further assume that Western and Pettit’s (2000) counts for age 20-35, when divided by three, give roughly correct counts for our two five-year age groups. In order to do the adjustment, we assume that no one in the incarcerated population earned a B.A. or equivalent.

Since the GSS was not administered in 1979, 1981, 1992, 1995, 1997, or 1999 there are a total of 24 waves of data over this 30-year interval. Surveys were not conducted in 1979, 1981, and 1992 because of funding shortages. Beginning in 1994 the GSS survey was administered every other year with roughly double the usual sample size (Inter-university Consortium for Political and Social Research [ICPSR] 2003).

The three way interaction consists of father’s education (comprised of 3 categories: no father, father has high school or less, father has some college or more), gender (male, female) and cohort (early, later). Loglinear effects sum to zero across all dimensions, which yields 2 independent effects (3-1*2-1*2-1) for the 12 possible combinations of categories. The full set of effects is as follows:

<table>
<thead>
<tr>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early cohort</td>
<td>Later cohort</td>
</tr>
<tr>
<td>No father</td>
<td>-.087</td>
</tr>
<tr>
<td>Father H.S. or less</td>
<td>.329</td>
</tr>
<tr>
<td>Father some college</td>
<td>-.242</td>
</tr>
</tbody>
</table>
Note the large negative effect for males in later cohorts with father’s who had a high school education or less, again indicating that the early advantage for males from this origin category became a major disadvantage for later cohorts.

12 Korup, Ganzeboom and Van Der Lippe (2002) also express skepticism about the gender-role model. They use the same data as Kalmijn and they embed the U.S. analysis within a three-country analysis that includes the Netherlands and West Germany. Because the U.S. data are the same in both their and Kalmijn’s analysis, we compare our findings with Kalmijn’s analysis.

13 The GSS lacks a measure of mother’s occupation from 1972-1993, so this variable was omitted from our parallel analysis.

14 For the older sample, only the linear specification is used, because they were all born before 1966.

15 The ratio of females to males in the second year of four-year colleges in the U.S. was 1.22 in 2002. The ratio of females to males in the second year of 2-year colleges was 1.33. See http://www.census.gov/population/www/socdemo/school/cps2002.html for details.


17 Father present is coded as missing when the respondent’s description of his living arrangements with parents at age 16 is coded as “other” because we cannot determine whether or not a male adult was present in these households.
Table 1: College Completion Rates by Parents’ Education, Family Structure, and Birth Cohort

Panel A: Percent of White Males and Females Ages 25-34 that have Completed College, Birth Cohorts 1938-1965

<table>
<thead>
<tr>
<th>Mother's Education</th>
<th>Father's Education</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School or Less</td>
<td>%</td>
<td>19.5</td>
<td>14.3</td>
<td>41.6</td>
<td>34.6</td>
<td>19.3</td>
<td>13.5</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>1,349</td>
<td>1,649</td>
<td>330</td>
<td>365</td>
<td>197</td>
<td>281</td>
</tr>
<tr>
<td>Some College or More</td>
<td>%</td>
<td>37.7</td>
<td>23.9</td>
<td>60.2</td>
<td>63.1</td>
<td>35.1</td>
<td>30.0</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>183</td>
<td>239</td>
<td>374</td>
<td>429</td>
<td>77</td>
<td>70</td>
</tr>
</tbody>
</table>

Panel B: Percent of White Males and Females Ages 25-34 that have Completed College, Birth Cohorts 1966-1977

<table>
<thead>
<tr>
<th>Mother's Education</th>
<th>Father's Education</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School or Less</td>
<td>%</td>
<td>12.4</td>
<td>16.6</td>
<td>38.8</td>
<td>33.6</td>
<td>13.7</td>
<td>13.1</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>241</td>
<td>271</td>
<td>103</td>
<td>110</td>
<td>73</td>
<td>84</td>
</tr>
<tr>
<td>Some College or More</td>
<td>%</td>
<td>26.2</td>
<td>40.8</td>
<td>61.5</td>
<td>63.6</td>
<td>26.1</td>
<td>37.0</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>65</td>
<td>71</td>
<td>174</td>
<td>195</td>
<td>46</td>
<td>54</td>
</tr>
</tbody>
</table>

Source: 1972-2002 GSS data.
<table>
<thead>
<tr>
<th>Birth Cohort 1966+ (vs. 1938-1965)</th>
<th>Coeff.</th>
<th>s.e.</th>
<th>Coeff.</th>
<th>s.e.</th>
<th>Coeff.</th>
<th>s.e.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>-.380 ** (.088)</td>
<td>-.136 (.133)</td>
<td>.682 (.381)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Later Cohorts * Female</td>
<td>.415 ** (.141)</td>
<td>-.107 (.272)</td>
<td>.733 (.381)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother Some College</td>
<td>.700 ** (.129)</td>
<td>.737 ** (.134)</td>
<td>.447 ** (.056)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Later Cohorts * Mother Some College</td>
<td>.197 (.149)</td>
<td>.079 (.218)</td>
<td>.050 (.037)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Father Present</td>
<td>-.041 (.163)</td>
<td>-.031 (.129)</td>
<td>-.009 (.116)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father Some College</td>
<td>1.079 ** (.111)</td>
<td>1.285 ** (.113)</td>
<td>1.237 ** (.083)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Later Cohorts * No Father</td>
<td>-.106 (.224)</td>
<td>-.107 (.226)</td>
<td>-.036 (.116)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Later Cohorts * Father Some College</td>
<td>-.014 (.160)</td>
<td>-.390 (.211)</td>
<td>.023 (.083)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother Some College * Female</td>
<td>.187 (.128)</td>
<td>.120 (.147)</td>
<td>.058 (.037)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Father Present * Female</td>
<td>.015 (.193)</td>
<td>-.069 (.112)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father Some College * Female</td>
<td>.113 (.131)</td>
<td>-.088 (.081)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother Some College * No Father</td>
<td>.119 (.207)</td>
<td>.108 (.208)</td>
<td>.058 (.104)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother Some College * Father Some College</td>
<td>.153 (.138)</td>
<td>.150 (.138)</td>
<td>.077 (.069)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No Father or Father H.S. or less * Male</th>
<th>Coeff.</th>
<th>s.e.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Father or Father H.S. or less * Male * Later Cohorts</td>
<td>-.801 ** (.293)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mother Some College * Female * Later Cohorts</th>
<th>Coeff.</th>
<th>s.e.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Father * Female * Later Cohorts</td>
<td>.221 (.295)</td>
<td>.029 (.037)</td>
</tr>
<tr>
<td>Father Some College * Male * Later Cohorts</td>
<td>.242 ** (.081)</td>
<td></td>
</tr>
</tbody>
</table>

**Age Main Effects**

2 & 3 way interactions between Age and (Gender,Cohort)

<table>
<thead>
<tr>
<th>Constant</th>
<th>Coeff.</th>
<th>s.e.</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.415 ** (.065)</td>
<td>-1.695 ** (.140)</td>
<td>-2.009 ** (.383)</td>
</tr>
</tbody>
</table>

| N | 7,024 | 7,024 | 7,024 |
| d.f. | 14 | 15 | 21 |
| Log likelihood | -4185 | -4185 | -4185 |

**Note:** Robust standard errors are in parentheses. Dummy variable effects are contrasts against the omitted reference category. Log linear effects sum to zero over the categories of the variable.

* p<.05    ** p<.01

**Joint Test of Interactions (using different cutpoints)**

<table>
<thead>
<tr>
<th>Wald X2</th>
<th>df</th>
<th>P &gt; X2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964/1965 cutpoint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father Ed<em>Gender</em>Cohort</td>
<td>4.799</td>
<td>1</td>
</tr>
<tr>
<td>Mother Ed<em>Gender</em>Cohort</td>
<td>.982</td>
<td>1</td>
</tr>
<tr>
<td>1965/1966 cutpoint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father Ed<em>Gender</em>Cohort</td>
<td>7.480</td>
<td>1</td>
</tr>
<tr>
<td>Mother Ed<em>Gender</em>Cohort</td>
<td>.562</td>
<td>1</td>
</tr>
<tr>
<td>1966/1967 cutpoint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father Ed<em>Gender</em>Cohort</td>
<td>3.581</td>
<td>1</td>
</tr>
<tr>
<td>Mother Ed<em>Gender</em>Cohort</td>
<td>.050</td>
<td>1</td>
</tr>
<tr>
<td>Cohort Measured as a Linear Variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father Ed<em>Gender</em>Cohort</td>
<td>7.681</td>
<td>2</td>
</tr>
<tr>
<td>Mother Ed<em>Gender</em>Cohort</td>
<td>2.130</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 3: Actual Change in Proportion Completing College vs. Predicted Change from a Model that Assumes that the Female-Favorable Trend Is the Same for Everyone Regardless of Family Background

<table>
<thead>
<tr>
<th>Parental Status</th>
<th>Gender</th>
<th>Period Change</th>
<th>Female Gain Relative to Male Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Actual</td>
<td>Predicted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Mother Ed: HS or less</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Father at age 16</td>
<td>Male</td>
<td>-0.056</td>
<td>-0.036</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>-0.004</td>
<td>0.019</td>
</tr>
<tr>
<td>Father Ed: HS or less</td>
<td>Male</td>
<td>-0.071</td>
<td>-0.036</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>0.024</td>
<td>0.020</td>
</tr>
<tr>
<td>Father Ed: Some College</td>
<td>Male</td>
<td>-0.028</td>
<td>-0.061</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>-0.010</td>
<td>0.036</td>
</tr>
<tr>
<td><strong>Mother Ed: Some College</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Father at age 16</td>
<td>Male</td>
<td>-0.090</td>
<td>-0.054</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>0.070</td>
<td>0.034</td>
</tr>
<tr>
<td>Father Ed: HS or less</td>
<td>Male</td>
<td>-0.116</td>
<td>-0.052</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>0.169</td>
<td>0.033</td>
</tr>
<tr>
<td>Father Ed: Some College</td>
<td>Male</td>
<td>0.013</td>
<td>-0.066</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>0.005</td>
<td>0.036</td>
</tr>
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</table>
Table 4. Tests of Interactions between Gender and Parental Resources, and between Gender, Parental Resources, and Cohort

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Gender*Resources</th>
<th>Gender<em>Resources</em>Cohort</th>
<th>N</th>
<th>Gender*Resources</th>
<th>Gender<em>Resources</em>Cohort</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1.</td>
<td>only families with father present and earlier than 1989</td>
<td>Education as Years Completed</td>
<td>cohort as linear variable</td>
<td>17.20** w/ 4 d.f.</td>
<td>14.31** w/ 4 d.f.</td>
<td>3232</td>
<td>7170</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cohort as step function</td>
<td>16.56** w/ 4 d.f.</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Education as Some College or not</td>
<td>cohort as linear variable</td>
<td>6.17 w/ 4 d.f.</td>
<td>1.33 w/ 4 d.f.</td>
<td>6431</td>
<td>16833</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cohort as step function</td>
<td>6.07 w/ 4 d.f.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2.</td>
<td>using all families, all years</td>
<td>Education as Years Completed</td>
<td>cohort as linear variable</td>
<td>24.34** w/ 5 d.f.</td>
<td>14.83* w/ 5 d.f.</td>
<td>24.96** w/ 5 d.f.</td>
<td>15.02* w/ 5 d.f.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cohort as step function</td>
<td>23.99** w/ 5 d.f.</td>
<td>8.22 w/ 5 d.f.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Education as Some College or not</td>
<td>cohort as linear variable</td>
<td>6.36 w/ 5 d.f.</td>
<td>11.35* w/ 5 d.f.</td>
<td>8.66 w/ 5 d.f.</td>
<td>16.44** w/ 5 d.f.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cohort as step function</td>
<td>6.34 w/ 5 d.f.</td>
<td>8.04 w/ 5 d.f.</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

* p< .05; **p < .01

Basic Model: cohort, siblings, mother's education, father present at age 16, father's education, father's occupational status, whether mother worked when a child, and 2 way interactions between mother worked and family status variables.

Gender*Resource refers to a joint test of the significance of gender and father present at age 16, father's education, mother's education, whether mother worked when a child, and father's occupational status in the presence of the basic model terms.

Gender*Resource*Period refers to a joint test of these three-way interactions in the presence of the basic model and gender*resource terms.

For models that include families with no father/substitute father in the household at age 16, Models B and C include families with absent fathers and cover all GSS survey years.
Figure 1

Proportion with BA by Cohort and Survey Year, Whites
Proportion of Blacks with BA by Survey Year, Including Prison Population

Figure 2
Proportion of Blacks with BA by Survey Year, Including Prison Population

Age 25-29

Age 30-34

Survey Year

female
male
female+prison
male+prison