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EDUCATIONAL ASSORTATIVE MATING AND THE FAMILY BACKGROUND OF THE NEXT GENERATION*

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EDUCATIONAL ASSORTATIVE MATING AND THE FAMILY BACKGROUND OF THE NEXT GENERATION

Abstract

The demographic behaviors of one generation, including marriage, divorce, fertility, and survival, create the population of families in which the next generation of children is raised. Assortative mating between men and women with varying socioeconomic characteristics is a key mechanism in establishing the families of the next generation, but differential fertility, child and parent survival, marital disruption, and parents' socioeconomic mobility modify these marriage patterns. This article examines the demographic mechanisms through which family backgrounds are created. It presents the mathematical links between marriage patterns and the joint distribution of parents' characteristics when their children are born and later in their lives. It illustrates these relationships using data on educational assortative mating, fertility, mortality, and the living arrangements of families in the United States. Although the educational attainments of husbands and wives are strongly associated, patterns of differential fertility reinforce this relationship, resulting in an even strong association between the educational attainments of mothers and fathers.

EDUCATIONAL ASSORTATIVE MATING AND THE FAMILY BACKGROUND OF THE NEXT GENERATION

INTRODUCTION

Social stratification research is centrally concerned with the links between the socioeconomic characteristics of parents and their offspring because the intergenerational transmission of inequality is part of how social hierarchies persist and change. The distribution of occupations, incomes, educational attainment, and other socioeconomic characteristics may change from one generation to the next because of economic growth, technological change, institutional development, and a variety of idiosyncratic historical changes. But even in the absence of these macro-social changes, distributions of socioeconomic characteristics change across generations because of elementary processes of population renewal. Most importantly, the distribution of family characteristics of a generation of children differs from the previous generation as a result of differences in levels and timing of fertility (Duncan 1966). Socioeconomic groups that produce more offspring have higher representation in the next generation than those that produce fewer. Families who bear no children are not represented in the next generation at all. This demographic fact presents challenges to investigators of intergenerational reproduction and the socioeconomic distributions of families, marriages, and individuals. In this article we explore the implications of this aspect of population renewal for describing the family backgrounds of children and resemblance between husbands and wives.

Family Background in Status Attainment and Mobility Studies

The dominant tradition of research on social stratification over the past five decades has focused on the relationship between the socioeconomic characteristics of families and the social

and economic success of their offspring, both as children and in adulthood (e.g., Blau and Duncan 1967; Erickson and Goldthorpe 1992; Featherman and Hauser 1978; Shavit and Blossfeld 1993; Treiman and Ganzeboom 1999). This research includes studies of intergenerational social mobility, which typically describe the association between one attribute of the parental generation (for example, father's occupation) and the same attribute in the offspring generation (son's or daughter's occupation). It also includes studies of socioeconomic attainment, which examine the effects of several family factors (e.g., parents' educational attainments, father's occupation, number of siblings) on one or more socioeconomic outcomes of individuals. Typically, studies of mobility and attainment use survey data on offspring who provide retrospective information on their family backgrounds. In these studies, family background is a set of traits that belong to each son or daughter.

This perspective has yielded a rich body of research on inequality of socioeconomic attainment. It does not, however, fully describe how social inequality is transformed between generations. The parents of a cohort of offspring are not a specific cohort or population at a specific period of time. Childless individuals from previous periods and cohorts are unobserved in retrospective reports of offspring. More generally, relative to the populations of previous periods and cohorts, cohorts of offspring overrepresent individuals who have many children, even though the offspring themselves appropriately represent their own cohorts. Even if each family has the same number of children, the distributions of parents and offspring differ because of variation in the timing of fertility. Because women's fertility spans approximately 35 years and men's fertility spans an even longer period, the parents of a cohort of offspring come from many prior cohorts and, at a given age of parenthood, live through many prior periods (Duncan 1966; Mare and Maralani 2006; Mukharjee 1954).

The complex relationship between parental and offspring generations obscures how the socioeconomic distributions of a population are transformed through cohort and intergenerational succession. Moreover, this relationship necessitates a more encompassing view of how the characteristics, actions, and experiences of one generation affect subsequent generations. Changes in the lives of members of the parental generation affect the offspring generation not only through the effects of parents on offspring—the staple of social stratification research—but also through the processes of survival, marriage, and fertility that give rise to the offspring generation itself. Differential fertility, mortality, and assortative mating determine the numbers of children of each type of family background (Mare and Maralani 2006). Thus, in a broader conception of intergenerational relationships, family backgrounds are not exogenous social influences. They are, instead, distributions of social arrangements that should be described and explained. With an understanding of how distributions of family backgrounds come about, it may be possible to develop a richer account of how intergenerational effects come about.

Family Background in Assortative Mating Studies

A second tradition of research in social stratification focuses on assortative mating between men and women with varying social characteristics. Patterns of who marries whom have implications for the formation of families, the maintenance of boundaries between groups, the extent of inequality among families and individuals, and the persistence of social hierarchies from generation to generation (e.g., Cavalli-Sforza and Feldman 1981; Eckland 1968; Fernández and Rogerson 2001; Johnson 1980; Kalmijn 1991b; Mare 1991; Schwartz and Mare 2005). Because individuals mate nonrandomly on social and economic traits, the clustering of couples on these traits is a source of inequality. Further, because most children are raised by one or more of their biological parents, the resemblance between mothers and fathers on dimensions of

socioeconomic status may reinforce or offset the intergenerational impact of inequality in the socioeconomic positions of parents.

The resemblance between partners on educational attainment is an important dimension of assortative mating because of the role of education in economic inequality and its persistence from generation to generation (e.g., Blossfeld and Timm 2004; Mare 1991; Smits, Ultee, and Lammers 1998). For individuals, educational attainment is their first major socioeconomic status that is defined separately from the resources of their parents, it has a major impact on all subsequent life outcomes, and it potentially affects the well-being of their children. The relative importance of educational resemblance of spouses, moreover, has strengthened over the past half century because of declines in the effects of religion, ethnicity, and family background on marriage patterns (Kalmijn 1991a, 1991b) and the increased importance of educational institutions as marriage markets (Blossfeld and Timm 2004; Mare 1991).

Substantial research documents a growing positive association between the educational attainments of husbands and wives, a trend that holds for both marriages that occur at point in time ("newlyweds") as well as for the stock of existing marriages ("prevailing marriages") (e.g., Kalmijn 1991a; Mare 1991; Pencavel 1998; Qian 1998; Schwartz and Mare 2005). Patterns of educational assortative mating suggest a high and increasing level of inequality among the families in which the next generation of children is raised. The intergenerational link between assortative mating and the family background of the next generation is a central motivation for research on assortative mating. Marriage patterns, however, apply to couples rather than the families experienced by the children they bear, the families that these children live in some years after their births, or the families experienced by children who survive to adulthood. It remains to

specify the links between patterns of marriage in the adult generation and the family backgrounds of the offspring generation.

In this article, we examine this issue in greater depth. We first discuss the mechanisms through which a cohort of women forms sexual unions and bears children, and through which a cohort of births to men and women with varying social characteristics survives and experiences changing family circumstances. Then we present some mathematical relationships between distributions of couples—who are typically described in analyses of assortative mating—and distributions of children—who are typically described in studies of intergenerational effects of parents' characteristics. Finally, we present some illustrative estimates for the United States to show how our assessment of families varies between the parents and offspring generations and how various demographic mechanisms bring about this variation. In these analyses, we clarify some of the formal relationships between the generations and between concepts of assortative mating and family background that are central to stratification research. We also show empirically how demographic processes affect the family backgrounds of children.

THE FAMILIES OF CHILDREN AND THE FAMILIES OF PARENTS[1]

Marital Status and Educational Attainment in the Families of Women and Children

We view the link between the families formed by adults and the families experienced by children from the dual perspectives of adults and offspring. Cohorts of women are the potential mothers of subsequent generations of children. Women vary, however, in whether they marry, whom they marry, and how they time and combine childbearing with marriage. Whether

[1] Preston (1976) provides a parallel analysis of the relationship between the average completed fertility of women and the average family sizes experienced by their children. Although size of sibship is a key element of family background, it is beyond the scope of this paper to integrate the analysis of women's and children's family size with the analysis of assortative mating and joint parents' characteristics.

married or not, they also vary in the numbers and timing of their births. During her childbearing years a woman is at risk of pregnancy and childbirth and, if she is unmarried, to the formation of a single parent, mother-only family. As is well known, children born into this circumstance may be substantially disadvantaged in their educational and socioeconomic attainment, although this effect arises at least in part from the association between being raised in a single-parent family and the socioeconomic characteristics of the family (e.g., McLanahan and Sandefur 1994). The prevalence of such families depends on the rate of nonmarital fertility, as well as rates of entry into marriage of unmarried women who have children and rates of marital disruption for couples with children. The family backgrounds of children also include the socioeconomic attainments of their parents which, because of differential fertility, have a different distribution for children than for the adult population as a whole. The discrepancy arises because of differences in fertility rates between married and unmarried women and among women with varying levels of educational attainment.

Assortative Mating of Couples and the Resemblance of Parents

Assortative Mating in New and Prevailing Marriages. For children raised by two parents, their socioeconomic positions are determined in part by the joint distribution of the socioeconomic characteristics of their parents. As noted above, a high resemblance of parents creates, *ceteris paribus*, more inequality in the family circumstances of children than low resemblance. From the standpoint of adults, this joint distribution is first established at the time of marriage, arising from varying preferences and opportunities for meeting, dating, and marrying persons of varying socioeconomic characteristics. A new marriage contributes to the population of prevailing marriages. Assortative mating patterns in new and prevailing marriages may differ because of secular trends in mating patterns, selective divorce and remarriage, and

changes in the socioeconomic characteristics of spouses after marriage. Although spousal resemblance at the time of marriage may vary across couples who marry at different ages, patterns of and trends in assortative mating for new and prevailing marriages in the United States are similar (Schwartz and Mare 2003, 2005).

Differential Fertility: Additive and Nonadditive Effects. When married couples bear children, they establish the family backgrounds of these children, indicated by the joint distribution of parents' socioeconomic characteristics and other characteristics of the family as well. But, because of socioeconomic differences in fertility, the distribution of family backgrounds of children born in a given year differs from the distribution of couples' characteristics in that year, even when the latter is restricted to couples with women of childbearing age. Men and women with varying educational attainments typically bear children at different rates, although the direction and strength of this relationship varies widely over time and place (e.g., Jejeebhoy 1995). These differentials affect the distribution of children's family backgrounds by reweighting the distribution of couples' characteristics by the varying fertility rates of men and women with different levels of educational attainment. Depending on the distributions of educational attainment in the couple and parent populations, fertility patterns may raise or lower the variability in the family backgrounds of children. If the effects of husband's and wife's educational attainments on fertility are additive, then the *covariance* of parental educational attainments simply mirrors the assortative mating patterns of couples. In this case, differential fertility affects the variance but not the covariance of parental characteristics. However, if husband's and wife's educational attainments have nonadditive effects on fertility, the resemblance of mother's and father's educational attainments may be greater or lesser than the resemblance of married couples.

Prior research on joint nonadditive effects of parents' educational attainments on fertility is limited, although Mascie-Taylor (1986) reports elevated fertility levels of educationally homogamous couples in which one spouse was a member of the 1958 birth cohort in Britain. We might expect such effects if educationally homogamous marriages are more stable and such couples are more likely to take on the responsibility of childrearing. For many couples, childbearing may represent a high level of commitment on a continuum from sexual intimacy to cohabitation to marriage (Blackwell and Lichter 2000, 2004), implying a higher degree of spousal resemblance on key social traits for parents than for all married couples. Additionally, educational homogamy may in part reflect age homogamy. If women of prime childbearing years are more likely to have children with partners who themselves are in those ages than with older or younger partners, this may also result in higher fertility for educationally homogamous couples as well. Further, couples in which both partners have very low or very high levels of educational attainment may be at such extreme levels of the socioeconomic hierarchy that their disadvantage or advantage is not adequately summarized by the additive effects of each spouse's characteristics. To the extent that couples at either extreme have exceptionally high fertility, the effect of parents' educational attainments may be nonadditive and contribute to a higher covariance of parental characteristics for children than one can see in the population of couples. Although these several arguments all point toward higher couple resemblance for parents compared to couples more generally, the strength and existence of this relationship is an empirical issue.

Differential Mortality. Differential mortality of children may induce further discrepancies between the assortative mating patterns of parents and the joint distribution of parents' characteristics. The distribution of children by the socioeconomic characteristics of their

parents changes with patterns of differential survival of infants and children. These effects parallel those for differential fertility. Additive effects of parents' characteristics may alter the variability of the socioeconomic characteristics of surviving children but not alter their covariance, whereas nonadditive effects may enhance or reduce the covariance among parents' characteristics. In societies in which mortality levels are very low, however, even very large mortality differences among children born to parents with varying socioeconomic positions may have only small effects on the distribution of children.

Marital Events after Children are Born. Family backgrounds of children are established when they are born, but they do not remain fixed. Instead, both the distributions of prevailing marriages and of the children who are raised in them evolve with time. Unmarried parents get married or remarried, married parents separate or divorce, and both parents may obtain further schooling or make other changes in their socioeconomic positions (Schwartz and Mare 2003). These changes may alter assortative mating patterns of couples and the families in which children are raised. To the extent that these changes differ between childless couples and couples with children, they will further deflect the distribution of family backgrounds of children from the distributions of married couples.

DEMOGRAPHY OF ASSORTATIVE MATING AND FAMILY BACKROUND

In this section we present some of the relationships among observations and components of assortative mating. We consider only assortative marriage and ignore cohabitation as well as the processes by which single persons marry. Thus, all of the analysis is conditional upon observed marriages (although we do consider single-parenthood). For concreteness, the discussion focuses on educational assortative mating, although, with small modifications, it

could apply to other dimensions of marital sorting. Throughout, we consider the ages of wives only, ignore husbands' ages, and assume that the population is closed to immigration and emigration. First, we present a modified version of the decomposition of intracohort variation in educational assortative mating that is discussed in Schwartz and Mare (2003) and show how this function can be used to express educational assortative mating patterns in prevailing marriages. Second, we consider the joint fertility of husbands and wives and examine the relationship between assortative marriage and assortative parenthood. Third, we present a statistical model for assortative parenthood. Finally, we show how to analyze populations of *children* who are classified by their educational attainments of their parents.

Decomposition of Couples into Marriages, Dissolutions, and Upgrades

Schwartz and Mare (2003) use a discrete time formulation of women's ages to express the number of marriages [$M_{ij(a+1)}$] between men in the i^{th} category of educational attainment and women aged $a + 1$ in the j^{th} category of education as a function of corresponding marriages in the previous age category (M_{ija}) and new marriages W_{ija}, marital dissolutions D_{ija}, remarriages R_{ija}, and educational changes of married persons E_{ija} that occur between successive ages ($i = 1, \ldots, I; j = 1, \ldots, J$). That is,

$$M_{ij(a+1)} = M_{ija} + W_{ija} - D_{ija} + R_{ija} + E_{ija} \quad . \tag{1}$$

Hereafter, we refer to these as *ij* marriages. If age varies continuously, we can show how sequences of new marriages, dissolutions, remarriages, and upgrades that produce the number of married couples at a given age. The number of *ij* marriages for women aged *s* is

$$M_{ij}(s) = \int_0^s \left[W_{ij}(a) - D_{ij}(a) + R_{ij}(a) + E_{ij}(a) \right] da \, . \tag{2}$$

The number of couple-years that a cohort spends in *ij* marriages is

$$M_{ij} = \int_0^{\omega} M_{ij}(s)ds \ , \qquad (3)$$

where ω is the maximum length of life. Given the relationships between cohorts and life table populations, (3) can also be interpreted as the number of *ij* couples in a stationary (life table) population. Obviously, special cases of (3) occur when we consider a specific age range of women (e.g., 15-49) by changing the limits of integration.

Assortative Parenthood

Let $b_{ij}(a)$ be the mother's age-specific birth rate for *ij* couples and B_{ij} be the corresponding number of births to such couples. Then

$$B_{ij} = \int_0^{\varpi} b_{ij}(a)M_{ij}(a)da = b_{ij}M_{ij} \ , \qquad (4)$$

where b_{ij} is the crude birth rate.

From the standpoint of analyzing the intergenerational significance of educational assortative mating, the joint distribution of births by parents' educational attainments may be more relevant than the joint distribution of prevailing marriages (or, *a fortiori*, new marriages). Thus, it may be valuable to describe trends in the B_{ij}, rather than the M_{ij}, using log-linear models based on the Poisson or Negative Binomial distribution. Alternatively, inasmuch as most educational assortative mating research is based on marriages, we may ask whether, net of the association between husband's and wife's educational attainments, the B_{ij} are affected by association between mother's and father's attainments. We can investigate this using a log-rate model. That is,

$$\log(B_{ij} / M_{ij}) = \lambda + \lambda_i^H + \lambda_j^W + \lambda_{ij}^{HW} \quad , \qquad (5)$$

where the λ parameters denote the effects of being in the i^{th} category of husband's education (H) and the j^{th} category of wife's education (W). This model can be estimated as a Poisson or Negative Binomial regression for the B_{ij} using $\log(M_{ij})$ as an offset. The marginal parameters λ_i^H and λ_j^W measure male and female fertility differentials by educational attainment (beyond what would be expected on the basis of the marginal distributions of husband's and wife's educational attainment). Because the M_{ij} already contain the association between husband's and wife's education in marriage, it is an open question whether parent's educational attainments have interaction effects λ_{ij}^{HW} on fertility. If interaction effects are present, this indicates that couple fertility contributes to assortative parenthood beyond what is expected on the basis of educational assortative mating alone. These models can be parameterized to reflect special features of the joint distribution of parents' educational attainments such as homogamy, uniform association, crossings, or other models. In addition, the possibility that a father may not be present at birth can be incorporated into the analysis by allowing the educational attainment of "father," which is indexed by i, to range from 0 to I where $i = 0$ when a mother does not have a husband and $i > 0$ when the father is present with a known educational attainment.

Numbers of Children and Assortative Childrearing

Using the formulas presented here, one can develop expressions for the number of children at any given age with *ij* parents. This quantity differs from the number of births to *ij* parents because infant and child deaths, marital dissolutions, upgrades, remarriages, and first marriages alter the joint distribution of parents' characteristics as children age. One can observe these quantities directly from census or survey data on children that also record the educational attainments of their parents. One can also develop expressions that show how mortality,

marriage dissolution, upgrades, and marriages affect the joint distributions of parents of children of varying ages. If we assume a stable population growth rate *r*, then an expression for children aged *u* with mothers aged *s* is

$$\begin{aligned} C_{ij}(u,s) &= B_{ij}(s-u)\,p_{ij}(u) \\ &= B_{ij}(s)e^{-ru}\,p_{ij}(u) \\ &= b_{ij}(s)M_{ij}(s)e^{-ru}\,p_{ij}(u) \\ &= b_{ij}(s)\left[\int_0^s \left[W_{ij}(u,a) - D_{ij}(u,a) + R_{ij}(u,a) + E_{ij}(u,a)\right]da\right]e^{-ru}\,p_{ij}(u) \end{aligned} \tag{6}$$

where $p_{ij}(u)$, the probability that a child born to an *ij* couple survives until age *u*, is assumed to be independent of changes in parents' marital statuses and educational attainments. We can aggregate to all children living with *ij* couples by integrating over ages of mothers and ages of children, say 0-18. That is,

$$C_{ij} = \int_0^{18} \int_0^{\omega} C_{ij}(u,s)\,ds\,du \tag{7}$$

Taken together, (6) and (7) show how first marriages, marital dissolutions, remarriages and educational upgrades contribute to numbers of children living with *ij* parents.

Choice of Measures of Assortative Mating

Four basic quantities may be used to monitor trends in "educational assortative mating:" prevailing marriages (M_{ij}), new marriages (W_{ij} or $W_{ij} + R_{ij}$), children (C_{ij}), and births (B_{ij}). Equation (5) shows how the analysis of births and marriages can be combined in statistical analysis. Equations (6) and (7) show the relationships among all four quantities that might, in principle, be used in quantitative analysis. No single way to study educational assortative mating is best, but these relationships show a comprehensive way to study it given that one's research purposes are clearly specified.

EMPIRICAL ILLUSTRATIONS

To illustrate some of the relationships described in this article, we focus on recent patterns of educational assortative mating and family structure for blacks and whites in the United States. As documented extensively elsewhere, the educational attainments of husbands and wives in the United States are highly associated and this association has increased steadily over the past 50 years (Kalmijn 1991a; Mare 1991; Schwartz and Mare 2005). The increased association between parents' educational attainments has given rise to concerns about the inequality among *families* in the next generation inasmuch as the degree of covariance between mothers' and fathers' socioeconomic characteristics varies directly, *ceteris paribus*, with the degree of inequality among family socioeconomic environments. As we have argued above, however, the effects of assortative marriage patterns in the parental generation on the families experienced by children in the subsequent generation are mediated through demographic processes, including the differential fertility of couples with varying amounts of schooling, the differential mortality of children born to couples with varying amounts of schooling, and changes in marital status and educational attainment of mothers and fathers after marriage and the onset of childbearing. Additionally, an important aspect of family backgrounds of children is whether or not both parents are present during their early years (e.g., McLanahan and Sandefur 1994). The presence of both parents provides a significant socioeconomic advantage over single-parent families for most children. Although single parent families result in part from the break up of marriages, they also result from childbearing by unmarried women. Conversely, some single mothers subsequently marry, thereby converting their families from single to two parent arrangements. These considerations suggest that it is informative to examine the distributions of marriages for women and couples of childbearing ages, of births, and of children. We consider

the total U.S. population as well as whites and blacks separately in view of the substantial differences between the races in rates of marriage, marital disruption, and fertility.

DATA AND MEASUREMENT

Women and Marriages

To describe marriages, we focus on prevailing marriages recorded in the 1989, 1990, and 1991 in the microdata samples from the outgoing rotation group samples from the 36 monthly Current Population Surveys, which are approximately a 0.1% sample of the civilian noninstitutional population of the United States. We examine women aged 15 to 49 years and classify them by their marital status (married vs. unmarried), race (white, black, other), age (15-19, 20-24, …, 45-49), and educational attainment (<10, 10-11, 12, 13-15, ≥16 years completed). For women who are married with a spouse present in the household, we also classify the educational attainment of the husband using the same categories as for the wife. The sample excludes married women who lived in group quarters and all married women who reported that their spouse was absent from the household (about 1% of all marriages). Because respondents in the outgoing rotation groups are interviewed twice in a two-year period (see U.S. Census Bureau 2002 for details), we restrict the sample to the first outgoing rotation group (month-in-sample 4) to avoid duplicate observations. These three years of data provide reliable estimates of marriage patterns in 1990, the year for which we estimate births. An alternative source of data on women and marriages for this year is microdata from the 5% sample of the 1990 decennial census, which would provide a much larger number of observations. The 1990 census, however, uses a revised measure of educational attainment based on education credentials, whereas the 1989-1991 CPSs

use the traditional measure of highest grade of school completed.[2] In analyses not shown here, we established that education distributions from the traditional measure of attainment agree closely with those provided from vital statistics, whereas the revised education measured used in the 1990 census yields education distributions that are much more discrepant with those from vital statistics.[3]

Births

To describe the distribution of newborns by characteristics of their mothers and fathers, we use natality microdata from the vital registration system of the U.S., which record all births in 1990 (U.S. Department of Health and Human Services 1993). We classify all births to 15 to 49 year old women in 1990 by the marital status, age, race, and educational attainment of their mothers and, for births to married women, the educational attainment of their fathers, using the same categories as we used for the CPS data. We exclude births to women who live in or that occurred in Washington state or New York state outside of New York city because these areas do not record parents' educational attainments on the birth certificate. For these two areas, we supplement the vital registration data with weighted counts of children under the age of one from

[2] The 1990 census asked respondents, "How much school has this person completed?" with fixed response categories for "No school completed," "Nursery school," Kindergarten," "1st, 2nd, 3rd, or 4th grade," "5th, 6th, 7th, or 8th grade," single grades for 9 through 11, "12th grade, no diploma," "High school graduate—high school diploma or the equivalent (e.g., GED)," "Some college but no degree," "Associate degree in college—occupational program," "Associate degree in college—academic program," "Bachelor's degree," "Master's degree," "Professional school degree," and "Doctorate degree." The U.S. Standard Birth Certificate instructs the parent to "Specify only highest grade completed" in a box for "Elementary-Secondary (0-12)" or for "College 1-4 or 5+." The 1990 census question induced more individuals to report that they had some college or an associate degree than the previous census question, which requested highest grade attended and whether the respondent had completed that grade (Jaeger 1997; Park 1996).

[3] We compared the education distribution of married mothers as estimated from 1990 birth records to the distribution of education of the married mothers of children in their first year of life who are observed in the 1990 census and the February 1990 CPS. The February 1990 CPS is unique in that it includes both measures of educational attainment. The enables us to isolate the separate effects of change in educational measurement and differences in population coverage between the census and CPS on estimated education distributions. The February 1990 mother's education distribution based on the traditional educational measure agrees more closely with the distribution from vital statistics data than either the February 1990 distribution based on the new education distribution or the 1990 census distribution.

the 5% sample of the 1990 census using the Integrated Public Use Microdata Series (IPUMS) (Ruggles et al. 2004), similarly classified by the characteristics of their parents.[4]

An alternative to the vital statistics would be to estimate births from native born children under the age of one in the 1990 census who were living with their mothers, and to classify them by the characteristics of their parents as discussed above. These children were born up to one year prior to the 1990 census date and thus approximate a sample of births during this period. This source of data has the advantages of identical population coverage to the census and identical measurements of key variables such as mother's and father's educational attainment. These data, however, suffer important disadvantages as well. Because they are for children living with their mothers at the date of the census, they exclude children who have died or been adopted by other adults. More important, the 1990 census substantially undercounted infants, by some estimates by as much as 18%. This substantial undercount, moreover, is not random with respect to race, geographic location, and socioeconomic status of families (Daponte et al. 1999; Edmonston 2002; West and Robinson 1999). This is a particularly serious concern for our purposes if a disproportionate amount of undercount results from omission of entire households in geographic areas where the least educated population is overrepresented. In this case, the census infant data may underestimate parents' resemblance on educational attainment. Thus, we

[4] Parents' schooling data are available for births to women who resided in Washington state or upstate New York (New York state, minus New York city) that took place elsewhere in the U.S. We nonetheless excluded those births to achieve as good a correspondence as possible between the data on births and the women who were at risk to having those births. The census data on both women and on infants are based on place of usual residence rather than on place of occurrence of births. When infants in the census for Washington state and upstate New York are combined with births in the vital statistics for the rest of the country, we omit the births that occurred in Washington state and upstate New York to women who reside in other parts of the U.S. This omission is a small proportion of all births and introduces a much smaller error than results from the undercount of infants in Washington state and upstate New York.

rely on the vital statistics data except for the geographic areas where they do not include information on parental educational attainment.

Mortality

To estimate differential mortality of children by the educational attainments of parents, we use linked birth and infant death vital statistics data for the 1990 birth cohort (U.S. Department of Health and Human Services 1995). These data consist of records for infant deaths occurring in 1990 or 1991 matched to their 1990 birth certificates for all infants born in 1990. We classify these infant deaths by the same parents' characteristics that we examine for infants as a whole. The data include infants born and residing in the 50 states and the District of Columbia, but we exclude Washington state and New York state outside of New York city because, as noted above, information on parents' educational attainments was not obtained on birth certificates in those areas. Unlike in the analysis of fertility, however, this exclusion does not create a discrepancy between the numerators and denominators of estimated rates because the same restrictions apply to both.

Children

We also examine family structure and the association between parents' educational attainments for older children. Specifically, we examine native born children who are 10 years old in 1999-2001 in the microdata samples from the monthly outgoing rotation group samples from the 36 monthly Current Population Surveys of 1999 – 2001. Again, we select women in the first outgoing rotation group to avoid double counting the children in our sample. We classify these children by the characteristics of their parents in similar fashion to the infant data discussed above. When weighted to population totals, these data, in comparison to those for infants, provide estimates of the net effects of infant and child mortality and changes in parents'

educational attainments and marital status on the distribution of family backgrounds of children. Although the CPS data are a sample (roughly 0.1%) of the population, sampling variability in the CPS data is reduced through post-stratification weights that adjust sample to population counts. Our knowledge of these counts, of course, is based largely on the 2000 census. The undercount of children in the 2000 census, however, was much less severe than in 1990 and, within each census, the undercount of infants is more severe than the undercount of older children (Daponte et al. 1999; Edmonston 2002). Comparisons between native-born 10 year olds in the 1999-2001 CPSs and 1990 birth records provide a reasonable assessment of the net change in family structure and parental resemblance due to mortality and changes in parents' educational attainments and marital status.[5]

MODELS AND MEASURES

We use several measures to summarize assortative mating and parents' resemblance on educational attainment. Some of these are based on a variety of log-linear models for analyses of multiway tables (e.g., Agresti 2002), whereas other are rudimentary measures of association. Whereas the former measures are more typically used in analyses of educational assortative mating (e.g., Mare 1991; Schwartz and Mare 2005), the latter correspond more closely to measures of the joint distributions of parents' characteristics that are implicit in regression analyses of the effects of parents' characteristics on the well-being and socioeconomic achievement of their offspring. The measures include: (1) odds of homogamy (based on a log-linear model that includes marginal effects of wife's [mother's] and husband's [father's]

[5] Using the Current Population Survey for couples in 1989-1991 and 10 year olds in 1999-2001 also has the advantage of holding constant our data source for the purposes of this comparison. Elsewhere we report evidence of differences in estimates of spousal resemblance between the Current Population Survey and the decennial census, which potentially confound the type of comparisons that we make in the present analysis (Schwartz and Mare 2005).

educational attainment and an indicator of whether spouses are in the same schooling category); (2) uniform association (based on a model that includes marginal effects of spouses' [parents'] attainments and a single linear-by-linear association parameter for spouses' attainments); (3) crossings parameters (based on a model that includes marginal effects of spouses' [parents'] attainments and four parameters for whether or not spouses [parents] cross one of four "barriers" to marriage across education lines) (Mare 1991; Schwartz and Mare 2005); (4) percent of marriages that are homogamous (spouses in same education category); (5) percent of heterogamous marriages that are hypergamous (spouses whose education categories differ in which the husband has more education than the wife); (6) Pearson correlation between spouses' educational attainments (based on approximate averages of years of school completed in each schooling category); and (7) canonical correlation (between sets of dichotomous variables for each husband's [father's] and wife's [mother's] education category). We compute these measures for each sample, including married couples, births to married couples, infant deaths, and 10 year olds. In addition, we report parameters for log-rate models based on equation (5), which are useful for comparing the degree of spousal resemblance in the several samples. These models are parameterized in similar fashion to the summary measures for the two-way marriage tables; that is, as homogamy, crossings, or uniform association. These models are discussed in further detail below.

EMPIRICAL RESULTS

We focus on women aged 15 to 49 years, whether single or in couples, and births to these women in 1990 in the United States and on surviving children one and ten years after birth. Our discussion of these quantities parallels the formal links between couples and the families of children in equations shown in equations (3), (4), and (7) above. We first examine the education and marital status of all women, their births, and their children at an older age. We then turn to a more detailed analysis of the associations between the educational attainments of husbands and wives or fathers and mothers from the perspective of all married couples, newborn children, and older children.

Education and Marital Status of Women, Mothers, and Children

We begin with the joint distribution of women's marital status and educational attainment to see how women and mothers with newborns differ and how this changes in the aggregate over the first ten years of children's lives. Table 1 presents these distributions for all races combined and separately for white and black women.[6] In 1989-1991, whereas slightly more than half of women aged 15 to 49 were married, given that fertility remains disproportionately within marriage, more than 70% of the mothers of newborns were married.[7] Among blacks, however, the distributions of women and mothers by marital status are very similar—roughly 30% are married in both populations. As mothers age, relatively more of them than of women as a whole marry, a pattern that is stronger for black women than for white women. Among white mothers of 10 year olds, approximately 80% are married, the same fraction as mothers of newborns.

[6] Analyses for the total population include nonblack nonwhites. The separate analyses of whites and blacks exclude this group.

[7] Throughout this discussion, "married" refers to persons who are married with spouse present. "Unmarried" refers to persons who are single, widowed, divorced, or separated. Persons who are "married spouse absent" are omitted from the analysis.

Among black mothers of 10 year olds, approximately 40% are married, in contrast to 33% for mothers of newborns.

Fertility also varies by educational attainment, although this pattern varies with the marital status of mothers. Relative to all married women, married mothers of newborns have disproportionately completed more than 12 years of schooling. That a plurality of births are to married women with at least some college is consistent with recent observations that marriage and childbearing are increasingly concentrated among relatively affluent women (Ellwood and Jencks 2004; Martin 2004). Among unmarried women, in contrast, fertility is concentrated among women with lower levels of education, although women with 12 years of schooling and those who have not completed high school make up roughly equal proportions of unmarried mothers of newborns. By the time children reach 10 years of age, however, the educational composition of their mothers has shifted substantially upwards. For married and unmarried mothers combined those without a high school education fall from about 22% to 12% for whites and from 29% to 13% for blacks. In contrast, women with post secondary schooling increase from about 41% to 55% for whites and from 27% to 44% for blacks.

In view of patterns of differential fertility by marital status and educational attainment, as well as differences in age distributions between mothers and women as a whole, it is not surprising to see a considerable discrepancy between the marriage and education patterns of women as a whole and of mothers. Perhaps of greater interest is the change in expected maternal educational attainment and family structure during the early lives of children. Mother's educational attainment and marital status change considerably over the first 10 years of a child's life, suggesting that family backgrounds are fluid and subject to systematic demographic forces.

This observation is based on relatively well known features of women's lives, but it motivates inquiry into variation in assortative mating patterns that are less well understood.

Assortative Mating for Couples, Parents, and Children

We first consider patterns of educational assortative mating in several populations, including married couples, parents of newborns, parents of deceased children, and parents of older children. Then we turn to the processes that link these populations. Table 2 presents a variety of summary measures for educational assortative mating for each of these populations using the data sources described above. Figure 1 illustrates the differences among populations for one statistic, the odds of homogamy, by the race of the wife. Table 2 shows well known patterns of resemblance between husbands and wives on educational attainment. For all races combined in which the wife is aged 15 to 49, the correlation between spouses' attainments is approximately 0.6, whether based on fixed scales of years of school completed or the canonical variates generated from the sample data. Slightly more than half of all couples are educationally homogamous using our five broad schooling categories and, among heterogamous couples, approximately 56% of husbands have more schooling than their wives. Estimates from various log-linear models, which provide measures of association that are unaffected by differences in the marginal distributions of husbands' and wives' schooling, also show a high degree of educational resemblance between spouses. The odds that marriages are educationally homogamous are greater than 3:1 and, as indicated by the "crossings" parameters, the odds of intermarriage across each of the four education barriers are less than 1:2 and are particularly small for the barrier between spouses who have 13-15 and 16 or more years of schooling. The products of the crossings parameters show that the odds of intermarriage across more than one education barrier are very small indeed.

The assortative mating patterns for whites mirror those for the population as a whole. For blacks, however, the association between the educational attainments of spouses, while still strongly positive, is markedly weaker than for whites. Whereas the canonical correlation, for example, for whites is 0.63, for blacks it is only 0.56. The homogamy and crossings measures also show greater intermarriage among education groups for blacks than for whites. Additionally, given that a marriage is heterogamous, black women, in contrast to white women, are more likely to marry *down* rather than up (Lichter, Anderson, and Hayward 1995). This latter pattern is mainly the result of the overall higher levels of educational attainment among black women than black men (Mare 1995).

Compared to the assortative mating patterns for couples as a whole, the patterns for births (i.e., assortative mating for parents of newborns), infant deaths (i.e., assortative mating for parents of children who die in their first year of life), and 10 year olds (assortative mating for parents of 10 year old children) all indicate a higher degree of spousal resemblance. For both races, there is strong evidence that homogamous couples bear children at a higher rate than heterogamous couples and thus the families of young children have higher spousal resemblance than for couples generally. For parents of newborns, for example, the canonical correlation between their educational attainments is 0.69 compared to 0.63 for all marriages. The odds of homogamy are approximately 18% higher for parents of newborns and the odds of crossing are lower at every education barrier.

For parents who have children who die in the first year of life, resemblance on educational attainment is slightly lower than for parents of all newborns but still higher than for all couples. This suggests that infant mortality rates are slightly higher for heterogamous than homogamous couples, although the relatively high homogamy level for couples of deceased

infants reflects the higher level of homogamy for parents compared to all couples. Conversely, it suggests that infants who survive the first year of life have parents who have a stronger positive association between their educational attainments than infants who die. Both fertility and infant mortality reinforce the educational resemblance of parents and, thus, the inequality among families. From these numbers alone, however, it is not easy to see the impact of differential mortality on parents' resemblance. We return to this in the next section.

By some measures, parents of 10 year olds also have a higher level of educational resemblance than couples as a whole, but for other measures there is little or no difference between parents and couples. The canonical correlation, for example, for parents of 10 year olds is 0.66, part way between the correlation of 0.63 for couples as a whole and 0.69 for parents of newborns. Statistics for homogamy, however, show little difference between couples as a whole and the parents of 10 year olds. This pattern suggests that changes in the population of parents resulting from entry into marriage of previously unmarried mothers, marital disruptions, remarriages, and the further schooling of partners may weaken the very strong association between parents' educational attainments at the time of birth. One must interpret this result cautiously, however, inasmuch as the associations for parents of 10 year olds are based on comparatively small samples of 10 year olds in the Current Population Survey, whereas the association for the parents of infants is based on vital statistics. Sampling variability and differences in the way that educational attainment is measured both may contaminate the comparison between these two populations of parents.

Effects of Fertility, Mortality, and Other Rates on Assortative Mating of Parents

The informal comparison of family patterns for populations of couples, infants, infant deaths, and children at later ages suggests that fertility and infant mortality reinforce the

educational homogamy of couples and make the family backgrounds of children somewhat more unequal than the assortative mating of all couples would imply. These relationships can be seen more explicitly using log-rate models of the form given in (5). Although equation (5) is formulated for fertility rates, we can analyze analogous rates for infant mortality and survival, as well as ratios between children at age 10 and infants.[8] We specify the parameters for husband-wife association in equation (5) using the same variety of log-linear models used in the results presented thus far, including the one parameter homogamy model, the one parameter uniform association model, and the four parameter crossings model. All of these models also control for the main effects of husband's (father's) and wife's (mother's) educational attainment. Table 3 summarizes these analyses and Figure 2 illustrates the estimates for our model of spousal homogamy.

The first column of Table 3 reports association parameters for the joint effects of mother's and father's educational attainments on rates of marital fertility. This provides strong evidence that, net of the main effects of husband's and wife's educational attainment, homogamous couples have higher fertility than their heterogamous counterparts and, more generally, the greater the resemblance of spouses, the higher their fertility. For example the rate of fertility for homogamous couples is 16% higher than for heterogamous couples. Except for the highest education barrier, couples that intermarry across adjacent education strata have fertility rates that vary between 4% and 27% lower than homogamous couples. Couples who intermarry across more distant strata have even lower fertility. We observe similar pattern for blacks and whites.

[8] The relationship between children aged 10 and infants is a ratio rather than a rate because children aged 10 with a given combination of parents' educational attainments are not a subset of infant children with the same combination of parents' attainments. For a given combination of parents' educational attainments, numbers of children increase or decrease as a result of child deaths, new marriages, divorces, remarriages, and educational upgrades.

The second column of Table 3 shows the joint impact of parents' educational attainments on infant mortality. The net joint effect of mortality is that deceased children come from somewhat less homogamous families on average than children who survive (that is, the mortality rate is about 5% lower for homogamous parents). This effect, however, results from effects of educational heterogamy for a particular group of couples. As the crossings parameters show, children of couples in which one parent has less than 10 years of schooling and the other has 10-11 years are 27% more likely to die than children of homogamous couples. Above this education level, however, the effects of intermarriage are very small.

Although these relative effects of parents' combined educational statuses on infant mortality appear large, they do not, in themselves, reveal their impact on the educational resemblance of parents of children who survive. To examine this effect, we compute the effects of parents' educational attainments on the *survival* rate of children. As the results summarized in the third column of Table 3 show, the impact of differential mortality on the families of surviving children is negligible. This result is simply a consequence of very low overall mortality rates. Although infant mortality is *relatively* higher for families in which neither parent has completed high school, the absolute mortality level of infants in 1990 is too small to have much impact on the makeup of family backgrounds.

The fourth column of Table 3 summarizes the analyses of the ratios of children aged 10 in 1999-2001 to infants in 1990. As Table 2 shows as well, the educational resemblance of parents of 10 year olds is substantially less than for infants. If one examines the product of columns 1 and 4 (shown in column 5), however, the results do indicate that parents of 10 year olds are somewhat more homogamous than the entire population of married couples. Although it is tempting to speculate upon the processes that weaken the associations between parents'

educational attainments over the 10 years after childbirth, we again caution that sampling variability measurement differences between the 1990 vital statistics data and the 1999-2001 Current Population Surveys may be responsible in part for these patterns.

Marital Events

A complete account of the demographic changes that modify the family backgrounds of children requires attention to such events as marriage, marital disruption, remarriage, and educational upgrades of either the mother or father. Schwartz and Mare (2003) describe the effects of these events on educational assortative mating from the standpoint of a cohort of women. The impact of these events depends on both the degree to which they vary systematically by the joint distribution of husbands' and wives' educational attainments and also the frequency with which these events occur. It is beyond the scope of this article to provide a detailed analysis of these events from the standpoint of children. Suffice it to say that new marriages are the predominant events in women's lives. In 1990, the vast majority (over 90%) of men and women 35 and over had ever married (Casper and Bianchi 2002:18). However, women also experienced substantial other changes, which alter the structure and socioeconomic position of families that children experience. Marital status life tables for 1995 indicate that slightly more than 40% of marriages end in divorce and that 78% of men and 69% of women remarry following a divorce (Schoen and Standish 2001). Furthermore, a substantial proportion of couples increased their educational attainment while married. Approximately 40% of husbands and wives aged 30-49 in 1987-88 attended school at some point after marriage and roughly one-quarter attended college full- or part-time (Bumpass and Call 1989:Table 4).

CONCLUSION

The families of adults have a major effect upon but are not the same as the families in which children are raised. Through the demographic mechanisms discussed in this article, the assortative mating patterns of couples are transformed into greater or lesser degrees of parental resemblance for children. The formal demography of marriage, childbearing, mortality, and social mobility establishes the structure of this transformation, but how it works in practice depends on empirically observed rates of behavior. For the United States in the 1990s, differential fertility and mortality by the educational resemblance of couples create even more resemblance in the educational attainments of parents than in the population of married couples. These regularities need to be reexamined in other times and places. Further work is also needed on the degree to which changes in family structure during children's lives, parents' intragenerational social mobility (such as educational upgrading), and the distribution of completed family sizes engender more or less resemblance between parents and more or less overall inequality for children.

The analyses reported in this article have implications for studies of the intergenerational transmission of inequality and of assortative mating. We have shown how adults' decisions about marriage and schooling form the family backgrounds of children. Multigenerational analyses of the reproduction of social inequality should take account of how each generation of families is formed, along with the effects of family characteristics on the socioeconomic attainment of their offspring. The effects of one generation on the next work through both family formation and intergenerational transmission (Mare and Maralani 2006). Analyses of assortative mating and marriage markets should take account of the patterns of association between spouses' characteristics in various distinct populations. Socioeconomic resemblance in

a population of newlyweds provides information about the structure of marriage markets and reflects both the preferences and the opportunities of persons seeking partners (Mare 1991). In contrast, the resemblance of spouses in a population of couples reflects a sequence of marriages in the past, as well as patterns of marital disruption and further changes in socioeconomic status after marriage (Schwartz and Mare 2003). The association between the socioeconomic characteristics of spouses in the population of prevailing marriages that results from this sequence of demographic events contributes to the level of socioeconomic inequality among families (Schwartz and Mare 2005). Finally, the association between the socioeconomic characteristics of mothers and fathers in a population of infants or older children is a key feature of the distribution of family backgrounds and inequality of opportunity for the next generation.

REFERENCES

Agresti, Alan. 2002. *Categorical Data Analysis.* Hoboken, NJ: John Wiley and Sons, Inc.

Blackwell, Debra L. and Daniel T. Lichter. 2000. "Mate Selection among Married and Cohabiting Couples." *Journal of Family Issues* 21: 275-302.

-----. 2004. "Homogamy among Dating, Cohabiting, and Married Couples." *The Sociological Quarterly* 45: 719-37.

Blau, Peter M. and Otis Dudley Duncan 1967. *The American Occupational Structure*. New York: John Wiley and Sons.

Blossfeld, Hans-Peter and Andreas Timm, eds. 2004. *Who Marries Whom? Educational Systems as Marriage Markets in Modern Societies.* Dordrecht: Kluwer Academic Publishers.

Bumpass, Larry L. and Vaughn R.A. Call. 1989. "The Timing of Marriage and Education." NSFH Working Paper No. 10. Center for Demography and Ecology, University of Wisconsin-Madison.

Casper, Lynne M. and Suzanne M. Bianchi. 2002. *Continuity and Change in the American Family*. Thousand Oaks: Sage Publications.

Cavalli-Sforza, Luigi L. and Marcus W. Feldman. 1981. *Cultural Transmission and Evolution: A Quantitative Approach.* (Monographs in Population and Biology 16). Princeton: Princeton University Press.

Daponte, Beth Osborne, Stephen E. Fienberg, Joseph B. Kadane, and Duane L. Steffey. 1999. "Sampling and Census 2000—Methodological Issues: Report to the Donner Foundation." Unpublished paper. Pittsburgh, PA: Carnegie Mellon University.

Duncan, Otis Dudley. 1966. "Methodological Issues in the Analysis of Social Mobility." Pp. 51-97 in N. J. Smelser and S. M. Lipset (eds.), *Social Structure and Mobility in Economic Development*. Chicago: Aldine.

Eckland, Bruce K. 1968. "Theories of Mate Selection." *Eugenics Quarterly* 15:71-84.

Edmonston, Barry. 2002. "The Undercount in the 2000 Census." Washington, D.C.: The Annie E. Casey Foundation and The Population Reference Bureau (http://www.aecf.org/kidscount/undercount_paper_final.pdf).

Ellwood, David T. and Christopher Jencks. 2004. "The Uneven Spread of Single-Parent Families: What Do We Know? Where Do We Look for Answers?" Pp. 3-77 in *Social Inequality*, edited by K. M. Neckerman. New York: Russell Sage Foundation.

Erikson, Robert and John H. Goldthorpe. 1992. *The Constant Flux: A Study of Class Mobility in Industrial Societies*. Oxford: Clarendon Press.

Featherman, David L. and Robert M. Hauser. 1978. *Opportunity and Change*. New York: Academic Press.

Fernández, Raquel and Richard Rogerson. 2001. "Sorting and Long-Run Inequality." *The Quarterly Journal of Economics* 116 (4): 1305-41.

Jaeger, David A. 1997. "Reconciling the Old and New Census Bureau Education Questions: Recommendations for Researchers." *Journal of Business and Economic Statistics* 15(3):300-309.

Jejeebhoy, Shireen J. 1995. *Women's Education, Autonomy, and Reproductive Behaviour*. Oxford: Clarendon Press.

Johnson, Robert A. 1980. *Religious Assortative Mating in the United States*. New York: Academic Press.

Lichter, Daniel T. Robert N. Anderson, Mark D. Hayward. 1995. "Marriage Markets and Marital Choice." *Journal of Family Issues* 16:412-31.

Kalmijn, Matthijs. 1991a. "Shifting Boundaries: Trends in Religious and Educational Homogamy." *American Sociological Review* 56(6):786-800.

-----. 1991b. "Status Homogamy in the United States." *American Journal of Sociology* 97(2):496-523.

Mare, Robert D. 1991. "Five Decades of Educational Assortative Mating." *American Sociological Review* 56(1):15-32.

-----. 1995. "Changes in Educational Attainment and School Enrollment." Pp. 155-213 in R. Farley (ed.), *State of the Union: America in the 1990s*. Volume I: Economic Trends. New York: Russell Sage Foundation.

Mare, Robert D. and Vida Maralani. 2006 "The Intergenerational Effects of Changes in Women's Educational Attainments." *American Sociological Review* 71: 542-64.

Martin, Steven P. 2004. "Women's Education and Family Timing: Outcomes and Trends Associated with Age at Marriage and First Birth." Pp., 79-118 in *Social Inequality*, edited by K. M. Neckerman. New York: Russell Sage Foundation.

Mascie-Taylor, C.G. Nicholas. 1986. "Assortative Mating and Differential Fertility." *Biology and Society* 3: 167-70.

McLanahan, Sara S. and Gary D. Sandefur. 1994. *Growing Up With a Single Parent*. Cambridge: Harvard University Press.

Mukherjee, Ramkrishna. 1954. "A Further Note on the Analysis of Data on Social Mobility." Pp. 242-59 in D. V. Glass (ed.), *Social Mobility in Britain*. London: Routledge and Kegan Paul.

Park, Jin Heum. 1996. "Measuring Education over Time: A Comparison of Old and New Measures of Education from the Current Population Survey." *Economics Letters* 50:425-28.

Pencavel, John. 1998. "Assortative Mating by Schooling and the Work Behavior of Wives and Husbands." *The American Economic Review* 88(2):326-29.

Preston, Samuel H. 1976. "Family Sizes of Children and Family Sizes of Women." *Demography* 13: 105-14.

Qian, Zhenchao. 1998. "Changes in Assortative Mating: The Impact of Age and Education, 1970-1990." *Demography* 35(3):279-92.

Ruggles, Steven, Matthew Sobek, Trent Alexander, Catherine A. Fitch, Ronald Goeken, Patricia Kelly Hall, Miriam King, and Chad Ronnander. 2004. *Integrated Public Use Microdata Series: Version 3.0* [Machine-readable database]. Minneapolis, MN: Minnesota Population Center [producer and distributor] (http://www.ipums.org).

Schoen, Robert and Nicola Standish. 2001. "The Retrenchment of Marriage: Results from Marital Status Life Tables for the United States, 1995." *Population and Development Review* 27:553-563.

Schwartz, Christine R. and Robert D. Mare. 2003. "The Effects of Marriage, Marital Dissolution, and Educational Upgrading on Educational Assortative Mating." Working Paper CCPR-026-03. California Center for Population Research, University of California–Los Angeles.

-----. 2005. "Trends in Educational Assortative Marriage from 1940 to 2003." *Demography* 42: 621-46.

Shavit, Yossi and Hans-Peter Blossfeld. 1993. *Persistent Inequality: Changing Educational Attainment in Thirteen Countries.* Boulder, CO: Westview Press.

Smits, Jeroen, Wout Ultee, and Jan Lammers. 1998. "Educational Homogamy in 65 Countries: An Explanation of Differences in Openness Using Country-Level Explanatory Variables." *American Sociological Review* 63:264-85.

Treiman, Donald J. and Harry B. G. Ganzeboom. 1999. "The Fourth Generation of Comparative Stratification Research." In *Sociological Research at the End of the Century*, edited by Stella Quah and Arnaud Sales. London: Sage.

U.S. Census Bureau. 2002. *Current Population Survey: Design and Methodology.* Technical Paper 63RV. Washington, D.C.: U.S. Department of Labor, Bureau of Statistics and U.S. Department of Commerce, U.S. Census Bureau.

U.S. Department of Health and Human Services. 1993. *Public Use Data Tape Documentation--1990 Detail Natality*. Hyattsville, MD: Public Health Services, Centers for Disease Control and Prevention, National Center for Health Statistics, U.S. Department of Health and Human Services.

U.S. Department of Health and Human Services. 1995. *Public Use Data Tape Documentation--Linked Birth/Infant Death Data Set: 1990 Birth Cohort*. Hyattsville, MD: Public Health Services, Centers for Disease Control and Prevention, National Center for Health Statistics, U.S. Department of Health and Human Services.

West, Kirsten K., and J. Gregory Robinson. 1999. "What Do We Know About the Undercount of Children?" Population Division Working Paper No. 39. Washington: U.S. Bureau of the Census (http://www.census.gov/population/www/documentation/twps0039/twps0039.html).

Table 1. Joint Marital Status and Education Distributions of Women Aged 15-49, by Sample and Race

	Women	Mothers (Births)	Mothers (10 Year Olds)
Full Sample			
Unmarried, < 12 years of schooling	14.0	12.1	4.4
Unmarried, 12 years of schooling	15.6	11.2	10.8
Unmarried, > 12 years of schooling	17.2	4.4	10.8
Married, < 12 years of schooling	6.8	10.8	7.6
Married, 12 years of schooling	22.8	27.0	24.1
Married, > 12 years of schooling	23.6	34.6	42.3
Total	100.0	100.0	100.0
	(173,432)	(3,818,007)	(7,501)
Whites			
Unmarried, < 12 years of schooling	12.4	9.5	3.4
Unmarried, 12 years of schooling	13.9	7.5	7.6
Unmarried, > 12 years of schooling	16.7	3.0	8.6
Married, < 12 years of schooling	7.1	12.0	8.4
Married, 12 years of schooling	24.6	29.9	26.1
Married, > 12 years of schooling	25.2	38.1	46.0
Total	100.0	100.0	100.0
	(145,365)	(3,011,480)	(6,146)
Blacks			
Unmarried, < 12 years of schooling	23.7	25.6	9.5
Unmarried, 12 years of schooling	27.1	29.8	27.3
Unmarried, > 12 years of schooling	19.6	11.4	21.8
Married, < 12 years of schooling	4.2	3.8	3.1
Married, 12 years of schooling	13.3	13.8	15.7
Married, > 12 years of schooling	12.1	15.5	22.6
Total	100.0	100.0	100.0
	(20,092)	(638,782)	(950)

SOURCES: 1989-1991 and 1999-2001 Current Population Survey and 1990 vital statistics data.
NOTES: Sample sizes are in parentheses.

Table 2. Measures of Educational Assortative Mating, by Sample and Race (Wives Aged 15-49)

Measure of Educational Assortative Mating	Marriages (M_{ij})	Births (B_{ij})	Infant Deaths (D_{ij})	10 Year Olds (C_{ij})
Full Sample				
% Homogamous	52.8	55.9	54.0	52.7
% Hypergamous given Heterogamy	55.8	53.5	52.0	51.3
Correlation	0.627	0.682	0.666	0.641
Canonical correlation	0.629	0.685	0.670	0.661
Odds of homogamy	3.44	4.05	3.91	3.34
Uniform association	1.21	1.25	1.24	1.23
Odds of Crossing				
<10/10-11	0.446	0.326	0.411	0.292
10-11/12	0.409	0.396	0.404	0.436
12/13-15	0.457	0.409	0.396	0.496
13-15/≥16	0.402	0.375	0.370	0.371
Whites				
% Homogamous	52.9	55.7	53.9	52.7
% Hypergamous given Heterogamy	56.6	53.8	53.4	52.0
Correlation	0.629	0.686	0.677	0.649
Canonical correlation	0.631	0.689	0.683	0.670
Odds of homogamy	3.43	4.05	3.98	3.27
Uniform association	1.21	1.25	1.24	1.23
Odds of Crossing				
<10/10-11	0.438	0.332	0.429	0.306
10-11/12	0.406	0.392	0.397	0.448
12/13-15	0.455	0.411	0.398	0.497
13-15/≥16	0.403	0.376	0.362	0.382
Blacks				
% Homogamous	49.9	54.5	52.2	50.8
% Hypergamous given Heterogamy	42.1	44.3	42.4	41.3
Correlation	0.553	0.563	0.543	0.540
Canonical correlation	0.561	0.570	0.556	0.561
Odds of homogamy	2.94	3.27	2.96	2.59
Uniform association	1.20	1.25	1.24	1.26
Odds of Crossing				
<10/10-11	0.556	0.383	0.445	0.262
10-11/12	0.431	0.443	0.471	0.375
12/13-15	0.454	0.386	0.393	0.533
13-15/≥16	0.423	0.412	0.431	0.375

SOURCES: 1989-1991 and 1999-2001 Current Population Survey and 1990 vital statistics data.

Table 3. Relative Educational Assortative Mating, by Measure and Race (Wives Aged 15-49)

Measure of Educational Assortative Mating	(1) $\frac{B_{ij}}{{}_{35}M_{15\,ij}}$	(2) $\frac{{}_{1}D_{0ij}}{B_{ij}}$	(3) $\frac{B_{ij}-{}_{1}D_{0ij}}{B_{ij}}$	(4) $\frac{{}_{1}C_{10\,ij}}{B_{ij}}$	(5) $\frac{{}_{1}C_{10\,ij}}{{}_{35}M_{15\,ij}}$
Full Sample					
Odds of homogamy	1.174	0.952	1.000	0.886	1.040
Uniform Association	1.026	0.993	1.000	0.988	1.014
Odds of Crossing					
<10/10-11	0.733	1.270	0.998	0.888	0.650
10-11/12	0.963	1.006	1.000	1.139	1.096
12/13-15	0.890	0.983	1.000	1.202	1.070
13-15/≥16	0.921	0.997	1.000	0.984	0.907
Whites					
Odds of homogamy	1.164	0.954	1.000	0.883	1.028
Uniform Association	1.025	0.993	1.000	0.987	1.011
Odds of Crossing					
<10/10-11	0.759	1.301	0.998	0.878	0.666
10-11/12	0.957	0.999	1.000	1.165	1.115
12/13-15	0.899	0.987	1.000	1.191	1.071
13-15/≥16	0.921	0.972	1.000	1.001	0.923
Blacks					
Odds of homogamy	1.175	0.911	1.000	0.879	1.033
Uniform Association	1.025	0.992	1.000	1.006	1.031
Odds of Crossing					
<10/10-11	0.693	1.181	0.998	0.467	0.324
10-11/12	1.013	1.057	0.999	0.810	0.820
12/13-15	0.831	1.032	1.000	1.325	1.101
13-15/≥16	0.962	1.053	0.999	0.869	0.836

SOURCES: 1989-1991 and 1999-2001 Current Population Survey and 1990 vital statistics data.

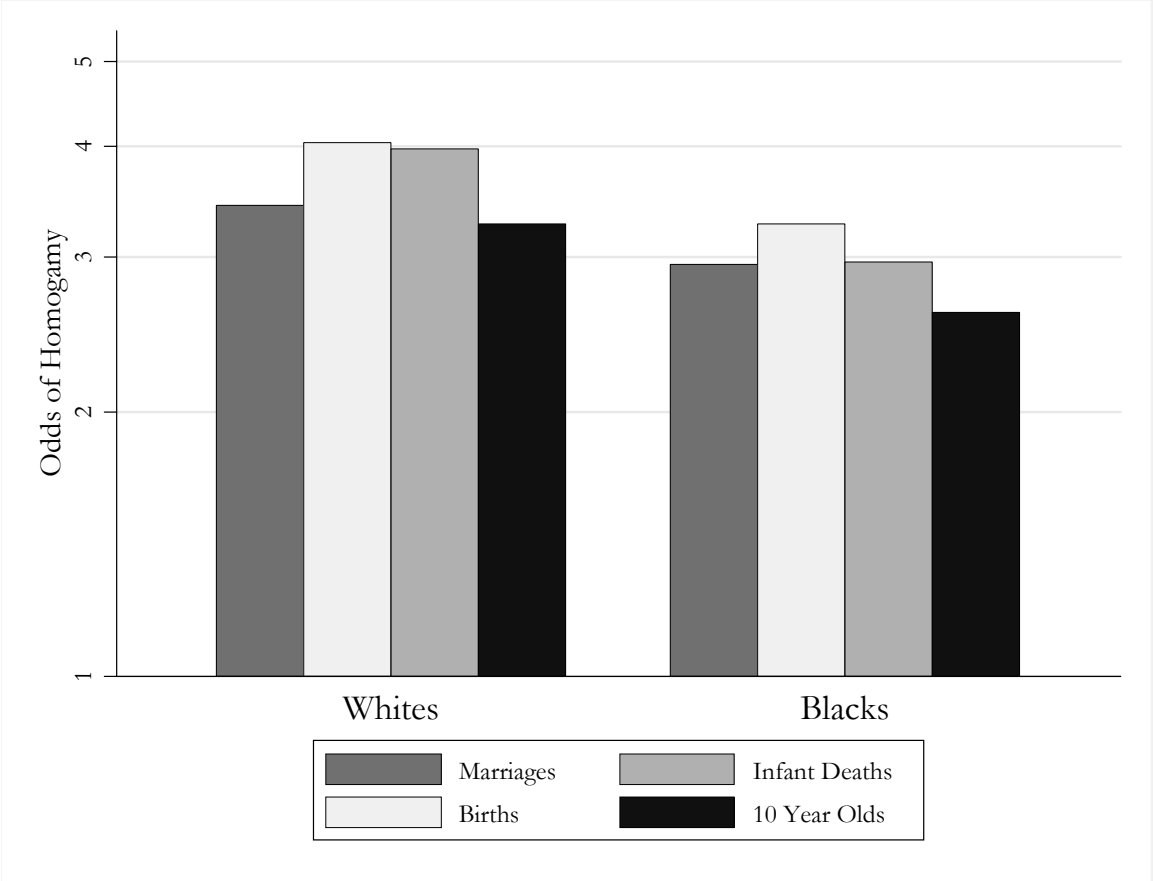
NOTES: B_{ij} = Births to husbands in education category *i* and wives in education category *j* in 1990.

${}_{35}M_{15ij}$ = Marriages between husbands in education category *i* and wives in education category *j* in which the wife is between the ages of 15 and 49 in 1989-1991.

${}_{1}D_{0ij}$ = Deaths occurring in the first year of life among infants born in 1990 to married couples in which the husband is in education category *i* and the wife is in education category *j*.

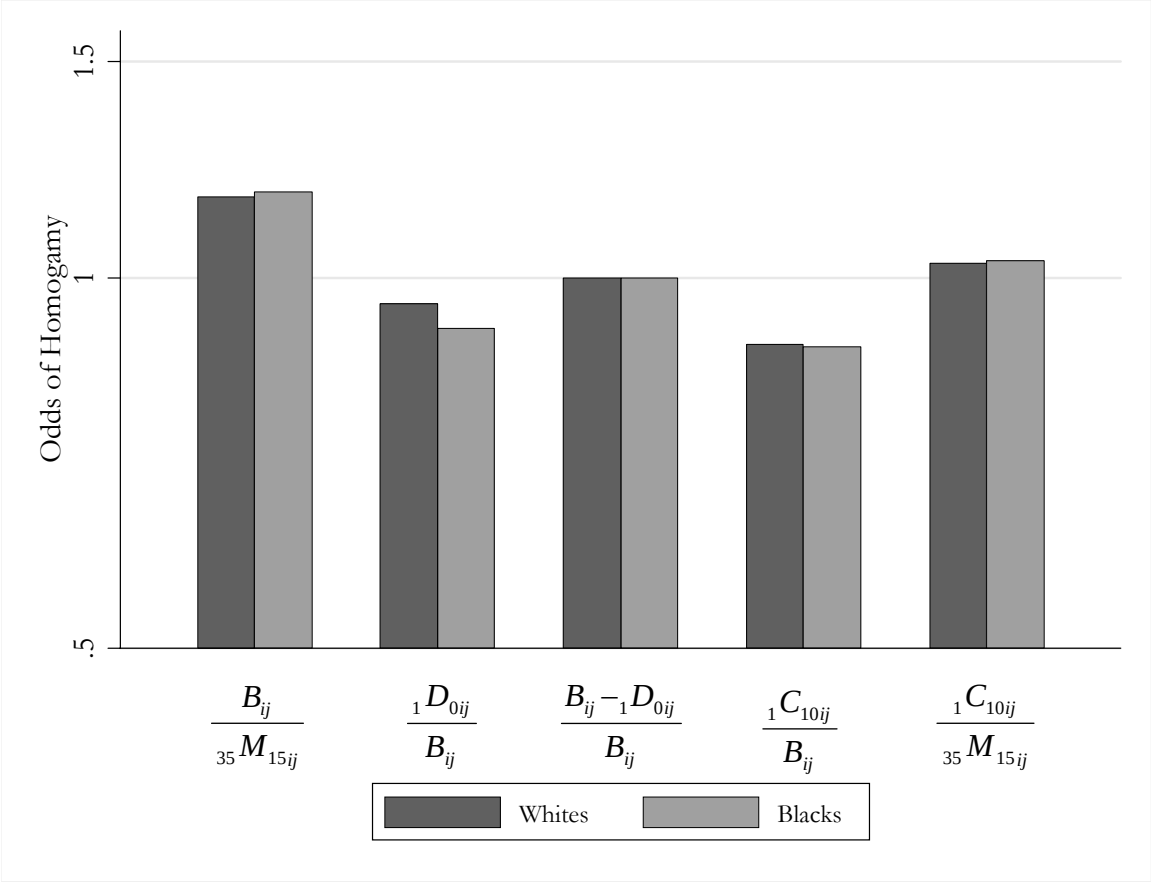
${}_{1}C_{10ij}$ = Children aged 10 in 1999-2001 who have mothers in education category *i* and whose mothers are married to men (fathers or step-fathers) in education category *j*.

Figure 1. Odds of Educational Homogamy, by Race (Wives Aged 15-49)



SOURCES: 1989-1991 and 1999-2001 Current Population Survey and 1990 vital statistics data.

Figure 2. Relative Odds of Educational Homogamy, by Race (Wives Aged 15-49)



SOURCES: 1989-1991 and 1999-2001 Current Population Survey and 1990 vital statistics data.

NOTES: B_{ij} = Births to husbands in education category *i* and wives in education category *j* in 1990.

${}_{35}M_{15ij}$ = Marriages between husbands in education category *i* and wives in education category *j* in which the wife is between the ages of 15 and 49 in 1989-1991.

${}_1D_{0ij}$ = Deaths occurring in the first year of life among infants born in 1990 to married couples in which the husband is in education category *i* and the wife is in education category *j*.

${}_1C_{10ij}$ = Children aged 10 in 1999-2001 who have mothers in education category *i* and whose mothers are married to men (fathers or step-fathers) in education category *j*.