Changing Education Gradients in Unwanted Births in the United States, 1960-2010

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April 22, 2014

Paper to be presented at the Population Association of America Annual Meetings, May 1-3, 2014, Boston, MA. Session 183: Fertility Intentions and Influences Upon.

Draft: please contact authors before citing or circulating.

8,828 words (all text, tables, references, and abstract)

Abstract: In the contemporary United States, unintended fertility is more common among less educated women. Over the past fifty years, educational differences in other family behaviors, such as early childbearing, nonmarital fertility, and divorce, have increased. It is not clear whether the association of education with unintended births has also strengthened. This paper analyzes trends in education gradients in unwanted births using pooled data from nine fertility surveys carried out between 1965 and 2010. We show that unwanted fertility declined for all women in the 1960s and 1970s, and educational differentials remained stable during this period. Starting in the 1980s, the overall proportion of births reported as unwanted stabilized, but educational differentials fluctuated. The timing of changes suggest that both contraceptive efficacy and availability and economic opportunity for women are important factors in explaining unwanted fertility, but that the importance of these factors depends on social and economic context.

Acknowledgements: We gratefully acknowledge support from the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), R01 HD053533, for the Integrated Fertility Survey Series project. This research was also supported in part by the Center for Family and Demographic Research, Bowling Green State University, which has core funding from NICHD (R24HD050959-09).

Unintended fertility – births that occur too early in the life course or to women who do not want any (additional) children – in the United States both results from and contributes to social disadvantage. Although unintended fertility occurs across the spectrum of race-ethnicity, age, relationship status, and socioeconomic characteristics, rates are persistently higher among economically disadvantaged women and women with low levels of education (Brown and Eisenberg 1995; Chandra et al. 2005; Finer and Henshaw 2006). Unintended births, and unwanted births in particular, are associated with decreased health and well-being for both mothers and children (Logan, Holcombe, Manlove, and Ryan 2007). The higher rates of unintended fertility among less educated women thus contribute to lower well-being for children and form part of a pattern of disadvantage that cumulates across generations.

Other family behaviors associated with disadvantage in the United States, such as divorce, nonmarital childbearing, and early childbearing, have become increasingly polarized over the second half of the twentieth century. Educational differentials in these behaviors have increased, producing a family system in which new family forms are largely clustered together and increasingly concentrated among educationally and economically disadvantaged women (Ellwood and Jencks 2004; Martin 2006; McLanahan 2004; Sullivan 2005). However, it is not clear whether educational differences in unintended fertility, like educational differences in other family formation behaviors, have *grown* over time. The overall level of unintended fertility has stayed fairly stable since the early 1980s despite increasing availability of contraceptives (Mosher, Jones, and Abma 2012). Published tabulations from early fertility surveys suggest that education differences are longstanding, but change over time in the education gradient of unintended fertility has not been explicitly examined in a multivariate framework. Thus, it is not

clear how trends in unintended fertility may have paralleled, or even contributed to, other family change.

In this paper, we use harmonized data from nine cross-sectional fertility surveys covering a period of fifty years to document evolving educational differences in the distribution of unwanted births over the second half of the twentieth century. We describe differences in the proportion of births that are unwanted according to education level and use event history models to predict the likelihood of a woman having an unwanted birth, a wanted birth, or no birth, conditional on education and time period and controlling for maternal age, marital status, race-ethnicity, parity, and other relevant sociodemographic characteristics. Both bivariate statistics and multivariate models focus on the degree to which educational differences have grown larger, grown smaller, or stayed consistent over time. Results show that differences between women without a high school degree and women with a high school degree changed non-linearly across the period of study. Differences between women with a high school degree and women with a college degree or more remained stable over much of the late twentieth and early twenty-first centuries, but increased slightly over the past two decades. We use these trends to reflect on and evaluate theories about contemporary differences in unintended fertility.

Evolving education differences in unintended fertility

A third of all births in the United States are unintended (either unwanted or mistimed). This proportion has stayed remarkably stable over the past few decades, although the proportion of births that were unwanted has increased slightly (Mosher, Jones, and Abma 2012). In 1982, 36.5% of all recent births (within 5 years) were unintended, and 9.8% were unwanted. In 2006-2010, 37.1% of all recent births were unintended, with only minor fluctuations in the intervening years, and 13.8% were unwanted. Behind the aggregate figures lie large socioeconomic

differences in unintended fertility. A larger proportion of births occurring to race-ethnic minorities, unmarried individuals, and at younger ages are unintended. Educational differences are also substantial – about 40% of recent births to those with less than a high school degree, a high school diploma, or some college are unintended compared to about 15% of those with a college degree (Mosher, Jones, and Abma 2012).

Evidence from early fertility surveys suggests that education differentials are longstanding. For instance, Westoff and Ryder (1977) showed a strong and positive association between education and meeting fertility goals between 1970 and 1975, with the least educated more likely to have surpassed their fertility goals – and thus having unintended fertility – whereas the most educated were most likely to underachieve their fertility goals. Of births to women 15-44 in 1973, 88% of college-educated mothers reported their births as wanted compared to 73% with less than a high school education (Munson 1977). However, because published research based on earlier surveys does not use consistent measures or modeling approaches, it is difficult to compare education gradients across reports.

Considering what we know about family change in the late twentieth century leads to mixed predictions about education gradients in unintended fertility. For example, during the period since the Baby Boom, educational differences in completed family size narrowed substantially, in part because of falling fertility among the less-educated (Bailey, Guldi, and Hershbein 2013). To the extent that these declines were the result of reduced unintended fertility among less educated women, they suggest that educational gradients in unintended fertility should have fallen after the Baby Boom. In contrast, educational differences in other fertility and family formation behaviors have increased. For example, the average age at first birth increased from 21.4 in 1970 to 25.6 in 2011, with the most rapid change occurring between 1970 and 1990

(Mathews and Brady 2009; Martin et al. 2013). However, most of the increase has been among the better-educated segments of the population; age at first birth has changed little since the Baby Boom for the less-educated. Similarly, the proportion of births occurring outside of marriage has risen from 5.3% of all births in 1960 to 40.7% of all births in 2011 (Ventura 2009; Martin el al. 2013), but nonmarital births are concentrated among the disadvantaged and less-educated (Mincieli et al. 2007; Musick 2007). Because both births to young women and births to unmarried women are disproportionately likely to be unintended births, these trends imply increased education gradients in unintended fertility.

Explaining education differences in unintended fertility

In this paper, we provide consistent estimates of educational differences in unwanted fertility over a fifty-year period. These estimates add to our understanding of how the swift and comprehensive change in family systems that took place during the second half of the twentieth century made its way through the population. They also provide insight into the fundamental causes of unintended fertility. Many explanations have been proposed for the large educational differences in unintended birth rates, including access to contraception, knowledge of contraceptive methods, self-efficacy, relationship context, stigma and support from social and family networks, financial costs of childbearing, and conflict with academic or employment goals, among others. All of these explanations have found some support; perhaps the largest difficulty in selecting among them is that they all point in the same direction. Given the large and growing social stratification in the United States, these multiple axes of inequality all overlap. By examining educational gradients in unintended fertility over a long time period in which the social, economic, and contraceptive context varied, we hope to be able to identify periods in which different factors are more important.

In the current project, we consider two central determinants of unintended fertility: the availability of effective and affordable contraceptive methods and the opportunity costs of childbearing related to lost wages. Of course, we could consider many other factors, such as reproductive health knowledge, the social acceptability of contraception, or the stigma associated with nonmarital fertility. We focus on these two factors because they are theoretically central and because they vary substantially over the period of study in different ways, though we do not measure them directly. Furthermore, these two factors represent different types of potential causation. The availability of contraception is an element of *access* to the means of preventing pregnancy, while the opportunity costs of childbearing is a component of *motivation* to prevent pregnancy.

Educated women are likely to have better access to medical knowledge and medical facilities, as well as more financial resources available for obtaining contraception (Musick et al. 2009). Current research suggests that these factors play a relatively small role in explaining unintended fertility in the late 20th century, although reproductive health knowledge and concerns about contraceptive side effects may have a larger impact (Edin and Kefalas 2005; Guzzo and Hayford 2012; Sable, Libbus, and Chiu 2000). However, the importance of cost and access factors has likely changed over time. The late twentieth century saw the introduction of hormonal methods of contraception, beginning with the Pill in the 1960s and more recently with injectable contraception and the contraceptive patch, which are both more effective and easier to use than the previously available barrier methods. Birth control has also become easier and more affordable to obtain, and evidence suggests that the cheaper and easier effective contraception is to afford and access, the more likely it will be adopted, with a corresponding decline in unintended fertility (Peipert et al. 2012). The Title X Family Planning program, enacted in 1970,

created a network of family planning centers that provide cost-effective family planning, among other services, for low-income individuals. Two years later, Congress required Medicaid to cover family planning and contraception (Gold et al. 2009). These changes dramatically improved access to contraception among economically disadvantaged and less educated women. Those with more education (and thus more income) have generally been better able to afford the cost of contraception, but there have similar changes among private insurance to increasingly cover contraception (Sonfield et al. 2004). For better-educated women, though, the move to family planning coverage in private insurance likely changes behavior only slightly, largely acting as a cost-shifting mechanism. As such, the least educated women may have benefited most from the overall trend toward decreasing cost and increasing access in the 1960s and 1970s, and educational disparities in unintended childbearing should have declined.

Motivation to prevent pregnancy is more difficult to conceptualize (and measure) than access to contraception. By definition, women with unintended pregnancies did not want to become pregnant at the time of conception. To some degree, then, these women were motivated to prevent pregnancy. However, many women have mixed feelings about the consequences of a birth (Edin et al. 2007; Luker 1999; Zabin 1999). These mixed feelings may be associated with less consistent or less effective use of contraception, which increases the risk of unintended fertility (Brückner, Martin, and Bearman 2004; Miller, Barber, and Gatny 2013). Thus, differences in the risk of unintended births may be explained by differences in the strength or consistency of motivation to prevent pregnancy.

One of the more common arguments about motivation to prevent pregnancy lies in the concept of opportunity costs. Because more educated women have higher potential wages on average than less educated women, their costs of leaving the workforce to raise children are

greater. There is some evidence that wages are negatively associated with unintended fertility, although this association does not explain current educational differences in unintended births (Musick et al. 2009). Furthermore, the full impact of opportunity costs on unintended birth rates may not larger than that captured by wages if, for instance, more educated women are more likely to work in occupations that reward seniority or require continuous employment. As with contraceptive access, the relevance of the opportunity costs of childbearing may have changed along with average education levels and the impact of education on work and family outcomes. Given increasing economic returns to education over the second half of the twentieth century (DiPrete and Buchmann 2006), theories based on opportunity costs of childbearing would imply that unintended birth rates should have declined more for more educated women in the late 20th century, leading to larger differences between more and less educated women.

Hypotheses

We propose the following specific hypotheses, whose predictions differ not only in the direction of change in education gradients but also in the timing of change and in whether change is concentrated among the most or the least educated women.

Hypothesis 1 (access to contraception): Education gradients in unintended fertility declined consistently as the introduction and widespread adoption of the pill in the 1960s made preventing unintended births easier for less educated women.

Hypothesis 2 (opportunity costs): Education gradients in unintended fertility increased as economic returns to education increased for women, leading to lower unintended fertility among more educated women.

Data and methods

Data

Data for this analysis come from the Integrated Fertility Survey Series (IFSS), a harmonized dataset combining data from ten surveys of fertility and family behavior conducted in the United States between 1955 and 2002, supplemented by data from the most recent NSFG, the continuous cycle data for 2006-2010. The component surveys of the IFSS are the Growth of American Families (GAF) surveys of 1955 and 1960; the National Fertility Surveys (NFS) of 1965 and 1970; and the National Surveys of Family Growth (NSFG) of 1973, 1976, 1982, 1988, 1995, and 2002. The IFSS compiles data from all surveys and harmonizes the original data, including weights and survey design variables, into comparable formats. Harmonized IFSS data are available online at http://www.icpsr.umich.edu/icpsrweb/IFSS/ . We do not use data from the GAF surveys for this analysis because these surveys collected data on birth wantedness for only a limited subset of births.

All IFSS component surveys and the continuous NSFG are nationally representative, but the populations represented vary; Table 1 presents the sampling frames and sample sizes of each survey. The most notable difference in the sample frames is the exclusion of never-married women in the early fertility surveys. Single women with children in the household are included starting in the 1973 NSFG, but never-married women are not fully represented in the samples until the 1982 NSFG. Despite these inclusions, nonmarital births are included in retrospective birth histories in all surveys. That is, the sample represents the fertility experience, both within and outside marriage, of women who eventually marry. This subset includes a majority of unmarried mothers in the years covered by these surveys. For example, of women who had nonmarital births in the 1960s, approximately 86% of white women and 67% of black women

married within 15 years after the birth of the child (Gibson-Davis 2011). Still, the fertility experiences represented in the survey sample frames are biased estimates of overall U.S. fertility. We return to the implications of the sample frame in the limitations section.

<Table 1 about here>

In all, the surveys used in this analysis include 77,965 women and 148,244 births. (Because abortion is severely underreported in the United States, we analyze only pregnancies that end in live birth.) For the descriptive analyses, our analytic sample is based on births. We exclude births with missing dates (dropping n=128). We further limit observation to the 105,093 births occurring in 1960 or later, after the introduction of the pill, to focus on the time period in which the most effective methods of contraception were female-controlled. To minimize bias related to retrospective reporting and age truncation (especially since different age groups were included across the surveys), we analyze births within the ten years prior to each survey (n=68,140 births). Finally, we drop births with missing data on wantedness (n=67). After these restrictions, our final analytic sample consists of 68,073 births. For the multivariate analyses, our sample is based on women. For consistency across surveys, we exclude women who were age 45 or over at the time of the survey (n=1060), and we exclude women with any missing dates of marriage (n=294) or birth (n=32). Finally, one woman with a missing weight was excluded, bringing the final sample size to 76,608 women.

Measures

All IFSS component surveys and the continuous NSFG collect complete fertility histories. We use these data to analyze trends in birth wantedness across 11 time periods spanning the second half of the twentieth century: 1960-64; 1965-69; 1970-74; 1975-79; 1980-84; 1985-89; 1990-94; 1995-1999; 2000-2004; and 2005-2010. Most of these time periods are

five-year periods; the last period is slightly longer because of the timing of the latest survey. We also tested multivariate models specifying change over time as a linear, quadratic, or cubic function of calendar year, but models using the dummy variable specification provided better model fit.

Although the basic approach to measuring unintended births was similar across surveys, there are variations in question wording and response categories. Most notably, the two NFS and the 1973 NSFG only measured whether a birth was wanted, that is, whether, at the time of conception, a woman ever wanted any more children. Starting with the 1976 NSFG, surveys also asked, for wanted births, whether the woman wanted to get pregnant at that time, earlier, or later. These questions can be used to identify mistimed births (births that occurred earlier than wanted) and to distinguished between intended (early and on-time) and unintended (unwanted and mistimed) births. The lack of data on desired fertility timing in the early surveys makes it difficult to capture variation in birth planning among low-parity births, which are likely to have been wanted at some point. Despite this limitation, we retain data from the earliest surveys in order to better capture fertility experiences during and immediately after the Baby Boom. As a result, we only analyze unwanted births, rather than all unintended births. Surveys also varied in how they classified uncertain or ambivalent responses to questions about birth wantedness. All surveys included a "don't know" response; some surveys also separately recorded answers like "didn't care" and "indifferent." We combine all uncertain responses into "don't know." This category is combined with "unwanted" in analyses.

Educational attainment is measured at the time of the survey. Educational attainment may be partially determined by fertility, especially early unplanned fertility. However, data on the timing of educational enrollment is not available in most of the component surveys. Therefore,

we use education at the time of survey and are cautious about making causal conclusions. The IFSS harmonized variable reports educational attainment as years of schooling. Based on this measure, we created four education categories: no high school degree (less than 12 years), high school degree only (12 years), some college education (more than 12 but less than 16 years), and bachelor's degree or higher (16 years or more). Unfortunately, degree attainment is not consistently available across surveys. Thus, it is not possible to create an accurate measure of degrees received. We also considered using reported years of schooling to create relative measures of education (e.g., education terciles or quartiles). However, some surveys report education in ranges rather than exact years. The approach we adopt is the most straightforward way of creating a meaningful education measure that is reasonably consistent over time. It is important to underscore that while our categorization of education is the same in all surveys, these categories do not have the same meaning over the period of study. Most notably, the proportion of women attending and graduating from college increased substantially over the second half of the twentieth century. Thus, the selectivity and social meaning of college education for women changed over time. We describe changing education gradients in unwanted fertility in the context of the shifting meaning of education.

We control for demographic factors related to education and unintended fertility that may have changed over the period of study. Control variables include age (15-17, 18-19, 20-21, 22-24, 25-29, 30-34, 35 and over), marital status (married vs. unmarried), race-ethnicity (non-Hispanic white, non-Hispanic Black, non-Hispanic other race, Hispanic), parity, and a set of controls for past childbearing (had a child less than 24 months ago, had a child 24-28 months ago, had a child more than 48 months ago, ever had an unwanted birth). Most of these measures are straightforward and highly comparable across surveys, with a few exceptions. In some

surveys, complete marriage histories are collected, while in other surveys start and end dates are recorded only for the first, second, and most recent marriage. For consistency, we count only the first, second, and most recent marriage in all surveys; for the few women who were married more than three times, some of the time spent married is treated as time spent unmarried. Approaches to measuring race-ethnicity varied somewhat over time. Although the NFS included Hispanic women, these surveys did not measure Hispanic ethnicity. In the 1973 NSFG, the first survey that measured Hispanic ethnicity, less than 3% of the sample identified as Hispanic, and the Hispanic population was likely smaller in the earlier surveys. Thus, we treat all women in the NFS sample as non-Hispanic. Previous analyses of fertility using these data suggest that this assumption does not distort results (Hayford, Guzzo, and Smock forthcoming). Unfortunately, because cohabitation was not measured in the earlier surveys, we are unable to distinguish cohabiting from non-cohabiting women. Similarly, other potential control variables such as family background or religiosity were not included because they were not consistently available across surveys.

Analyses

All analyses use survey weights, and all standard errors are adjusted for complex survey design using SURVEY procedures in SAS. We begin with simple bivariate tabulations of the proportion of births that were reported as unwanted, by mother's education and by the time period of birth. We use the proportion of births that are reported as unwanted rather than the unwanted birth rate in order to facilitate comparison with existing published reports. We then proceed to multivariate analyses to test the statistical significance of time change and to account for the changing race-ethnic composition of the population and the changing age, parity, and marital context of fertility. We use discrete-time event history analyses with person-months as

the unit of analysis. For these analyses, women enter the sample at age 15, the year 1960, or ten years prior to the survey, whichever is latest, and contribute person-months until the date of the survey. The outcome measure is lagged by 9 months in order to describe the association of birth wantedness with the context at the time of conception of the birth. Months while a woman is pregnant are not included in the analysis, since women are not at risk of conception during pregnancy. We use a competing risks framework to estimate the hazards of experiencing an unwanted birth vs. a wanted birth or no birth. Results are presented in the form of two sets of contrasts: the relative risk of having an unwanted birth vs. no birth and the relative risk of having an unwanted birth vs. a wanted birth. The first contrast is comparable to an unwanted birth rate, while the second contrast is essentially a proportion. These two contrasts may show different trends if educational gradients in wanted fertility change over time.

The primary focus of this analysis is understanding how educational differences in fertility change over time. To address this question, we estimate interactions between measures of educational attainment and time period. As noted above, we specify time as a series of dummy variables for five-year periods; we include interactions between educational categories and each time period. In exploratory analyses, we ran all models separately by time period in order to assess whether the relationship between wanted and unwanted fertility and other controls changed over time. We found some suggestion of race-ethnic convergence over time, but results for educational gradients did not change when taking this variation into account. Since race-ethnic convergence is not the main focus of this analysis, we do not include these interaction terms in the final models. Coefficients for other variables did not vary consistently over time.

Results

Descriptive results

Figure 1 shows change over time in the proportion of births reported as unwanted for all women and by educational attainment (no high school degree, high school degree only, some college, bachelor's degree or higher). The sample sizes for these proportions are reported in Table 2, along with the distribution of mothers by educational attainment in each five-year time period. Overall, the proportion of births reported as unwanted fell during this time period from about 24.6% of births in 1960-64, or nearly one in four births, to 14.5% in 2005-2010. This decline was sharpest in the first two decades of the period of analysis, from 1960 to 1980. After 1980, the level of unwanted fertility did not decline farther, and appears even to have increased slightly starting in the late 1990s. These trends are consistent with a decline in unwanted fertility sparked by the introduction of hormonal contraception in the 1960s followed by a period of plateau at relatively high levels.

<Figure 1 about here>

<Table 2 about here>

In all time periods, unwanted births were most common among the least educated women and least common among the most educated women. In the first part of the period, trends did not vary substantially by education level – women in all education groups experienced the rapid decline in unwanted births in the 1960s and 1970s, contrary to the prediction of Hypothesis 1. Starting in the 1980s, however, there is some suggestion of divergence. Women in the highest and lowest education groups (women with a bachelor's degree and women without a high school degree) experienced stability in the proportion of births that were unwanted between 1980 and 2010. In contrast, women in the middle groups, those with a high school degree or some college

but less than a bachelor's degree, reported an increase in the proportion of unwanted births. This increase was largest among women with a high school degree; while the level of unwanted fertility among this group was similar to women with some college at the start of the period, by the early twenty-first century women with a high school degree but no college experience more closely resemble women without a high school diploma. As a result of these shifts, the difference between women with a bachelor's degree and women in the middle education groups increased, while the difference between women without a high school degree and women with intermediate levels of education declined. This change is partially consistent with the prediction of Hypothesis 2.

Multivariate results

These bivariate descriptions do not account for changes in the race-ethnic composition of the population, marriage rates, or birth timing. We therefore proceed to multivariate analysis of unwanted births. As described in the methods section, we use event history analysis to model the hazards of two possible competing outcomes, an unwanted birth and a wanted birth, and present results (Table 3) in the form of two sets of contrasts. The first, the relative risk of having an unwanted birth vs. no birth, can be interpreted as an unwanted birth rate. The unwanted birth rate is the behavioral outcome that is the subject of our hypotheses. The second, the relative risk of having an unwanted vs. a wanted birth, is most closely comparable to the proportions shown in Figure 1.

<Table 3 about here>

Time trends from the multivariate models are largely similar to the bivariate results from Figure 1. The main effects terms for the time trends, which represent change over time in unwanted fertility for women with a high school degree, the reference category for education, are

consistently negative in both column 1 and column 2. As indicated by these coefficients, both unwanted birth rates and the proportion of births that were unwanted declined after the earliest time period, 1960-64. The magnitude of the coefficients increases until about 1980 and then declines slightly, consistent with the bivariate results showing an increase in unwanted fertility for women with a high school degree after 1980. The similarity in bivariate and multivariate results suggests that change over time in the proportion of births that are unwanted cannot be primarily attributed to changes in marriage behavior, the timing of births, the parity distribution of births, or the race-ethnic composition of the population. In additional analyses (not shown), we estimated models without sociodemographic controls. The coefficients for the time trends (for both main effects and interactions, and for both contrasts) differed very little from those shown here, adding further evidence that trends in unwanted births are not the result of compositional change.

Results for education differ somewhat between the multivariate and bivariate analyses. The main effects coefficients, which represent educational differences in the period 1960-64, the reference period, show the expected negative and statistically significant relationship between education and the hazard of having an unwanted birth vs. no birth (column 1). Women with some college education and women with a bachelor's degree have lower unwanted birth rates than women with a high school degree, while women with no high school degree have higher unwanted birth rates. However, coefficients in column 2 are statistically significant only for women with some college education. That is, the proportion of births that are unwanted does not differ significantly among women with a high school degree, women without a high school degree, and women with a bachelor's degree once other characteristics are taken into account. These unexpected results imply that there is variation by education in wanted birth rates as well,

such that the least educated women have higher wanted as well as unwanted birth rates than women with a high school degree and women with a college degree have lower wanted birth rates. The difference in results between the two contrasts points to the importance of considering differences in wanted births as well as unwanted births when analyzing variation in the proportion of births that are unwanted.

The primary focus of this analysis is change over time in educational differences in unwanted fertility, represented here by the interactions between time period and education. Table 3 includes joint significance tests for each set of education interactions (based on Wald chi-square tests) as well as the magnitude and significance of each interaction. Interactions for the "less than high school degree" category are jointly significant both for the unwanted birth vs. no birth contrast and for the unwanted birth vs. wanted birth contrasts. Looking at the individual interaction terms, the significant positive interactions for 1980-84 and 1985-89 show that in the 1980s, differences between women without a high school degree and women with a high school degree were significantly larger than in 1960-64. However, the apparent narrowing of the gap between women with and without a high school degree in the most recent period suggested by Figure 1 does not persist when accounting for sociodemographic characteristics: The coefficients for interactions for the 1990s and 2000s are not statistically significant.

For the "some college" category, the interactions are not jointly significant, and none of the individual terms are statistically significant. That is, over the time period considered as a whole, the trends in unwanted fertility for women with some college education but not a degree do not differ from the trends for women with a high school degree to a statistically significant level, after accounting for compositional changes. The interactions for the "bachelor's degree or higher" category are also not jointly significant. However, most of the individual interaction

terms for the 1990s and 2000s are statistically different from zero when considered individually. Additional models (not shown) showed a statistically significant difference in the relationship between having a bachelor's degree and having a high school degree in the post-1990 period versus the pre-1990 period. The negative sign of the interaction terms, combined with the negative main effect for having bachelor's degree, indicate that education gradients widened after 1990. That is, the widening gap between women with a bachelor's degree and women with a high school degree shown in Figure 1 persists when controlling for individual characteristics.

Results for control variables are largely consistent with findings from previous research on the determinants of unwanted fertility. Unwanted birth rates (column 1) are higher among Black and Hispanic women than among non-Hispanic white women; the proportion of births that are unwanted (column 2) is higher among Black women than among white women, but does not differ significantly between Hispanic women and non-Hispanic white women. Married women have higher unwanted birth rates than unmarried women, consistent with the generally higher birth rates of married women during the period of study, but report a much lower proportion of births to be unwanted. Age is negatively associated with unwanted birth rates, but non-linearly associated with the proportion of unwanted births, such that both the oldest age groups and the youngest age groups report a higher proportion of unwanted births than women in their twenties. Having more children, having had a recent birth (in the past two years), and having a previous unwanted birth all increase the odds of having an unwanted birth vs. no birth and vs. a wanted birth.

Discussion and conclusions

Summary and discussion

Unwanted fertility declined steadily and substantially during the 1960s and 1970s in the United States. After 1980, however, both rates and proportions of unwanted births stagnated at relatively high levels. The timing of these changes suggests that the introduction and dissemination of hormonal contraception in the 1960s, and improved access to public family planning clinics in the 1970s, may have played a large role in reducing unwanted births, as proposed by Hypothesis 1. Contrary to this hypothesis, however, the large declines in unwanted fertility in the 1960s were experienced equally across all education groups. Throughout the period under study, the least educated women experienced the highest unwanted birth rates.

Although overall levels of unwanted fertility remained stable over the past three decades, educational gradients have shifted. The gap between women with and without a high school degree widened in the 1980s, then returned to previous levels. Starting in the 1990s, the difference between women with a bachelor's degree or more education and women with a high school degree increased. Although a full explanation of these trends would require detailed information on economic experiences and contraceptive availability, it is suggestive that the difference in unwanted fertility between women with a bachelor's degree and women with less education grew at the same time that the wage differential associated with having a four-year college degree increased (DiPrete and Buchmann 2006). Thus, our results provide weak support for Hypothesis 2.

Limitations

Pooling data from multiple surveys allowed us to examine unwanted fertility over a long time period marked by substantial changes in family formation, contraceptive efficacy and

availability, and economic opportunities. In general, the surveys we use in this analysis are considered to be highly comparable, especially for relatively straightforward measures such as education and the timing of births. These surveys have been used to study trends over time (e.g., Bailey, Guldi, and Hershbein 2013; Brewster, Cooksey, Guilkey, and Rindfuss 1998; Finer and Philbin forthcoming; Kennedy and Bumpass 2008; Rindfuss, Morgan, and Swicegood 1988), and analyses specifically focused on the comparability of data across surveys have found high consistency (e.g., Ekouevi and Morgan 1991; Swicegood, Morgan, and Rindfuss 1984). However, using data from different surveys to analyze trends over time always raises the possibility that apparent trends may be driven by minor variation in survey methodology. Because of the timing of the surveys, we have overlapping data from multiple surveys to describe most time points in our analyses. The fact that time and data source are not fully collinear over the period of analysis means that the peculiarities of any one survey are less likely to drive our results. Still, some caution is required in interpreting results.

Combining data from multiple surveys also requires compromise in the construction of measures. Because of the way earlier surveys asked about previous births, we were not able to analyze mistimed births. Over time, as marriage ages have risen and nonmarital fertility has increased, mistimed births make up an increasing proportion of unintended fertility. Thus, our analysis of unwanted fertility does not fully describe trends in unintended fertility. Furthermore, early surveys do not measure cohabitation, so we are not able to account for the potential role of cohabitation in explaining education gradients. In recent years, however, the intention status of cohabiting births more closely resembles that of births to non-cohabiting unmarried women than that of births to married women (Mosher, Jones, and Abma 2012), suggesting that the exclusion of cohabitation is unlikely to completely drive our results.

Finally, surveys before 1982 have sample frames that are limited according to marriage and childbearing history. This exclusion is most severe for the earliest surveys, which include only currently married women (1965 NFS) or ever-married women (1970 NFS). Data from these surveys leaves out the fertility experience of women who do not marry; to the extent that their births are disproportionately unwanted, estimates of unwanted fertility for the time period covered by these surveys are biased downward. The 1973 and 1976 National Surveys of Family Growth include never-married women only if they have children in the household. Because never-married women without children are excluded from the sample, and thus are not present in the denominator of rates, our data overestimates both wanted and unwanted birth rates. However, since women with young children are included and our sample is restricted to women with births in ten years before the survey, our analyses based on births, such as the proportion of births that are unwanted, accurately represent population experiences.

The bias introduced by the limited sample frames of the earliest surveys is somewhat mitigated by the availability of data from later surveys. For example, the period 1973-1982 is described by data from the 1982 NSFG, which included all women of reproductive age in the sample frame, as well as the more limited data from the 1976 NSFG. However, unwanted fertility is likely underestimated in the earliest time period in our analysis. Thus, our description of change over time is conservative, in that the true starting levels for unwanted fertility are probably higher than our reported levels. It is not clear how sample frame restrictions might bias our most central findings, those related to education gradients. It is possible that there are changes between the 1960s and the 1970s that are not captured in the limited sample frame. However, the significant changes we find after the 1980s are not affected by changes in sample frames, since all surveys covering this time period included all women of reproductive age.

Conclusion

The large declines in unwanted births in the U.S. in the 1960s and 1970s suggest that the availability of effective contraception can have an important impact on unwanted births for all women, while the increased advantage in unwanted birth rates among the most educated women in the 1990s implies that economic opportunity can be an important motivation for preventing unwanted births. The key result from this analysis, however, may be the uneven and non-linear nature of changes in educational gradients in unwanted fertility. Over the past fifty years, there has been no consistent pattern either in overall unwanted fertility or in educational differentials. Unwanted fertility is responsive to multiple elements of the social, economic, and contraceptive context, and the factors that produce educational differentials depend on these contextual factors. Understanding educational differentials, then, requires not just individual-level analysis, but also a consideration of local, national, and temporal context.

The inconsistent pattern of change over time in unwanted fertility also introduces a potential paradox. Since World War II, the United States has seen dramatic changes in fertility and family formation. The high (and early) rates of marriage and marital fertility during the Baby Boom have given way to high rates of nonmarital fertility, cohabitation, and relationship instability (Kennedy and Bumpass 2008; Ventura 2009; Wu 2008). Unwanted births are strongly associated with all of these behaviors. But while changes in nonmarital fertility and cohabitation have been sustained and almost linear, unwanted fertility has been stable for almost thirty years. And while many family formation behaviors have demonstrated a pattern of divergence by educational attainment, unwanted fertility shows only limited evidence of increasing education gradients. It seems unlikely, then, that unwanted fertility has been either the cause or the result of

other changes in family formation behavior in the United States. Instead, unwanted fertility may represent a stable fixture of American family systems.

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Table 1. Component surveys, sampling frames, and sample sizes

Survey	Sample frame	N (women)
NFS: 1965	Currently married women, age 18-54; black women oversampled	5617
NFS: 1970	Ever-married women, age 18-44; black women oversampled	6752
NSFG: 1973	Ever-married women and single women with children in household, age 15-44; black women oversampled	9797
NSFG: 1976	Ever-married women and single women with children in household, age 15-44; black women oversampled	8611
NSFG: 1982	Women, age 15-44; black and teenage women oversampled	7969
NSFG: 1988	Women, age 15-44; black women oversampled	8450
NSFG: 1995	Women, age 15-44; black and Hispanic women oversampled	10847
NSFG: 2002	Women, age 15-44; black, Hispanic, and teenage women oversampled	7643
NSFG: 2006-2010	Women, age 15-44; black, Hispanic, and teenage women oversampled	12279

NFS: National Fertility Survey. NSFG: National Survey of Family Growth.

Table 2. Sample size and characteristics of births in sample

	N (births)	Percent of births unwanted	Percent of births to women with: No h.s. degree	High school degree	Some college	Bachelor's degree or more
1960-64	9535	24.6	36.4	43.7	12.2	7.7
1965-69	13814	19.5	31.1	45.8	14.2	8.9
1970-74	10849	14.3	26.7	46.3	16.1	10.9
1975-79	4885	11.7	22.1	40.4	22.3	15.2
1980-84	4865	11.8	20.8	36.3	25.1	17.9
1985-89	5689	11.7	20.5	34.4	25.7	19.4
1990-94	5153	12.4	21.1	32.9	25.5	20.6
1995-99	4151	13.4	21.3	24.9	29.2	24.6
2000-04	5945	15.0	22.1	25.6	26.1	26.3
2005-10	3187	14.5	23.4	26.4	24.4	25.8

Data: IFSS (National Fertility Surveys of 1965 and 1970; National Surveys of Family Growth of 1973, 1976, 1982, 1988, 1995, and 2002), National Survey of Family Growth 2006-2010. Births after 1960, within 10 years of survey, with non-missing data. Percents weighted.

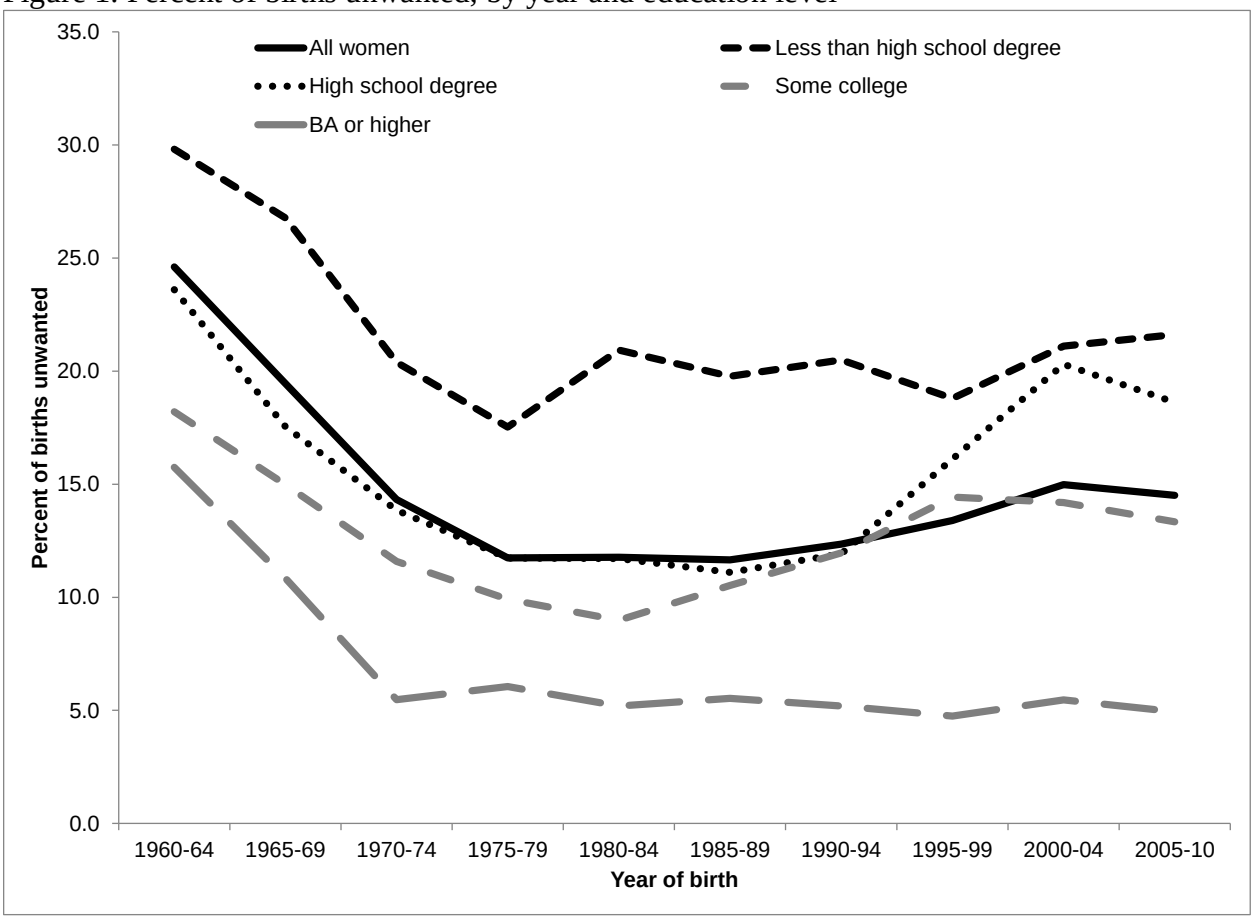
Table 3. Discrete-time event history analysis modeling competing risks of unwanted birth vs. wanted birth, no birth

		Column 1: Unwanted birth vs. no birth			Column 2: Unwanted vs. wanted birth		
		b	SE		b	SE	
Intercept		-6.78	0.06	***	-1.65	0.07	***
Time period							
1960-64 (reference)							
1965-69		-0.60	0.05	***	-0.39	0.06	***
1970-74		-1.10	0.07	***	-0.65	0.08	***
1975-79		-1.37	0.08	***	-0.77	0.10	***
1980-84		-1.20	0.10	***	-0.72	0.11	***
1985-89		-1.32	0.09	***	-0.87	0.09	***
1990-94		-1.11	0.10	***	-0.83	0.11	***
1995-99		-0.86	0.11	***	-0.61	0.12	***
2000-04		-0.70	0.10	***	-0.49	0.11	***
2005-10		-1.04	0.14	***	-0.71	0.15	***
Education							
No high school degree		0.15	0.06	**	-0.12	0.07	
High school degree (reference)							
Some college		-0.26	0.09	**	-0.21	0.10	*
BA or higher		-0.36	0.13	**	-0.17	0.13	
Education x time interactions							
No high school degree x:							
Joint significance test				**			*
	1965-69	0.13	0.07		0.12	0.08	
	1970-74	0.05	0.09		0.04	0.10	
	1975-79	0.15	0.13		0.09	0.15	
	1980-84	0.34	0.13	**	0.38	0.15	**
	1985-89	0.50	0.12	***	0.42	0.14	**
	1990-94	0.24	0.14		0.22	0.16	
	1995-99	0.03	0.15		0.03	0.17	
	2000-04	-0.10	0.13		-0.14	0.15	
	2005-10	0.04	0.18		0.14	0.22	
Some college x:							
Joint significance test				n.s.			n.s.
	1965-69	0.12	0.11		0.13	0.12	
	1970-74	0.05	0.14		0.17	0.17	
	1975-79	0.15	0.17		0.23	0.20	
	1980-84	-0.18	0.18		-0.12	0.19	
	1985-89	0.22	0.15		0.27	0.17	
	1990-94	0.14	0.17		0.34	0.18	

	1995-99	0.17	0.16		0.23	0.18	
	2000-04	-0.11	0.15		0.02	0.17	
	2005-10	-0.36	0.23		-0.07	0.26	
BA or higher x							
Joint significance test				n.s.			n.s.
	1965-69	-0.11	0.15		-0.06	0.17	
	1970-74	-0.34	0.22		-0.35	0.22	
	1975-79	-0.18	0.27		-0.19	0.28	
	1980-84	-0.21	0.26		-0.30	0.28	
	1985-89	-0.12	0.19		-0.09	0.20	
	1990-94	-0.41	0.21	*	-0.38	0.22	
	1995-99	-0.62	0.27	*	-0.56	0.28	*
	2000-04	-0.54	0.26	*	-0.58	0.27	*
	2005-10	-0.67	0.33	*	-0.66	0.35	
Fixed characteristics							
Non-Hispanic black		0.71	0.03	***	0.38	0.03	***
Non-Hispanic white (reference)							
Non-Hispanic other		0.35	0.08	***	0.19	0.08	*
Hispanic		0.32	0.05	***	0.04	0.06	
Time-varying characteristics							
Married		0.28	0.03	***	-1.22	0.04	***
Age 15-17		0.08	0.06		0.36	0.06	***
Age 18-19		0.46	0.05	***	0.24	0.05	***
Age 20-21		0.29	0.04	***	0.18	0.05	***
Age 22-24 (reference)							
Age 25-29		-0.17	0.04	***	-0.01	0.04	
Age 30-34		-0.57	0.05	***	0.05	0.05	
Age 35 and up		-1.21	0.06	***	0.44	0.07	***
Parity		0.10	0.01	***	0.45	0.02	***
No previous births (reference)							
Had a birth 0-23 months ago		1.09	0.05	***	0.64	0.05	***
Had a birth 24-47 months ago		0.92	0.05	***	0.33	0.06	***
Had a birth 48 months ago or more		0.45	0.06	***	0.65	0.07	***
Any previous unwanted birth		0.72	0.03	***	1.38	0.05	***

Data: IFSS (National Fertility Surveys of 1965 and 1970; National Surveys of Family Growth of 1973, 1976, 1982, 1988, 1995, and 2002), National Survey of Family Growth 2006-2010. Person-months after 1960, within 10 years of survey. Women with missing data excluded. N= 7,284,117 person-months from 76,608 women. Models incorporate weights and adjust standard errors for survey design. *: p<.05; **: p<.01; ***: p<.001. n.s.: not significant.

Figure 1. Percent of births unwanted, by year and education level



Data: IFSS (National Fertility Surveys of 1965 and 1970; National Surveys of Family Growth of 1973, 1976, 1982, 1988, 1995, and 2002), National Survey of Family Growth 2006-2010. Births after 1960, within 10 years of survey, with non-missing data. Percents weighted.