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Fertility Trends Among U.S. Women Who Defer Childbearing Past Age 30

Steven P. Martin

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Steven P. Martin
University of Wisconsin-Madison

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Direct correspondence to Steven P. Martin, Department of Sociology, 1180 Observatory Drive, University of Wisconsin, Madison, WI 53706, smartin@ssc.wisc.edu. I gratefully acknowledge research funding provided by an NICHD core grant to the Center for Demography and Ecology (HD 05876) and by an NICHD grant for research on single mothers (HD 29550).

ABSTRACT

In 1975-79, U.S. women childless at age 30 had low fertility after age 30. Under age- and parity-specific birth rates for 1975-79, such women would average 0.35 first births and 0.6 total births by age 45.

By 1990-95, more women of most educational levels remained childless to age 30, and two distinct patterns of subsequent fertility emerged. Women with college degrees had increased fertility after age 30 due to higher first and second birth rates, higher marriage rates and marital birth rates, and lower marital disruption rates. Women without college degrees experienced no such changes.

INTRODUCTION

Research on delayed childbearing and childlessness

Women and couples have increasingly delayed the start of parenthood in recent decades, both in the United States and in other developed nations (Rindfuss, Morgan, and Swicegood 1988; c.f. Bosveld and Kuijstein 1995). These changes in the timing of parenthood have spurred interest in several possible consequences of postponed childbearing. One such consequence is the increasing health risks associated with births at advanced reproductive ages (c.f. Berendes, Forman, and Cnattingius 1993; Margoulis 1993). Another subject of wide debate is the link between delay and childlessness, along with the personal experience and societal consequences of childlessness (Veevers 1980; May 1995; Toulemon 1996). Also, some interest in this topic derives from the link between delayed fertility and the recent transformation of women's work roles. Working women commonly postpone childbearing as a way to coordinate their work and domestic roles (c.f. Van Horn 1988; Bianchi and Spain 1986), and delayed fertility rates following postponement could be an indicator of how often women effectively integrate these competing roles.

Delayed childbearing and childlessness are not new phenomena. Women born around 1910 had childlessness rates well over 20 percent (Davis 1978; Morgan 1991). Many of these women apparently postponed childbearing because of harsh economic conditions. Then, limited childbearing opportunities, continued hardships, or impaired fecundity (due in part to hazardous fertility control methods) led to continued low fertility rates in their later reproductive years. Period changes in overall fertility did increase birth rates in the later reproductive years for women in their thirties after World War 2. Still, for cohorts of women born from 1910 to 1930, the proportion of women childless at age 30 who eventually had a child remained fairly constant at about 35 to 40 percent (derived from Rindfuss, Morgan, and Swicegood 1988).

Women born from the 1930s to the 1940s entered their childbearing years in the baby boom. They generally began childbearing early and had rates of childlessness as low as or lower than 10 percent. In the decades after the baby boom, women have returned to a pattern of delayed childbearing, so much so that researchers such as Bloom (1982) predicted eventual childlessness rates as high as 30 percent for women born in the 1950s. However, these recent cohorts appear to be “catching up” with increased first birth rates at age 30 and older (Chen and Morgan 1991; Morgan and Chen 1992). Among women who reached childbearing age in the 1970s, the proportion eventually childless will probably be about 20 percent. More recent cohorts of women have experienced continuing declines in first birth rates before age 30, but if their first birth rates after age 30 continue to increase, then recent cohorts might also experience childlessness rates near 20 percent. Thus, trends in first births suggest a diminishing association between postponed childbearing and low fertility.

Demographic processes leading to delayed childbearing

Two types of demographic trends can increase the amount of delayed childbearing in a society. First of all, birth rates can decline for women (or couples) in their early childbearing years, thereby increasing the population exposed to the possibility of delayed childbearing. This first process has been the overwhelming determinant of delayed fertility for most of this century (Rindfuss, Morgan, and Swicegood 1988).

In this context, a notable feature of delayed childbearing is its relation to education. College-educated women are much more likely than other women to have births after age 30 rather than earlier

(Rindfuss, Morgan, and Offutt 1996), or to not have children at all (Bachu 1995). Most explanations of this educational pattern focus on the earlier childbearing years. For example, women with college degrees are more likely to spend their early adult years completing their educations and establishing their work careers instead of starting families.

The second trend that can increase delayed childbearing is an increase in birth rates among women who have already deferred childbearing. This process has been demographically less important than fertility changes in the earlier childbearing years. Furthermore, even if fertility rates increase among women at advanced reproductive ages, one might attribute such an increase to selection effects of early fertility behavior. According to this argument, the additional women now postponing fertility have more commitment to childbearing or more resources for childbearing than such women in the past. Therefore, the population as a whole has higher fertility rates in the advanced reproductive years.

Despite the above argument, there are reasons to look beyond selection effects when explaining changing fertility rates among women at advanced reproductive ages. First of all, fertility rates among women at advanced reproductive ages have been very low in the past, especially in comparison to those women's own expectations (Rindfuss and Bumpass 1978). Such low fertility rates suggest that age imposes strong social or biological constraints on fertility after age 30. Fertility changes could mean these age constraints are changing, at least for certain groups of women.

Secondly, one can turn around the causal implications of the selection argument. Early childbearing rates can influence later childbearing rates, but later childbearing rates can also affect early childbearing rates. If women can anticipate being able to successfully defer childbearing to a later age, they may be more likely to do so. If women cannot reasonably anticipate delayed childbearing, they may be more likely to choose to have their children early, even under difficult marital or other circumstances.

Plan of this study

This study focuses on fertility rates in the advanced reproductive years; specifically, on fertility rates of women who are childless at age 30. Like other studies of delayed childbearing, this study pays special attention to educational differences. Unlike other studies that focus on first births or on all births, this study focuses on educational patterns in first, second, and third birth rates of women childless at age 30.

In addition to educational patterns, this study also evaluates time patterns in fertility rates at advanced reproductive ages. This study compares fertility rates from the late 1970s to the early 1990s, both overall and by educational status, and thus measures fertility rates at advanced reproductive ages across a time interval in which the total amount of delayed childbearing has increased dramatically.

Over the past two decades, as delayed childbearing has increased in the United States, delayed marriage and nonmarital childbearing have also increased. To see how these demographic shifts may be related to birth rates in the later reproductive years, I measure change in marital status as a competing risk to a birth. Thus, given trends in birth rates at a given parity level, this paper examines how marital and nonmarital childbearing, marriage formation and marital dissolution may contribute to those trends.

The goal of this study, then, is to increase the understanding of delayed childbearing by focusing on its less-studied second component. A large literature has already examined how education, marriage formation, and other factors have affected women's willingness to delay childbearing past their early-and mid-twenties. This paper examines how those same factors affect fertility rates after women defer childbearing past age 30.

DATA

Most of the analyses in this study use the June 1990 and June 1995 versions of the Current Population Survey (CPS). I also replicate some results using the 1995 cycle of the National Survey of Family Growth (NSFG).

The CPS for June 1990 and June 1995 contains some background information plus a nearly complete marital and fertility history. The CPS fertility history has high allocation rates and a few improbable dates (such as six-month birth intervals), but it also contains a large enough sample size to identify interactions between period trends and age patterns in fertility. The fertility history records the dates of each of the first four births to women age 15 to 65 at interview. This study uses data from 14,803 respondents in the June 1990 and June 1995 CPS who were childless at age 30 in 1975 or later.

The CPS marital history contains the dates of each marriage for the first three marriages. The marital history also contains dates of separation, divorce, or widowhood (if such occurred) for the first three marriages. Most other information in the CPS refers to the current status of the respondent and is of little use in an event history study. However, I assumed that data on race, ethnicity, and educational status were the same at age 30 as at interview for women over age 30.

Because I assume that educational attainment is the same at age 30 and at interview, I could distort findings about the effect of education on fertility in the late childbearing years. If a substantial portion of women pursue additional education in midlife, *and* if childlessness is a significant predictor of return to school in midlife, then my findings might downwardly bias estimates of fertility rates for women at higher education levels. The literature on educational attainment in midlife is somewhat sparse, but recent work by Sheridan and Carr (1999) suggests that childlessness does *not* significantly affect the likelihood that a woman will return to school in midlife. Still, many women with four-year college degrees do return to school for master's and other post-four-year degrees, and many women with no college education pursue some college education. To be safe, then, I emphasize distinctions between women with and without four-year college degrees in this study.

As an additional caution, I limit my analyses of fertility patterns among divorced or remarried women. Respondents do not rehearse and remember separation or divorce dates as they do marriage and birth dates, so data in a complicated marital history may be unreliable. This paper analyzes changes in fertility rates over time, so differences in recall accuracy over time can easily confound results. Furthermore, divorced women have quite different fertility rates than remarried women, so misclassified marital status can severely distort apparent birth rates. For these reasons, models in this paper that disaggregate fertility by marital status examine fertility rates only for never-married women and for women in their first marriage.

The NSFG 1995 contains fertility, social, economic, and family background data from a national sample of 10,847 women in the United States age 15 to 44 at interview. I restrict this NSFG analysis to birth events from 1990 to 1995 among 1,242 white nonhispanic and black nonhispanic women childless after age 30. I have not used the NSFG's extensive background data in this paper.

For this paper, I only use the NSFG fertility history, plus information on race and education at interview. The NSFG education history has variables that permit researchers to better identify educational status at a given age. However, in this paper I use educational status at interview to preserve continuity with CPS results.

METHODS

The first portion of the analysis contains descriptive statistics on childlessness at age 30, based on weighted scores from the combined 1990 and 1995 June Current Population Surveys. This section provides the reader with an impression of the characteristics of the population of women childless at age 30 in the late 1970s and in the early 1990s.

Hazard models

The second and main part of the analysis examines conditional birth rates among women childless at age 30. I estimate the effects of education, time period, and age on birth rates using hazard models in the RATE program for event history analysis. I analyze separate hazard models for white nonhispanic women and for black nonhispanic women; the CPS samples of hispanic and other women were too small to support a full analysis.

In the hazard models, the rate or *hazard* of a live birth in each month *t* is represented by the following equation:

$$h(t) = exp(b_0 + b_1 x_1 + b_2 x_2 + \ldots + b_k x_k + c_0 (t))$$

In this type of hazard model, the x –variables have effects that either add to or subtract from the log of the baseline rate of the event. This model also includes an effect c_0 that causes the log of the birth rate to increase or decrease over time. The baseline hazard rate is thus based on a Gompertz function.

Time zero in the baseline function can vary in the different models. For models of first births, nonmarital births, and first marriages, time zero is the month of the respondent's 30th birthday. For second and third births, time zero is the month of the previous birth. Thus, second birth models will have three "clocks": a baseline clock for time since last birth, a measure of age of the mother at previous birth, and a period clock that measures the current year. Finally, for models of marital births and marital dissolutions, I use a baseline which sets time zero at the month of the marriage.

The baseline hazard of a birth over time appears as a "hump" function over age or over the interval since a previous birth. To model such a functional form, I spline several Gompertz functions together to produce a splined piecewise Gompertz function. For first births to women childless at age 30, I spline three functions for ages 30-34, 35-39, and 40-44 to cover a 15-year interval after the 30th birthday. For subsequent births, I spline three functions for 1-18, 19-36, and 37-120 months to cover a 10-year interval after the previous birth. I censor observations at age 45 and at 10 years postpartum to minimize the effects of extreme duration values.

The splined piecewise functional form matches the observed birth rates fairly well, but to verify covariate estimates I used several alternative models. As a first replication, I simplified the models to exclude linear effects of time. These *piecewise exponential* models produced similar but somewhat less precise coefficients. I also adjusted the time locations and numbers of spline constraints, again to no great effect. Finally, I generated more complicated models by inserting splined time effects for each covariate, as well as the baseline. This final *nonproportional effects* hazard model makes it difficult to estimate standard errors, but it also entails less distortion due to the model. Again, the results came out mostly the same, although with some differences I will discuss in the results. These alternate models are not presented, and results are available on request.

In the main sets of hazard models, the outcome of interest is a live birth. I estimate separate models for first births, second births and third births. In the models shown, I estimate parallel baseline rates for single and multiple births, but constrain the covariate effects for multiple births to be the same as for single births.

The sets of models estimate three categories of covariate effects. First, the models estimate a covariate effect of *time period*. In the models shown, time period is estimated as a linear effect of current year from 1975 to 1995. Other models grouped current year into four five-year categories and estimated separate effects of each category on birth rates. In these models, fertility changes from 1975 to 1995 were not perfectly linear over time, but the differences from a straight linear effect were usually not statistically significant. In the results, I present only the linear effects of time period and discuss one significant departure from linearity.[1]

The second category of covariate effects is for education. I estimate effects of education on birth rate for women without a high school diploma, for women with a high school diploma but no college (the omitted category), for women with some college but no four-year degree, and for women with a four-year-degree or more. In addition, I test whether changes in fertility over the last two decades might have been different for women of different educational status. To test this idea, I use an

[1] Still other models estimated linear effect of period for a data set restricted to 1980-1995, and the results were fully consistent with those presented here. For most effects of time period, both the coefficients and the standard errors were larger in 1980-1995 than in 1975-1995.

interaction variable that has a value equal to the time period (in years) for respondents with a four-year degree, and a value of 0 for all other respondents.

The interaction between period and education is extremely important in most models, so I investigated alternate specifications. Specifically, I divided the data set to run models that included only women of a given educational level. Models for women with four-year degrees produced results quite consistent with those predicted by the interaction coefficients. Among women without four-year degrees, the three subgroups (no high school diploma, high school diploma, some college) had very similar coefficients for period effects in separate models. Interestingly, women with some college education had slightly lower (more negative and less positive) period coefficients than women with high school diplomas. This pattern suggests that recent differences in delayed fertility by education are a threshold phenomenon, not a graded phenomenon. As the results will show, a college diploma has become a crucial predictor of fertility rates in the advanced reproductive years.

The third category of covariate effects is for current age of the respondent. In the first birth models, these effects appear in the linear coefficient terms of the baseline model. For subsequent births, the baseline hazard function measures not current age but the interval after the previous birth. In the subsequent birth models I include a linear term for the age of the respondent in months at the previous birth.

Simulations of birth expectancy at age 30

The main set of analyses identifies statistically significant differences in covariate effects on birth rates. However, the total number of births a woman has is a result not only of birth rates, but also of exposure time and interactions of first birth rates with subsequent birth rates. To incorporate these complications, I use the coefficients from the models in the main analysis to reconstruct a measure of "birth expectancy" for women childless at age 30.

I define the birth expectancy as the number of children of all parities a woman childless at age 30 might expect to have by age 45, if she were to live all her years from age 30 to 45 in one time period (say, 1975-1979). This measure gives some real-world meaning to the differences in rates in the formal models.

To construct the measure of birth expectancy, I first perform separate hazard analyses for black nonhispanic women, white nonhispanic women without college degrees, and white nonhispanic women with college degrees.[2] Next I calculate the coefficients for a splined Gompertz hazard function for first births for each of the five-year intervals 1975-1979, 1980-1984, 1985-1989, and 1990-1995. Then I derive the survival function from the hazard function to estimate the proportion of women with first births each year from age 30 to 44. To accommodate twin births, I assign a proportion of multiple births equal to the proportion of multiple births in each sample.[3] Next, for each one-year interval I derive survival functions for second births based on the hazard coefficients for second births. I calculate total second births by estimating the proportion of women with a second birth at ten years postpartum, given a first birth in the middle of each year of age, and given the proportions of women childless at age 30 who have a first birth at each age. Finally, I repeat the procedure for third births after assigning all second births to their proper year of age.

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[2] The sample of black nonhispanic women with college degrees was too small to model separately, as only 13 percent of the already small sample of black women reported receiving a college degree. The samples of other racial and ethnic groups were too small to model at all.

[3] To the extent that more women and couples use fertility assistance, multiple birth rates have increased more rapidly than singleton birth rates among women childless at age 30 (SART and ASRM 1996). Competing hazard models of multiple births suggest that more twin births occurred in the most recent years, but the number of such births is too small to permit a stable estimate.

This measure of birth expectancy is subject to some error. The total number of births at parity *n* is partly a function of the number of births at parity *n-1,* so sampling or specification errors in first birth rates can propagate themselves. To test whether sampling error might distort the results, I replicated the results with the NSFG 1995 data set. The NSFG sample was too small to estimate effects for earlier intervals, so I only produced a single set of estimates for the 1990-1995 interval.

To test whether the statistical model distorted the results, I also constructed the measure of birth expectancy using a piecewise exponential parameterization with more steps but no slopes; the results are not greatly different, but they differ enough to cause some concern. Of the two constructed measures, the measure presented here shows the *least* dramatic differences across the last two decades.

Marital transitions and birth transitions

The remaining portion of the analysis examines the contributions of marital status to the patterns in the main analysis. The analysis of marital status mimics the main analysis. I estimate first and second birth rates for never married women and within a first marriage, then I estimate first marriage formation and dissolution rates of childless women and of women with one child. (A dissolution can be a separation, a divorce, or the death of a spouse.) These competing risk models use almost the same parameters as the models in the main analysis. For models of marital transitions for black nonhispanic women, I simplify the baseline hazard function by removing the node at age 40 years.

RESULTS

Descriptive statistics of women childless at age 30.

Table 1 shows 1990/95 CPS estimates of the proportion of U.S. women childless at age 30 from the late 1970s to the early 1990s. Scores are weighted; unweighted scores produced essentially identical results. One sees the same general patterns looking down each column of figures. Women with a four-year degree are more likely to be childless at age 30 than other women, and nonhispanic white women are more likely to be childless at age 30 than nonhispanic black women or hispanic women. Not surprisingly, women who have never married at age 30 are very likely to be childless at age 30.

<Table 1 about here>

One can make informal comparisons in Table 1 between groups of women in the two time periods. In the late 1970s, about one fourth of women remained childless at age 30. By the mid-1990s, that proportion had risen to almost one third. Women of most educational levels and race and ethnic groups seem more likely to be childless at age 30 in the 1990s. The increases are most definite for women with four-year degrees and for white nonhispanic women, but the trend to delayed childbearing appears to be present in almost the entire population. One category of women is less likely to be childless at age 30, and that category is never-married women. The proportion of married women childless at age 30 seems to be increasing; most of this increase is probably caused by delayed marriage, which increases the number of newly married 30-year-olds.

The results in Table 1 for nonwhites differ from some results in the literature. Some studies of delayed childbearing have used vital statistics data on natality to calculate delayed childbearing and childlessness rates (Rindfuss, Morgan, and Swicegood 1988; Chen and Morgan 1991; Morgan and

Chen 1992). Unfortunately, the data on the population exposed to a birth is slightly biased in vital statistics data. Iterative methods of calculating the population at risk of a first birth magnify this bias into the later reproductive years. That problem was most pronounced for nonwhite women, for whom the incorrectly estimated rates of eventual childlessness were extremely low. Current Population Surveys gather information about births and about the population at risk from the same sample of women, so the CPS does not suffer from this problem (Morgan et al. 1994). Still, to be careful, I have replicated these results as much as possible with NSFG 1995 data. Proportions childless at age 30, delayed first birth rates, and subsequent second birth rates compare well in the CPS and NSFG samples, for blacks and whites as well as for women with or without a college degree.

Table 1 shows the proportion of all women childless at age 30 by category, but the *composition* of the population childless at age 30 is also important. Figure 1 decomposes the population of women childless at age 30 according to educational attainment. Note that in both the late 1970s and the early 1990s, more than half of women childless at age 30 *did not* have a four-year college degree. Women with four-year college degrees are certainly overrepresented in the population childless at age 30, and most public discussion of delayed childbearing involves college-educated women. However, a majority of women childless at age 30 do not have four-year degrees, primarily because a large majority of all women do not have four-year degrees.

As we shall see, this less-noticed majority has very different fertility outcomes in the later reproductive years than does the large minority of women with college degrees.

< Figure 1 about here. >

Figure 2 describes the population of women childless at age 30 according to marital status. From the late 1970s to the early 1990s, half or more of childless women were either never-married or unmarried at age 30. In the early 1990s, never-married women were the most numerous group of women childless at age 30. To produce this increase in the number of never-married childless women, trends toward delayed marriage must have more than offset increases in nonmarital births. Consequently, if birth rates are increasing in the later reproductive years, then marital birth rates, nonmarital birth rates, and/or marriage rates must be increasing.

< Figure 2 about here. >

First, second, and third birth rates of women childless at age 30.

Now begins the main analysis based on hazard models. Table 2 shows statistics for the variables included in the hazard models. The white nonhispanic sample contains many more cases than the black nonhispanic sample (or the samples of other racial and ethnic groups). Race/ethnicity and education data are imputed in less than one percent of cases. The hazard models control for imputed race and education characteristics.[4]

< Table 2 about here. >

Table 3 shows the effect of time period, education, and age on first birth rates for women childless at age 30. The first three columns contain models for first births to white nonhispanic women. Model A includes the annual change in birth rate from 1975 to 1995, plus the coefficients of the baseline Gompertz function. The period effect is positive and highly statistically significant. Translated into real terms, the period coefficient means that first birth rates for white nonhispanic women childless at age 30

[4] I do not show coefficients for these imputation variables, and their inclusion has no effect on the other coefficients. The models I present do *not* control for imputation or proxy data on birth or marital transition dates. I ran exploratory analyses that excluded such cases, and the covariate effects were similar to those in the models I present. However, the baseline event rates were biased downward in these models because only cases with a birth or marital transition could have an imputation or proxy flag.

have risen about exp(.022) = 2.2 percent per year from 1975 to 1995. Looking further down the column for Model A, one sees that the first birth rate in all years declines with the age of the woman. From age 30 to 34, the decline translates to just over 1 percent *per month* (based on the previous month). From age 35 to 39 the decline is more than 2 percent per month, and from age 40 to 44, more than 3 percent per month. The intercept for the peak birth rate (at age 30) is in log form; it translates to a rate of exp(-5.07) = 0.6 percent per month, or about 7 percent per year for the baseline year 1975. In summary, the first birth rate of white nonhispanic women is very low at age 30 and declines rapidly with age. However, the first birth rate has been increasing at all ages over 30 since the late 1970s.

< Table 3 about here. >

Again in Table 3, Model B for white nonhispanic women includes all the variables in Model A plus a set of variables for educational status. Adding education variables leaves the period and age effects essentially unchanged; the recent increase in delayed fertility among white women is *not* due to increases in educational attainment. The coefficients for education indicate that higher education (relative to a high school diploma) corresponds to higher rates of first births after age 30. For example, women with a four-year degree have about an exp(.34) = 40 percent higher first birth rate after age 30 than women with a high school diploma.

Model C in Table 3 adds a final variable that interacts the annual time-period effect with the four-year degree category. With the interaction term in place, the overall coefficient for annual change is only about exp(.007), or a 0.7 percent increase per year, and is no longer statistically significant. This small number represents the annual change in first birth rates among women *without* a four-year degree. The annual change for women *with* a four-year degree is the sum of the overall and interaction effects of time period. In other words, first birth rates among college educated women have increased by exp(.007+.025) = 3.3 percent per year, more than four times the increase for other women.[5]

Note that the coefficient for education for a four-year degree is not statistically significant in Model C. This means that in 1975, women with a four-year degree had about the same first birth rates after age 30 as other women after age 30. Thus, educational differences in first birth rates at advanced reproductive ages seem to be a recent phenomenon.[6]

The final three columns in Table 3 repeat Models A, B, and C for nonhispanic black women. With the smaller sample of black women, the results are less clear than for white women. The overall period effect is not positive in Model A, but the negative coefficient is not statistically significant. This means that first birth rates are probably steady or declining among black nonhispanic women childless at age 30. Also, no coefficient for education at interview is statistically significant in Model B. In Model C, the coefficient for the interaction term (annual change X college degree) is large and positive, but not statistically significant. This coefficient indicates that the first birth rate for women with a college degree may have increased relative to the first birth rate for other black nonhispanic women childless at age 30.

Table 4 turns to second birth rates, conditional on a first birth to a woman who was childless at age 30. The Models in Table 4 are mostly the same as those in Table 3. A single covariate for age at previous birth now shows the effect of age, much as the three monthly age parameters in each model of

5 I stress that this period interaction applies only to women with four-year college degrees. The CPS data show that women with some college actually have *declining* fertility relative to women with high school diplomas, although college attendance in midlife might bias this apparent effect.

6 A final note on the models for white women in Table 3 concerns the proper specification of the models. Models A, B, and C all identify a period effect for all ages 30 to 44. In more complicated nonproportional effects models, this period effect has the greatest magnitude at ages 35 to 39, and the smallest magnitude near age 30. Most births to women age 30 to 44 occur near age 30, as evidenced by the steeply downward age coefficients. Indeed, half of all first births in the interval occur at ages 30 to 32, when the true period effect is smallest. Thus, the overall coefficient for the period effect overstates the true increase in total first births among more recent cohorts of women. This is because the true period effect is smallest at age 30, when the birth rates are the highest.

Table 3. Table 4 does not display the coefficients of the baseline hazard, which now describes the duration after the first birth.

< Table 4 about here. >

The first column in Table 4 contains Model A, a simple model for the annual change in the second birth rate for white nonhispanic women. The coefficient for the period effect in Model A is .009, or less than 1 percent per year, and is statistically significant at the 5 percent level. Model B for white nonhispanic women adds variables for education at interview and for age at previous birth. Of the education variables in Model B, the category for four-year college stands out. Among white women childless at age 30, women with a four year degree have about an exp(.24) = 27 percent higher second birth rate than women with a high school diploma. As one might expect, the effect of age at first birth on second birth rates is strong and negative.

Model C for white nonhispanic women in Table 4 adds a single interaction variable for annual change X four-year degree. As in the models for first births, this single interaction variable has a profound effect on the whole model. According to Model C, the annual change in the conditional second birth rate among women childless at age 30 is essentially zero for women without a four-year degree. For women with a four-year degree, the conditional second birth rate has increased exp(-.000 + .020) or about 2.0 percent per year. Again, the positive coefficient for four-year degree in Model B disappears when the model adds the interaction term. In 1975, university-educated women *did not* have higher second birth rates (conditional on being childless at age 30 and then having a child) than other women; by 1995, they *did*.

Models A through C for black nonhispanic women in Table 4 show some of the same patterns as the models for white women. Consistent with the results for first birth and for white women, the coefficient for the interaction term (annual change X four-year degree) stands out as positive, large, and statistically significant. Unlike the case with white women, black women with no high school diploma appear to have higher second birth rates (given that they were childless at 30, then had a first birth) than women with a high school diploma.

Table 5 repeats the models in Table 4, this time for conditional third birth rates. The sample sizes are fairly small, and the interaction terms are no longer statistically significant. Note that the main effects for annual change are always negative for third births, although that effect is smaller in models that control for age at previous birth. Note also the negative coefficients for the effects of a four-year college degree relative to a high school diploma. Overall, it appears that third birth rates for women childless at age 30 have been low throughout the period 1975 to 1995, especially for women with university degrees. If there has been any period change in third birth rates from 1975 to 1995, it is that that the conditional third birth rates for women without a university degree have fallen towards the low rates for women with a university degree.

< Table 5 about here. >

Tables 3 through 5 constitute the results for the main analysis. One can combine the results for different parities and different races and make three general statements about birth rates for women childless at age 30.

1.) In 1975, women with a four-year degree had about the same overall birth rates as women without a four-year degree.

2.) For women without a four-year degree, overall birth rates changed little or not at all from 1975 to 1995.

3.) For women with a four-year degree, overall birth rates increased dramatically from 1975 to 1995.

Birth expectancy at age 30

The above statements are about birth rates, not about actual births. To verify these statements for actual births, I simulated the birth expectancy for women childless at age 30. The results are shown in Table 6 and summarized in Figures 3, 4, and 5.[7]

< Table 6 about here. >

Figure 3 shows the estimated proportion of women childless at age 30 who will have a first birth by age 45. According to Figure 3, a woman childless at age 30 in 1975-1979, who experienced age-specific1975-1979 first birth rates for the rest of her reproductive years, would have about a 35 percent chance of having a child. This proportion applied to black nonhispanic women and white nonhispanic women regardless of educational status. However, for a woman childless at age 30 in 1990-1995 who experienced age-specific1990-1995 first birth rates for the rest of her reproductive years, her chance of having a child depended strongly on her educational status. Among nonhispanic white women with four year-degrees, that chance was over 50 percent. For other categories of women, that chance remained at about 35 percent.

[7] According to Table 6, the NSFG data for fertility rates after age 30 in 1990-95 corroborate the CPS data for the same period. Thus, it does appear very likely that the educational differences described in this paper truly existed in the early 1990s. While the overall birth rates for the late 1970s are consistent with those for earlier time periods (Rindfuss, Morgan, and Swicegood, 1988), I have not yet replicated results to show that educational differences did not exist in the late 1970s.

< Figure 3 about here. >

Figure 4 evaluates second births to women childless at age 30 who had one child between ages 30 and 44. Figure 4 shows the proportion of these women who have a second birth in the ten years after their first birth. Several patterns stand out. First, in 1975-79, second birth rates were similar for women of different race and educational levels. Second, white nonhispanic women with four-year degrees experienced an increase in second birth rates by 1990-95, while second birth rates were the same or lower for other groups of women. Third, and unlike the case for first births, the second birth ratio (conditional on a first birth) is fairly high. Thus, even among women who delay childbearing past age 30, about half or more who have a first birth also have a second birth.

< Figure 4 about here. >

Figure 5 shows estimates for third birth ratios. These estimates contain more uncertainty than estimates for other birth ratios, but they appear to show low and declining third birth ratios for most women (of parity two) who were childless at age 30.

< Figure 5 about here. >

Figure 6 combines the estimates of first, second, and third births in Figures 3, 4, and 5 to produce an estimate of the total average number of children born to women childless at age 30. This total average number of children is the "birth expectancy at age 30." This summary measure shows most dramatically the recent race and educational differences in delayed fertility. Those differences either did not exist or were much smaller twenty years before.

< Figure 6 about here >

Marital and nonmarital birth rates; marriage rates and marital dissolution rates.

The results so far show that compared to other women childless at age 30, women with four-year degrees have experienced an increase in births after age 30. This section shows that marriage patterns may explain part of that increase. Table 7 shows nonmarital birth rates for white nonhispanic and black nonhispanic women. To minimize the effect of response error, I analyze birth rates only for women who have never married.[8] All models are the equivalent of Model C, the full model in Tables 3 through 5.

< Table 7 about here. >

The first column in Table 7 shows a model for first birth rates to never-married women. The period effects indicate no change or perhaps a slight increase in the rate of never-married first births from 1975 to 1995, and no significant interaction among women with four-year degrees. Among the education variables, the coefficient for women with a four-year college degree indicates that women with college degrees have only exp(-.75) or 47 percent of the rate of never-married first births compared to women with high school diplomas. The most important coefficient is the coefficient for the peak birth rate at age 30. For never-married women, this coefficient indicates a first birth rate of exp(-6.98) or 0.09 percent per month, which translates to just over 1 percent per year. This tiny baseline rate means that never-married first birth rates are still very low among older women, despite recent increases in never-married first births among younger women. The *number* of never-married first births to women over thirty has increased because more women have not married by age thirty. Still, if we seek an explanation for increased first birth *rates* among college-educated women, we must look elsewhere.

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[8] Results for birth and marriage transitions to unmarried and remarried women are available on request. It is extremely likely that response errors biased the coefficient estimates in these models.

The second column in Table 7 shows estimates for second birth rates to never-married women with a first child after their 30th birthday. The sample size is extremely small because only 170 of 4930 women never-married at 30 had a never-married first birth after age 30. The interaction term (annual change X 4-year degree) is extremely large and positive, but not statistically significant at the 5 percent level; it may indicate that more never-married births to college educated women occur in the context of a cohabiting relationship more likely to produce a second birth.

The final column in Table 7 models never-married first births rates among nonhispanic black women. With the small sample size the results are not clear, but it appears that never-married first birth rates declined for most black women, but held steady or increased among black women with college degrees. However, never-married births to black college-educated women were extremely low in the late 1970s, so even a substantial increase in never-married *birth rates* would not produce a large number of never-married *births*.

According to Table 7, birth rates to never-married women do not explain recent trends in birth rates at advanced reproductive ages. Table 8 evaluates comparable birth rates for women in a first marriage. The first column estimates effects on first birth rates to white nonhispanic women married and childless after age 30.[9] In this column, the coefficient for the interaction term is statistically significant and positive. Thus we may attribute some portion of the increase in all first births among women with four-year degrees to an increase in marital first birth rates.[10] From the other columns in Table 8, it is not

[9] Note: many women married and childless at age 30 were married before age 30. The effects of marriage duration are controlled in the baseline hazard function.

[10] Note also that the education coefficient for women with four-year college degrees is also positive and statistically significant. In the 1970s, white nonhispanic women with four-year degrees already had higher marital first birth rates than women with high school degrees. This relative advantage may have been balanced out by lower proportions of university-educated women married in the 1970s, because the overall difference in first birth rates was not statistically significant at that time (see Table 3).

clear whether trends in marital birth rates affected overall birth rates for second births or for black women. However, note that the peak birth rates in all columns of Table 8 are much higher than the peak birth rates for never-married women. (The baseline estimates are 3 times higher for blacks to more than 11 times higher for whites, and the baseline differences are magnified in all columns for women with college degrees.) In other words, the fertility effects of marriage may not have changed much for women childless at age 30, but those effects have always been very large.

< Table 8 about here. >

Given the importance of marriage for fertility after age 30, Table 9 looks at marital transition rates. For women childless at age 30, the first two columns show first marriage rates for white nonhispanic women, and the third column shows marriage rates for black nonhispanic women. The interaction term dominates all these models. White nonhispanic women with a college degree and childless at age 30 are entering marriages at a rate increasing by exp(.000 + .033) = 3.4 percent per year. For such women with a never-married first birth, the marriage rate appears to be several times larger, perhaps reflecting increases in cohabiting couples turning to marriage after a birth. For black women, the time effect of a college degree is equally striking. Overall, it is clear that women with college degrees are undergoing rapid increases in marriage rates in their later reproductive years, and other women are not.

< Table 9 about here. >

Table 10 completes the analysis of marital transitions by showing estimates for marital dissolution rates among women who were childless at age 30. As in Table 9, the coefficients for the interaction terms are statistically significant in all models, but this time the coefficients are negative. Thus, compared to other women, women with college degrees appear to be increasingly unlikely to experience a marital dissolution. These coefficients are important to fertility rates at later ages for two reasons. First, they indicate that women with college degrees are becoming less likely to move from the high-fertility state of marriage to the low-fertility states of separation, divorce, or widowhood. Second, these coefficients imply that any recent increases in marital birth rates might be partly attributable to increasing stability of marriages among women with college degrees.

DISCUSSION

Summary of results

This paper assessed "catching up" fertility behavior of women who deferred childbearing past age 30. In the late1970s, most such women, regardless of education or race, had relatively low expected fertility – this study estimates about 0.6 total children per woman, with nearly two thirds remaining childless. By the early 1990s, delayed childbearing rates had increased dramatically, but only for women with four-year college degrees. For white nonhispanic women with college degrees, this study predicts about 1.0 child per woman, with less than half remaining childless. For other white women, fertility among women childless at age 30 remained at its earlier low levels, and for black nonhispanic women, such fertility may have actually declined. (The small population of black nonhispanic women with college degrees probably experienced an increase in fertility.) Thus, in the 1990s, educational attainment has become a powerful predictor of fertility rates among women childless at age 30.

Both first and second birth rates increased among women with college degrees. The increase in second birth rates is notable for several reasons. First, the increase in second birth rates was entirely limited to women with college degrees. Second, the increase in second birth proportions occurred despite an increasing average age at first birth of college-educated women with a first birth after age 30. Third, the combined increases in first and second birth rates among college educated women produced a compounded increase in total fertility. Lastly, although third birth rates declined from 1975 to 1995 for all women childless at age 30, total third births to college-educated women still increased because more such women reached parity two.

Additional analyses suggested strong effects of marriage on delayed childbearing. At later childbearing ages, married women have much higher birth rates than women who have never married. From 1975 to 1995, birth rates of never-married women have not risen appreciably, but first birth rates have risen for college-educated white nonhispanic women in first marriages. Other changes in marriage over the past twenty years involve marriage formation and marital stability. Among women childless at age 30, women with four-year degrees, and only women with four-year degrees, have *dramatically increasing* first marriage rates after age 30. Similarly, compared to other women, women with four-year degrees have *decreasing* marital dissolution rates after age 30. Undoubtedly, these changes in marriage formation and dissolution have made possible much of the increase in fertility in late childbearing years among women with college degrees.

Explaining the results

The relationship between educational attainment and fertility in the later reproductive years appears to have changed in the past two decades. Women with college degrees who are childless at age 30 have increasing birth rates after age 30. Has this fertility shift (and the attendant shift in marital transitions) occurred simply because more women with college degrees have postponed childbearing until after age 30, or has it happened because women with college degrees have increasingly overcome the social and biological limits imposed by age on fertility?

Selection effects, if they exist, should manifest themselves in two places. First, more women in recent cohorts who are childless at age 30 and married should be recently married (say, at age 29). In analyses of marital transitions and births, this paper controlled for such a selection effect but did not measure it directly. Second, more women unmarried and childless at age 30 should be forming marriages after age 30. This pattern is strongly borne out by the results, and may be strong evidence for a selection effect of earlier fertility behavior on the relationship between education and fertility rates after age 30.

However, selection effects fall short of explaining other fertility and marital trends. Specifically, it is hard to find a straightforward selection argument to explain the following trends apparently unique to women with four-year degrees:

1.) Decreases in marital dissolution rates

2.) Increases in marital birth rates, controlling for marital duration and age

and 3.) Increases in second birth rates conditional on a first birth after age 30.

In addition, it is not clear why the effects of selection should accrue to only college-educated women. The proportion of women with college degrees childless at age 30 certainly increased from the 1970s to the 1990s. However, the relative proportions and absolute numbers of other women childless at age 30 increased at almost the same pace, and such women still comprise a significant majority of all women childless after age 30. Selection arguments would have difficulty explaining why so many women still have low birth rates after age 30.

The final difficulty with a selection explanation is that the causal direction is not clear. Perhaps women with college degrees are more likely to defer childbearing because their prospects for later marriage and childbearing are good. At the same time, women with less than a four-year college education and especially black women tend to have children relatively early and often outside of marriage. Women in the same educational and racial groups have low fertility rates if they are childless at age 30, in part because they have low marriage rates after age 30. It is certainly possible that these women condition their early fertility decisions on their future marriage and fertility potential.[11]

Aside from selection effects, social and biological constraints of age might explain why only college-educated women have increasing birth rates after age 30. Biological constraints of age are probably not a critical factor in fertility of women mostly in their 30s (Menken 1985; McFalls 1990), and recent medical advances in reproductive assistance are pushing back those biological constraints to some unknown extent. Still, women with college degrees may have better access to advanced reproductive technologies, and their overall marital first and second birth rates may be increasing *slightly* as a result (in this context see Chandra and Stephen 1998).

Social constraints of age more plausibly limit the fertility of women mostly in their thirties. Rindfuss and Bumpass (1978) divided such social constraints into several categories, of which three merit discussion here.

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[11] Chen and Morgan (1991) originally found that nonwhite women had both low rates of childlessness at age 30 and extremely high first birth rates after age 30. These early findings appeared to deny the contention that women have births under unfavorable circumstances early in life if they have low birth probabilities later in life. However, the authors have corrected those early results (Morgan et al., 1994)

One social effect of age involves synchrony, the timing of a woman's births relative to the average timing. If most women have births at early ages, women who wait longer may have lower fertility due to a lack of support, pressure, advice, or opportunity for childbearing. To the extent that synchrony is important to fertility, it could work in concert with selection effects. For example, if more people postpone marriage, then the marriage market will improve for people in their middle and late reproductive years.

Another social effect of age would entail normative bounds on the proper times for childbearing. Some researchers argue that fertility norms in general are weakening in comparison to more individualistic childbearing motivations (c.f. Hall 1993). If this were true, one might expect fertility norms to weaken most quickly among women with college degrees. However, one might also expect fertility norms against nonmarital births and only-child families to be weakening, but marital birth proportions and second birth rates are still quite high among women with college degrees. Most likely, fertility norms operate and interact in complex ways that defy simple predictions.

A final social effect of age involves competition between domestic and other career paths in the lives of women, especially paid employment. In the 1970s, this largely meant that the longer a woman postponed childbearing, the greater the likelihood that her energies would be diverted to her job. Furthermore, college-educated women presumably help the most enticing jobs to distract them from a domestic life path. In the 1970s, according to this argument, a college education should have been a net disincentive to births in women's later reproductive years.

By the 1990s, however, most women must plan their childbearing in the context of a paid career, not as an alternative to a paid career. Consequently, the effect of a college degree on fertility rates may have shifted dramatically among women over thirty. Twenty years ago, a high-education career might have been a distraction from the domestic life path, but now it is often a path to continued employment after childbearing without a catastrophic loss of earning power.[12]

The changing relationship between work and childbearing could explain several patterns in the results. For example, recent educational differences in second birth rates make sense if women with college degrees have greater resources to weather a short absence from the labor force. For first birth rates, however, this explanation must incorporate the role of marriage formation and stability in delayed childbearing. A growing literature certainly supports the contention that women's economic potential is having an increasing positive effect on marriage formation rates and marriage quality (Oppenheimer 1988, Sweeney 1997).

This paper has measured educational differences in birth rates among women childless at age 30 or older. This paper has also explored to some extent how those birth rates have changed across time and in the context of different marital transitions. However, the processes underlying these educational differences remain unclear. In the results, the clearest change over time involves increasing marriage rates after age 30 to women with a four-year college degree. Unfortunately, most of the explanations I have proposed for recent fertility trends predict just such an increase. Because the different explanations have such different implications, I hope that this paper motivates others to examine this topic further.

[12] Dex et al. (1996) find that women in the United Kingdom with college degrees and high wages experience far less employment disruption around childbearing than other women, perhaps especially at older reproductive ages.

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Table 1: Proportion of women childless at age 30, 1975-1979 to 1990-1995.
By race, education level, and marital status.

Category:	Proportion in category who were childless at age 30 in 1975-79	1980-84	1985-89	1990-95
All U.S. Women	.24	.28	.31	.33
By education level				
4-year college degree (or more)	.40	.46	.54	.56
No 4-year college degree	.19	.22	.23	.25
Less than high school diploma	.15	.15	.13	.16
High school diploma	.17	.20	.22	.22
Some college, no 4-year degree	.23	.26	.29	.32
By race				
White nonhispanic	.25	.30	.33	.36
Black nonhispanic	.22	.21	.21	.23
Hispanic	.19	.18	.20	.23
Other nonhispanic	.31	.33	.35	.41
By marital status				
Never married	.75	.70	.68	.65
First marriage	.16	.18	.20	.24
Divorced/separated/widowed	.20	.23	.25	.21
Remarried	.13	.17	.16	.18

Notes:
Source: June 1990 and June 1995 Current Population Survey.
N = 41,698 women age 30 in 1975-1995.
Proportions are based on weighted scores

Table 2: Descriptive statistics for June 1990/1995 Current Population Survey. U.S. women childless at age 30-44 in 1975 or later.

Variable	All women	White nonhispanic	Black nonhispanic
Sample Size	14803	11934	1314
White nonhispanic	.81		
Black nonhispanic	.09		
Hispanic	.05		
Other nonhispanic	.05		
Race/ethnicity based on imputed or proxy data	.007	.007	.003
Less than high school diploma	.08	.05	.17
High school diploma	.27	.27	.31
Some college, no 4-year degree	.25	.25	.25
4-year college degree (or more)	.40	.43	.26
Education level based on imputed or proxy data	.007	.006	.004
Never married at age 30		.42	.61
One or more marital transition dates based on imputed or proxy data		.15	.19
One or more birth transition dates based on imputed or proxy data	.02	.02	.05
1990 CPS	.46	.47	.47

Notes:
Source: June 1990 and June 1995 Current Population Survey.
Scores are unweighted

Table 3: Effects of time period, education, and age on 1st birth rates for women childless at age 30-44. U.S. white nonhispanic women and black nonhispanic women, 1975-95.

First births:	White nonhispanic women			Black nonhispanic women		
	A	B	C	A	B	C
Period effects:						
Annual change in birth rate:	.022**	.020**	.007	-.006	-.007	-.018
1975 to 1995	(.003)	(.003)	(.005)	(.011)	(.011)	(.013)
Annual change			**.025****			**.041**
X 4-year college degree			**(.007)**			**(.025)**
Education at interview:						
No high school diploma		-.41**	-.43**		.10	.09
		(.12)	(.12)		(.18)	(.18)
High school diploma		omitted	omitted		omitted	omitted
Some college, no 4-year deg.		.10*	.11*		.11	.12
		(.05)	(.05)		(.16)	(.16)
4-year college degree		.34**	.07		.23	-.18
		(.05)	(.08)		(.16)	(.30)
Age effects:						
Monthly change: ages 30-34	-.011**	-.011**	-.011**	-.003	-.003	-.003
	(.001)	(.001)	(.001)	(.003)	(.003)	(.003)
Monthly change: ages 35-39	-.022**	-.022**	-.022**	-.024**	-.023**	-.023**
	(.001)	(.001)	(.001)	(.003)	(.003)	(.003)
Monthly change: ages 40-44	-.034**	-.033**	-.033**	-.008	-.008	-.008
	(.005)	(.005)	(.005)	(.010)	(.010)	(.010)
Peak birth rate at age 30	-5.07**	-5.24**	-5.11**	-5.33**	-5.45**	-5.34**
	(0.05)	(0.06)	(0.07)	(0.16)	(0.19)	(0.19)
Sample size	11934			1314		
Log likelihood	-21165.0	-21113.5	-21106.5	-1973.6	-1971.8	-1970.5

Notes: coefficients represent the log of the change in conditional birth rates associated with each covariate. Peak birth rates are intercepts for single births; coefficients show effects for single or multiple births. Intercepts for multiple births are not shown. Coefficients for imputation flags are not shown.

Source: June 1990 and June 1995 Current Population Survey. * $p < .05$ ** $p < .01$

Table 4: Effects of time period, education, and age on 2nd birth rates for women childless at age 30-44. U.S. white nonhispanic women and black nonhispanic women, 1975-95.

Second births:	White nonhispanic women			Black nonhispanic women		
	A	B	C	A	B	C
Period effects:						
Annual change in birth rate: 1975 to 1995	.009* (.004)	.010* (.005)	-.000 (.006)	-.003 (.016)	-.005 (.016)	-.028 (.019)
Annual change X 4-year college degree			**.020* (.009)**			**.081* (.036)**
Education at interview:						
No high school diploma		-.11 (.16)	-.14 (.17)		.49* (.24)	.52 (.24)
High school diploma		omitted	omitted		omitted	omitted
Some college, no 4-year deg.		.12 (.07)	.12 (.07)		.18 (.23)	.21 (.24)
4-year college degree		.24** (.06)	.02 (.11)		.25 (.23)	-.60 (.46)
Age effects:						
Age at previous birth (in months after age 30)		-.009** (.001)	-.009** (.001)		-.002 (.002)	-.002 (.002)
2nd birth rate at age 33 (given 1st birth at age 30)	-3.77 -------	-3.63 -------	-3.52 -------	-4.24 -------	-4.33 -------	-4.13 -------
Sample size	3764			367		
Log likelihood	-9134.3	-9066.7	-9064.6	-846.5	-844.1	-841.6

Notes: coefficients represent the log of the change in conditional birth rates associated with each covariate. Birth rates are intercepts for single births; coefficients show effects for single or multiple births. Intercepts for multiple births are not shown. Coefficients for imputation flags are not shown. Coefficients for the baseline hazard function for second births are not shown.

Source: June 1990 and June 1995 Current Population Survey. $* p < .05$ $**p < .01$

Table 5: Effects of time period, education, and age on 3rd birth rates for women childless at age 30-44. U.S. white nonhispanic women and black nonhispanic women, 1975-95.

Second births:	White nonhispanic women A	B	C	Black nonhispanic women A	B	C
Period effects:						
Annual change in birth rate:	-.036**	-.026**	-.029*	-.029	-.013	-.027
1975 to 1995	(.009)	(.010)	(.012)	(.024)	(.025)	(.028)
Annual change			**.006**			**.079**
X 4-year college degree			**(.020)**			**(.071)**
Education at interview:						
No high school diploma		.38	.38		.01	.01
		(.23)	(.23)		(.33)	(.33)
High school diploma		omitted	omitted		omitted	omitted
Some college, no 4-year deg.		-.08	-.08		-.57	-.55
		(.14)	(.14)		(.40)	(.41)
4-year college degree		-.47**	-.53*		-.84*	-1.77
		(.13)	(.24)		(.41)	(.98)
Age effects:						
Age at previous birth		-.006**	-.006**		-.009**	-.009**
(in months after age 30)		(.002)	(.002)		(.003)	(.003)
3rd birth rate at age 36	-4.67	-4.40	-4.38	-4.24	-4.49	-4.37
(given 2nd birth at age 33)	-------	-------	-------	-------	-------	-------
Sample size	1984			181		
Log likelihood	-2395.7	-2379.2	-2379.2	-329.7	-319.1	-318.4

Notes: coefficients represent the log of the change in conditional birth rates associated with each covariate. Birth rates are intercepts for single or multiple births; coefficients show effects for single or multiple births. Coefficients for imputation flags are not shown. Coefficients for the baseline hazard function for third births are not shown.

*Source: June 1990 and June 1995 Current Population Survey. * p < .05 **p < .01*

Table 6: "Birth Expectancy" at Age 30.
Expected total births by age 45 to women childless at age 30.

	1975-79 CPS	1980-84 CPS	1985-89 CPS	1990-95 CPS	1990-95 NSFG
White nonhispanic women with 4-year degree:					
Proportion with					
1st births:	.36	.38	.44	.54	.51
2nd births:	.21	.24	.30	.38	.33
3rd births:	.05	.04	.05	.09	.09
TOTAL:	.62	.66	.78	1.02	.93
White nonhispanic women with no 4-year degree:					
Proportion with					
1st births:	.30	.37	.37	.34	.38
2nd births:	.17	.21	.21	.20	.22
3rd births:	.06	.06	.06	.02	.04
TOTAL:	.52	.64	.64	.56	.64
All black nonhispanic women:					
Proportion with					
1st births:	.35	.36	.36	.32	.28
2nd births:	.21	.18	.15	.18	.15
3rd births:	.08	.06	.04	.04	.02
TOTAL:	.65	.59	.55	.54	.45

Estimates based on parameters for 1st, 2nd and 3rd birth rates.
Sources: June 1990 and June 1995 Current Population Survey.
National Survey of Family Growth 1995.
See text for explanations and details.

Table 7: Effects of time period, education, and age on birth rates for never-married U.S. women. White and black nonhispanic women childless at age 30-44, 1975-1995.

Never-married women:	white nonhispanic 1st birth rates	 2nd birth rates	black nonhispanic 1st birth rates
Period effects:			
Annual change in birth rate:	.012	-.091	-.046*
1975 to 1995	(.018)	(.049)	(.022)
Annual change	**.007**	**.16**	**.10**
X 4-year college degree	**(.026)**	**(.09)**	**(.05)**
Education at interview:			
No high school diploma	-.20	1.16	.40
	(.34)	(.76)	(.30)
High school diploma	omitted	omitted	omitted
Some college, no 4-year deg.	-.39	.66	.30
	(.22)	(.71)	(.27)
4-year college degree	-.75*	-1.62	-1.50*
	(.32)	(.89)	(.65)
Age effects:			
Monthly change: ages 30-34	-.008		-.004
	(.004)		(.006)
Monthly change: ages 35-39	-.009*		-.029**
	(.005)		(.008)
Monthly change: ages 40-44	-.058		= -.029**
	(.031)		= (.008)
Age at 1st birth		-.009	
		(.007)	
Peak birth rate at age 30	-6.98**	-4.78	-5.40**
(age 33 for 2nd births)	(.27)	- - - - -	(.33)
Sample size	4930	170	720
Log likelihood	-1265.2	-143.0	-640.0

Notes: coefficients represent the log of the change in conditional birth rates associated with each covariate. Peak birth rates are intercepts for single or multiple births. "Peak" birth rates for second births are estimated at 36 months postpartum. Never married women are censored at first marriage.

Source: June 1990 and June 1995 Current Population Survey. $* p < .05$ $** p < .01$

Table 8: Effects of time period, education, and age on birth rates for U.S. women in a first marriage. White and black nonhispanic women childless at age 30-44, 1975-1995.

Women in a 1st marriage:	white nonhispanic 1st births	white nonhispanic 2nd births	black nonhispanic 1st births
Period effects:			
Annual change in birth rate:	-.000	.005	.003
1975 to 1995	(.005)	(.007)	(.019)
Annual change	**.013***	**.016**	**-.005**
X 4-year college degree	**(.005)**	**(.010)**	**(.024)**
Education at interview:			
No high school diploma	-.11	-.23	-.23
	(.15)	(.32)	(.32)
High school diploma	omitted	omitted	omitted
Some college, no 4-year deg.	.14*	.08	.08
	(.06)	(.25)	(.25)
4-year college degree	.23**	.01	.55
	(.06)	(.12)	(.28)
Age effects:			
Age at marriage	-.011**		-.008**
	(.001)		(.002)
Age at 1st birth		-.008**	
		(.001)	
Peak birth rate at age 30	-4.54**	-3.47	-4.35**
(age 33 for 2nd births)	(.10)	- - - - -	(.36)
Sample size	6142	3087	483
Log likelihood	-13406.1	-7252.4	-795.7

*Notes: coefficients represent the log of the change in conditional birth rates associated with each covariate. Peak birth rates are intercepts for single or multiple births. "Peak" birth rates for second births are estimated at 36 months postpartum. Never married women are censored at first marriage. Coefficients for the baseline hazard function for marital duration are not shown. Source: June 1990 and June 1995 Current Population Survey. * p < .05 ** p < .01*

Table 9: Effects of time period, education, and age on marriage rates for never-married U.S. women. White and black nonhispanic women childless at age 30-44, 1975-1995.

Never-married women:	white nonhispanic w/no children	white nonhispanic w/1 child	black nonhispanic w/no children
Period effects:			
Annual change in birth rate: 1975 to 1995	.000 (.006)	-.035 (.032)	-.18 (.18)
Annual change X 4-year college degree	**.033**** **(.008)**	**.24**** **(.07)**	**.080**** **(.027)**
Education at interview:			
No high school diploma	-.82** (.18)	.10 (.49)	.48 (.26)
High school diploma	omitted	omitted	omitted
Some college, no 4-year deg.	.13 (.08)	.08 (.38)	.43 (.23)
4-year college degree	-.10 (.09)	-2.39* (.98)	-.42 (.36)
Age effects:			
Monthly change: ages 30-34	-.010** (.001)		-.002 (.005)
Monthly change: ages 35-39	-.013** (.001)		-.005 (.004)
Monthly change: ages 40-44	-.013* (.006)		= -.008 = (.004)
Age at 1st birth in months		-.012* (.005)	
Marriage rate at age 30	-4.93** (.09)	-3.59** (.54)	-5.78** (.28)
Sample size	4930	170	720
Log likelihood	-9561.9	-296.3	-1004.8

Notes: coefficients represent the log of the change in conditional birth rates associated with each covariate. Never-married women are censored at a birth event.

Source: June 1990 and June 1995 Current Population Survey. $* p < .05$ $** p < .01$

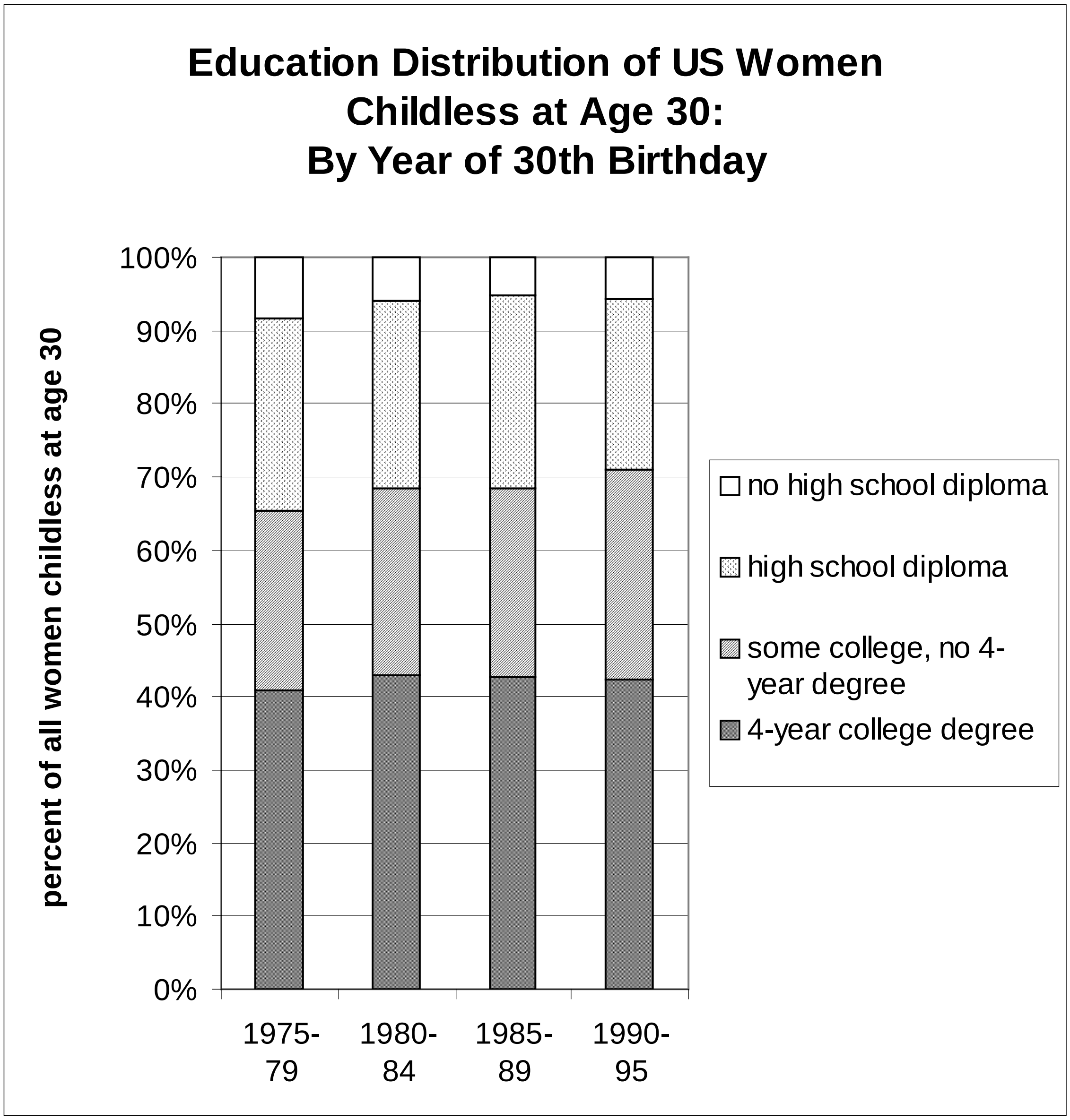
Table 10: Effects of time period, education, and age on marital dissolution rates for U.S. women in a first marriage.
White and black nonhispanic women childless at age 30-44, 1975-1995.

Women in a 1st marriage:	white nonhispanic w/ no children	w/ 1 child	black nonhispanic w/ no children
Period effects:			
Annual change in birth rate: 1975 to 1995	.008 (.008)	.008 (.017)	.019 (.019)
Annual change X 4-year college degree	**-.025*** **(.010)**	**-.060*** **(.030)**	**-.084**** **(.032)**
Education at interview:			
No high school diploma	.24 (.20)	.22 (.35)	.27 (.27)
High school diploma	omitted	omitted	omitted
Some college, no 4-year deg.	.17 (.10)	-.14 (.20)	.08 (.26)
4-year college degree	.14 (.12)	-.62 (.34)	.62 (.36)
Age effects:			
Age at marriage	-.004** (.001)		-.005* (.002)
Age at 1st birth		-.002 (.002)	
Dissolution rate at age 30	-5.64** (.19)	-6.38** (.33)	-4.53** (.41)
Sample size	6142	3087	483
Log likelihood	-4721.3	-1325.3	-673.0

Notes: coefficients represent the log of the change in conditional birth rates associated with each covariate. Married women are censored at a birth event.

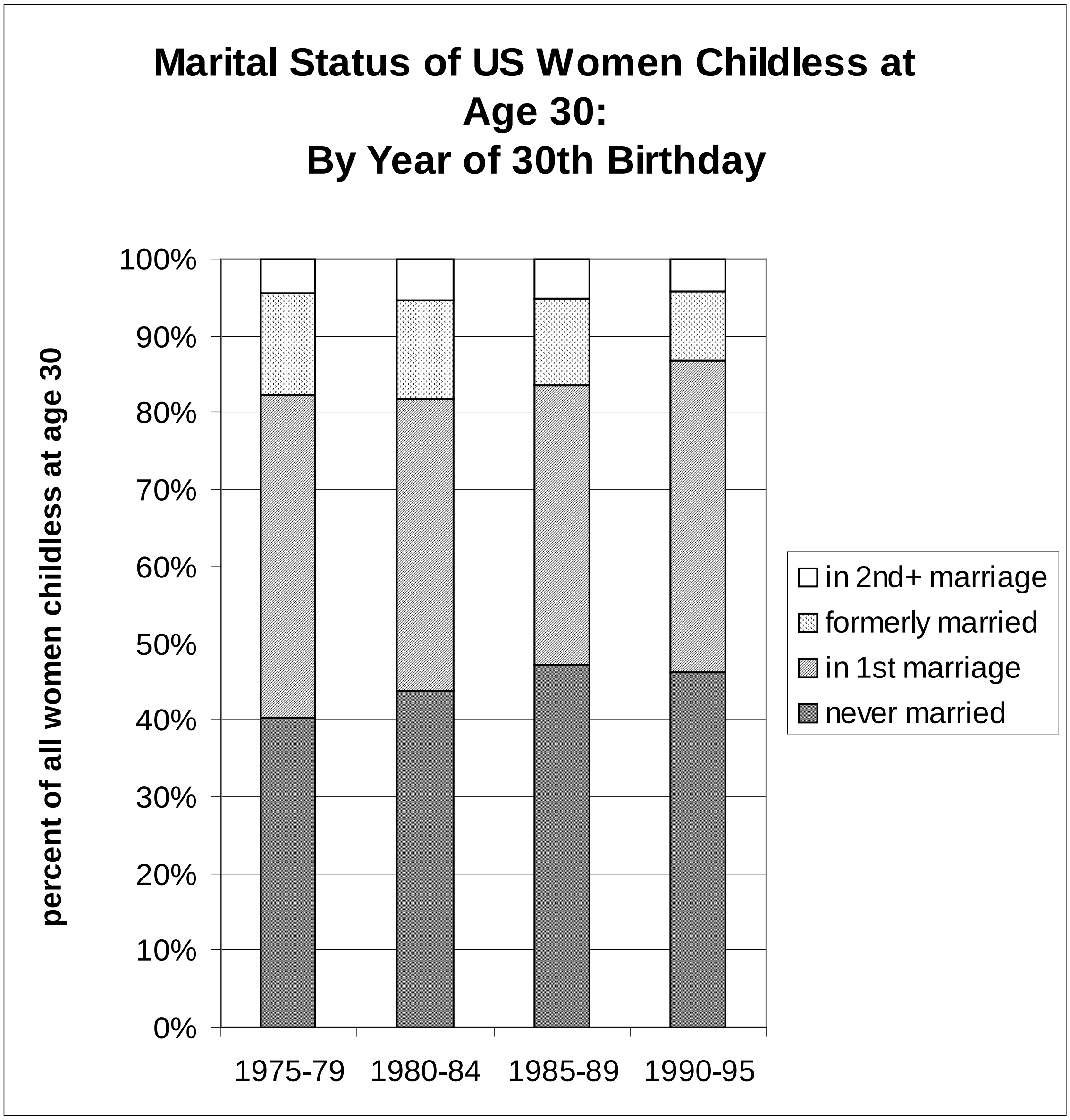
Source: June 1990 and June 1995 Current Population Survey. $* p < .05$ $** p < .01$

Figure 1:



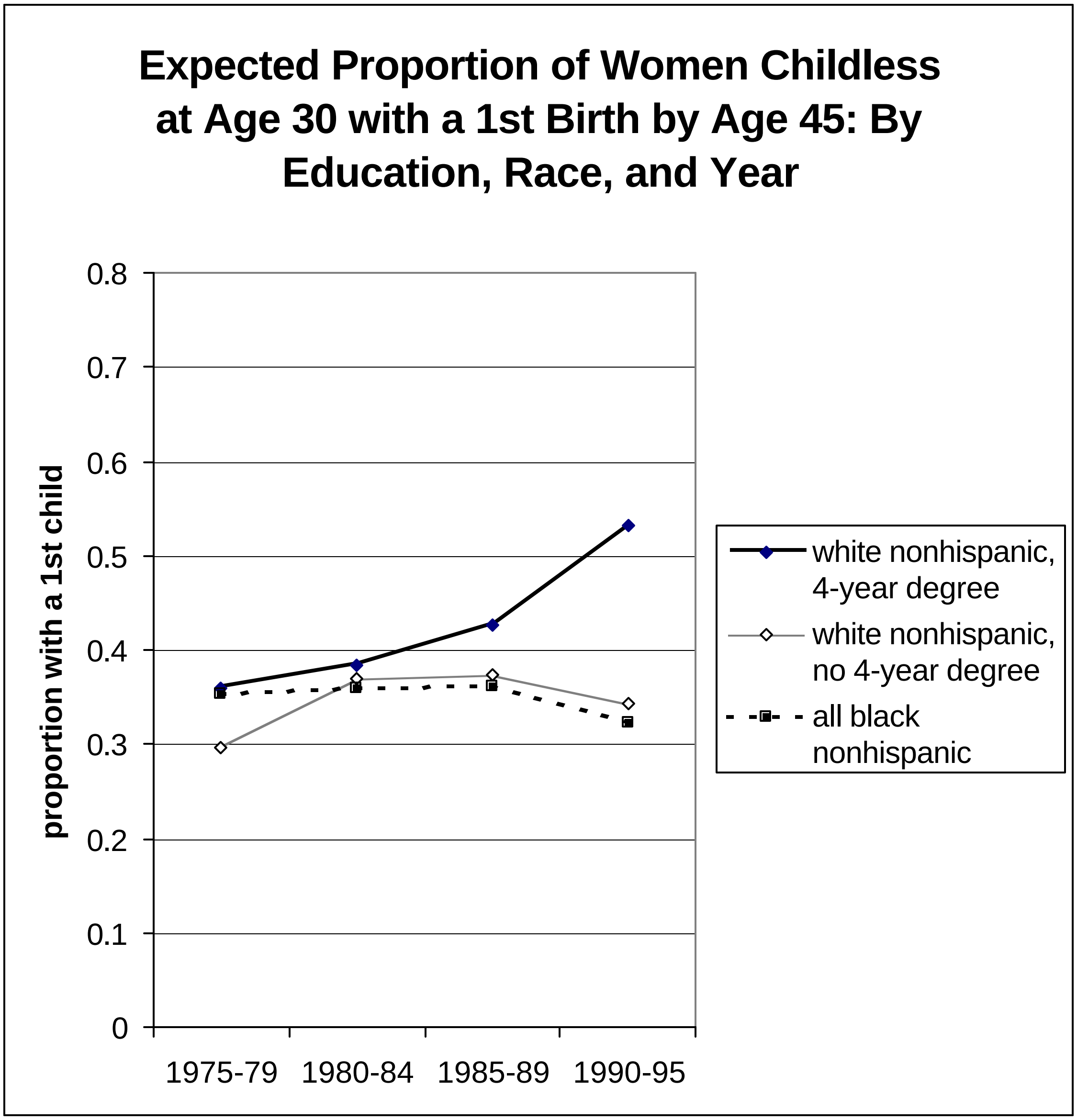
Source: June 1990 and 1995 Current Population Survey
See text for details

Figure 2:



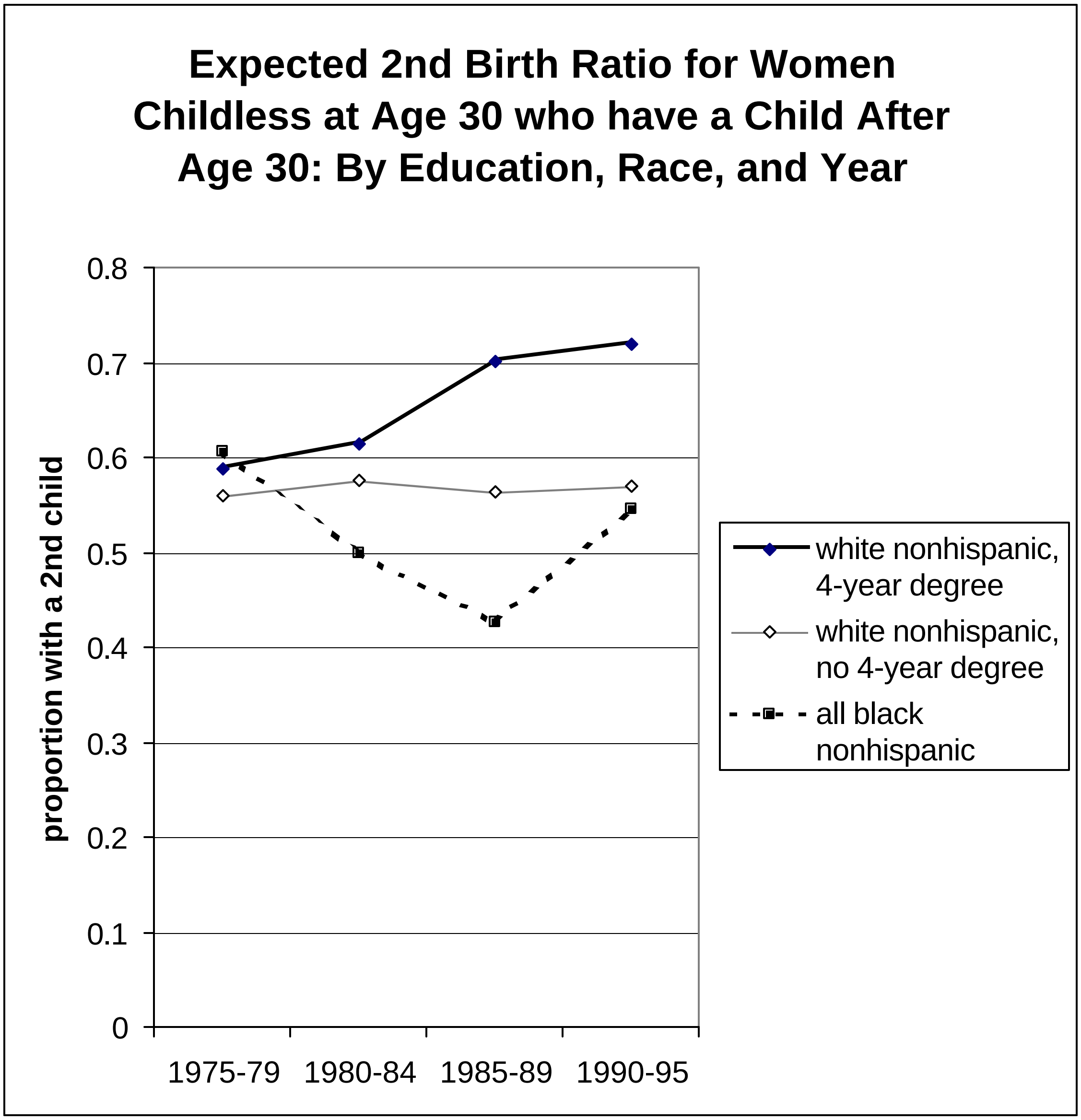
Source: June 1990 and 1995 Current Population Survey
See text for details.

Figure 3:



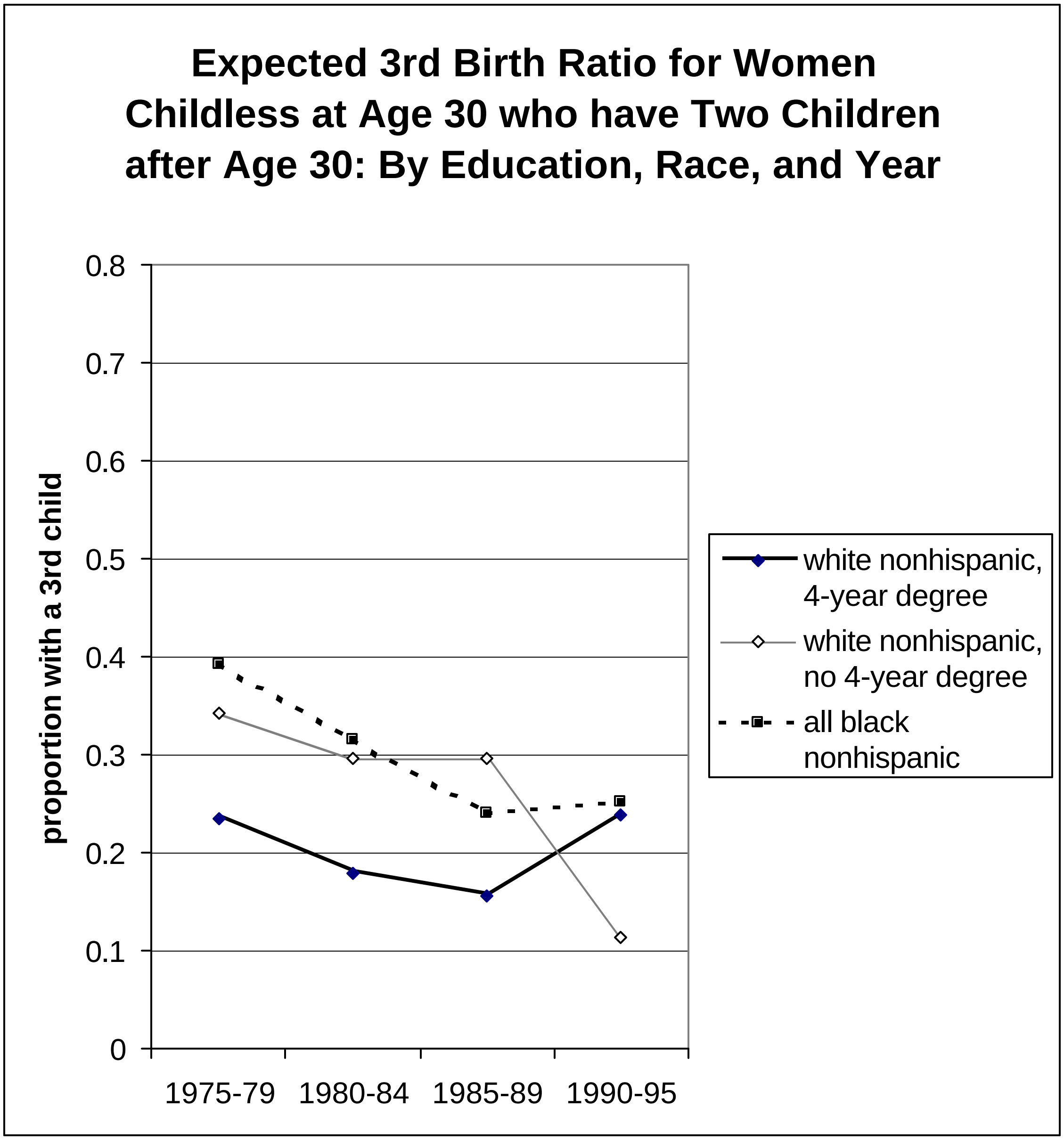
Source: June 1990 and 1995 Current Population Survey
See text for details.

Figure 4:



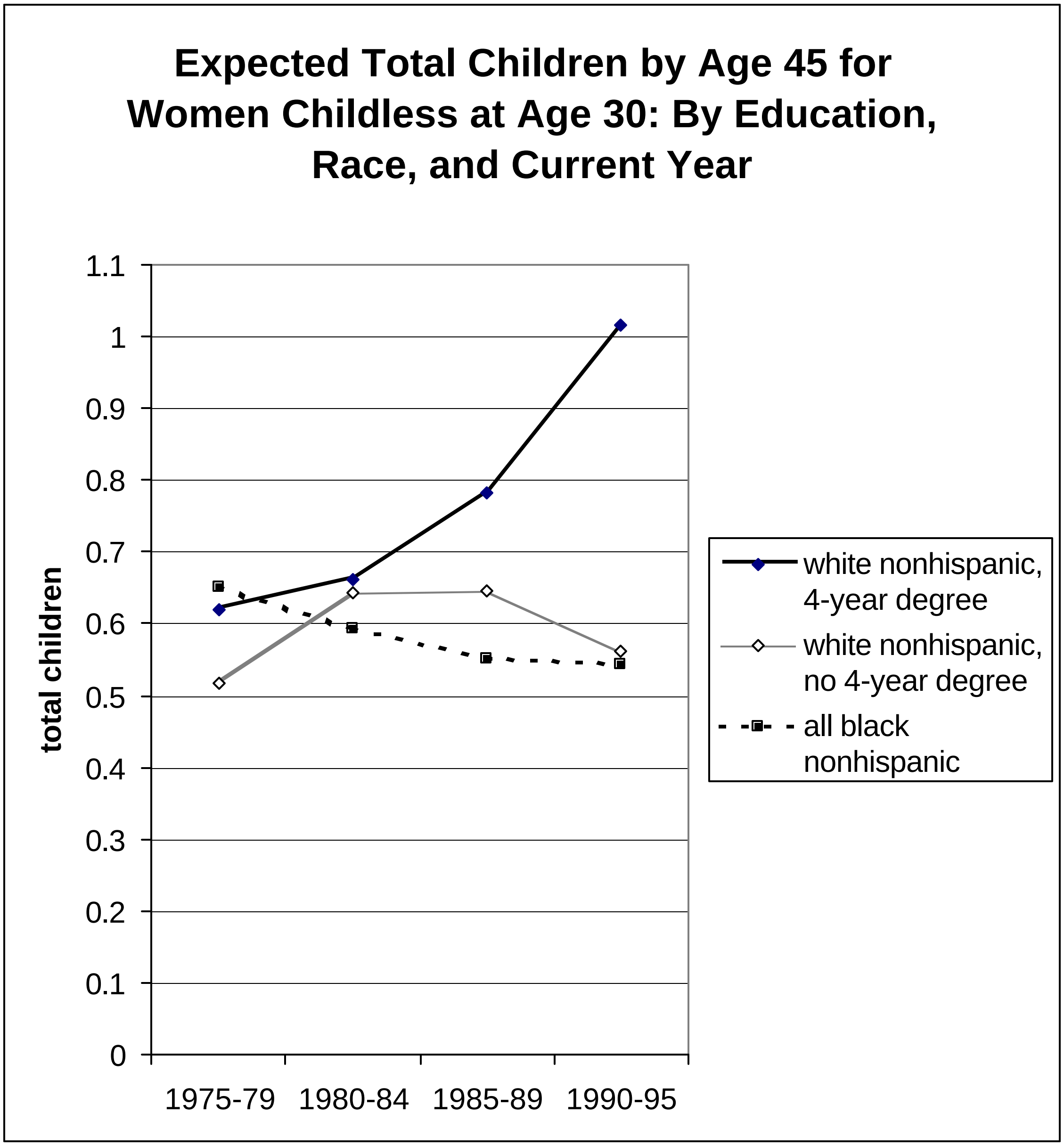
Source: June 1990 and 1995 Current Population Survey
See text for details.

Figure 5:



Source: June 1990 and 1995 Current Population Survey
See text for details.

Figure 6:



Source: June 1990 and 1995 Current Population Survey
See text for details.

Center for Demography and Ecology
University of Wisconsin
1180 Observatory Drive Rm. 4412
Madison, WI 53706-1393
U.S.A.
608/262-2182
FAX 608/262-8400
comments to: smartin@ssc.wisc.edu
requests to: cdepubs@ssc.wisc.edu