Demographic drivers of the post-recessionary fertility decline and the future of U.S. fertility

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Abstract

This paper examines trends in important demographic drivers of fertility—such as intentions for children, postponed childbearing, and unintended pregnancy—to better understand the implications of the recent fertility decline for future fertility patterns. In the most recent years for which we have data, intended fertility remained high (i.e. 2.11-2.63 children) among young women across nearly all demographic groups. Only women with no religious affiliation, a growing segment of the population, showed a preference for below-replacement fertility levels (<2.1 children). Among most subgroups analyzed, total intended fertility shifted downward after the Great Recession; reductions were largest for teenagers and women in their early 20s, who intended around 0.15 children less than earlier cohorts. On average, women who have recently completed childbearing fell short of meeting their intentions by 0.25 children; it is unclear how large this shortfall will be for younger cohorts, although new evidence indicates that the gap will likely be greater for millennial women with higher levels of education. The fall in fertility in the post-recessionary period was most pronounced for younger women, suggesting that part of the decline in total fertility may be transitional, as women shift to having children later in their lives. Total fertility rates (TFRs) that adjust for shifts in fertility timing show little evidence of decline; in 2016, for example, the adjusted TFR was 2.18, substantially higher than the observed TFR of 1.82. Finally, much of the fertility decline was driven by reductions in unintended pregnancy and births to Latinas. The future of U.S. fertility, therefore, rests on whether those who delay childbearing will ultimately meet their fertility goals, the long-term implications of a declining unintended pregnancy rate, and whether the post-recessionary drivers of Latina fertility will continue to affect fertility rates in the near future.

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Introduction

The most recent data from the Centers for Disease Control continue to show a steady decline in fertility that started with the Great Recession (Martin et al. 2018). In 2007, before the recession began, the total fertility rate (TFR) was 2.12 (Martin et al. 2010). By 2017, this figure had fallen by 17% to 1.77, the lowest level observed since the 1970s (Martin et al. 2018). The absence of a fertility rebound in the years following the Great Recession has triggered apprehension, since the negative economic effects associated with the recession, including high unemployment, have improved over the same period.

Persistent fertility levels that fall below the replacement level of 2.1 children per woman are cause for concern. In the absence of migration, below replacement fertility levels generally mean that a population will not be able to replace itself in the long run and will therefore decline in size. Sustained below replacement fertility, moreover, can fundamentally change the age structure of a population, leading to higher old age dependency ratios that affect the fiscal health of entitlement programs such as Social Security.

Given widespread spillover effects that fertility levels have on other domains, a central question is if the U.S. will continue to observe below-replacement fertility levels in the future. Is the drop in fertility permanent and no longer responsive to economic factors that have historically been linked with fertility change? Or are there other factors underlying these trends that suggest that the expected fertility rebound has merely been delayed?

Absent a crystal ball, demographers have relied on observed relationships between fertility determinants and eventual fertility to make informed predictions about fertility trends. One salient predictor of eventual fertility are fertility intentions and expectations, which provide a general indication of future fertility patterns. As such, a key question arising from the continued fertility decline is if individuals are expecting fewer children in light of the economic recession and its attendant consequences—including growing economic uncertainty, skyrocketing costs of childcare, and increasing work-family conflict—or if they expect the same number of children, but are waiting to have them at older ages.

Fertility expectations are only one part of the puzzle, however. Not everyone who expects to have children will do so, and many will miss their stated targets by either having more or less than they originally intended. Indeed, demographers believe that most cross-national differences in observed fertility are largely driven not by differences in expected fertility, but rather by differences in individuals' ability to meet their expectations (Bongaarts 2001; Beaujouan and

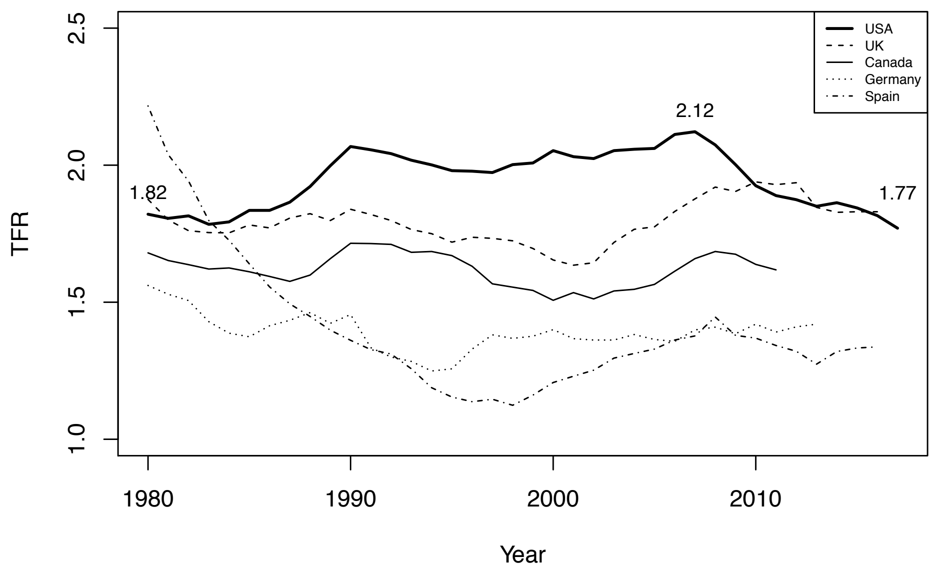
Berghammer 2017). Thus, another key question stemming from the recent fertility decline is if women are falling short of their stated expectations, and if so, by how much.

To shed light on these questions and generate evidence-based predictions of future fertility in the U.S., we accomplish the following aims. First, we provide a brief overview of U.S. fertility trends and place these trends in a cross-national perspective; doing so provides important context for the recent, continued decline in U.S. fertility and its subsequent trajectory. We also describe underlying variation in fertility rates by race-ethnicity, immigration status, education, and religion, since these characteristics are important for shaping women's childbearing trajectories. Second, we analyze fertility intention data over the past decade to assess if intentions for children have changed since the Great Recession, and if these trends are similar for important demographic subgroups. Third, we present old and new evidence on the correspondence between fertility intentions and subsequent fertility among U.S. women. Fourth, we touch on other demographic drivers of fertility change that will impact the future of U.S. fertility, including trends in unintended pregnancy, contraceptive use, and delayed childbearing; we also pay particular attention to the role of Latina and immigrant fertility, which accounts for a large share of U.S. births. We then incorporate the findings from the previous aims to discuss implications for the future. The paper closes with a brief discussion of related research on future U.S. fertility trends, future research directions, and policy implications.

An overview of U.S. fertility levels and trends

Since the 1980s, the U.S. has enjoyed relatively high levels of fertility compared with other high-income countries. As displayed in Figure 1, the TFR for the U.S., shown in the solid black line, remained above 2.0 across most of the 1990s and 2000s, reaching 2.12 in 2007. After the recession, however, the TFR declined substantially and began to converge with TFRs in lower fertility countries.

Figure 1. Total fertility rates (TFR) for selected countries, 1980-2017.

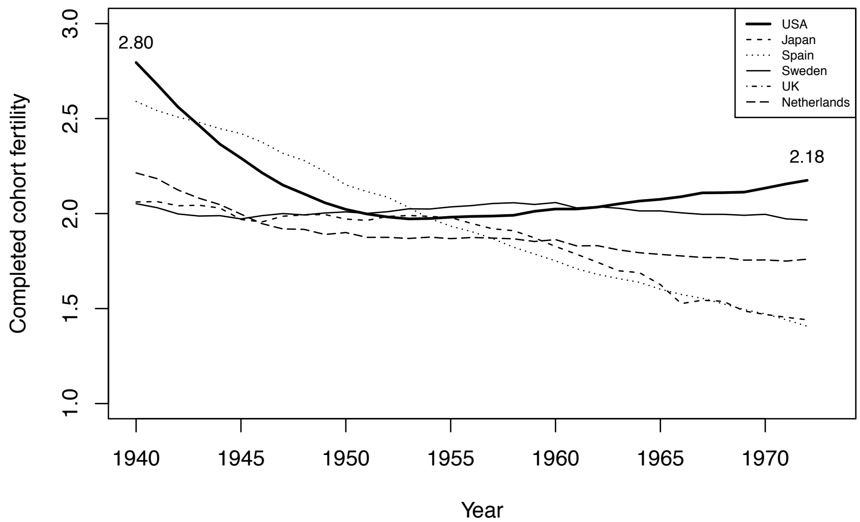


Source: Human Fertility Database.

The TFR measure used above may be a misleading indicator of fertility because it is sensitive to changes in fertility timing, or what demographers call tempo effects. For example, the low TFRs displayed in Figure 1 for some countries are artificially depressed because increasing numbers of women began delaying first births[1]. A more accurate measure of fertility is a cohort's completed fertility, or the average number of children women have at the end of their childbearing years, which is not influenced by tempo effects. As shown in Figure 2, when we use a measure of completed cohort fertility, we continue to see much higher fertility among American women (solid black line) compared to those in other high-income countries; moreover, in contrast to the period TFR, completed cohort fertility shows no sign of decline. However, we do not yet know the completed fertility levels for the cohorts whose key childbearing years took place during and after the recession.

[1] When women are delaying births, it creates a situation where many younger women are not having births yet, and many older women have already had their births, so there are relatively few births in that year. This affects TFR (which is based only on births in a given year), even if both groups of women (older and younger) end up having the same number of births eventually. See Bongaarts & Feeney (1998) for additional information.

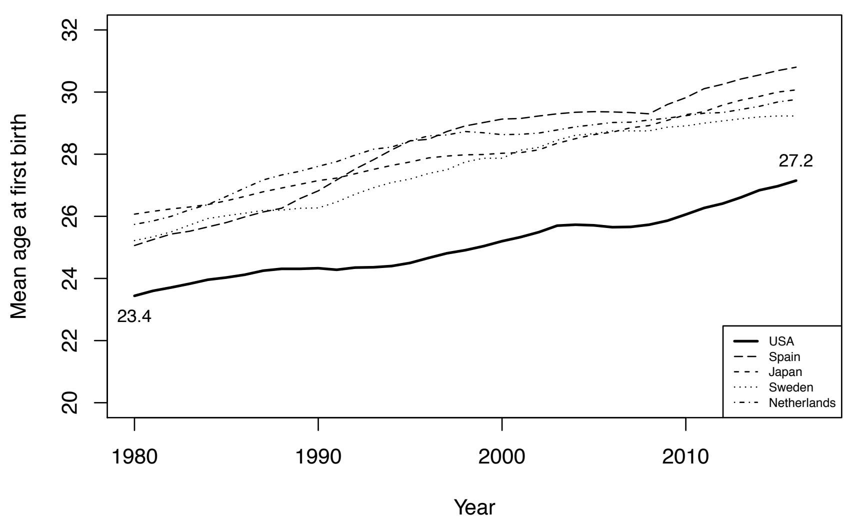
Figure 2. Completed cohort fertility among women born in 1940-74, for selected countries.



Source: Human Fertility Database.

The mean age at childbearing in the U.S. also differs substantially from levels found in other industrialized countries. Figure 3 shows that compared with its high-income counterparts, the U.S. has a much lower mean age at first birth across the years 1980-2016. Over this same time period, the mean age at first birth increased more slowly in the U.S as well. As a result, the tempo effects that may artificially depress the TFR were not as large in the U.S. as those experienced in other countries.

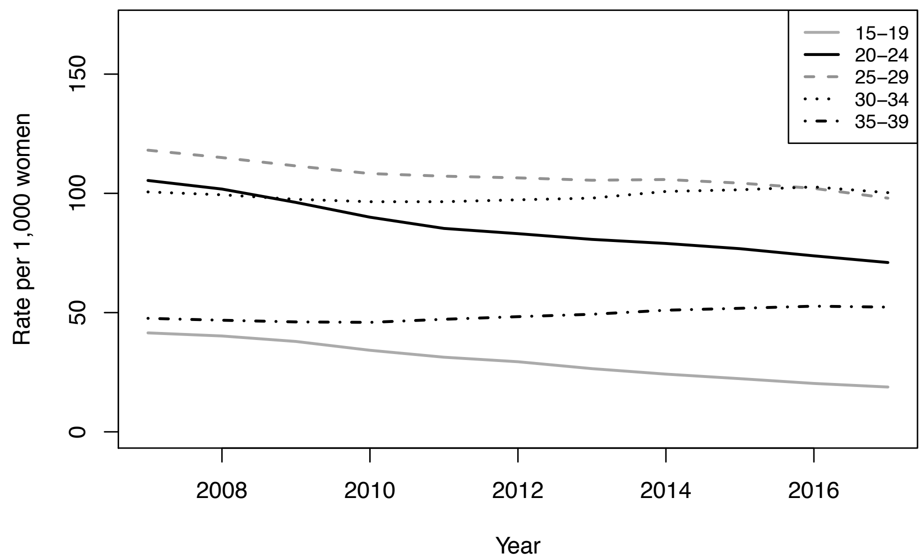
Figure 3. Mean age at first birth for selected countries, 1980-2016.



Source: Human Fertility Database.

Since the recession, however, increasing shares of American women began delaying births, and the pace of change in the mean age of first birth increased, suggesting that the U.S. is in the midst of a growing postponement transition. Figure 4 shows birth rates by age of mother for the years 2007-2017. Birth rates fell markedly for teenagers and young adult women aged 20-24, while rates slightly increased for women in their 30s. This suggests that that part of the decline in total fertility may be transitional, as women shift to having children later in their lives.

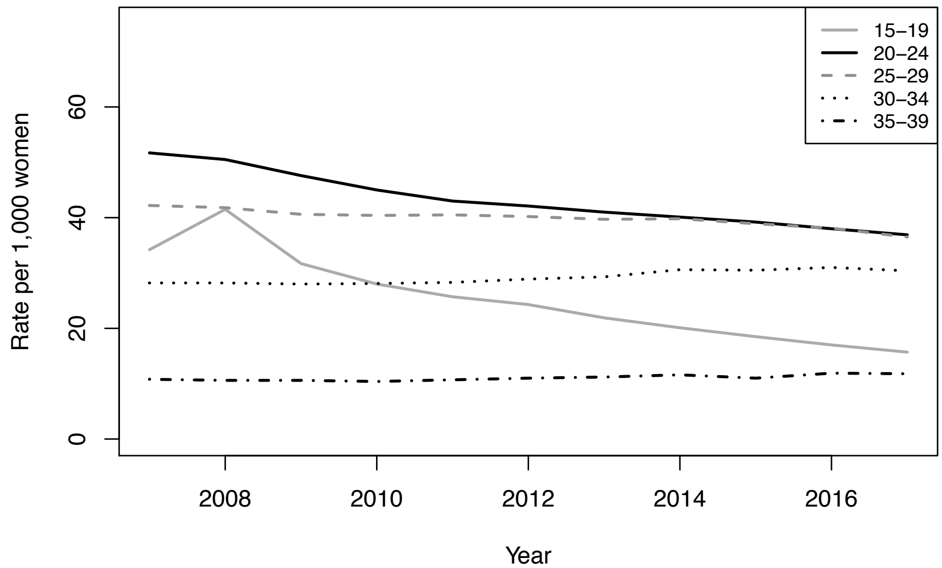
Figure 4. Birth rates by age of mother, 2007-2017.



Source: National Center for Health Statistics.

Figure 5 provides a more detailed picture of the postponement transition, since it displays birth rates for *first* births only, by age of mother. Again, the decline in first births among teens and young adult women, coupled with the slight increases in first births among 30-year-olds, suggest that the fertility decline in the post-recessionary period was due, in part, to women delaying first births. The role of fertility postponement will be discussed in more detail in a later section.

Figure 5. First birth rates by age of mother, 2007-2017.



Source: National Center for Health Statistics.

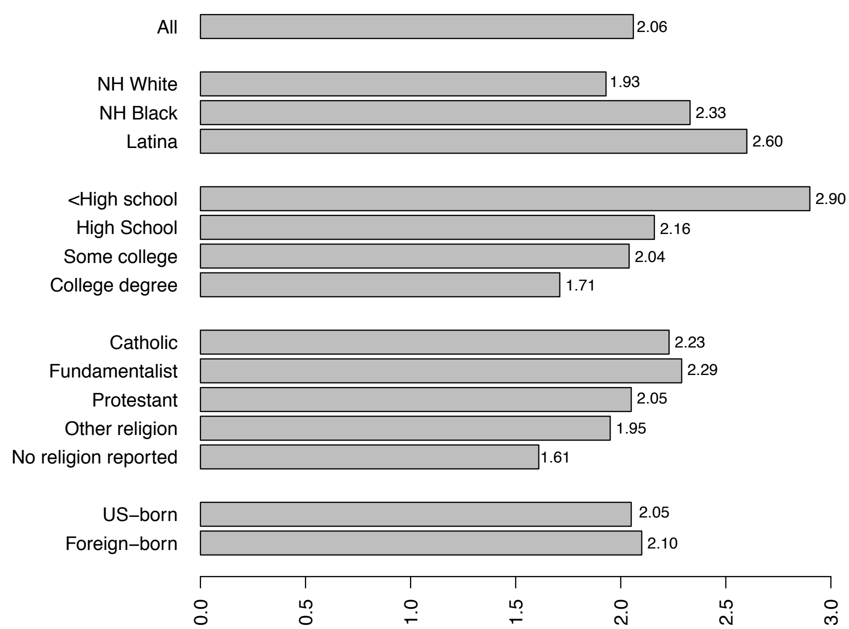
Levels and trends in cohort completed fertility

The next section describes fertility patterns of U.S. women in more detail by examining levels of completed fertility across several segments of society. Measures of completed childbearing in the U.S. are generally drawn from two sources: the biennial fertility supplement of the Current Population Survey and the National Survey of Family Growth (NSFG). This analysis uses data from the latter survey because it affords a more detailed picture of U.S. fertility and because completed fertility is measured consistently across time (Monte 2015).

Before continuing, it is worth describing a bit more about the NSFG. The NSFG is a periodic national probability survey of the noninstitutionalized population aged 15–44 years in the United States, conducted by the National Center for Health Statistics. The survey uses a multistage, stratified, clustered sampling frame to collect information on family life, pregnancy and childbearing, contraceptive use, and reproductive health. The survey was first conducted in periodic cycles (years: 1973, 1976, 1982, 1988, 1995, and 2002), and then shifted to continuous interviewing for the 2006-2010, 2011-2015, and 2015-2017 waves; men were not included in the survey until 2002. The respective sample sizes for the 2006-2010, 2011-2015, and 2015-2017 surveys, which are analyzed in this paper, are 22,682; 20,621; and 10,094 men and women.

Completed fertility in the NSFG is obtained from reproductive histories of women who are aged 40-44 at the time of the survey.[2] Figure 6 shows levels of completed fertility among women from the 2011-2015 NSFG. Data from earlier rounds are not shown because trends in completed fertility have remained relatively stable for both the entire population and for the subgroups analyzed. In 2011-2015, the average number of children women have at the end of their reproductive careers is 2.06, just slightly below replacement fertility. This is down slightly from average completed fertility measured in 2002, which was at 2.11 children.

Figure 6. Completed fertility among women aged 40-44 for all women and for selected subgroups, 2011-2015.



Source: Author's calculations using data from the National Survey of Family Growth.

Fertility continues to be highly differentiated by several demographic characteristics historically associated with fertility variation in the U.S., including race/ethnicity, education, and religious affiliation. Average fertility rates for the U.S. population, therefore, are a function of both higher- and lower-fertility groups. Latina (Hispanic) women, for example, have 2.60 children on average, which is nearly 0.70 children more than non-Hispanic (NH) white women.

[2] Although completed fertility should ideally be measured after all members of a cohort have completed childbearing, there are very few births to older women aged 45-54 (U.S. Census Bureau 2011).

NH black women also have higher fertility than NH white women, although this difference is not as large (0.40 more children, on average).

Completed fertility also shows a strong education gradient. Women with less than a high school degree have the highest levels of completed fertility, at nearly 3 children. By contrast, women with a college degree have less than two children on average (1.71). Women with a high school degree and with some college education have levels of completed fertility around replacement level (2.16 and 2.04, respectively.) Among women with a high school degree or more, these levels have remained relatively unchanged since 2002. Completed fertility among women with less than a high school education, however, increased by 0.15 children since 2002.

Religious affiliation is also associated with completed fertility, with Catholic and Fundamentalist Protestant women having higher levels of completed fertility than other groups (2.23 and 2.29, respectively.) Importantly, women who provide no religious affiliation, a growing segment of the population, exhibit some of the lowest levels of completed fertility. In 2011-2015, for example, these women had only 1.61 children on average.

Last, Figure 6 shows that completed fertility for U.S.-born and foreign-born women in 2011-2015 is largely similar, which counters much of the literature on immigrant fertility differentials. This may be due, in part, to shifts in the composition of foreign-born women over the past two decades, a phenomenon that will be discussed in detail later. In 2002, for example, completed fertility among foreign-born women was 2.36 children—more than a quarter of a child higher than completed fertility in 2011-2015.

Levels and trends in expected and intended fertility

The primary drawback of completed fertility is that it does not capture fertility patterns among those who are currently in their childbearing years. Thus, the levels of completed fertility shown in Figure 6 do not reflect the unprecedented declines in teen and young adult fertility that occurred after the Great Recession. Instead, the most up-to-date completed fertility rate (from today's 40-44 year olds) describes childbearing that largely occurred 10-20 years ago.

One way to gauge future completed fertility levels of younger cohorts is to examine their intentions for children, which are a key determinant of achieved fertility at the population and individual level (e.g., Quesnel-Vallée and Morgan 2003; Schoen et al. 1999). Could the recent declines in fertility rates reflect declining intentions for children and growing intentions for childlessness, which in turn would portend lower levels of fertility? Or are individuals expecting the same number of children, but merely waiting to have them at older ages? The following section answers these questions by examining how intentions and expectations for future children have changed over the past decade.[3]

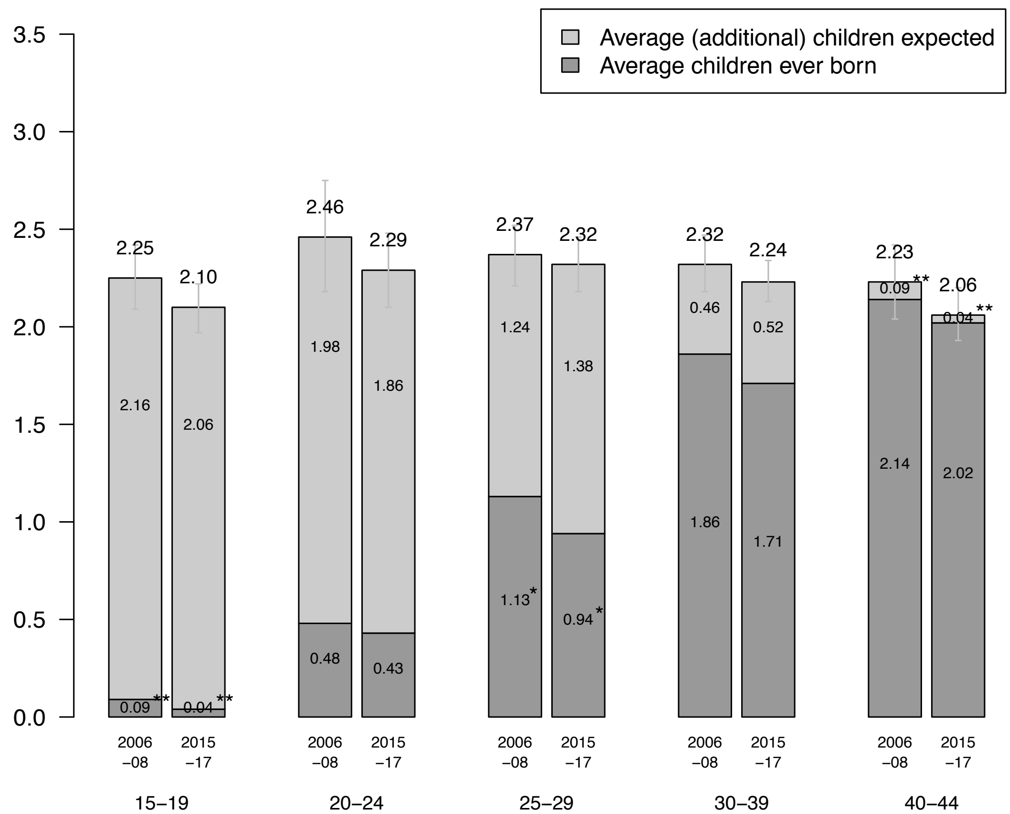
Data on fertility expectations are drawn from the 2006-2010 and 2015-2017 waves of the NSFG. For the former wave, we use data from the first 10 quarters of the survey (i.e. June 2006-December 2008) to roughly capture stated expectations before the Great Recession; all data are weighted using the appropriate 2-year survey weights. Each wave provides data on the number of biological children the respondent has (i.e., achieved parity), and the number of additional children expected. We sum these two responses to create a measure of total expected parity.[4]

Figure 7 provides a detailed picture of how fertility expectations have changed since the Great Recession. Because the relationship between expected and achieved fertility changes across age, data are presented separately for key age groups. Each bar represents total expected fertility, which is the sum of the average number of children ever born (in dark grey) and average number of additional children expected (in light grey). Error bars showing 95% confidence intervals for total expected fertility are graphed to reflect sampling error.

[3] The terms expectations and intentions are used interchangeably in this paper because the NSFG measure used in this analysis is a composite measure of both intentions and expectations. Moreover, the two terms are often used synonymously in the literature (e.g. (e.g., Hayford 2009; Iacovou and Tavares 2011) and appear to operate similarly in empirical studies.

[4] Current pregnancies are added to the number of future expected births.

Figure 7. Achieved and expected number of children by age and survey year.



Source: Author's calculations using data from the National Survey of Family Growth.

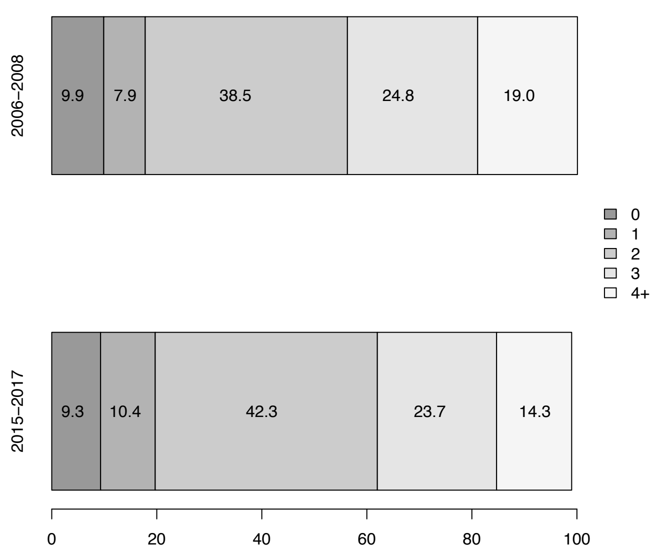
Note: **2006-08 and 2015-2017 significantly different (p<0.05); *2006-08 and 2015-2017 significantly different (p<0.10)

Looking first across the 5 age categories, we see that achieved parity (in dark gray) increases from around 0.04-0.09 children among women aged 15-19 to a little over 2 children for women in their early 40s. Further, the figure shows that as achieved fertility increases, the share of additional expected fertility decreases; women aged 15-19, for example, expect to have 2.06 to 2.16 more children, whereas women in their 40s expect very few additional children. In general, levels of total expected fertility remain somewhat stable throughout peak childbearing years, but fall among women aged 40-44.

Trends within each age group show that fertility expectations declined across all ages over the past decade, although none of these declines are not statistically significant. Declines were largest for teens, women in their early 20s, and women in their early 40s (average decline: 0.15-0.17 children). For younger women (<25 years old), these declines in total expected fertility were driven by both declines in achieved parity and future expected parity. For women in their late 20s and 30s, however, declines in achieved parity were partly offset by increases in future intended parity. For women aged 25-29, for example, achieved parity declined significantly from 1.13 children right before the recession to 0.94 in 2015-2107; future expected parity, on the other hand, increased by 0.14 children (from 1.24 to 1.38), which nearly compensates for the 0.19 drop in achieved fertility. Thus, an examination of fertility intention trends by age tells two stories: older women likely intend to recuperate some of the births they lost in the post-recessionary period, while younger women show lower levels of both intended and achieved fertility than earlier cohorts.

Are the declines in total expected fertility among young adult women driven by increases in those intending to have no children? Figure 8 presents the distribution of expected parity for women aged 20-24 for the two survey waves. Across the board, the data show a shift away from larger families, and to a lesser extent, a shift toward smaller families. For example, the share of young women expecting more than 2 children decreased by 5.8 percentage points between 2006-2008 and 2015-2017, while the share expecting less than 2 children increased by 1.9 percentage points. Notably, intentions for childlessness remained relatively stable between the two waves.

Figure 8. Distribution of total expected number of children among 20-24-year-old women, by survey year.



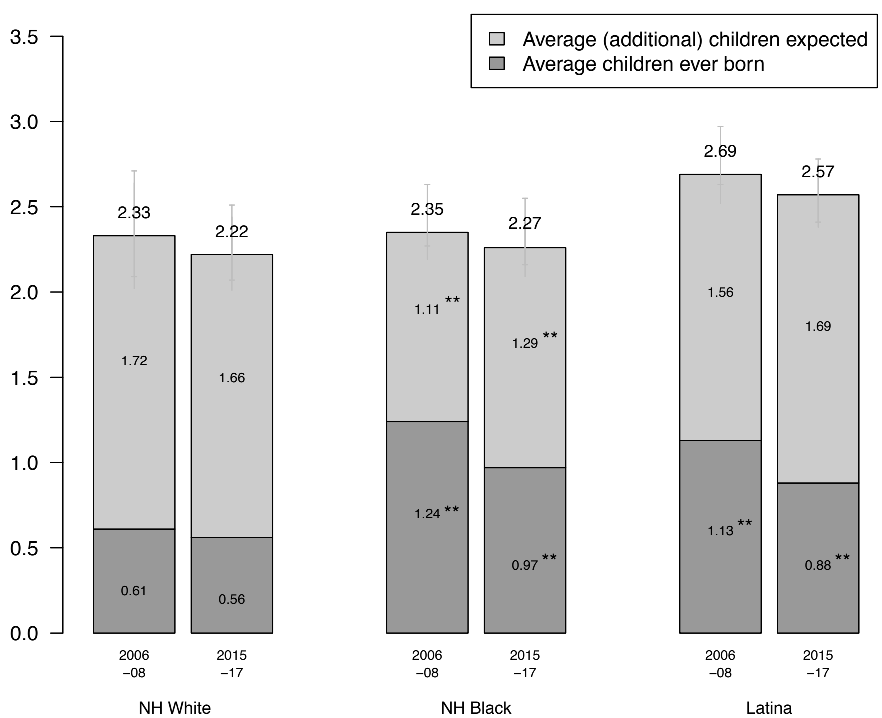
Source: Author's calculations using data from the National Survey of Family Growth.

How do fertility expectation levels and trends vary by demographic subgroups? The following analyses present trends in total expected fertility for young women aged 20-29 for the four demographic factors highlighted in the previous section: race/ethnicity, education, religious affiliation, and nativity. All figures for this exercise are presented in the same format as figure 7 above, where each bar shows total expected parity broken down by achieved parity (in dark gray) and future expected parity (in light gray).

Race/ethnicity

Figure 9 displays trends in total expected fertility among 20-29-year-old women across survey waves for each racial/ethnic group. For each racial/ethnic group, total expected fertility declined between the two survey waves, although these declines were not statistically significant. The decline in expected fertility for NH Whites was driven by both decreases in achieved and future expected parity. For NH Black and Latina women, however, significant declines in achieved fertility were partly offset by increases in future expected fertility, with NH Black women expecting to make up a larger share of "lost" fertility than Latina women (66% of the 0.27 decline in achieved fertility vs. 50% of the 0.25 decline in achieved fertility among Latinas).

Figure 9. Achieved and expected number of children by race/ethnicity and survey year for 20-29-year-old women.

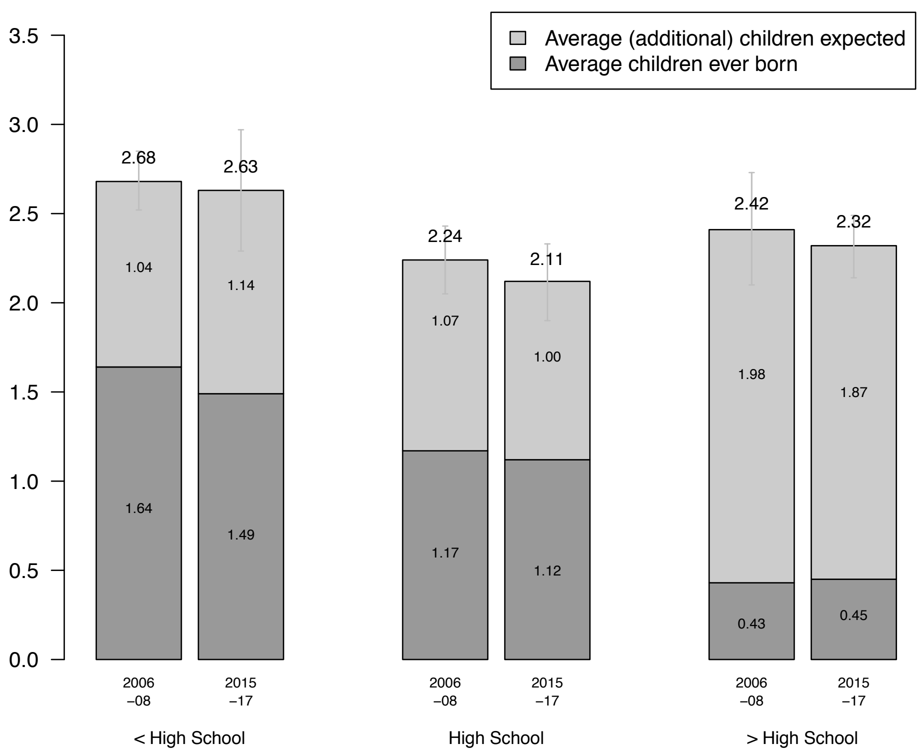


Source: Author's calculations using data from the National Survey of Family Growth.
Note: **2006-08 and 2015-2017 significantly different ($p<0.05$)

Education

Trends in expected fertility by education level are shown in Figure 10. Because many women in their 20s are still completing their education, the analysis does not separately examine college-educated women, though trends are similar in sensitivity analyses that use a 4-part education variable among 25-29-year-old women (i.e. <HS, HS, Some college, College degree). Across all three education levels examined (i.e. <HS, HS, >HS), there were declines in total fertility (although again, no declines were statistically significant). Moreover, these declines appear larger for women who attended high school or at least some college compared to women with less than a high school degree. Importantly, women who pursue at least some college have higher levels of total intended fertility that those who complete a high school degree, which may counter the hypothesis that highly educated females are forgoing childbearing to pursue career or other aspirations.

Figure 10. Achieved and expected number of children by education level and survey year for 20-29-year-old women.

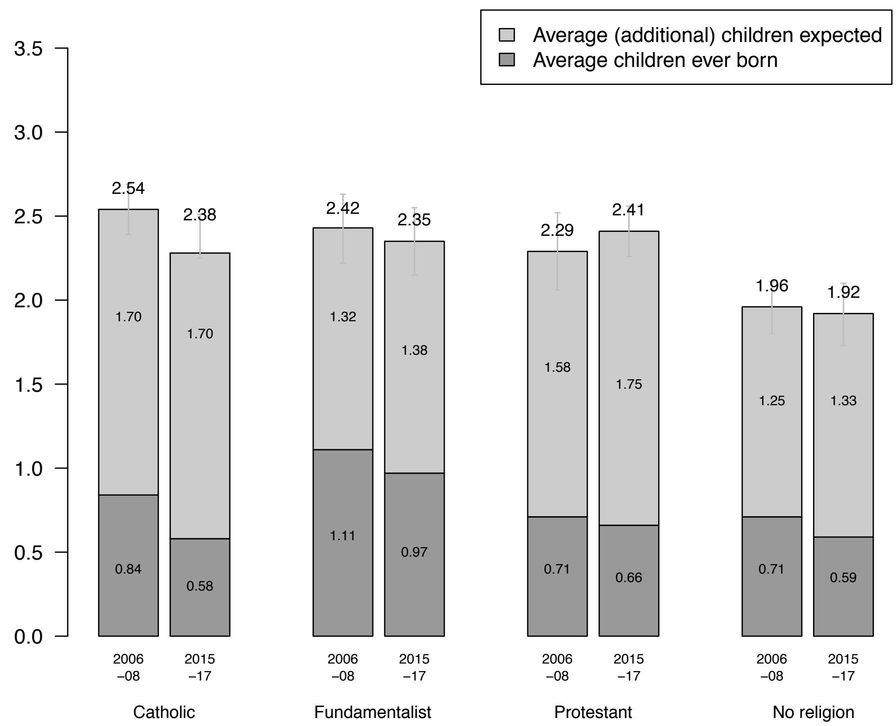


Source: Author's calculations using data from the National Survey of Family Growth.

Religion

Next, Figure 11 investigates differentials in achieved and total expected parity among young adult women by religious affiliation. Results show that levels of intended fertility declined across all groups, with the exception of those affiliated with Protestant Christianity; as before, none of these trends were statistically significant. Notably, however, young adult women with no religion, a growing segment of the population, reported some of the lowest levels of total intended fertility—in 2015-2017 total expected fertility was 1.92 for this group.

Figure 11. Achieved and expected number of children by religious affiliation and survey year for 20-29-year-old women.

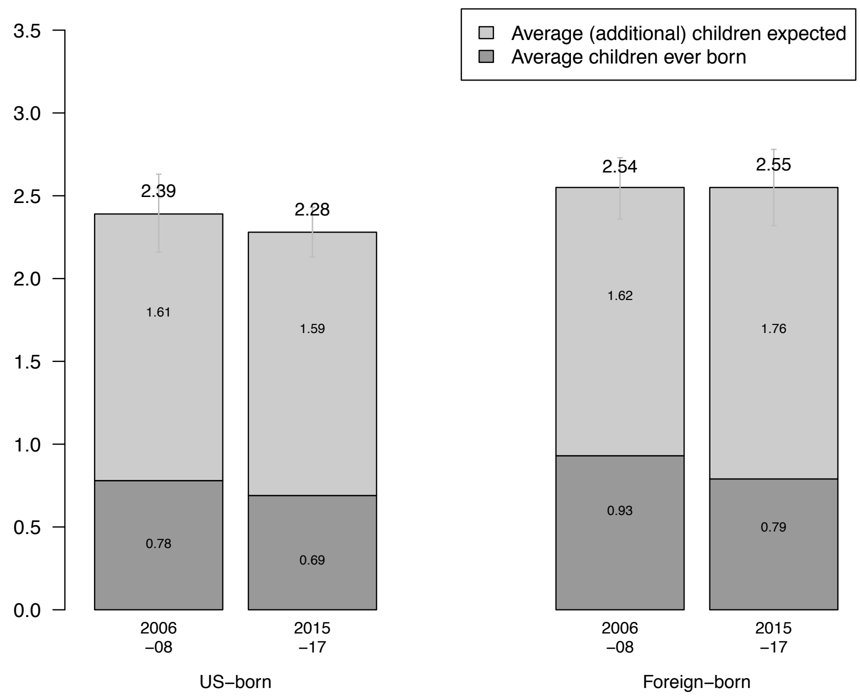


Source: Author's calculations using data from the National Survey of Family Growth.

Nativity

Finally, Figure 12 shows levels of achieved and expected fertility for young adult women by nativity. Whereas there was a slight decline in total expected fertility among US-born women, levels among foreign-born women remained relatively stable. These stable levels resulted from increases in expected fertility that completely offset declines in achieved fertility that occurred over the post-recessionary period. Among US-born women, however, there was no evidence of increasing intentions for future children.

Figure 12. Achieved and expected number of children by nativity and survey year for 20-29-year-old women.



Source: Author's calculations using data from the National Survey of Family Growth

Gap between intended and achieved fertility

Although fertility intentions are one of the strongest predictors of future fertility, whether women (and couples) achieve their intentions depends on a range of factors that either enable or constrain them. This idea was formalized by Bongaarts (2002), who proposed a framework to account for observed discrepancies between intended and realized fertility, often called a fertility gap. An adapted formulation of this framework for the U.S. (Morgan and Rackin 2010) is as follows:

$$FP = IP * f(F,U,M,C)$$

In this model, final parity (*FP*) is primarily a function of intended parity (*IP*), which is in turn modified by additional factors that either bolster or reduce fertility relative to intentions (i.e., *F, U, M,* and *C*). Fecundity impairments (*F*), for example, reduce achieved parity relative to intentions, while unwanted births (*U*) increase it. Marriage and partnership (*M*), often viewed as a precondition for childbearing, also play an important role in whether or not individuals meet their stated intentions. Finally, the model considers how competition (*C*) with other goals and aspirations, including opportunity costs of having a child, can also constrain childbearing.

Perhaps not surprisingly, in most high-income countries, including the U.S., intended fertility, on average, exceeds achieved fertility (Beaujouan and Berghammer 2017). Notably, though, the U.S. fertility gap (between intended and achieved fertility) is relatively small compared with estimates from its many OECD counterparts. For example, based on data from cohorts born in the late 1960s, the fertility gap for U.S. women appears to be in the range of 0.25-0.30 children—much lower than the gap of around 0.50 child found in the Netherlands, Portugal, Spain, and Italy.

The most in-depth investigation of the fertility gap among U.S. women was conducted by Morgan and Rackin (2010) using detailed longitudinal measures of fertility intentions. These unique data come from the National Longitudinal Survey of Youth 1979 (NLSY79), a panel survey of 12,686 males and females in the United States born between 1957 and 1964. Fertility expectations were measured at 19 time points across the survey, starting with the first wave in 1979, yearly from 1982 to 1986, and then biennially from 1988 to 2012. Using this data, Morgan and Rackin investigated the correspondence between fertility intentions stated at age 24 and completed fertility measured after age 40.

Table 1 presents the main descriptive findings of the study for men and women. The average intended parity among 24-year-old women in the NLSY79 cohort was 2.22, while the average achieved parity was 1.97. Thus, women fell short of their expected fertility in the aggregate by about 0.25 children. At the individual-level, less than half of women (43.4%) achieved their stated intentions at age 24, and more women were likely to underachieve (34.9%) rather than overachieve (21.7%). Although men and women intended to have roughly the same number of children (2.17 and 2.22, respectively), men were more likely to underachieve their stated intentions (42.8% vs. 34.9%), which contributed to a much larger fertility gap for men of -0.40 children.

Table 1. The correspondence between fertility intentions stated at age 24 and completed fertility for cohorts born between 1957 and 1964.

	Women	Men
Average intended parity at age 24	2.22	2.17
Average completed parity after 40	1.97	1.77
Net error	-0.25	-0.40
% achieved intentions	43.4	34.2
% underachieved intentions	34.9	42.8
% overachieved intentions	21.7	23.0

Source: Morgan and Rackin (2010), using data from the National Longitudinal Survey of Youth 1979 cohort

The detailed investigation conducted by Morgan and Rackin (2010) provides important evidence about the fertility gap experience among a cohort of individuals who have already completed childbearing. It is unclear, though, if the same patterns observed in this cohort extend to those who are currently in their childbearing years—including those who have experienced economic or other structural factors associated with the Great Recession. Will these young men and women be able to meet their fertility goals? To shed light on this question, the following section provides new estimates on the correspondence between intentions and subsequent fertility using data from the younger National Longitudinal Survey of Youth 1997 (NLSY97) cohort, whose members were born in the years 1980-1984 (i.e. the oldest millennials).

Case Study: NLSY97 cohort

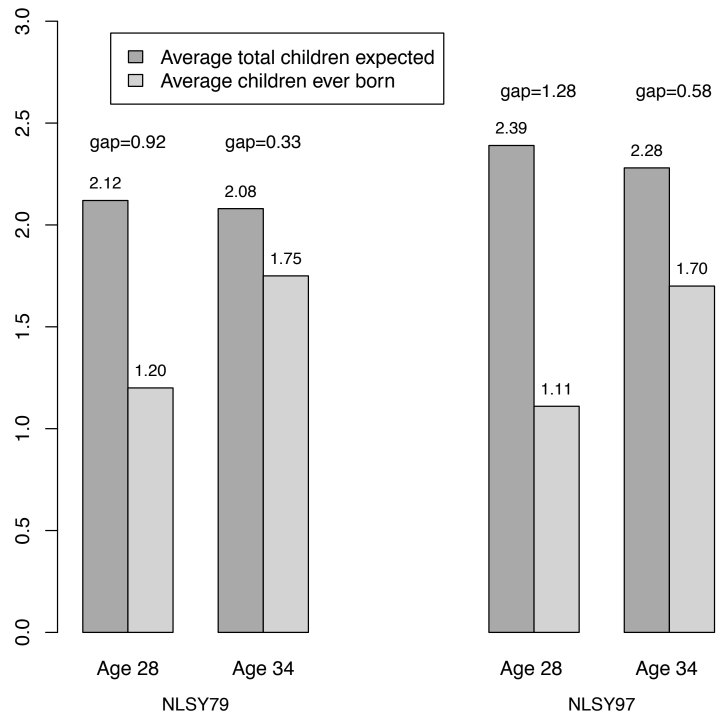
The NLSY97 largely parallels the NLSY79 survey, which collects information on labor market experiences and other significant life events for men and women as they transition to adulthood and beyond. Data for the NLSY97 study were collected annually from 1997 to 2011, and biennially thereafter; the initial sample included 8,984 participants.

Although fertility expectation data were not collected regularly throughout the survey as they were with the NLSY79 cohort, fertility expectations for the younger cohort were collected in the 2009 and 2015 waves, when the average age of participants was 27 and 33, respectively. This case study, therefore, uses recently collected fertility expectation measures, in conjunction with detailed fertility history data, to investigate the predictive ability of fertility expectations in a 6-year time period (i.e. between 2009 and 2015). Importantly, the analysis covers the post-recessionary period, when participants were at the peak of their childbearing years. The analysis also compares achieved and expected fertility patterns between the NSLY79 and NLSY97 cohorts to examine potential differences in the gap between intended and achieved fertility and to make informed predictions about completed fertility gaps among younger cohorts. For the purposes of comparison, the NLSY97 cohort was limited to older participants who were around age 28 in 2009 and age 34 in 2015. In the interest of space, all results present aggregate patterns and do not describe individual-level variation in fertility gaps (i.e. % able to achieve their goals).

Figure 13 shows the average number of children expected (dark gray bars) and average number of children ever born (light gray bars) for those aged 28 and 34 for both surveys; data from the NLSY79 cohort are shown on the left, while those for the younger NLSY97 cohort are shown on the right. The cross-sectional gap between the total number expected and achieved is labeled above each set of bars. Looking first at age 28, we see that total expected fertility at age 28 is *lower* in the NLSY79 cohort than the NLSY97 cohort (2.12 vs. 2.39 children); thus, the younger NLSY97 cohort expects about 0.25 children more than the older cohort did at age 28. Conversely, achieved fertility levels at age 28 for the two cohorts are more similar: 1.20 for NLSY79 and 1.11 for NLSY97. Thus, while the cross-sectional fertility gap at age 28 is larger for younger cohorts (1.28 vs. 0.92), this appears to be driven primarily by higher intended fertility.

Turning now to expected and achieved fertility at age 34, we see that the cross-sectional gap has narrowed considerably for the older NLSY79 cohort, at 0.33 children. The gap for the NLSY97 members, on the other hand, remains above half a child (0.58 children). These findings largely parallel estimates of the *longitudinal* fertility gap, which measures the gap between expectations stated at age 28 and achieved fertility at age 34. Although this is not explicitly labeled in the figure, it is clear that the older NLSY79 cohort were more likely to meet their stated intentions at age 28 over the 6-year period than younger women (i.e. 2.12-1.75= a gap of 0.37 children for NLSY79; 2.39-1.70=a gap of 0.69 children for NLSY97), again owing to higher intended fertility among the younger cohort.

Figure 13. Average total children expected and children ever born at ages 28 and 34, by NLSY cohort.

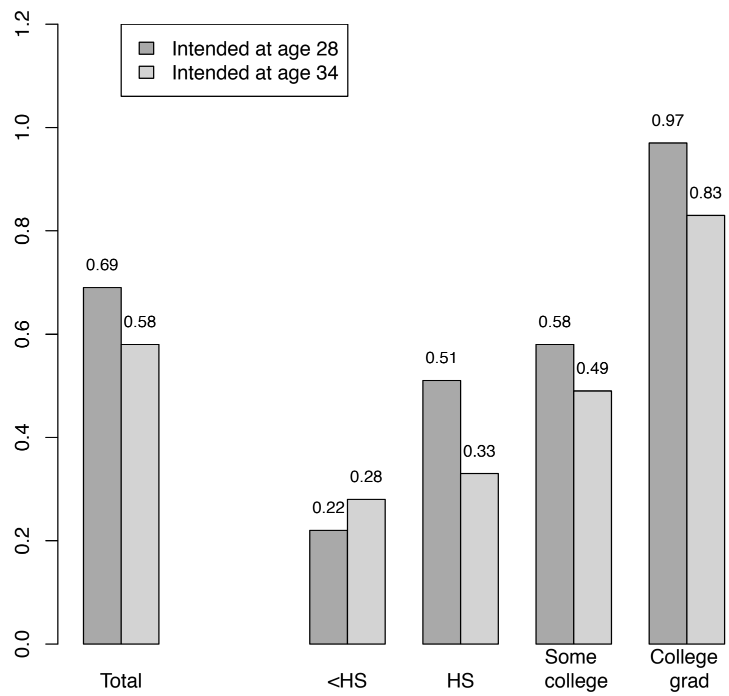


Source: Morgan and Rackin (2010), using data from the National Longitudinal Survey of Youth 1979 cohort; and author's calculations from the National Longitudinal Survey of Youth 1997 cohort

Additional analyses were conducted to investigate if the fertility gap among the NLSY97 cohort differs by key demographic factors such as race/ethnicity and education. Although there was no statistically significant difference in the fertility gap by race/ethnicity, there was a strong relationship with educational attainment. Figure 14 displays the gap between intentions measured at age 28 and age 34 with achieved fertility at age 34; as such, the first bar (in dark gray) shows the longitudinal, 6-year fertility gap, while the second bar (in light gray) shows the cross-sectional gap at age 34. Results are presented first for all women, and then by educational attainment.

As figure 14 shows, when we look at the *longitudinal* fertility gap (in dark grey) women with less than a high school education have the smallest fertility gap between expected fertility at age 28 and achieved fertility 6 years later (0.22 children), while college-educated women fall short of their stated expectations at age 28 by nearly 1 child (0.97 children). The cross-sectional gap at age 34 (in light gray) reveals similar patterns; women with lower levels of education expect to have 0.28-0.33 children in their remaining childbearing years, while women with some college education expect to have a half child more (0.49). Last, women with a college education expect to have 0.83 children after the age of 34.

Figure 14. Average number of additional children intended at age 28 and age 34 for the NLSY97 cohort, by education level.



Source: Morgan and Rackin (2010), using data from the National Longitudinal Survey of Youth 1979 cohort; and author's calculations from the National Longitudinal Survey of Youth 1997 cohort

The education differences presented in Figure 14 are primarily driven by sharp divides in fertility patterns by level of education. Using data from this same cohort, for example, Cherlin and colleagues (2014) find that births among non-college graduate women account for 81% of all births that had occurred in this cohort by the time these women reached their late 20s. As such, one can assume that a substantial number of participants with lower levels of education had already completed childbearing in 2009, when fertility intention data were first collected. Conversely, women with higher levels of education who postponed childbearing have substantial ground to make up, as evidenced by the large longitudinal and cross-sectional gaps presented in Figure 14. Moreover, among women with at least a high school education, total expected fertility fell by 0.09-0.18 children between ages 28 and 34 (data not shown). Thus, the expectations stated at age 34 may decline further as women face biological and other constraints at the end of their reproductive careers.

In sum, while the younger NLSY97 cohort intends more children at ages 28 and 34 than their older counterparts, they have roughly the same levels of achieved fertility by age 34. Because of their higher intended fertility, therefore, this younger cohort has a larger gap to close in their remaining childbearing years, and this varies greatly by education. A key question, therefore, is if these older millennials we be able to meet the intentions expressed in their mid-30s as they near the end of their childbearing years.

Table 2 presents two possible scenarios for projected completed fertility for the NLSY97 cohort using both observed data from the NLSY79 and simple assumptions about the projected gap between intentions measured at age 28 and final parity. The first row of the table shows observed intended parity at age 28 and final parity among the NLSY79 women who have completed childbearing; the gap between the two is 0.15 children. If we assume that the fertility gap between intentions at age 28 and final parity is held constant across cohorts in absolute terms, then we can expect a projected gap of 0.15 children and final parity of 2.24 children for women in the NLSY97 cohort. Alternatively, if we assume that the fertility gap across cohorts is the same in relative terms, then the projected gap increases to 0.17 children and final parity declines to 2.22 children.

Table 2. Observed and projected final parity for the NLSY79 and NLSY97 cohorts.

	Intended parity at age 28	Final parity	Gap between intentions at age 28 and final parity	Assumed gap between intentions at age 28 and final parity	Projected final parity (i.e. intended parity at age 28 minus assumed gap)
NLSY79	2.12	1.97	0.15		
NLSY97, scenario 1	2.39	?	?	Absolute gap = 0.15 reduction	2.24
NLSY97, scenario 2	2.39	?	?	Relative gap = 7% reduction or 0.17	2.22

Source: Morgan and Rackin (2010), using data from the National Longitudinal Survey of Youth 1979 cohort; and author's calculations from the National Longitudinal Survey of Youth 1997 cohort

Demographic drivers of US fertility

The next sections of the paper discuss trends in other factors closely linked with fertility outcomes that have important implications for the future of U.S. fertility. These include unintended pregnancy and contraceptive use, Latina and immigrant fertility, and delayed childbearing.

It should be noted that these sections do not provide a detailed overview of macro-level factors associated with fertility change, including economic factors closely linked with post-recessionary declines in fertility (see, for example, Schneider 2015; Seltzer 2019). Although such factors likely underlie the demographic trends highlighted below, they are beyond the scope of this paper.

Unintended pregnancy and contraceptive use

Nearly half of all pregnancies in the United States are classified as unintended, meaning that a woman became pregnant sooner than planned (i.e. mistimed pregnancy) or that the pregnancy was not wanted (i.e. unwanted pregnancy) (Finer and Zolna 2016).[5] Of these unintended pregnancies, approximately 58% end in birth. These levels of unintended pregnancy and birth are among the highest observed in the developed world and are believed to be a key driver of higher levels of U.S. fertility compared with other industrialized countries.

Although the rate of unintended pregnancy in the U.S. increased slightly between 2001 and 2008, it declined by 18% from 2008 to 2011 (Finer and Zolna 2016). Larger declines occurred among teenagers, women who were cohabiting, low-income women, women with less than a high school education, and Latinas. Notably, these were the same demographic subgroups that experienced the largest declines in fertility since the Great Recession. Indeed, a recent analysis found that 35% of the decline in fertility between 2007 and 2016 could be explained by declines in births that were unintended (Buckles et al. 2019).

There are various reasons why women had fewer unintended pregnancies and births in the wake of the Great Recession. While research is still ongoing, several studies point to the role of contraception as a key behavioral determinant of declining fertility (Guttmacher Institute 2009; Schneider and Gemmill 2016). In particular, increases in the use of long-acting reversible contraceptive methods, or LARCS, have been linked with declines in pregnancy among young

[5] About 60% of unintended pregnancies are classified as mistimed, while the remaining 40% are classified as unwanted (Finer and Zolna 2016).

women over this time period (Ricketts, Klinger, and Schwalberg 2014). These methods, which include implants, hormonal IUDs, and copper IUDs, require little intervention from users and are associated with low failure and discontinuation rates.

Although LARC use remained relatively low and stable prior to 2002, the advent of next-generation, safer IUDs, as well as efforts to remove institutional and provider barriers, resulted in a nearly 5-fold increase in LARC use over the past decade (Branum and Jones 2015). Moreover, the contraceptive provision of the Affordable Care Act, which took effect in 2013, likely furthered the adoption of LARCs by eliminating the large upfront costs required to use these devices (Bearak et al. 2015). Results from a microsimulation study show that even a modest uptake in LARC use, as opposed to other contraceptive methods including the pill, could have substantial impact on the risk of unintended pregnancy (Thomas and Karpilow 2016), and thereby overall fertility levels.

What do recent trends in unintended pregnancy and contraceptive use mean for the future of U.S. fertility? First, it is important to distinguish between unintended births that are mistimed and unintended births that are unwanted. If a large share of the fertility decline was driven solely by reductions in *unwanted* births, much of the decline would be permanent, since these "lost" births are those that women never wanted to have at any point in the future. Alternatively, if the decline was driven solely by reductions in *mistimed* births, we would expect fertility to rebound once women have births when they want them. Although the Buckles et al. (2019) analysis did not distinguish between mistimed and unwanted births, we can assume that much of the decline in unintended births in the post-recessionary period was due to women who avoided having children sooner than intended (i.e. mistimed) rather than women forgoing having any (more) children. This is because declines in unintended pregnancy were largest among young women—mostly teens and women in their early 20s—who would likely intend children in the future (Finer and Zolna 2016). More evidence is needed, however, to evaluate the long-term fertility outcomes of women who avoided unintended pregnancy in the post-recessionary period: will these women ultimately have lower fertility or will they eventually recuperate births that were lost over the last decade?

Second, although it is unknown if observed declines in unintended pregnancy and births will continue in the near future, it is important to note that economic pressures that couples faced during the onset of the Great Recession are now weaker, which may in turn reduce the cost of an unintended birth. Moreover, recent political efforts to limit abortion and publicly funded contraceptive services may threaten access to, and affordability of, highly effective methods, especially for populations that have witnessed the greatest declines in unintended pregnancy. Thus, future fertility patterns may be closely linked with contraceptive policies and regulations.

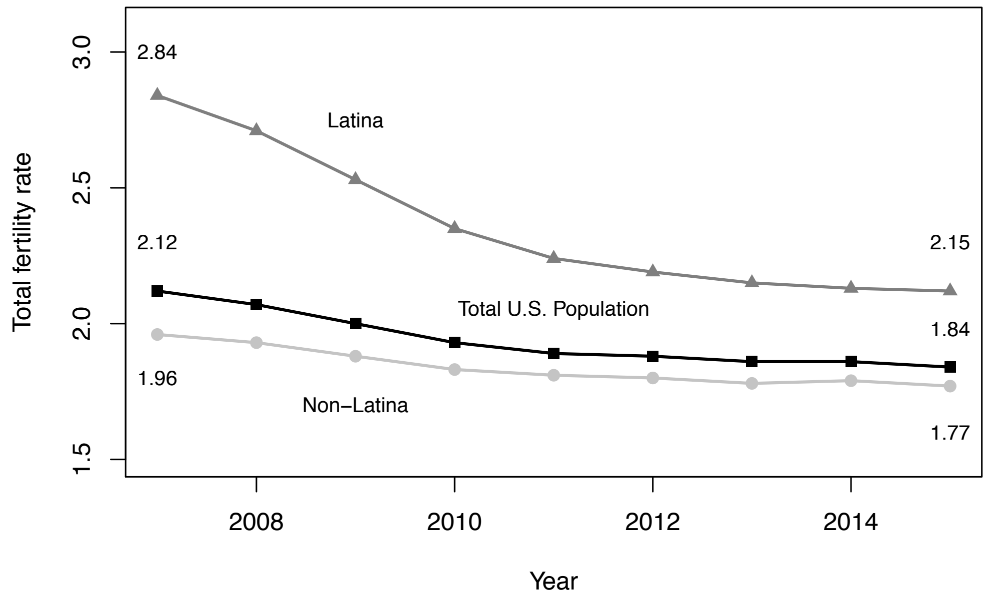
Latina and immigrant fertility

Prior to the Great Recession, Latina and immigrant women exhibited some of the highest levels of fertility, which were believed to bolster overall fertility levels in the U.S. However, both groups saw declining fertility after the Great Recession. Figure 15 presents TFRs for the total U.S. population (in black), and separately for Latina (Hispanic) and non-Latina women (i.e. non-Hispanic white, black, and other). In the post-recessionary period, fertility declined more rapidly for Latina than non-Latina women. The TFR for Latinas fell from 2.84 in 2007 to 2.15 in 2015—a decline of 0.69 children.[6] The TFR for non-Latina women, on the other hand, declined by only 0.19 children (1.96 in 2018 to 1.77 in 2015). Notably, much of the decline in Latina fertility over the 2007-2015 time period occurred before 2012.

Importantly, this decline in Latina births had a substantial impact on overall fertility levels in the U.S. If Latinas continued to have children at the same fertility rates observed in 2007, for example, the General Fertility Rate for the entire population would have declined by only 3%, rather than the observed 13%. Thus, understanding these dramatic changes in Latina fertility over the past decade should prove useful for projecting future fertility.

[6] The general fertility rate, or number of births per 1,000 women aged 15-44, showed a 34% decline for Latina women over this similar time period, from 102.2 in 2007 to 67.6 in 2017.

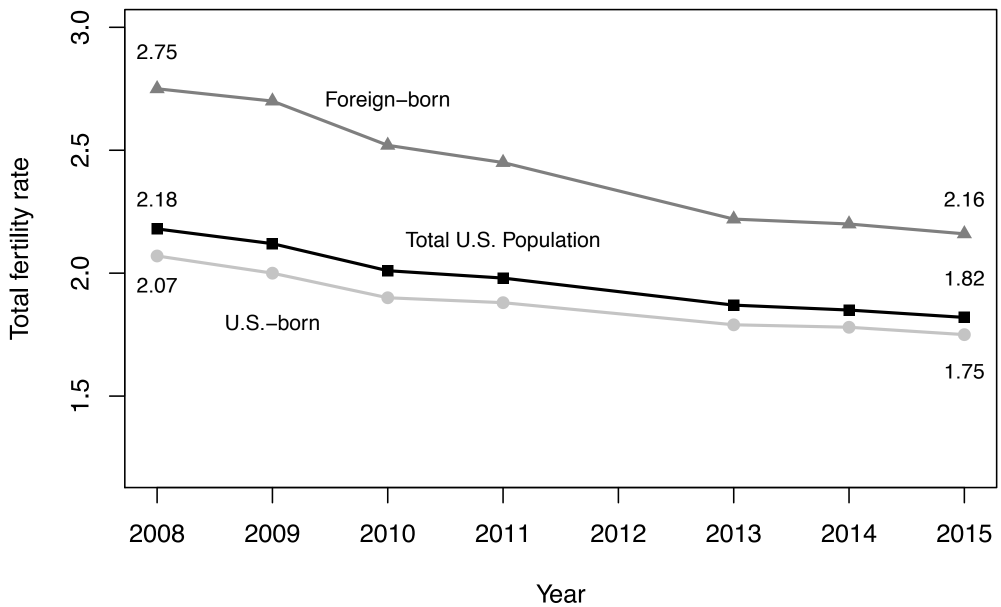
Figure 15. Total fertility rates for the total U.S., Latina, and non-Latina populations, 2007-2015.



Source: National Center for Health Statistics.

Although few studies have focused on the drivers of the recent dramatic fertility decline among Latinas, there was a noteworthy decrease in the share of births to Latinas that were foreign-born. In 2007, just over 60% of births to Latinas were to foreign-born women (Martin et al. 2010); by 2017, this figure fell to 48% (Martin et al. 2018). Not surprisingly, therefore, declines in Latina fertility are closely tied to dramatic changes in immigrant fertility overall. Between 2008 and 2015, the immigrant advantage in fertility fell by about 0.30 children—from nearly 0.70 children in 2008 to about 0.40 children in 2015 (Figure 16). Most of this narrowing occurred before 2013, suggesting that the gap in TFR between immigrants and natives has stabilized somewhat in recent years.

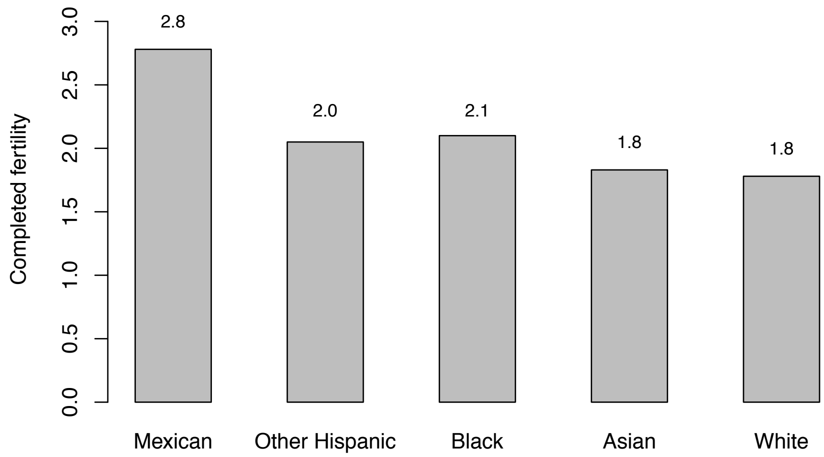
Figure 16. Total fertility rates for the total U.S., U.S.-born, and foreign-born populations, 2008-2015.



Source: Camarota and Zeigler (2017), using data from the American Community Surveys. Data from 2012 is not used due to problems with certain variables.

It is unclear how trends in immigration, including declines in new immigrants from Mexico (López et al. 2018), may have impacted recent trends in Latina births. However, changes in the composition of immigrants may have important long-term impacts on U.S. fertility. For example, groups that increasingly make up the population of new immigrants, such as other Latinas and Asian women, have much lower fertility than Mexican-born women (Figure 17). Moreover, the higher level of fertility among Mexican ethnic women persists across generations; among children of the native-born (i.e., 3rd generation or higher), Mexican women have 2.2 children, whereas all other ethnic groups, including other Latinas, Blacks, Asians, and Whites have less than 2 children (Alvira-Hammond and Guzzo 2014). Thus, the decline in new immigrants from Mexico may have important cross-generational effects that have historically boosted U.S. fertility.

Figure 17. Completed fertility by race/ethnicity among foreign-born U.S. women, 2000-2010.

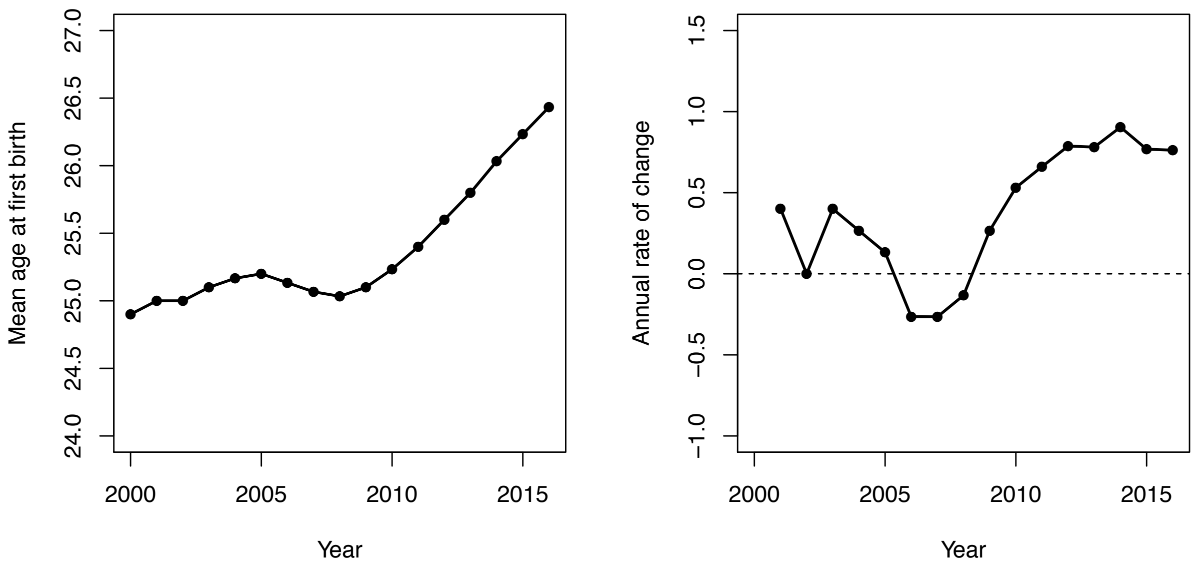


Source: Alvira-Hammond and Guzzo (2014), using data from Current Population Surveys.

Postponement of childbearing

As discussed previously, first birth rates to young women have declined significantly since the great recession, suggesting that larger numbers of women are increasingly delaying childbirth. Indeed, as shown in the left side of Figure 18, the mean age at first birth in the U.S. has climbed greatly since the Great Recession, at a rapid pace of 2 months per year. The corresponding annual rates of change are shown on the right-hand side of the figure. After the recession, the rates became positive, rising steeply between 2008 and 2012, and then stabilizing at around 0.7 per year thereafter. The absence of a decline in the rate after 2008 suggests that the women will continue delaying births in the near future.

Figure 18. Mean age at first birth and corresponding annual rate of change for U.S. women, 2000-2016.



Source: Author's calculations using data from the Human Fertility Database.

Note: Times series are smoothed using a 3-year moving average.

As mentioned previously, when increasing shares of women delay childbearing, the period TFR may not accurately capture cohort fertility. This is because period fertility rates are sensitive to changes in when women have their children—or so-called tempo effects. A key question, then, is if the rapid decline in fertility since the Great Recession could be largely due to shifts in the timing of childbearing.

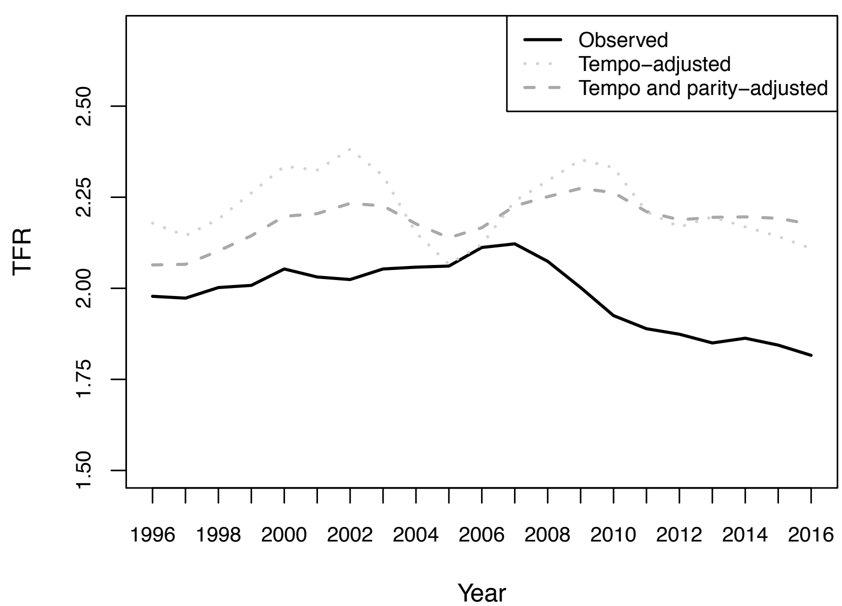
Demographers have come up with mathematical formulae to estimate counterfactual TFRs; these are the TFRs that would have been observed if there were no shifts in when women gave birth. The most well-known of these, from Bongaarts and Feeney (1998), estimates a tempo-adjusted TFR that has been validated against less-biased fertility indictors. More recently, Bongaarts and Sobotka (2012) developed a new variant of the Bongaarts-Feeney adjustment that also controls for the composition of the female by parity. Their resulting indicator was shown to be the most stable and robust way to control for tempo effects and produced period fertility estimates that came the closest to approximating the future cohort completed fertility rates.

Figure 19 displays trends in three indicators of the TFR: observed (i.e., unadjusted), tempo-adjusted (i.e. Bongaarts-Feeney adjustment), and tempo- and parity-adjusted (i.e.

Bongaarts-Sobotka adjustment). The dark grey and light grey trend lines show that once tempo effects are adjusted for, fertility levels in the post-recessionary period are all above 2.0 children. In 2016, for example, the tempo- and parity-adjusted TFR was 2.18, which is substantially higher than the observed TFR of 1.82. The adjusted TFRs, therefore, suggest that most of the post-recessionary decline in fertility is likely due to women delaying births, and that with time, cohorts currently in their childbearing years should eventually have roughly the same number of children as prior cohorts.

Although the adjusted trends are reassuring, it is unclear when we can expect the period TFR to rebound. If the mean age at first birth continues increasing at a rapid pace, we can expect to see depressed and distorted fertility levels for some time. However, once the pace of childbearing postponement diminishes, we should likely see an increase in the period TFR, which is similar to what occurred in several European countries in the 2000s (Bongaarts and Sobotka 2012).

Figure 19. Observed, tempo-adjusted, and tempo- and parity-adjusted TFRs for the U.S., 1996-2016.



Source: Author's calculations using data from the Human Fertility Database.

Use of assisted reproductive technologies

One limitation of the adjustments used in the previous section is that they assume those who delay childbearing will eventually have the children they intend. However, as shown previously, women may not be able to meet their original intentions because of barriers or constraints to childbearing. Importantly, as more women postpone childbearing, an increasing fraction of couples will have problems having children because of age-related declined in fecundity. A key question, then, is if assisted reproductive technologies (ART) have the potential to counteract these negative consequences.

Thus far, the research suggests the effect of ART on population-level fertility is quite small. Leridon and Shapiro (2017), for example, using real and simulated data for French cohorts, found that ART could bolster fertility by 0.02 children. Habbema et al. (2009) found somewhat greater increases (0.03-0.04 children), but made stronger assumptions about the success of treatments. Taken together, the results suggest that ART, at least in its current technological state, has very limited impact on fertility levels. However, technologic breakthroughs could change the role of ART in the future.

The future of U.S. fertility: Related research, implications, and future research directions

Thus far, the paper has provided an overview of the forces shaping contemporary fertility patterns in the United States and described how recent trends may further impact future fertility. Although no one can say with certainty what future levels of fertility in the U.S. will be, demographers have several tools at their disposal to make evidence-based projections of fertility levels. For example, the United Nations Population Division recently implemented new Bayesian methods to produce probabilistic projections of future fertility for most countries; these methods improve upon the former deterministic cohort-component projection methods that do not provide estimates of uncertainty (Alkema 2015). In analyses conducted by Alkema et al. (2011), the Bayesian projection model yielded a median TFR of 2.10 for the U.S. in 2050, as well as lower and upper bounds of the 80% projection interval: 1.86 to 2.36. This median estimate of 2.10 is higher than the estimate obtained from the former cohort-component projection method (1.85).

Demographers have also developed improved methods for projecting completed cohort fertility. Myrskylä and colleges (2013), using an adapted Lee-Carter model (Lee and Carter 1992), predict that the cohort born in 1979 will have around 2.23 children on average, up from 2.10 for women born in 1970. Their analysis does not provide estimates for cohorts born in the

1980s. An alternative approach, put forward by Schmertmann et al. (2012), uses Bayesian forecasting methods to project completed fertility for cohorts born through the 1990s; appropriately, the models assign more uncertainty to women from younger cohorts. According to their analyses, median projected completed fertility for cohorts born in the 1980s and 1990s will reach around 2.40 children, which is much higher than current fertility trends would suggest. This higher estimate, however, likely assumes that younger women who are postponing births now will eventually have their intended children in the future.

In addition to advancing demographic methodologies, demographers hold unique expertise in understanding the social, economic, and cultural drivers of fertility change. In 2013, the Wittgenstein Centre for Demography and Human Capital conducted a global survey of experts on the future of low fertility in low-fertility countries (Basten 2013). Among the 22 experts who provided information for the U.S., the projected mean TFRs in 2030 and 2050 were 1.93 and 1.83, respectively. These projections are quite lower than the estimates generated using formal demographic tools described above because they likely reflect contextual influences not typically captured in mathematical methods. These projections, moreover, may take into account the continuing postponement transition, which could go on for several decades as it did in European countries.

The trends presented in this paper do show some cause for concern, though, which might explain why some demographic experts predict below-replacement fertility in the future. First, across nearly all population subgroups, we observe a decline in the total number of children women intend to have. For young women, these declines are driven both by reductions in current parity as well as reductions in future expected parity. Future research should monitor these younger cohorts to determine if recent reductions signal a permanent decline in intentions, or if intentions will increase once these cohorts reach older ages. For 25-39-year-old women, as well as for non-Hispanic black and Latina women, the recent declines in childbearing among these groups appear to be partly offset by increases in future expected parity, which aligns closely with a postponed childbearing explanation rather than a permanent reduction in fertility. Future research should provide a more detailed description of fertility intentions over the post-recessionary period and better link stated intentions with the ongoing postponement transition.

Second, new evidence from the NLSY97 cohort shows that while the oldest millennials are experiencing the same levels of fertility as women born between 1957 and 1964, they have more ground to make up at age 34 because they intend to have more children. This is especially true for women with higher levels of education, who make up an increasing share of the population; college-educated millennials, for example, expected to have 0.83 more children on average at age 34. Undoubtedly, some of these women will encounter constraints to achieving these intentions. Thus, whether these women will be able to meet their intentions is an open question.

Third, while adjusted TFRs that account for shifts in fertility timing show little evidence of fertility decline, it is important to recognize a key underlying assumption of these estimates—namely that women who delay childbearing will ultimately have the same number of children had they not waited. So far, much research suggests that women will ultimately recuperate the births they "lost" due to delayed childbearing, although more evidence is needed to support this assumption, especially in the U.S. context.

Fourth, as mentioned previously, future decreases in unintended pregnancy and LARC use could have a sizeable impact on U.S. fertility. Approximately 35% of the decline in fertility since 2008 was due to declines in unintended births, especially among teens and young adult women. As more young and disadvantaged women adopt LARCs—which appear to have substantial population-level impacts on teen and unintended births (Ricketts et al. 2014; Lindo and Packham 2017) — trends in unintended pregnancy may show further declines. The extent to which these declines impact long-term fertility is an open question. One the one hand, reductions in unintended pregnancy may be closely linked with the postponement transition—younger women in the post-recessionary period likely avoided having births sooner than they would have liked, and instead plan to have their desired number of children at later ages. On the other hand, reductions in unintended pregnancy could ultimately lead to lower fertility, since women may have avoided unwanted births with no intention of having more births in the future. Separating out the long-term impacts of *mistimed* vs. *unwanted* births, therefore, would be a useful exercise.

Last, changes in Latina fertility accounted for much of the recent decline in fertility. Given the lack of empirical evidence on the drivers of these changes, however, it is hard to know if Latina fertility will continue to decline in the future, remain stable, or rebound to its pre-recessionary levels. However, the findings from this paper suggest that Latina fertility may be entering a new fertility regime, since immigrant fertility has declined rapidly in the post-recessionary period and net migration from Mexico in recent years is negative. Understanding these dramatic changes in Latina fertility over the past decade, therefore, should prove useful for projecting future U.S. fertility.

Policy Implications

We do not know where fertility rates will go in the future, but we can expect one of three scenarios, each of which would call for a different set of policy responses. In the first scenario, cohort completed fertility would remain around two children per woman (consistent with the tempo-adjusted measures presented in Figure 19). In this scenario, the fertility rate itself does not present economic challenges, and policy interventions should focus on improving women's ability to realize their childbearing preferences, and enhancing the health and human capital of today's (and tomorrow's) children.

In the second scenario, cohort completed fertility falls moderately below two children per woman (for example 1.7 children per woman). This scenario does not cause substantial economic concerns if managed well (Morgan 2003). When fertility levels are in this range, it is feasible for immigration to compensate for the decline in younger workers (Morgan 2003). Further, given the long time frame in which moderate population decline and aging occur, it is possible to plan around these changes (such as planning ahead for an increasing percentage of the population collecting Social Security), and many countries have maintained successful economies and high individual economic well-being under these conditions (Coleman & Rowthorn 2011). In light of automation, globalization, and other market changes, the economy of the future will likely require fewer workers and fewer U.S.-based consumers. At the same time, completed fertility below two in a population that reports wanting well above two children per family indicates that some fraction of women and men experience significant structural barriers to having their desired number of children, such as financial constraints, longer-term economic uncertainty, and trouble partnering. This may already be the case in the U.S.: according to a recent survey, U.S. women who were unsure about having children frequently cited financial concerns and challenges finding a suitable partner (New York Times 7/5/2018).

In the third scenario, cohort completed fertility would fall substantially within a relatively short period of time (for example to 1.3 children per women). This scenario would result in more rapid social change and has a greater risk of being destabilizing. As always, the policy options are to either try to change the demographic behavior (i.e. increase birth rates) or to try to make accommodations for the behavior (i.e. help society adjust to a shrinking and aging population with minimal negative impacts), or some combination of the two. Some countries that have experienced "lowest low" fertility, however, have had little success raising fertility rates, and some have hypothesized that low fertility is a self-reinforcing "trap" (Lutz, Skirbekk, & Testa

2006). Therefore, it may be better to address common barriers to childbearing before rates fall to very low levels.

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