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Family Structure and the Reproduction of Inequality: Parents' Contribution to Children's College Costs

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Abstract

This article examines the role of family structure in the financial support parents provide for their children's college education. Data are from the Health and Retirement Study. We focus on aspects of family structure that affect parental support and estimate shared family variance in investments as well as within-family variation using a multilevel model. Family membership accounts for about 60% of the variance in payment of college costs. Small family size, living with both biological parents (compared to one biological parent and a stepparent), higher parental education, and having older parents are associated with greater parental expenditures.

Keywords

college cost; intergenerational transfers; family structure

1.0 Introduction

Fostering college attendance and providing financial support for it are two related ways that parents pass their advantage to their children. In this article we examine how family structure affects this process. The large increase in divorce and remarriage over time in the United States (U.S. Bureau of the Census 2002) has produced more families that include stepparents and stepchildren as well as more blended families in which all the children do not share the same biological or step relationship to their parents. This changing family structure raises the possibility that the pattern of family relationships plays an increasing role in influencing how parents assist their children.

While provision of financial support has been studied previously, our analysis extends existing research on family structure and parental college contributions in two significant ways. First, because we have data on all children in a family, we are able to estimate shared family variance in financial support as well as within-family variation. Moreover, we can

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identify the relationship of all children to the adults in the household, thus allowing a better characterization of family structure. Second, we explicitly consider the selection resulting from college attendance in our model of provision of support. The decision to attend college and the parental provision of support are not independent. Attending college is influenced by the expectations of parents, and parents who want their children to attend are likely to be more willing to provide financial support. Hence those who attend are a select group whose parents are more likely to provide support.

1.1 Previous Research

We focus on two aspects of family structure, parental marital structure and sibling configuration, and two outcomes, college attendance and parental contributions to college costs.

1.2 Parental Marital Structure

Children from families with both biological parents present, and those from single mother families, are equally likely to attend college (Conley 2001; Wojtkiewicz and Holtzman 2011), while children in stepfamilies are less likely to attend (Case, Lin, and McLanahan 2001; Sandefur, Meier, and Campbell 2006; Wojtkiewicz and Holtzman 2011). Research on educational attainment topics other than college attendance is consistent with this pattern. A number of studies have found lower levels of cognitive achievement in single parent and step families compared to biological two-parent families (Biblarz and Raftery 1999; Ginther and Pollak 2004) but also substantial variation among family types. Bilbarz and Raftery (1999), in particular, find that single mother families do better in producing child achievement than do single father or stepchild families even though they do not do as well as biological two-parent families.

The proximal mechanisms producing these differences between family types are not well understood. While single-parent and step families have lower levels of measured parental behaviors that support and encourage children’s attainment, these behavioral differences account for only a very small proportion of the difference in educational attainment outcomes (Astone and McLanahan 1991). Beyond proximal mechanisms, the distal reasons for differences in outcomes are also unknown. One possible explanation for lower achievement in stepchild families and single father families is the evolutionary argument that mothers have greater investment in their own biological children and hence will favor them (Anderson, Kaplan, Lam, and Lancaster 1999; Biblarz and Raftery 1999). Yet, other research challenges this explanation, finding that joint biological children in blended families perform similarly to stepchildren (Ginther and Pollak 2004), and parental investments in adopted children are equal to those in biological two-parent families (Hamilton, Cheng, and Powell 2007). These latter findings suggest the possibility that other aspects of family functioning or selection of families into single or step family status may be responsible for the poorer performance of stepchildren or the children of single parents.

The relationship of family marital structure to parental contributions for college costs has received less attention. Steelman and Powell (1991) control for parental education and income and find that unmarried parents are more likely to see government, instead of the student or parent, as responsible for college funding. Single parents said they were less able to pay and, in fact, had saved less money for their children’s college attendance. There is only one recent study of family marital structure and actual parental contribution to college costs. Turley and Desmond (2011) find that biological two-parent families contribute more to children’s college costs than either stepparent families or divorced parents. Remarried parents had similar incomes to biological two-parent families but contributed 5% of their income compared to 8% for biological two-parent families. Among other parental characteristics that differentiate between families, parental education, income, and wealth (Conley 2001) are associated with a higher probability of children attending college, and parental income is associated with greater parental willingness to pay for college (Steelman and Powell 1991).

1.3 Sibling Configuration

Turning to the characteristics of children in the family, two characteristics of the sibship, number of children and gender composition, and two characteristics of the individual child, birth order and gender, have been examined. Larger sibships are associated with a lower probability of attending college (Conley 2001), lower parental investments (Powell and Steelman 1989; Steelman and Powell 1989; Yilmazer 2008) in any one child, and lower saving (Steelman and Powell 1991) for each child's education. Powell and Steelman (1989) measure sibship size separately by gender and find that an additional brother reduces parental financial support for a college education more than an additional sister. In studies of overall educational attainment that do not focus on college attendance, there is mixed evidence for sibship gender composition, with results ranging from findings that the sex composition of sibships affects educational attainment (Butcher and Case 1994) to findings of no effect (Hauser and Kuo 1998), and even a finding that having opposite-sex siblings reduces educational attainment (Conley 2000).

Another often-studied characteristic, the individual child's birth order, yields equally complex results. Later birth order is associated with greater financial support for college costs (Steelman and Powell 1989) and more saving for the child (Steelman and Powell 1991). Yet, there is also evidence of higher overall educational attainment (Black, Devereux, and Salvanes 2005; Booth and Kee 2009) and higher achievement test scores (Conley, Pfeiffer, and Velez 2007) among earlier-born children. Results for gender of the individual child are also mixed. Steelman and Powell (1989) find female children receive greater financial assistance while the same authors (1991) find no gender difference in saving for college but a stated attitude of greater willingness to use debt to finance a son's education.

1.4 Family Effects

The measured aspects of family structure that children share, such as the size of the sibship or being in a blended family, as well as unmeasured shared characteristics of family members together constitute a family membership effect that will differentiate one family from another. There have been a number of recent estimates of the family effect on years of schooling in the United States – that is, the proportion of variance accounted for by family membership. These estimates range from 60% to slightly higher (Mazumder and Levine 2003; Mazumder 2008; Conley and Glauber 2008), indicating relatively strong family effects.

1.5 Remaining Research Issues

There has been relativity little investigation of the relationship between family marital structure and payment of college costs, and the research reported here adds to what is known on this topic in two important ways. One important unanswered question is whether all children in a blended family receive similar levels of support or whether stepchildren receive lower support. Differentiating between these two possibilities requires data on support provided to all children in a family though much of the existing related research has examined only one child in a family (e.g., Astone and McLanahan 1991; Turley and Desmond 2011; Wojtkiewicz and Holtzman 2011).

Differentiating between individual stepchild versus blended family effects can shed light on both proximal and distal sources of educational achievement. For example, Astone and

McLanahan (1991) find that stepchildren receive less encouragement from parents. Yet, as they point out, this finding might simply reflect selection into divorce and remarriage. Our data allow us to examine stepchild and blended family effects on another kind of parental encouragement, the payment of college expenses. The distinction between stepchild and blended family effects can also shed light on possible distal explanations for levels of family support. This issue was discussed previously in relation to studies of cognitive achievement. If lower financial support resulted from the individual child's stepchild status, one possible explanation is an evolutionary process in which mothers have greater investment in their biological children (e.g., Anderson, Kaplan, Lam, and Lancaster 1999; Biblarz and Raftery 1999). On the other hand, if all children in blended families are similarly affected (e.g., Ginther and Pollak 2004), the more likely explanation is selection or other aspects of family functioning.

Data from the Health and Retirement Study (HRS), which includes data on all children in a family, allow us to examine this issue in relation to payment of college costs. Our focus on payment of college costs both adds an additional outcome to those previously examined in the literature and broadens the literature by examining a young adult outcome.

The second contribution of this research is providing an estimate of the family membership effect on payment of college expenses. The extent to which family membership accounts for inequality is an important general question in stratification research because it reflects the extent of intergenerational inheritance. Examining this issue in relation to payment of college expenses expands a research literature that heretofore has focused on educational attainment, thus broadening the focus of this literature to a specific mechanism that may account for intergenerational inheritance. Moreover, we are able to estimate the degree to which measured characteristics account for the family effect. We focus on these issues in a model that also adjusts for the characteristics of the individual child, the demographic characteristics of the parents, and the varying context of college attendance over time.

2.0 Data and Methods

Data are from the 2001 Human Capital Expenditure Mail Study (HUMS), a supplement to the Health and Retirement Study (HRS). The study collected data on parental post-secondary education expenditures individually for each of the respondents' children and was sent to 3862 randomly-selected HRS households who had responded to the 2000 wave of the survey and who had at least one living child aged 18 or older. The response rate for the survey was 78.5%, including non-responses because of mortality or undeliverable questionnaires.

For many respondents, expenditures on children's education had occurred decades in the past, and collecting expenditure data through direct questions about amount spent would have posed significant difficulties with recall. Instead, the HRS asked the name and location of the last college attended, the total length of college attendance, the child's age when last attended college, and the portion of college tuition costs paid by the respondent. Respondents were also asked the number of years the child lived away from home while attending college and the proportion of room and board expenses the parent paid. These survey data were then merged with data on tuition and room and board charges for the specific college each individual child attended for the last year the child attended college. The college cost data come from the Integrated Postseconday Education Data Systems (IPEDS) Institutional Characteristics Survey collected by the National Center for Educational Statistics. These data are publicly available in the National Science Foundation's Integrated Science and Engineering Resource Data System (National Science Foundation 2010). College cost data in IPEDS are available for 1969 to 2001 and include an increasing number of institutions in successive years. Missing data in respondent reports and IPEDS data were imputed. Details on the IPEDS data and the imputation procedure used are available from the Health and Retirement Study website (Cao, Henretta, Norgard, Soldo, and Weir, 2005). The methodology for measuring college costs involves a number of assumptions including, for example, that recall error for percent paid is less than that for amount paid and that the child attended the same college (or a college of similar cost) throughout. The data from the mail survey were linked to the respondents' data in the general Health and Retirement Study, providing a broad range of data on respondents and their children.

Because most children attended college before the first wave of HRS data collection in 1992, we created stepchild and blended family measures for the time when each child was age18. Doing so required several steps. First, because data on stepchild relationships was not carried forward correctly from the first wave of the HRS, we coded those who were stepparents in 1992 as stepparents of a particular child in later waves, even if that status was not shown in a later wave data set. Next, if one parent was listed as a stepparent, we determined the identity of the adult respondents in the household at the child's age 18 based on the marital history of the biological parent. If the current marriage began after the child was 18, we examined the rest of the biological parent's marital history for an earlier spouse during the years of the HRS (i.e., since 1992) who was in the household when the child was 18. If a prior spouse was identified, data for that earlier parent or stepparent were used. When we were not able to identify an HRS respondent as the second parent in the household when the child was 18, we used the biological parent's marital history to identify the family configuration at child's age 18. Using the marital history, we were able to identify single-parent households, households with both biological parents of the child, and households with a stepparent. These assignments were inferred from the starting and ending years of marriages. For example, if a child was born during a marriage that began before the child's birth and lasted until after the child reached age 18, we assumed there were two biological parents in the household when the child turned 18. Conversely, a marriage that began after the child's birth but was in existence when the child was 18 indicated the presence of a stepparent in the household at age 18. Hence we were able to measure step relationship of an age-18 parent who was not directly observed in the HRS. If an unknown biological or stepparent was in the household at age 18, we do not know that person's age or education. We allow for this circumstance in coding the variables, as described later. We do not have measures of parental socioeconomic status before the time the child was of college age, except for parents' education. The lack of income data at the time each child was 18 is a significant loss but allows inclusion on all children in each family.

2.1 The Sample

Our base sample consists of the 5768 children of the original HRS cohort (born 1931-1941) who attained age 18 between 1964 and 2000 and who are either black or white. Virtually all the HRS children were college age during the years in which IPEDS data are available, but we impose the year range because some external time series data used in the analysis are available for these years only. We limit the analysis to black and white respondents because there are not an adequate number of cases to estimate effects for various other ethnic categories. Further deletions because of missing data reduce the sample to 5070 children, 87.9% of the base sample. Most of these losses stem from the respondents' failure to answer whether the child attended college. Of the 5070 children in the final sample, 2957 attended college, and we are able to estimate tuition and room and board costs for 2867, or 97% of those who attended college. The 5070 sample children are clustered into 1519 family groups.

2.2 The Model

The process that generates the data available for our analysis is complex but only three outcomes are observed: (1) whether or not the child attends *any* college, (2) the parents' financial support of tuition costs, and (3) the parents' financial support of subsistence costs. These three outcomes observed are jointly determined; the two financial-support variables are observed only if the dummy variable indicating college attendance equals one; and, either or both of the observed financial-support variables may equal zero. A regression framework for these three jointly-determined outcomes is as follows:

$$\text{COLLEGE}^{*}_{ij}=X_{ij1}\text{B}_1+u_{i1}+e_{ij1}, \quad (1)$$

$$\text{TUITION}^{*}_{ij}=X_{ij2}\text{B}_2+u_{i2}+e_{ij2}, \quad \text{and} \quad (2)$$

$$\text{ROOMBOARD}^{*}_{ij}=X_{ij3}\text{B}_3+u_{i3}+e_{ij3}. \quad (3)$$

In these equations, the subscript i refers to families while the subscript j refers to children within families. The dependent variables in equations (1) – (3) are all latent variables. They are connected to observed outcomes as follows: the observed variable $COLLEGE_{ij}$ = 1 if the latent variable $\text{COLLEGE}^{*}_{ij}>0$, and $COLLEGE_{ij}$ = 0 otherwise; similarly $\text{TUITION}_{ij}=\text{TUITION}^{*}_{ij}$ if $\text{TUITION}^{*}_{ij}>0$, $TUITION_{ij}$ = 0 otherwise and *ROOM* & $BOARD_{ij}$ = *ROOM* & $\text{ROOM\&BOARD}_{ij}=\text{ROOM\&BOARD}^{*}_{ij}$ if *ROOM* & $\text{ROOM\&BOARD}^{*}_{ij}>0$, while *ROOM* & $BOARD_{ij}$ = 0 otherwise. Furthermore, $TUITION_{ij}$ and *ROOM* & $BOARD_{ij}$ are observed only if $COLLEGE_{ij}$ = 1.

The random components multilevel model divides the error in each equation into two components, a component representing the family effect and a random error within families. We assume that the random errors e_{ij1}, e_{ij2}, and e_{ij3} are independently normally distributed. The family-specific effects, u_{i1}, u_{i2}, and u_{i3}, account for the presence in our data of multiple children from some families (i.e., clustering at the family level), and capture any residual variance associated with family membership. We assume that these three family-specific random components have a multivariate normal distribution. Given these assumptions, equation (1) is a Probit equation, while equations (2) and (3) are Tobit equations. The Probit equation is a "selection" equation for the two Tobit equations. Moreover, because of the family-level random effects, the equations represent a multilevel model. In this model, the three outcome domains for the individual child (*COLLEGE, TUITION*, and *ROOM* & *BOARD*) constitute "level 1" while the family is "level 2" in the analysis.

Manski (1989) addresses the identification of selection models, pointing out the lack of robustness in models for which the regressors in the "selection" equation and the "outcome" equation are the same. For this reason, we include cohort-average rates of military service at age 18 as an instrument in the college attendance equation.[1] Throughout the period covered by our data, entering the military was an alternative to going to college for 18-year-olds; moreover, prior to 1973 (and especially during the war in Vietnam) the existence of the draft altered the incentive to enroll in college. Cohort-average rates of military service have been

[1]For 1964 through 1983 our *proportion military* variable uses data presented in Carlson and Andress (2009). We calculated the corresponding percentages for 1990 and 2000 using Census public-use data (Ruggles et al. 2010), and interpolated the remaining values. The percentage of a birth cohort serving in the military at age 18 ranged from 8 to 9 percent for those turning 18 during 1964-69, and from 5 to 6 percent for those turning 18 during 1970-1977. The proportion serving among later birth cohorts fell steadily, from about 4 to just 1 percent among the 1982 birth cohort.

used as instrumental variables in several recent studies of the long-run consequences of military service (e.g., Bedard and Deschênes 2006; Imbens and van der Klaauw 1995). Between-cohort variation in the level of military service reflects a number of exogenous factors including the existence of the draft, rules governing exemptions and deferments, military manpower needs, recruiting efforts, and military pay relative to that available in civilian labor markets. None of these exogenous factors is expected directly to influence individual families' ability or willingness to contribute to their own children's college costs, justifying the exclusion of the cohort military service variable from the two parental-expenditure equations. Because military service factors are expected to have gender-specific effects, we also interact the *proportion military* variable with the child's gender. We use a single-equation linear probability model of the college attendance outcome to assess the explanatory power of the *proportion military* variables in the attendance equation. The full three-equation model is estimated by full-information maximum-likelihood, using aML software (Lillard and Panis 2003).

2.3 Variables

Descriptive statistics for the dependent variables included in the equations are presented in Table 1. We examine three outcomes. *Attend College* is a dichotomous variable coded '1' if the child attended college and '0' otherwise. *Tuition expenditure* is the product of the imputed tuition cost in the last year the child attended college times the number of years the child attended college times the proportion of tuition paid by the parent. *Room and board expenditure* is the product of the college's room and board charge in the last year the child attended times the number of years the child lived away from home times the proportion of room and board expenses paid by the parent. Both tuition and room and board expenditures are adjusted for price changes using the 2001 Consumer Price Index for all urban consumers (Bureau of Labor Statistics 2010). Nearly 60% of the children attended college. Among those who attended college, the mean tuition paid by the parent is $9,986, but only 73.6% of parents contributed to college costs. Among those who contributed to tuition, the mean amount paid was $13,565. For room and board, 53% contributed to costs; the overall mean contribution was $5,763 and among those who actually contributed it was $10,867.

The first column of Table 2 presents means of the independent variables used in the analysis. While the main focus of our analysis is the marital and parental structure of the household and the characteristics of the sibship, covariates in the analysis also include individual child characteristics, the parents' demographic characteristics, and a set of variables to adjust for contextual factors that may differ over time and place.

The household marital and parental structure is captured by the relationship of each child to each parent when the child was age 18. The method for determining this relationship was described in section 2.0. The categories are: stepchild of the parent (*stepfather* and *stepmother*); and parent not present because of death, divorce, or other reason (*no father* and *no mother).* Biological child of both parents is the reference category.

We also include a variable measuring whether the child was in a blended family at age 18 (*blended family).* This variable allows us to differentiate a particular child's relationship to the parents (described in the previous paragraph) from common effects for all children in a blended family. We define a blended family as one in which there are differences among children in their relationship to the parents. For example, a blended family is one in which some children are own children and some are stepchildren of a parent. However, if all children in a family are biological children of one partner and stepchildren of the other, the family is not blended because there is no diversity in parenthood patterns. Because children in HRS turned age 18 at different times before data were collected and possibly before their current parents were married to each other, not all children can be unambiguously categorized on this variable. We therefore create three categories for the blended variable: not blended, blended, and possibly blended. Not blended (the reference category) includes children in families in which all children are joint biological children of the two partners; children who turned 18 before the current marriage at a time at which there is no evidence that the biological parent was in a marriage (as judged from the start and stop dates of the biological parent's marriages); and children in families in which all children are biological children of one parent and stepchildren of the other parent and all children turned 18 in the current marriage. It also includes children who turned 18 before the current marriage during a time at which there were two biological parents in the household. It is possible that the unknown biological parent brought children to the marriage but this pattern is unlikely because the previous marriage had lasted at least 18 years. The blended category includes children who, at age 18, were in families in which at least one parent reports both biological children and stepchildren. We place the remaining children in the "possibly blended" category. 14.2% of children are in blended families, 60.3% are not in blended families, and 25.5% are in possibly blended families. Characteristics of the sibship include its size and gender composition, based on the 2000 roster of living children. Following Powell and Steelman (1989), size and gender composition are measured by *number of brothers* and *number of sisters*, each coded 0 to 5 or more. The top-coded category of 5 or more includes four percent of the observations of both brothers and sisters. It is not possible to unambiguously recreate a family roster when the child was age 18. Use of the 2000 roster may introduce measurement error because it does not adjust for death and birth of siblings or the effects of family breakup and new stepfamily formation since the child attained age 18. Yet the possible effects of this measurement error are reduced because we estimate the effects of sibship controlling for whether the child is in a blended family.

Individual child characteristics measuring concepts discussed earlier include birth order and gender. *Male* is coded as male equal to '1' and female equal to '0'. Child's *birth order*, ranges from 1 to 10. To distinguish only children from other first-born children, we code a dichotomous indicator equal to '1' for children who were *first-born with younger siblings* and '0' otherwise. We also include a measure of ethnicity (*black*) coded '1' for blacks and '0' for whites for each child though this measure is taken from parents' ethnicity and is the same for all children in a family.

Parents' demographic characteristics are measured when the child was age 18 using the approach described in section 2.0. They include a dichotomous indicator of whether each parent is a *college graduate*, coded '1' and coded '0' otherwise, as well as the interaction (*both parents college graduates*). We are not able to include income or assets because they were first measured in 1992, after most children attended college. Hence education measures parental values but also serves as a proxy measure for economic status. We also include each *parent's age* at the child's birth. Parents' age when the child was born is shown in the table; hence, when the child turned 18, fathers averaged 47.1 years, and mothers 43.8 years of age. We also include an indicator variable measuring whether the parents' characteristics are unknown (*father's demographics unknown* and *mother's demographics unknown)*. This variable indicates that a parent was present but we do not know the parent's characteristics because that parent was not present by the time the HRS began. Mother's characteristics are unknown for 8.9% of children, and father's characteristics are unknown for 9.5%.

Finally, because the HRS children attended college over a long period, we include some contextual measure of opportunities to attend college and societal conditions at the time of college attendance. To measure opportunities to attend college which vary substantially by state (College Board 2010), we include respondent's Census region of residence in 1992.[2] The reference category is the South Atlantic region. In addition, we include two contextual variables measured for the year the child attained age 18. College costs and the amount of financial aid available change over time and may affect the decision to attend. *College cost* is the average of total tuition, room, and board for four-year universities, available for years 1964-1965 through 2000-2001, and taken from Table 315, column 4 of Snyder (2002). These average-cost figures have been converted to constant (2002) dollars. *College aid per capita* is the average aid provided through the Pell Grant and related grant programs per full-time equivalent recipient, available for selected years during the period 1963-1964 through 1983-1984 in Gillespie and Carlson (1983) and for 1973-1974 through 2002-2003 in College Board (2003). Missing years in the early part of the series were filled in using linear interpolation, and the resulting combined series was expressed in 2002 dollars.

Another characteristic that may affect the decision to attend and may change over time is the expected gain from college. We measure this expectation using the difference in average wages between college and high school graduates at the time the child was aged 18. The *College-High School Wage Gap* is the ratio of average full-time weekly wages for those with a college education or more, to wages among those with a high school degree at the time the child was age 18, based on March Current Population Survey data for 1964-2003; the ratios represent fixed weighted averages of wage-gap ratios estimated separately for men and women in four different years-of-experience groups [(see Figure 2A of Autor, Katz and Kearney (2005), which provides additional detail on the derivation of these ratios]. The final two variables, *proportion military* and its interaction with *male*, appear in the selection equation only, as discussed in section 2.2.

3.0 Results

Parameter estimates for the three-equation model are presented in Table 2. We begin by discussing the college attendance results. Among child and sibship characteristics, later birth order, being a male, and having more brothers or sisters reduce attendance. Holding constant the other characteristics in the model, black females are more likely to attend than white females. Being a stepchild of either parent reduces the probability of college attendance. Holding the child's relationship to the parents constant, being in a blended family does not have a significant effect on attendance. Having parents who are college graduates increases the child's probability of attendance. The negative interaction of father's and mother's education indicates that having a second college graduate parent increases the attendance probability but the effect is less than additive.

The main-effect coefficient on *proportion military,* which pertains to females, is negative. This suggests a lower propensity for women to attend college during the years that military service was more prevalent, i.e., from 1964 to 1970 in our sample. The interaction of the military-service variable with gender indicates that males are more likely than females to enter college if they graduate from high school when military service is more common, as expected. The negative sign for the main-effects result accords with past research showing that the proportion of females entering college has risen, relative to the proportion for males, quite steadily since about 1973 (Card and Lemieux 2000). Over this time period, the proportion military variable declined in a nearly-monotonic fashion. One study of the gender gap in college attendance found that most of the differences are explained by non-cognitive factors such as the ability to follow directions, to work in groups, to pay attention in class, and organizational skills (Jacob, 2002), factors not included in our analysis. The large size of the coefficient of *proportion military* results from the scale of the variable. The coefficient is

[2]The ideal measure of opportunity to attend college would be state of residence at the time the child attended college. The HRS public data release includes only region of residence, not state, in order to maintain confidentiality. In addition, parents' residence at the time the child was 18 is not available. Mid-life parental respondents are likely to be stable geographically, and so we use the 1992 measure as a proxy for region when the child attended college.

the predicted change in the Probit for a one percent change in the military variable. However, the entire range of the *proportion military* variable over the years of observation is about one-twelfth of one percent. The chi-square test statistic for the null hypothesis that excludes the two identifying variables from the selection equation is 8.78 ($df = 2$; $p = 0.012$), indicating that these variables have good explanatory power for the decision to attend college.

The last two columns of Table 2 present results for tuition and room and board paid. With only a small number of exceptions, results in the two equations follow the same pattern and are discussed together. None of the individual child characteristics is significant. Having more brothers or sisters reduces the amount spent on an individual child, with the brothers coefficient having a somewhat greater size. Blended family membership is not significant. Having a stepmother is associated with significantly lower support for both tuition and room and board, while having a stepfather reduces room and board expenditures only. For both outcomes, the point estimates for stepmother are about twice those for stepfather. Having either a mother or father who is a college graduate significantly increases both types of support, though the point estimate for fathers is greater. Unlike the college attendance equation, having a second parent who is a college graduate does not affect the additive nature of parental educational attainment in a significant way. Higher parental age at the child's birth, a proxy for career stage and income, is associated with greater expenditures on tuition, though the effect on room and board is only observed for fathers.

The error structure for the equations is presented in the last four rows of the table. The random effects multilevel model disaggregates the total residual error in each equation into two components: a family effect that accounts for the correlation among family members net of measured covariates, and a purely random component. Focusing on the family effect, we find strong evidence of selection in the financial support equations, in the form of correlations (ρ_{1j} and ρ_{2j}) greater than .4 between the family component of the college attendance equation and the two financial support residual error components. That is, the families whose children are more likely to attend college, net of measured covariates, are also the ones that are more likely to provide greater financial support.

The family effect is the same as the intra-class correlation and measures the degree to which unexplained variance is due to family membership. Using the notation of equations 2 and 3 presented earlier, it equals the ratio $\sigma_u^2 / \left(\sigma_u^2 + \sigma_e^2\right)$ (Rabe-Hesketh and Skrondal 2008: 58-59). For tuition and room and board, respectively, 48.2% and 53.9% of the residual variance is due to the difference between families that is not accounted for by the model covariates.

3.1 Disaggregating the Family Effect

To examine the source of the variance due to family membership, we estimated the intra-class correlation for several models nested in the final model shown in Table 2. Changes in the correlation across nested models indicate the variance accounted for by the additional variables included in each of these nested equations. These results are presented in Table 3. The first model is the intercept only model which provides an unconditional estimate of the family membership effect; it indicates that family membership accounts for about 60 percent in the variation in parental contribution for both tuition and room and board. The model in the second row adds the contextual variables: region of residence, average college cost, financial aid *per capita*, and the college-high school wage gap. This addition produces a modest decline in the tuition equation but no change in the room and board equation.

Model 3 adds mother's and fathers education, age, the stepfather and stepmother variables, parental absence, and demographics unknown. The addition of parents' own characteristics and their relationship to each child in model 3 result in a substantial reduction in the residual shared variance. The later addition of family characteristics (numbers of brothers and sisters, and blended family) results in only a modest further reduction. The final model including child characteristics produces no further change, a result expected from the non-significance of those variables. Compared to the intercept-only model, we have accounted for one-fifth of the unconditional family effect on tuition and about 15 percent of the unconditional family effect on room and board. Parental characteristics and the relationship between parents and the child produce most of the family effect. Still, while there is a strong family effect, the measured covariates account for a limited portion of what families share.

3.2 Predicted Probabilities for Parental and Child Configurations

To assist in interpretation, Tables 4 and 5 present predicted results for different sibship and parent configurations, respectively.[3] Note that these tables predict the sum of tuition and room and board. Table 4 presents predicted values for various combinations of the sibling variables for families with one, two, or three children, holding other variables constant at the sample means. The first panel presents results for a first-born child with no siblings. The second panel presents predicted results for a two child family, varying the birth order of the child and whether the sibling is male or female. The third panel presents predicted results for a three child family with one male and one female sibling, varying only birth order.

Having siblings reduces the probability of college attendance. An only child has the highest probability of attendance, slightly over 80%. Each additional sibling reduces attendance by a first-born sibling by 2 to 3%. Birth order also makes a substantial difference. Being born second instead of first reduces attendance between 2 and 4%, while the difference in attendance between second and third birth order is about 2%.

In contrast, birth order has modest (and non-significant) effects on total tuition and room and board payments within categories of family size or sibship gender composition. The predicted effects in the first amount row, labeled Total Payments, includes both the contribution of birth order to the probability of college attendance and to amount paid. The second and third amount rows include only those who attended college (the second row, labeled Total payments|college=1) or those who both attended and received some support (the last row of the table). In the latter two rows, being born later results in a modest increase in amount paid, reflecting the small positive, but non-significant coefficient for birth order in the tuition equation in Table 2. Focusing on the last two rows for families with two children, we find somewhat larger differences between families with different proportions of male and female children than between children with different birth orders. For example, varying gender composition between columns 2 and 4 results in a larger difference than varying birth order between columns 2 and 3.

Table 5 presents predicted values for several parental relationship configurations.. The probability of attendance is very sensitive to parental configuration and the predicted effects are large. Children with two biological parents are more likely to attend college and receive more support than those with a stepparent or no parent. Children with a stepparent are both less likely to attend and receive substantially less support than those with biological parents, and those with a stepmother receive substantially less than those with a stepfather.

[3]The predictions are based on a large (n=100,000) sample of simulated draws from the estimated error-covariance structure shown in Table 2. The simulated errors are added to the expected values implied by the given array of explanatory variables and estimated regression coefficients; the resulting predicted values are then recoded in accordance with the observability conditions discussed above, producing the samples of individual-level predictions that is summarized in Tables 4 and 5. The simulated errors are held constant over all variations in the X vector used in these tables.

Having no father (i.e., a mother-only household) reduces support much more than having no mother (a father-only household). In contrast, the probability of attendance for those with no father is higher than for those with no mother. Put in another way, single mothers are more likely to promote college attendance among their children compared to single fathers but they provide a substantially lower level of financial support for that college attendance.

4.0 Discussion and Conclusion

Our random-effects modeling approach allows us to quantify the relative contribution of family- and individual-level factors, both observed and unobserved, to the substantial population-level heterogeneity in propensities to attend college, and in parental financial support of their children's higher education. This approach permits us to address several of the issues raised by the literature.

The first set of key findings address the implications of blended family status and marital configuration, a concept including presence of stepparents and single-parents. Being in a blended family neither reduces the probability of college attendance or the amount of support received. Being a stepchild of either parent, however, reduces the probability of attendance, and having a stepmother is associated with a substantial reduction in the amount of support received. In other words, it is stepchildren, not all children in a blended family, who are most disadvantaged.

This finding addresses the findings of earlier research that suggested that all children in a blended family are likely to be negatively affected. This earlier research focused on cognitive achievement, an outcome more similar to college attendance than to parental support for attendance. However, our findings for college attendance provide no confirmation of the general disadvantage of all children in blended families. At the same time, our results also indicate important differences in the situation of individual children because being a stepchild reduces college attendance.

The point estimate for the stepmother effect is larger than the stepfather effect in all three equations. One explanation for these findings is the evolutionary argument, presented earlier, that biological mothers have greater investment in their own children than fathers. Alternatively, this difference may simply be a reflection of the household in which the child has spent more time. Households report on their children in the HRS regardless of whether they were residents of that household. The children are now adults, and it is not possible to tell with whom they lived during childhood. When the child had a stepmother at age 18, it is likely that the child did not live in the reporting household given that primary custody by the biological mothers was the more common arrangement for parents born between 1931 and 1941. Even in 2001, long after virtually all the children of the 1931-41 birth cohort had reached age 18, child's residence with the mother post-divorce was almost four times more common than residence with the father (Kreider 2005). Hence, a child with a stepmother has typically spent relatively little time in the reporting household and may receive less support for that reason. When a stepfather is in the household, it is likely that the child was resident with her biological mother. Of course, the more common custody arrangement of living with the biological mother may itself be a reflection of a biological mother's greater investment in her children.

The lower amount provided to children with either a stepmother or stepfather, compared to a biological child, might be due to the existence of a second parent outside the household who is contributing support. However, between biological parents not in the respondent household, we might expect an absent father to contribute a larger amount than an absent mother because men's average wages are higher than women's. However, having a stepfather – i.e., having a biological father whose contribution is not observed – involves less of a financial penalty in the reporting household than having a biological mother who is not observed. Hence explanations linked to residence or mothers' greater investment in their children are more convincing than the possible contributions of the unobserved biological parent.

A second key finding extends research on the effects of family membership on schooling. As noted earlier, recent estimates of the role of family membership on years of schooling find that about 60% of the variation in years of schooling can be attributed to family membership. We find the same level of shared family total variance in parental financial contributions to college costs. We have only modest success in explaining this family effect. Even after the introduction of covariates, the shared family residual variance is about 50%. There are many possible explanations of this residual variance for which we do not have measures, including children's ability, neighborhood environment, emphasis on cognitive skills, and the parent's income and values, to name a few.

Beyond these two new findings, our results generally confirm earlier research. A larger number of children in a family reduces both the probability of college attendance and the amount of financial support. Later birth order is associated with lower probability of attendance, but we fail to confirm the positive association of later birth order and parental financial contributions. There are not clear findings in previous research addressing gender composition and gender of the child. While child's gender is associated with college attendance, it is not significantly related to amount of support. We find that both number of brothers and number of sisters reduce parental contributions though the point estimates suggest that an additional brother has a somewhat larger negative effect than an additional sister, a finding consistent with Powell and Steelman (1989).

Our findings for parents' demographic characteristics are consistent with previous research though we are limited to parents' education as a measure of their socioeconomic status. The retrospective nature of the HRS data collection on college costs is an important limitation in this regard because we cannot recover income or asset level at the time the child was aged 18. We would expect that income and assets would have a significant effect and that it would have reduced the residual family membership effect in a substantial way. Moreover, the results for stepchild status might also be affected substantially by inclusion of income and assets in the model.

Overall, the analysis presented here contributes to family demography by extending research on stepchild status and blended family membership to the payment of college expenses. While family membership – that is, factors shared by all children in a family – accounts for most of the variance in parental support for college, the results also indicate that a stepchild relationship produces important differences within a family.

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Highlights

- We examine parental support for children's college expenses
- Stepchildren are less likely to attend college
- Stepchildren who do attend receive less financial support
- Family membership accounts for 60% of the variance in parental financial support

Table 1

Means[a] and Standard Deviations of Dependent Variables

	Mean	S.D.
Variables:		
Attend College	59.5	
Tuition Paid | Attend College	$9,986.22	(16721.65)
Any Tuition Paid | Attend College	73.6	
Tuition | Any Tuition Paid	$13,564.54	(18285.75)
Room & Board Paid | Attend College	$5,763.92	(8286.34)
Any Room & Board Paid | Attend College	53.0	
Room & Board Paid | Any Room & Board Paid	$10,867.03	(8598.50)

[a]Percentage shown for categorical variables; mean and (SD) shown for continuous variables. All summary statistics are weighted; unweighted *n* = 5071.

Table 2

Summary Statistics and Results for College Payment Equations

		Regression Coefficients (S.E.)		
	Mean[a] [S.D.]	Attend College	Tuition Paid	Room & Board Paid
Intercept		0.456 (0.431)	−13145.639 ** (4570.473)	−9812.425 ** (3024.771)
Child characteristics				
Male	50.8	−0.488 ** (0.156)	−645.863 (743.744)	−246.990 (528.608)
Black	8.6	0.426 *** (0.119)	−1217.963 (1495.367)	−246.118 (1186.157)
Black × Male	4.3	−0.422 *** (0.125)	−1025.874 (1910.120)	−1506.961 (1437.521)
Firstborn with Younger Siblings	27.3	0.030 (0.084)	409.972 (1111.758)	110.645 (766.793)
Birth Order	2.3 [1.93]	−0.067 * (0.030)	310.867 (449.502)	−23.193 (303.962)
Sibship Characteristics				
Number of Brothers	1.7 [1.3]	−0.127 *** (0.031)	−2183.809 *** (470.214)	−1420.798 *** (315.945)
Number of Sisters	1.6 [1.3]	−0.172 *** (0.031)	−1695.161 *** (428.044)	−907.504 ** (302.371)
Blended Family	14.2	−0.142 (0.116)	1202.090 (1839.552)	1951.104 (1286.560)
Possibly Blended Family	25.5	−0.175 (0.119)	−3017.910 (1832.348)	−1429.487 (1269.454)
Parents ’ Relationship to Child				
Stepfather	9.5	−0.323 ** (0.112)	−2788.238 (1839.419)	-2777.277 * (1272.732)
Stepmother	12.6	−0.391 *** (0.116)	−5279.706 ** (1871.937)	−5592.220 *** (1327.245)
No Father	9.2	0.034 (0.171)	−334.683 (2669.354)	−93.420 (1955.565)
No Mother	6.0	−0.094 (0.188)	198.061 (2407.095)	809.848 (1822.550)
Parents’ Characteristics				
Father College Graduate[b]	26.3	1.217 *** (0.127)	10775.482 *** (1425.299)	7121.283 *** (965.646)
Mother College Graduate[b]	14.8	1.026 *** (0.143)	8348.403 *** (1843.787)	5108.909 *** (1326.651)
Both Parents College Graduates[b]	10.9	−0.592 * (0.252)	−3963.100 (2714.383)	−1815.348 (1812.221)
Father’s Age[b]	29.1 [6.1]	0.010 * (0.005)	265.032 *** (79.576)	143.852 * (59.124)
Mother’s Age[b]	25.8 [5.3]	0.018 ** (0.006)	231.582 ** (88.754)	110.751 (62.086)

	Mean[a] [S.D.]	Regression Coefficients (S.E.) Attend College	Tuition Paid	Room & Board Paid
Father's demographics unknown	8.9	0.147 (0.173)	5028.348 * (2553.184)	2123.929 (1951.980)
Mother's demographics unknown	9.5	0.180 (0.192)	9210.480 ** (3272.964)	2594.842 (2195.874)
Contextual Variables				
New England	7.2	0.240 (0.154)	12390.540 *** (2786.517)	3202.199 (1686.726)
Middle Atlantic	14.8	0.282 * (0.114)	9146.485 *** (1812.941)	1706.105 (1233.294)
East N Central	17.9	0.281 * (0.112)	1721.384 (1351.158)	1102.163 (1013.968)
West N Central	11.2	0.299 * (0.129)	−650.721 (1688.387)	382.375 (1145.415)
East S Central	5.7	0.349 * (0.159)	−2744.794 (1889.027)	−178.189 (1357.644)
West S Central	8.4	0.201 (0.136)	500.837 (1558.765)	1457.046 (1160.850)
Mountain	4.2	0.008 (0.210)	−2966.019 (2904.425)	536.166 (1956.365)
P acific	13.4	0.118 (0.129)	−3523.497 * (1545.145)	−799.759 (1177.663)
College Cost	$ 7,028.30 [789.438]	0.027 (0.083)	−1.480 (1.090)	0.046 (0.778)
College Aid Per Capita	$ 3,899.80 [693.66]	−0.076 (0.055)	−0.798 (0.779)	−0.400 (0.515)
College-HS Wage Gap	0.46 (0.06)	0.321 (1.134)	35401.105 * (14345.854)	9160.962 (10148.366)
Proportion of Cohort in Military	0.04 [0.013]	−11.939 ** (3.945)		
Male × Cohort in Military	0.02 [0.02]	7.927 * (3.646)		
σ_u (family effect)		0.927 *** (0.047)	12066.396 *** (595.402)	8575.339 *** (331.508)
ρ_{1j}			0.420 *** (0.081)	0.424 *** (0.069)
ρ_{2j}				0.897 *** (0.034)
σ_e (pure noise)		1.000	12498.176 *** (543.313)	7937.279 *** (270.248)

Note: robust standard errors in parentheses

* $P < 0.05$

** $P < 0.01$

*** $P < 0.001$

[a] Percentage shown for categorical variables; mean and [SD] shown for continuous variables. All summary statistics are weighted; unweighted n = 5071.

[b] Mean values shown for non-missing cases only.

Table 3

Intra-class Correlations for Nested Models

Model	Tuition	% Reduction (from preceding)	Room and Board	% Reduction (from preceding)
Intercept only	0.601		0.632	
Contextual variables	0.573	−4.58%	0.632	0.00%
Parental characteristics and relationship	0.495	−13.57%	0.552	−12.72%
Family characteristics	0.483	−2.45%	0.539	−2.36%
Individual child characteristics	0.482	−0.09%	0.539	0.00%

Table 4

Partial Effects of Sibling-Configuration Variables on Expected Values of Model Outcomes

Sibling-configuration variables:								
Total family size	**One**			**Two**				**Three**
Birth order:	1	1	2	1	2	1	2	3
Number of brothers:	0	1	1	0	0	1	1	1
Number of sisters:	0	0	0	1	1	1	1	1
Partial Effects								
Prob. (college = 1) × 100	80.1	78.1	74.2	77.0	74.8	74.1	70.1	68.3
Total payments	$13,381	$11,642	$11,238	$12,002	$12,184	$10,068	$9,680	$9,606
Total payments|college=l	$16,708	$14,913	$15,141	$15,582	$16,286	$13,588	$13,806	$14,068
Total payments|payments > 0	$21,305	$19,891	$20,008	$20,370	$20,855	$18,750	$18,933	$19,134

Note: all variables other than those representing sibling configuration held constant at sample mean.

Table 5

Partial Effects of Parental-Configuration Variables on Expected Value of Model Outcomes

Parental-Configuration Variables:	Both biological parents	Stepmother	Stepfather	No mother[a]	No father[b]
Partial Effects					
Pr(college = 1) × 100	66.7	55.4	57.4	49.5	54.1
Total payments	$8,437	$4,576	$5,964	$4,596	$3,761
Total payments|college=l	$12,651	$8,267	$10,388	$9,292	$6,957
Total payments|payments > 0	$18,041	$14,692	$16,306	$15,240	$13,373

Note: except as noted, all variables other than those representing parental configuration held constant at the sample mean.

[a]Mother's age and mother's college education = 0.

[b]Father's age and father's college education = 0.