

# The Effects of Early Childbearing On Schooling over Time

By Sandra L. Hofferth, Lori Reid and Frank L. Mott

**Context:** *In recent studies, the effects of teenage childbearing on the schooling of young women have been smaller than those in earlier research. The discrepancy has been attributed to the use in the later studies of controls for unmeasured differences between young women who start childbearing early and those who do not, but could instead reflect changes in the effect of early childbearing over time.*

**Methods:** *Data from the National Longitudinal Survey of the Labor Market Experience of Youth and the Panel Study of Income Dynamics are used to identify the reasons for this difference. Logistic regression, ordinary least-squares regression and fixed-effects models examine the impact of early childbearing on rates of high school graduation and college attendance, and number of years of schooling completed through age 29.*

**Results:** *The two data sets show a significant negative impact of a teenage birth on rates and years of completed schooling. For example, teenage mothers complete 1.9–2.2 fewer years of education than do women who delay their first birth until age 30 or older. Moreover, compared with women who give birth at age 30 or older, teenage mothers have odds of high school completion 10–12% as high and odds of postsecondary schooling 14–29% as high. Unobserved differences between young mothers and their childless peers reduce, but do not eliminate, the effects of early births. Effects on high school completion declined in recent periods because more young women completed high school, regardless of the timing of their first birth. However, the gap between early and later childbearers in postsecondary school attendance widened from 27 to 44 percentage points between the early 1960s and the early 1990s.*

**Conclusions:** *Given the current importance of a college education, teenage childbearers today are at least as disadvantaged as those of past generations.*

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Schooling is critical to a young woman's prospects throughout her life. The amount of schooling a woman obtains affects her occupation, her income, her chances of marriage, her risk of poverty and welfare dependence and, more generally, the quality of her own life and that of her children.<sup>1</sup> The timing of family formation plays a critical part in the amount of schooling a young woman obtains. While marriage used to be the key transition to adulthood,<sup>2</sup> few women today marry young. Motherhood is the key event, because childrearing consumes time and energy and because, with few exceptions, women bear the primary burden of child care. Caring for and rearing children thus consumes time and energy that could otherwise be spent on schooling, work and leisure-time activities.

Research on the impact of early childbearing has a long history; its methods and interpretation, however, have changed over time. The first generation of researchers, the traditionalists, argued that an early first birth is detrimental to a young woman in that it causes her to com-

plete less schooling than her childless peers.<sup>3</sup> These researchers have explored a variety of methodological techniques to determine whether the relationship is causal.<sup>4</sup> They have continued to believe that early childbearing per se is detrimental to young women's prospects, although the evidence is mixed.

The second generation of researchers, the revisionists, argue that the effects of young motherhood are exaggerated because early childbearers differ substantially from young women who delay motherhood in ways that may affect their own welfare and that of their families.<sup>5</sup> Given the substantial disadvantages and reduced opportunities with which early childbearers start, they might not do better if they delayed family formation. The work of the revisionists has moved the field toward a consensus that although early childbearing influences young women's schooling, its influence is weaker than previously believed.<sup>6</sup>

Data have been gathered over many years, during which political and cultural factors have changed and new methods

and data have become available. It is important, therefore, to revisit this issue.

This article examines the evidence, and proposes and subsequently tests an alternative explanation—historic change—for the reduced effects of early childbearing identified in recent research. To compare period trends in the consequences of early childbearing for women's schooling, we use two data sets with comparable samples and variables—the National Longitudinal Survey of the Labor Market Experience of Youth (NLSY) and the Panel Study of Income Dynamics (PSID).

## Possible Explanations

### *Selection into Early Childbearing*

It has long been believed that an early birth causes young women who would not otherwise do so to drop out of school, thus curtailing their education. One key reason is that childrearing takes time and energy from other activities. A second reason is the immaturity of such young women. Coping with the demands of an infant is likely to be even more challenging for a teenager who is not prepared for it than for an older woman. Thus, we would expect early childbearers to be less likely than their childless peers to complete high school and to complete some college; we would also expect them to complete fewer total years of schooling. However, recent evidence suggests that the differences are much smaller than previous results would suggest.

If young women who had an early first birth had delayed childbearing, their educational attainment might not have been much different. The same factors—low achievement, low motivation and lack of success in school generally—are associat-

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ed with both early childbearing and school dropout. Thus, the prospects for early childbearers are restricted to begin with.

In addition, women who have a child at a young age differ initially from those who do not: Their mother's education is lower, they are more likely to come from a single-parent family and they have more siblings.<sup>7</sup> Such young women are less likely to delay sexual activity and are more likely to bear and raise a child if they become pregnant.<sup>8</sup> We can control for some factors associated with early childbearing, but we cannot measure others. Therefore, researchers have used a variety of methodological techniques to control for unmeasured factors that influence both schooling and early childbearing.

Controlling for unobserved factors common to siblings reduces the effects of an early birth on some outcomes, but does not completely eliminate them.<sup>9</sup> It is not surprising that differences in factors associated with employment, such as work hours and earnings, do not strongly disadvantage young mothers in relation to delayed childbearers, because employment is tied to the life cycle. Later childbearers may be entering a period of lower employment just when early childbearers are entering or returning to the labor force.<sup>10</sup>

The effects of a teenage birth on schooling are remarkably robust. In two of the three data sets that have been used to examine these effects—the 1979 NLSY and the PSID—a teenage birth is just as strongly associated with a reduced chance of high school graduation in within-family models as in between-family models. Only in the sample from the 1968 National Longitudinal Survey of Young Women (NLSYW) are a teenage birth and high school completion not significantly related in analyses based on siblings. The effect of a teenage birth on postsecondary schooling also is highly significant in within-family models in two of the three data sets (the NLSY and the NLSYW).<sup>11</sup>

Several recent studies have used so-called natural experiments to examine the effects of a teenage birth; the samples for these studies consisted of similar women who differed by a random event. One study compared the consequences for an unwed mother of having twins versus having a single first birth. The overall effect of an unplanned additional birth to an unwed black mother was an 11-percent-age-point reduction in the probability of high school completion.<sup>12</sup> A study using a different methodology, comparing teenagers who had a miscarriage and consequently had their first birth after adoles-

cence with pregnant women who gave birth before age 18, found teenage childbearing to be associated with a reduced rate of high school graduation.<sup>13</sup> On average, 41% of teenage mothers obtained a standard high school degree, compared with 61% of women who did not give birth as teenagers. These results hold under various assumptions regarding underreporting of pregnancies and miscarriages.<sup>14</sup>

### ***Changes in the Effect over Time***

One unexplored reason for the differing estimates of the impact of early childbearing across studies is that the effect of an early first birth may have changed over time. Depending on whether teenage childbearers of 1980 are compared with older childbearers of 1980 or older childbearers of 1990 (i.e., their peers who delayed their first birth), differences in schooling completed by timing of childbearing may appear larger or smaller.

There are a number of reasons to expect differences over time in the effects of birth timing on young women. First, young mothers can now remain in school. In the past, a pregnant teenager would not have been permitted to do so. The implementation in 1975 of Title IX of the Educational Amendments Act effectively eliminated pregnancy as a legitimate reason for expulsion, although such practices may not have disappeared completely. School systems have adapted to the schooling of pregnant and parenting teenagers. Some send all such young women to a special school; others provide alternative or special programs in the same school.<sup>15</sup>

Second, norms have changed, and informal pressure to drop out, to marry or to conceal one's pregnancy from one's peers has diminished.<sup>16</sup> Nonmarital childbearing is still not acceptable to the majority of Americans, but almost half of black and white women aged 20–29 find it acceptable.<sup>17</sup> To the extent to which social pressures, institutional barriers and lack of community supports led pregnant teenagers to drop out in the past, societal changes should have led to decreases over time in the effects of a teenage birth on high school completion. The lower effects found in recent studies may reflect a real decline in the impact of early childbearing on young women since the 1970s as a result of changes in policies and attitudes.<sup>18</sup>

Although high school completion may now be easier for young mothers, the same is not true for enrollment in college; public programs for teenage mothers generally end with high school completion.<sup>19</sup> In the past, young women receiving welfare ben-

efits could enroll in college.<sup>20</sup> Since such young women must now work at least 20 hours per week once they have completed high school, it may be difficult for them to continue their education.<sup>21</sup> Therefore, we expect that the differential in postsecondary school enrollment between early and later childbearers has increased.

All these changes occurred in a period in which the significance of education itself may have increased. As a result of slow wage growth and falling demand for less-skilled labor, workers without college education suffered declines in earnings during the 1980s, while those who had attended college did not.<sup>22</sup> Income inequality across educational groups has increased. Today, early childbearers who are unable to obtain some higher education are at a disadvantage.

Personal and historic time affect demographic events such as family formation and dissolution. Research on marital dissolution found evidence of period effects—increases in divorce rates occurred in all marriage cohorts at the same historic time.<sup>23</sup> The only study to examine trends in the effects of early childbearing focused on three birth cohorts: 1920–1929, 1930–1944 and 1945–1960. The effects of early childbearing on completed schooling were greater for later cohorts than for earlier cohorts.<sup>24</sup> This result probably reflects the fact that early childbearing was embedded within early marriage in younger cohorts. That is, early childbearing did not have a negative effect until it became an exception to the norm.

In this article, we examine changes among young women born after World War II, comparing teenage childbearers of the early 1960s with teenage childbearers in later periods. Over this postwar period, we anticipate that the effects of an early birth on high school completion will decline, but that effects on postsecondary schooling will increase. Because it is impossible to identify age, period and cohort effects in a single model,<sup>25</sup> we explored in preliminary analyses whether a period or cohort approach best describes the data. Our hypotheses and analyses better fit the period models; therefore, we focus on period rather than cohort effects.

The purpose of this article, therefore, is to examine changes in the consequences of teenage childbearing for young women during distinct historic periods. We ask if the effects of timing of childbearing on the schooling of young women who had a first birth in the 1960s and 1970s differ from the effects on the schooling of those who bore a child in the 1980s and early 1990s.

Of the two data sets used in this analysis, the NLSY is the “gold standard,” as it has been used extensively to document the consequences of teenage childbearing for young women. However, it represents only a single birth cohort and thus does not permit comparisons of women who gave birth as teenagers during different historic periods.

The PSID has also been used to look at teenage childbearing.<sup>26</sup> It includes many birth cohorts of women, but the number of women in each cohort is relatively small. It is important to establish comparability of results between the two data sets at the outset, or the peculiarities of the data set used will limit the applicability of the findings.<sup>27</sup> To the extent that these two data sets provide similar pictures of the same cohort, the PSID can be used to depict cohort and period trends.

We use two methods to control for between-family differences that affect both early childbearing and schooling. For most of the analyses, we use either ordinary least-squares or logistic regression to control for background factors. These analyses include all the young women in the sample. However, to assess whether important unobserved factors have been omitted, we draw a sample of sisters from the full data set. Conventional between-family estimates using sister data serve as our baseline. These results are comparable to those from the logistic regression analyses including the entire sample. To assess whether unobserved differences between families might affect our estimates, we examine different schooling levels associated with differences in timing of childbearing among sisters within the same family.

## Data and Methodology

### *The NLSY*

The NLSY is an ongoing longitudinal survey of a cohort of youth who were aged 14–21 on December 31, 1978. The respondents were followed annually through in-person or telephone interviews until 1994, and have been interviewed every other year since then. In 1994, the cohort included 4,480 females, of whom 3,464 had children. The focus of the NLSY has been on the labor force participation and family formation behavior of young women. This study focuses on the period from 1986 through the 1994 wave of interviews.

Rates of response to the NLSY have been quite high; about 89% of those still eligible for interview in 1994 were included in that survey round. Because the NLSY contacts dropouts regularly to maintain this level of response, not all re-

spondents are necessarily present in every study year; by 1996, 70% of the women had been interviewed in every wave, with 85% interviewed in at least 15 waves. Weights that adjust for the probability of selection and for differential levels of attrition are used throughout.

### *The PSID*

Now having completed its 32nd year of data collection, the PSID is a longitudinal survey of a representative sample of U.S. men, women and children and the families in which they reside. Data on employment, income, wealth, housing, food expenditures, transfer income, and marital and fertility behavior have been collected annually since 1968. From 5,000 families in 1968, the survey grew to include more than 8,500 core families in 1995; children and other sample members become respondents in their own right when they leave the original household. This article uses PSID waves from 1968 through 1995.

An ongoing concern of analysts is whether the PSID is still a nationally representative sample, given that 32 years have passed since the original sample was selected. Although consistent response rates of 96–97% have been attained each year, nonresponse accumulates; after 32 years, about half of the original respondents remain in the study (60% if adjusted for mortality). Because of concerns about the representativeness of the sample as a result of attrition over time, the PSID is weighted to adjust for the initial probability of selection into the sample plus annual attrition. In addition, the PSID has conducted a large number of methodological studies, none of which has found that attrition biases the sample when the appropriate weights are used.<sup>28</sup> The PSID now contacts and interviews sample members who have dropped out, focusing on recent dropouts. Weights adjusting for differential selection and attrition are used in our analyses.

### *Dependent Variables*

We examine whether the relationship between a mother’s age at first birth and how much schooling she ultimately completes has changed over time. According to the data, women complete little additional schooling after about age 29, so we begin by examining education completed through that age.

The passage of public policies requiring high schools to educate teenage mothers should increase the retention of these young women in high school, which leads us to expect a diminished relationship be-

tween early childbearing and high school completion over time. Because completion of high school is almost universal, it may no longer distinguish early from later childbearers. The average American now completes one year of higher education. It is important to see whether early childbearers today are more likely than their counterparts in the past to obtain some college education. To sort out where the differential in total schooling lies, if indeed there is any, we examine both high school completion (12 full years of formal schooling) and completion of some college, as well as the total years of schooling completed through age 29.

In this article, getting a general equivalency diploma (GED) is *not* counted as completing 12 years of high school; research suggests that getting a GED does not confer the same benefits on men as completing high school.<sup>29</sup> For the full sample of women, in contrast, a GED and a high school diploma provide similar returns,<sup>30</sup> although the findings for teenage childbearers may be different.

Two studies have examined the relationship between family formation and the receipt of a GED. The first study, which examined cohorts up to those of the 1940s, found no relationship.<sup>31</sup> Since then, the GED has become an increasingly common way of completing high school. In 1968, only 5% of high school certificates were obtained through GED examinations, compared with 14% in 1987.<sup>32</sup> A second study found teenage mothers to be much less likely than delayers to obtain a regular high school diploma, but more likely to obtain a GED—23% received a GED by age 30, compared with 2% of delayers.<sup>33</sup>

Given access to the GED, failure to complete high school is not, in itself, a barrier to postsecondary schooling.<sup>34</sup> In this analysis, therefore, all women are considered eligible to have completed some college, regardless of whether they have actually obtained a high school degree. It should be kept in mind that our measure of high school completion is defined as completing 12 years of schooling. The difference in high school completion between early and later childbearers should be high in the late teenage years, but should decline over the life course as teenage childbearers complete their high school education through the GED. This reduction in the schooling gap should show up in our analysis of total years of schooling completed through age 29.

The major independent variables are the young woman’s age at first birth and the period of her first birth. Age at first

**Table 1. Selected mean values, and percentage distribution of women, by selected characteristics, all according to data set and age at first birth, National Longitudinal Survey of the Labor Market Experience of Youth (NLSY) and Panel Study of Income Dynamics (PSID)**

Characteristic	NLSY					PSID				
	Total (N=4,013)	<20 (N=994)	20–24 (N=1,013)	25–29 (N=742)	≥30 (N=1,264)	Total (N=3,562)	<20 (N=992)	20–24 (N=1,065)	25–29 (N=648)	≥30 (N=857)
<b>MEANS</b>										
<b>Yrs. of schooling</b>	13.2	11.3	12.6	13.9	14.5	13.1	11.4	12.7	14.2	14.3
<b>No. of siblings</b>	3.3	4.0	3.5	3.1	2.9	3.6	4.3	3.7	3.3	3.3
<b>Mother's mean yrs. of schooling</b>	11.7	10.4	11.5	12.1	12.8	11.4	10.3	11.3	11.9	11.9
<b>PERCENTAGE DISTRIBUTIONS</b>										
<b>Age at first birth</b>										
<20	19.6	na	na	na	na	23.7	na	na	na	na
20–24	24.9	na	na	na	na	28.7	na	na	na	na
25–29	21.2	na	na	na	na	19.8	na	na	na	na
≥30/no birth	34.3	na	na	na	na	27.8	na	na	na	na
<b>Black</b>										
Yes	14.4	28.7	15.3	7.3	6.8	15.8	27.2	15.8	9.2	9.2
No	85.6	71.3	84.7	92.7	93.2	84.2	72.8	84.2	90.8	90.8
<b>Family structure at age 14</b>										
Two parents	84.6	76.3	84.9	88.7	86.6	82.4	72.9	82.8	87.2	87.2
Mother only	13.3	19.2	12.8	10.6	10.1	15.9	24.7	15.8	11.9	11.9
Father only	0.1	0.4	0.1	0.1	0.1	1.4	2.4	1.4	1.0	1.0
Other	1.9	4.0	2.2	0.6	1.0	u	u	u	u	u
<b>Maternal employment at age 14</b>										
Employed	54.5	53.9	56.8	52.9	48.3	59.9	54.7	62.5	58.8	58.8
Not employed	45.5	46.1	43.2	47.1	51.7	40.1	45.3	37.5	41.2	41.2
<b>Region</b>										
Northeast	17.8	10.9	15.0	17.9	27.0	22.5	15.5	18.5	25.6	25.6
North Central	29.3	30.0	32.2	35.5	27.9	26.9	26.7	29.1	30.5	30.5
South	36.8	47.2	35.4	31.1	30.7	32.1	41.4	35.3	25.0	25.0
West	16.1	11.9	17.4	15.4	17.8	18.1	16.4	16.6	17.9	17.9
Other country	na	na	na	na	na	0.5	0.0	0.5	0.9	0.9
<b>Period of first birth</b>										
Early 1960s	na	na	na	na	na	3.2	13.6	0.0	0.0	0.0
Late 1960s	na	na	na	na	na	11.7	26.0	19.2	0.0	0.0
Early 1970s	2.4	12.4	0.0	0.0	0.0	14.6	24.0	23.9	10.4	10.4
Late 1970s	16.5	59.5	19.9	0.0	0.0	17.4	24.2	21.8	24.0	24.0
Early 1980s	25.1	28.0	62.3	19.2	0.0	15.6	12.2	23.9	22.6	22.6
Late 1980s	21.3	0.1	17.8	62.8	41.5	10.7	0.0	11.2	24.2	24.2
Early 1990s	8.9	0.0	0.0	17.9	57.9	11.3	0.0	0.0	18.7	18.7
<b>Birth cohort</b>										
Late 1940s	na	na	na	na	na	23.0	26.6	27.7	16.7	19.6
Early 1950s	na	na	na	na	na	25.8	25.2	25.5	27.3	25.8
Late 1950s	na	na	na	na	na	23.4	25.4	22.0	22.5	24.0
Early 1960s	59.1	57.0	56.7	62.6	59.9	24.8	19.8	22.3	30.9	27.3
Late 1960s	na	na	na	na	na	2.9	3.0	2.5	2.6	3.3

Notes: All values are based on weighted data. u=unavailable. na=not applicable.

birth is divided into four categories. Teenage mothers, the group of most interest, had a first birth at age 19 or younger. (In the sibling analyses, teenage childbearers are further divided into two categories—aged younger than 18 and aged 18–19.) They are compared with women whose first birth occurred at ages 20–24, those whose first birth occurred at ages 25–29 and those whose first birth occurred at age 30 or later or who had not had a birth by the end of the survey (the reference category).<sup>\*</sup> Although we could have selected another age-group as the comparison cat-

<sup>\*</sup>Some of those who had not yet had a birth will eventually do so. The standard approach in the literature is to include all women, thus avoiding selectivity problems.

egory, this choice becomes irrelevant once we turn to predicted values of schooling for all women by childbearing age and period.

In the PSID, first-birth period is divided into seven five-year categories, from 1961–1965 (the reference category) to 1991–1995. In the NLSY, since few women were old enough to have had a birth before 1970, the 1970–1974 birth period is the reference category. We also examine interactions between birth period and age at first birth.

**Control Variables**

Individuals are identified as Hispanic, black, or nonblack non-Hispanic by either their response to the screener item for racial or ethnic cohort (NLSY) or their re-

sponses to items on racial origin and Spanish descent (PSID). The Hispanic sample of the NLSY differs from that of the PSID, with the former including a sample of more recent adult immigrants to the United States. Because we want the overall samples to be as similar as possible, Hispanics are excluded from the analyses. Background variables include family structure and maternal employment at age 14, mother's education, number of siblings, and region of residence at age 29.

The between-family sibling models use the same set of controls. Family income at age 14 is not included in the trend analyses because the data are not available in the NLSY. It is, however, included in the PSID sibling models. The only control variable

**Table 2. Coefficients and odds ratios from ordinary least-squares and logistic regressions examining the effect of first-birth timing on schooling outcomes, NLSY and PSID**

Outcome and timing of first birth	NLSY		PSID	
	Coefficient	Odds ratio	Coefficient	Odds ratio
<b>Years of schooling through age 29</b>				
Teens	-1.94**	na	-2.20**	na
Early 20s	-1.07**	na	-1.34**	na
Late 20s	-0.23	na	-0.07	na
≥30/no birth (ref)	na	na	na	na
<b>High school completed</b>				
Teens	-2.09**	0.12	-2.27**	0.10
Early 20s	-0.53*	0.59	-0.77*	0.46
Late 20s	-0.13	0.88	0.86*	2.37
≥30/no birth (ref)	na	1.00	na	1.00
<b>Some college completed</b>				
Teens	-1.25**	0.29	-1.99**	0.14
Early 20s	-0.55**	0.58	-1.25**	0.29
Late 20s	-0.15	0.86	-0.06	0.94
≥30/no birth (ref)	na	1.00	na	1.00

\*p<.05. \*\*p<.01. Notes: All models include controls for birth period, race, number of siblings, maternal education, family structure at age 14, maternal employment status at age 14 and region. na=not applicable. ref=reference group.

included in the within-family analyses is the young woman's birth cohort.

**Samples and Methods**

The NLSY analyses include the entire sample of young women born between 1958 and 1965; all had reached at least age 29 by 1994. The size and makeup of PSID samples vary slightly from analysis to analysis, according to the dependent variable being examined. The coding of variables in the two samples also differs somewhat.

• *Schooling through age 29.* The PSID sample consists of women born between 1946 and 1966, who were at least 29 in 1995. We use respondents' years of schooling at age

29 unless data on schooling are missing for that year. If schooling is missing for a respondent at age 29, we use the value available for the next age after 29.

• *High school completion.* The PSID sample includes women born between 1946 and 1975, who were 20 or older in 1995. Those who had completed 13 or more years of schooling by 1994 (NLSY) or by 1995 (PSID) are coded as having completed at least one year of college. Our first approach is to estimate the effects of early (versus later) childbearing on schooling, using ordinary least-squares for the continuous measure (schooling through age 29) and logistic regression for the dichotomous measures of having completed high school and having some college education. Sample sizes in the within-family samples are too small to allow calculations of period effects and of interactions between period and age at first birth. Instead, we calculate similar mod-

**Table 3. Coefficients and odds ratios from logistic regression models using different reference groups to examine differences in the effects of age at first birth on high school completion and some college completion between families and within families, PSID**

Age at first birth	High school completed				Some college completed			
	Between families†		Within families‡		Between families†		Within families‡	
	Coefficient	Odds ratio	Coefficient	Odds ratio	Coefficient	Odds ratio	Coefficient	Odds ratio
<b>Model A</b>								
12-17	-1.21**	0.30	-0.39	0.68	-1.28**	0.28	-0.62*	0.54
18-19	-0.71**	0.49	-0.19	0.83	-1.41**	0.25	-1.07**	0.34
20-24	0.20	1.22	0.76**	2.14	-0.62**	0.54	-0.41*	0.66
25-29	1.53**	4.62	1.58**	4.87	0.31*	1.37	0.12	1.13
≥30/no birth (ref)	na	1.00	na	1.00	na	1.00	na	1.00
<b>Model B</b>								
12-17	-2.74**	0.07	-1.86**	0.16	na	na	na	na
18-19	-2.24**	0.11	-1.66**	-0.19	na	na	na	na
20-24	-1.33**	0.27	-0.71	0.49	na	na	na	na
25-29 (ref)	na	1.00	na	1.00	na	na	na	na
≥30/no birth	-1.53**	0.22	-1.48**	0.23	na	na	na	na

\*p<.05. \*\*p<.01. †Includes controls for race, number of siblings, maternal education, family structure at age 14, maternal employment status when daughter was 14, family income at age 14, region and birth cohort. ‡Includes only control for birth cohort. Notes: ref=reference group. na=not applicable.

els in which we adjust for fixed family effects by comparing sisters.\* The purpose of this analysis is to see whether early and later childbearers differ solely because of unobserved family differences. If so, there will be no remaining variation to be explained by the period of first birth and the interaction between period and age at first birth. If differences (even slightly smaller ones) remain, we can use the entire sample to evaluate our hypothesis that changes have occurred in the effects of early childbearing over time.

We first create a sample that includes all sister groups in which at least two of the sisters differ in terms of the outcome variable. Each such pairing is used to create difference scores. Including the difference scores of two young women in the family eliminates the family fixed effect, as well as the observed variables that are the same for both children in the family.<sup>35</sup> We then regress the differences in outcomes on the differences in the explanatory variables.

Sibling models introduce selectivity; they eliminate young women without siblings and those whose sibling has dropped out of the survey (by leaving the parental home or failing to be followed). Additionally, only pairs in which sisters differ in the outcome of interest contribute to the analysis.<sup>36</sup> Such samples are likely to differ from samples that include all sisters.

The small number of cases that are usable has been the major limitation of this technique in prior research.<sup>37</sup> However, given the availability in the PSID of 28 years of data (through 1995), eight years more than in previous studies, sample sizes (690 and 941 matched sisters in the high school and college analyses, respectively) are adequate for the present analysis.

**Results**

Table 1 shows the characteristics of the samples of mothers used to examine schooling attained through age 29. The two groups are generally comparable. Young women completed 13.1-13.2 years of schooling, on average, while their own mothers completed 11.4-11.7 years. The average number of siblings is 3.3-3.6. Regional distributions for the two samples

\*In our model specification, the young woman's schooling depends only on family characteristics, individual characteristics, an individual error term and a family error term:  $y_i = \beta_x \chi_i + \beta_z Z_i + \epsilon_i + \alpha_f$ , where  $y_i$ =the outcome, e.g., whether the woman completed high school and whether she entered college;  $x$ =family factors that are the same for all family members, such as mother's education;  $z$ =individual characteristics that are unique to each woman, such as age at first birth and birth cohort;  $\alpha$  and  $\epsilon$  = fixed family and individual error terms; and  $i$  and  $f$  = individual and family subscripts.

**Table 4. Selected mean values, and percentage distribution of PSID respondents, by selected characteristics, all according to schooling outcome and sample**

Characteristic	High school completed			Some college completed		
	All women (N=4,998)	All sisters (N=2,497)	Matched sisters (N=690)	All women (N=4,712)	All sisters (N=2,316)	Matched sisters (N=941)
<b>MEANS</b>						
No. of siblings	2.8	3.4	4.4	2.9	3.6	4.3
Family income at age 14 (\$)	22,155	24,184	17,722	23,733	22,773	22,204
Mother's mean yrs. of schooling	11.8	11.6	10.6	11.8	11.6	11.4
<b>PERCENTAGE DISTRIBUTIONS</b>						
<b>Age at first birth</b>						
<18	9.4	11.1	23.3	9.4	11.2	11.6
18-19	12.6	13.2	21.3	13.0	13.9	16.5
20-24	25.9	22.6	20.0	27.2	24.2	25.2
25-29	15.7	14.5	8.7	16.6	15.6	16.1
≥30	36.4	38.5	26.6	33.8	35.1	30.5
<b>Completed high school/some college</b>						
Yes	88.5	86.3	55.8	54.4	50.6	46.3
No	11.5	13.7	44.2	45.6	49.4	53.7
<b>Black</b>						
Yes	14.9	19.9	35.9	15.2	20.7	22.5
No	85.1	80.1	64.1	84.8	79.3	77.5
<b>Family structure at age 14</b>						
Two parents	57.2	64.6	55.2	56.3	64.0	66.0
Mother only	12.2	15.9	28.6	11.8	15.3	15.9
Father only	2.3	1.5	1.0	2.2	1.5	0.9
Missing	28.3	18.1	15.2	29.7	19.2	17.1
<b>Maternal employment at age 14</b>						
Employed	43.9	50.3	50.1	42.6	49.0	48.9
Not employed	56.1	49.7	49.9	57.4	51.0	51.1
<b>Region</b>						
Northeast	21.1	22.7	13.5	21.3	23.0	22.3
North Central	26.7	25.5	27.6	26.7	25.6	28.7
South	32.7	33.5	38.9	32.4	33.3	28.2
West	19.6	18.3	20.0	19.6	18	20.8
Other country	0.1	0.0	0.1	0.1	0.0	0.0
<b>Birth cohort</b>						
Late 1940s	16.8	7.3	2.9	17.6	7.8	5.3
1950s	36.0	36.5	38.5	37.9	39.1	42.1
1960s	32.6	37.4	35.4	34.4	40.1	41.3
1970s	14.6	18.9	23.2	10.1	12.9	11.3

are similar, with about one-third of respondents living in the South.

Differences are limited to the characteristics of the woman's family during her youth. According to available data (100% for the NLSY; 62% for the PSID), the proportion living with the mother alone at age 14 is slightly lower in the NLSY (13%) than in the PSID (16%), and the proportion with two parents is slightly higher (85% vs. 82%). The level of maternal employment at age 14 is higher in the PSID than in the NLSY (60% vs. 55%). A dummy variable is included in the regressions to adjust for missing information.

The table also shows differences in the characteristics of young women according to the timing of their first birth. Early childbearers have fewer mean completed years

of schooling than do late childbearers. Consistent with the revisionist argument, however, early childbearers are more disadvantaged than delayed childbearers to begin with: They have more siblings, their mothers have less education, they are more likely to be black and they are more likely to have grown up in a female-headed family. It is important to control for these known differences in examining the effects of early childbearing on schooling.

**Effects of Early Childbearing on Schooling**

Our first multivariate analyses examine the effect of an early birth on later schooling (Table 2, page 263). All models include controls for period of first birth, race, number of siblings, mother's education, family structure and maternal employment at age 14, and region.

The two data sets yield remarkably similar results. The first panel of the table indicates that women with a teenage birth

complete 1.9-2.2 fewer years of schooling than a woman with no birth by age 30. A birth also reduces the completed schooling of women in their early 20s (by 1.1-1.3 years). There is no significant difference in completed schooling between women who first give birth in their late 20s and those who have not had a child by age 30.

The NLSY and the PSID also yield similar results for completion of high school and completion of some college. Teenage childbearing is associated with greatly reduced odds of completing high school and of attending college in both samples. Compared with women who give birth at age 30 or older, teenage mothers have odds of high school completion 10-12% as high and odds of postsecondary schooling 14-29% as high. Having a birth in the early 20s is also associated with reduced chances of completing high school and completing some college.

These results do not take into account the possibility that unmeasured differences between families with early and later childbearers may explain differences in schooling. To examine this issue, we conduct a parallel analysis in which we limit the sample to sisters.

**Within- Versus Between-Family Estimates**

Although the sample including only sisters does not vary much from the sample of all women, the matched, within-family sister sample is quite a bit different. A smaller proportion are white, the mother's education is lower, the number of siblings is larger, family income when the respondent was 14 is lower, and the young woman was more likely to live with only her mother at age 14. Given that families with more than one daughter are larger, on average, they are more likely to be economically disadvantaged.

• *High school completion.* In the between-family analysis (based on the sample including all sisters), older teenage childbearers are significantly less likely to complete high school than women giving birth in their 30s or later (odds ratio of 0.49), and younger teenage mothers are even less likely to do so (0.30, Table 3, page 263). In the within-family comparison, the coefficients are smaller, and the effects of an early or late teenage birth on high school completion are no longer statistically significant.

Matched sisters are much less likely than women in the full sample to have a first birth at 25 or older. Sisters who have a birth at 30 or older tend to be clustered in their early 30s rather than distributed more broadly in that age-group.\* This anomaly affects our results. When the ref-

\*The characteristics of sisters are likely to be unknown for women who had children at older ages. Many of these women entered the sample through marriage; in this case, information on sisters is missing.

erence category is women whose first birth occurs in their late 20s (bottom panel of Table 3), the effect of an early or late teenage birth is associated with significantly reduced odds of high school completion. As before, the size of the effect is reduced in the within-family model, but the effects of a teenage birth are still large and statistically significant.

• *Some college.* The effects of teenage childbearing on completion of some college are quite large. Compared with young women who bear a child in their 30s or have not yet had a child, women who give birth when they are younger than 18 have odds of postsecondary schooling 28% as high. Adjusting for fixed family effects reduces the effect of a teenage birth on postsecondary schooling, but does not eliminate it. The odds of postsecondary schooling among young teenage childbearers are 54% as high as those among women who delay until at least age 30.

The effects of an early first birth on college attendance are weaker for the matched-sister sample, but do not disappear. In addition, the matched-sister sample effectively selects women from more disadvantaged families, making the results of the fixed effects models less generalizable to the population than is the full sample (Table 4). Consequently, using standard statistical models, we proceed to analyze trends in age at first birth in the full sample of mothers drawn from the PSID.

### Changes in the Effect over Time

Table 5 shows the regression coefficients and odds ratios for PSID models that include birth period and interactions between birth period and age at first birth.

• *Main effects of age at first birth and period.* The main effects of age at first birth confirm the negative effects on schooling shown in Table 2. However, the effects of a teenage birth on schooling through age 29 are smaller than those previously shown. Examining the effects of birth period (Table 5), we see a significant increase in completed schooling over time. This is especially evident in the analyses of effects on schooling through age 29 and on postsecondary schooling; in all later periods, educational attainment is significantly greater than in the early 1960s. These data are consistent with national educational trends.<sup>38</sup>

• *Interaction between period and age at first birth.* In Table 5, we see one significant interaction with period in the effect of a teenage birth on schooling completed through age 29. The negative effects of a teenage birth became stronger in the late 1970s than they had been in the early 1960s. The

**Table 5. Coefficients and odds ratios from regression models examining the effects of age at first birth, period of first birth and interactions between those variables on education, PSID**

Variable	Schooling through age 29		High school completed		Some college completed	
	Coefficient		Coefficient	Odds ratio	Coefficient	Odds ratio
<b>Age at first birth</b>						
Teens	-1.34**		-2.54**	0.08	-1.89**	0.15
Early 20s	-1.26**		-1.13**	0.32	-1.37**	0.25
Late 20s	0.03		2.20**	9.05	-0.12	0.88
≥30/no birth (ref)	na		na	1.00	na	1.00
<b>Period of first birth</b>						
Early 1960s (ref)	na		na	1.00	na	1.00
Late 1960s	1.76**		0.83	2.30	1.06**	2.90
Early 1970s	1.58**		0.99*	2.70	1.99**	7.32
Late 1970s	3.28**		-0.41	0.66	2.26**	9.55
Early 1980s	1.67**		-1.25*	0.29	1.11*	3.03
Late 1980s	2.42**		4.10	6.02	1.35**	3.85
Early 1990s	2.38**		0.21	1.24	1.67**	5.29
<b>Interactions</b>						
Teens x early 1960s (ref)	na		na	1.00	na	1.00
Teens x late 1960s	-0.88		0.27	1.31	u	u
Teens x early 1970s	-0.32		0.13	1.14	-0.44	0.65
Teens x late 1970s	-1.94**		1.24	3.49	-0.75*	0.48
Teens x early 1980s	u		2.23**	9.30	-0.32	1.38
Teens x late 1980s	u		-3.43	0.03	0.12	1.13
Early 20s x early 1970s	0.22		u	u	-0.50	0.61
Early 20s x late 1970s	-0.81		1.85*	6.35	u	u
Early 20s x early 1980s	0.35		2.78**	8.83	0.51	1.67
Early 20s x late 1980s	u		-3.07	0.05	0.37	1.44
Late 20s x late 1970s	-1.14*		u	u	-0.67*	0.51
Late 20s x early 1980s	0.92*		-0.17	1.19	-0.73	2.08
Late 20s x late 1980s	-0.47		-5.89	0.00	0.09	1.09

\*p<.05. \*\*p<.01. Notes: Analyses control for race, number of siblings, maternal education, family structure at age 14, maternal employment status at age 14 and region. ref=reference group. u=unavailable. na=not applicable.

apparent reason is that while teenage childbearers in the late 1970s and early 1980s were more likely to complete high school than those in earlier periods (as indicated by the large positive interaction between teenage birth and early 1980s for “high school completed”), they were less likely to attend college (as shown by the result for the interaction between teenage birth and late 1970s for “some college completed”). A teenage birth is associated with lower college attendance in the late 1970s, and college attendance for this group does not increase in the early 1980s. These results are consistent with those of Geronimus and Korenman,<sup>39</sup> who found an effect of a teenage birth on schooling in the NLSY sample but not in the earlier NLSYW sample. The former young women are likely to have been teenage mothers in the late 1970s and early 1980s, when the difference between the completed schooling of an early and later childbearer was at its maximum.

When we test the significance of the interaction terms, we find that the joint test of the interaction between age at first birth and first-birth period is statistically significant (p<.001) for schooling through age 29 (not shown). The test is also statistically significant at p<.05 for high school completion and p<.001 for completion of some

college (not shown). These results support our hypothesis that the effect of early childbearing changes over time.

### Trends in Schooling of Early Childbearers

Describing the effects of a teenage birth across time is a complex task when interactions are involved. To assist in showing the implications of our regressions, we predict the years of schooling a woman would complete through age 29 and the probabilities of completing high school and some college for the different age-at-first-birth and birth-period groups in the PSID, with all the control variables held constant at their means. We use trends in period to make projections of schooling for periods in which no actual data from the study are available, such as the late 1980s and early 1990s for teenage childbearers.

• *Schooling through age 29.* The predicted years of schooling of childbearers in their teens and early 20s rose from the early 1960s to the early 1990s (Table 6, page 266). Teenagers who bore a child in the later period are expected to complete about two years of schooling more than teenagers who bore a child in the earlier period (13.0 vs. 10.6 years)

Although the schooling attained by teenage mothers has increased dramatically, such young women remain relatively

**Table 6. Predicted years of schooling and probabilities of completing high school and completing some college, by period of first birth, according to age at first birth, PSID**

Schooling outcome and period of first birth	Teens	Early 20s	Late 20s	≥30
<b>Yrs. of schooling through age 29</b>				
Early 1960s	10.57	10.64	11.94	11.91
Late 1960s	11.45	12.41	13.70	13.67
Early 1970s	11.83	12.44	13.52	13.48
Late 1970s	11.91	13.11	14.08	15.19
Early 1980s	12.23	12.66	14.52	13.57
Late 1980s	12.99	13.06	13.89	14.33
Early 1990s	12.95	13.02	14.32	14.29
<b>High school completed</b>				
Early 1960s	0.60	0.86	0.99	0.95
Late 1960s	0.82	0.93	1.00	0.98
Early 1970s	0.82	0.94	1.00	0.98
Late 1970s	0.78	0.96	0.99	0.93
Early 1980s	0.80	0.94	0.98	0.85
Late 1980s	0.75	0.95	0.97	1.00
Early 1990s	0.65	0.89	1.00	0.96
<b>Some college completed</b>				
Early 1960s	0.07	0.12	0.31	0.34
Late 1960s	0.18	0.27	0.57	0.60
Early 1970s	0.27	0.37	0.77	0.79
Late 1970s	0.26	0.55	0.69	0.83
Early 1980s	0.24	0.40	0.74	0.61
Late 1980s	0.25	0.42	0.66	0.66
Early 1990s	0.29	0.41	0.70	0.73

disadvantaged because the educational level of older mothers has risen as well. The expected years of schooling completed by a young woman who did not have a birth through age 29 was 14.3 in the early 1990s, compared with 11.9 in the early 1960s. Some variation in the relationship between teenage childbearing and schooling is evident. The gap between early and later childbearers' expected schooling rose through the late 1970s, and then declined, ending the period as it started, with a one-year difference. The size of the impact of early childbearing could rise or fall, depending on when the data were collected and which groups were compared.

• **High school completion.** Early childbearers are less likely to complete high school than later childbearers; still, three-fifths to four-fifths do (Table 6). Among early childbearers, rates of high school completion rose in the 1960s, then leveled off in the 1970s and 1980s, and declined in the 1990s. The gap between early and later childbearers in rates of high school completion remained fairly constant until the late 1980s. Our projections suggest an increasing gap in the early 1990s, with early childbearers becoming less likely to graduate from high school with a diploma.

• **Some college.** The biggest difference in schooling between young mothers and their peers who delayed childbearing or remained childless is in college attendance. Among women who gave birth in the early 1990s, 29% of those in their teens are pre-

dicted to attend college, compared with 41% of those in their early 20s, 70% of those in their late 20s and 73% of those who became mothers after age 29 or who did not have a birth (Table 6). While college attendance rose over time for teenage mothers, it increased much more for delayers; early childbearers remain considerably disadvantaged in comparison with women who waited at least until their late 20s. However, both teenage childbearers and women who have a child in their early 20s are disadvantaged relative to those who bear a child in their late 20s or afterward. The gap between teenage mothers and older childbearers in college entry widened between the early 1960s and the early 1990s, according to these data, from 27 to 44 percentage points.

### Discussion

Early childbearing is associated with reductions in completed schooling in all but one of our models. Because years of schooling increased for everyone, teenage mothers are at least as disadvantaged today as they were in the past. We identified variations in the relationship between first birth and schooling over time. For example, the effect of a teenage birth on overall years of schooling peaked in the late 1970s and declined in the early 1980s.

We have shown that high school completion rates rose among early childbearers; still, by the early 1980s, only 80% of teenage mothers completed high school. The gap in high school graduation rates between early and later childbearers has stayed relatively constant. Of course, the most recent teenage mothers have not had time to complete high school or obtain a GED. Because teenage mothers are more likely than delayed childbearers to obtain a GED, the gap between the two groups in rates of high school completion will eventually close. Thus, the results support our hypothesis that the impact of a teenage birth on high school completion has declined.

Our hypothesis that the impact of early childbearing on college attendance has increased also appears to be supported. Be-

tween the early 1960s and the late 1970s, the probability of attending college rose for all young women, but the rate of increase for older childbearers was greater than that for young mothers. Since then, it has remained stable for both groups. To catch up, early childbearers would have to enroll in college at higher rates than their peers who delay motherhood, but they are not doing so. As a result, once postsecondary education is considered, the effects of early childbearing on schooling are not as small as some scholars have recently asserted. Why have the revisionist researchers concluded that early childbearing effects are smaller than previously estimated? Two possible explanations are that period affects the estimates of effects from single-cohort studies and that unobserved family factors influence both early childbearing and schooling.

### Single-Cohort Studies

If we use a single birth cohort of young women and pool teenage mothers from the late 1970s and early 1980s with late childbearers from the late 1980s and early 1990s, will we come up with different conclusions than we would if we compared early and late childbearers in the same historic period? Because levels of schooling are rising, using a single cohort should exaggerate the impact of early childbearing. Net of other factors, a teenage mother in the early 1980s would be expected to complete 12.2 years of schooling, compared with 13.6 years of schooling for a woman with no birth before age 30. In the early 1990s, one would expect a teenage mother to complete 13.0 years of schooling, compared with 14.3 years for a woman whose first birth occurred after age 29. So, net of other factors, the effects of a teenage birth appear weaker if we use data based on the same period of first birth (a gap of 1.3–1.4 years) rather than on the same maternal birth cohort (a gap of 2.1 years), even though the real gap has remained the same (about 1.4 years' difference in schooling in each period).

A similar conclusion holds for college attendance, though the absolute difference increased from 37 points in the early 1980s (24% vs. 61%) to 44 points (29% vs. 73%) in the 1990s. The effect of early childbearing on college attendance is greater today than in the past. In addition, the necessity of advanced education for today's highly technical jobs makes a college education critical for young women's self-sufficiency. Even so, the effect will be exaggerated if we use a single cohort. The gap is 49 points (24% vs. 73%) in the single-cohort



sample, compared with 44 points in the 1990s in a period sample including multiple cohorts.

### Unobserved Characteristics

Although one reason for the difference in between- and within-family estimates lies in the fact that studies using a single cohort overestimate the effect of early childbearing because of period change, the difference in unobserved characteristics may also be a factor. Using sister samples in a single cohort study is likely to reduce the effect of unobserved characteristics as well as the effect of period change (because sisters are likely to be close in age and in timing of first births). The results of this study suggest that the effects of a teenage birth on high school completion are estimated as precisely by using period and interactions between period and age at first birth as by using matched sister samples. This is not the case for postsecondary schooling. Using interactions between period and age at first birth still overestimates the effect of a teenage birth on postsecondary schooling. Using samples of matched sisters reduces the amount of the overestimate.

Sister comparisons have their own disadvantages, of course. Besides restricting the samples available for analysis, such samples tend to be more disadvantaged than nonsister samples; this violation of the assumption of comparability means that we cannot necessarily generalize to the entire population of women. We can avoid some of the problems of overestimating the effects of teenage childbearing by including a full sample of early and later childbearers in each historic period and cohort. Sibling samples also help reduce the bias caused by unobserved family characteristics in studies of the impact of teenage childbearing.

### Conclusions

Although smaller proportions of young women are becoming teenage mothers, early childbearing is still an important issue for policymakers. One of every eight births occur to a teenager.<sup>40</sup> And while rates of postsecondary attendance have increased for all mothers, regardless of their age at first birth, they have risen least for early childbearers. This discrepancy has increased rather than reduced the gap in schooling by timing of first birth.

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