CENTER for RETIREMENT RESEARCH at BOSTON COLLEGE

HOW WILL COVID AFFECT THE COMPLETED FERTILITY RATE?

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Abstract

When COVID-19 brought on a health crisis and shut down many parts of the economy in 2020, many expected the fertility rate to plummet, even more than it had in recent years. While initially the severity of the public health and economic crises did result in large declines in fertility, the swift labor market recovery and income support for families led to a small rebound in fertility rates in 2021. The question is what happens next: is the uptick simply a temporary blip or a sign that the decade-long decline in fertility rates is over?

The paper found that:

- COVID resulted in a small increase in births from existing trend across most age groups.
- This uptick may well be temporary, though, as early data show that the ideal total number of children has dropped sharply for women in their 20s and held steady for women in their early 30s.
- And evidence from the Great Recession suggests that their expectations will not bounce back in later years.

The policy implications of the findings are:

- More robust fertility expectations data are required to confirm whether younger women want fewer children in the aftermath of COVID.
- A lower fertility rate will likely result in a smaller workforce, slower economic growth, and higher required tax rates for pay-as-you-go programs such as Social Security, but it also reflects the evolving preferences of women today.

Introduction

In just a little over a month after the COVID-19 pandemic was declared a national emergency in March 2020, the U.S. recorded over a million COVID-19 cases and over 65,000 deaths. Schools, business, and many parts of the economy shut down, and unemployment had skyrocketed to 14.7 percent. It is not surprising that the severe public health and economic conditions resulted in a sharp drop in birth rates in 2020. When the economy swiftly recovered, so did birth rates. The question is what happens next: is this uptick simply a temporary blip or a sign that the decade-long decline in fertility rates is over?

To identify whether the pandemic-induced uptick in births is temporary or permanent, this study uses a two-pronged approach. First, it examines the change in birth rates by age in 2020 and 2021, using an event study with heterogeneous treatment effects, relying on data from the *National Vital Statistics System* to isolate the impact of COVID-19. If changes in fertility are concentrated among women in their late-30s or 40s, they likely represent changes in the total number of children and are permanent. However, if changes in fertility are concentrated among women in their 20s and early-30s, they can reflect either shifts in timing or shifts in the total number of children. To shed light on future fertility trends for younger women, the second part of the analysis turns to expectations data. If COVID-induced changes in birth rates are accompanied by similar changes in how many children women anticipate having overall, then it likely reflects changes in the total number of births among women in their 20s and early-30s and is not just a shift in the timing of births.

The discussion proceeds as follows. The first section provides some background on recent trends in fertility and on how fertility expectations shape fertility outcomes. The second and third sections describe the data and methodology. The fourth section presents the results, which show that the pandemic resulted in a small increase from trend in fertility across most age groups; however, expectations data from COVID and the Great Recession show that the total number of children women want has remained flat or decreased, suggesting that the upticks in births likely reflect shifts in timing. The final section concludes that a lower fertility rate will likely result in a smaller workforce, slower economic growth, and higher required tax rates for pay-as-you-go programs such as Social Security, but it also reflects the evolving preferences of women today.

Background

Fertility rates generally fall during a recession or crisis.[1] The COVID-19 pandemic shut down businesses, skyrocketed unemployment to a staggering 14.7 percent, and resulted in over 350,000 deaths in 2020.[2] So, it was not surprising when official data showed that the birth rate declined in 2020.[3] Interestingly, the detrimental economic and public health effects of COVID-19 did not seem to have a lasting effect on fertility, as birth rates increased in 2021 for the first time since 2014 (see Figure 1). Three factors contributed to the rebound. First, although unemployment rose sharply, it also declined rapidly, falling to 6.7 percent by the end of 2020 and dropping further to 3.9 percent by the end of 2021 (see Figure 2), which researchers have shown leads to higher births (Kearny and Levine 2022). Second, Congress provided a substantial amount of financial support to households, mediating the impact of income losses, which, as prior literature suggests, should also improve birth rates.[4] Finally, as restrictions began to lift and vaccine rollouts began, the fear and uncertainty related to the pandemic may have also worn off and contributed to the rebound in birth rates.

The rebound, however, did not make up for the dip in births in 2020. The birth rate declined from 58.3 births per 1,000 women in 2019, to 55.7 births per 1,000 women in 2020 but only rebounded to 56.3 births per 1,000 women in 2021. The question, however, is whether birth rates will continue to recover after 2021 or whether the pre-pandemic decline in fertility will persist. If declining trends in fertility since the Great Recession reflect changes in the preferences of women, then implications for the future workforce, economic growth, and pay-as-you-go programs such as Social Security will have to be evaluated.

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[1] The relationship between the economy and fertility is well documented: fertility rates generally decrease during recessions and increase in recoveries. This finding is true both in aggregate (Lee and Miller 1990; Schaller 2016; Munnell, Chen, and Sanzenbacher 2019) and at the individual level (Lindo 2010; Dettling and Kearny 2014; Kearny and Wilson 2018; Autor, Dorn and Hanson 2019). Similarly, conceptions decline when mortality rates are high (Herteliu, Richmond, and Roehner 2018; Richmond and Roehner 2018). In the United States, the Cuban Missile Crisis, Oklahoma City Bombing, and 9/11 had negative impacts on fertility (Rashcky and Wong 2012; Rodgers, John, and Coleman 2005; and Ruther 2010).

[2] COVID Data Tracker "Trends in Number of COVID-19 Cases and Deaths in the US Reported to CDC, by State/Territory" Available at: https://covid.cdc.gov/covid-data-tracker/#trends_totaldeaths_select_00

[3] National Center for Health Statistics (2021).

[4] A few papers show that exogenous changes in earnings lead to increases in higher fertility. Black et al. (2013) examine fertility in coal-producing areas after coal price increases; Kearney and Wilson (2018) examined fertility after local fracking booms; and Dettling and Kearney (2014) and Loveheim and Mumford (2013) examined fertility after housing booms; all found these increases in income lead to higher fertility.

The impact of these fluctuations on completed fertility depends on where in the age distribution of women the changes in births rates have been concentrated. Childbearing has an obvious biological limit. The higher the age of the woman, the longer it takes to get pregnant, the higher the risk of miscarriage, and hence the fewer children conceived (Morgan and Rackin 2010; Schmidt et al. 2012; Alves de Carvalho, Wong, and Mirando-Ribeiro 2016). As a result, changes in fertility patterns among women in their late 30s and 40+ largely reflect a permanent increase, but these women account for only 20 percent of total births. In contrast, higher fertility among women in their 20s and early 30s, which matters a lot, can represent either permanent increases or shifts in timing of births.

To help distinguish between these two possible explanations for this younger group, analysts rely on fertility expectations. Empirical research has consistently found that fertility expectations, particularly after age 30, are a strong predictor of the number of children women will end up having (Barber 2001; Bongaarts 1992; Schoen et al. 1999; Westoff and Ryder 1977; Chen and Gok 2021). If fertility expectations also increase, the observed uptick in births could reflect a reversal of recent fertility trends. However, if fertility expectations stay steady or decrease, the recent uptick in births likely reflects changes in timing rather than completed births.

Data

The analysis is based on birth data from the Centers for Disease Control's (CDC) *National Vital Statistics System* (NVSS) and data on local economic conditions from the *Current Population Survey* (CPS). Data on fertility expectations come from the *General Social Survey* (GSS) and the *National Longitudinal Survey of Youth 79 Young Adult* (NLSY79YA).

Birth Rates

The NVSS contains data from all birth certificates in the United States. For years 2016-2020, we use aggregated data by state, month, 5-year age group of mother, and educational attainment of the mother from the CDC Wonder database. For births in 2021, birth certificate microdata are used since aggregate versions were not yet available through the CDC Wonder database. A limitation of the public microdata is that we cannot observe the state of birth and therefore cannot take advantage of state-level economic variations.

Birth rates are calculated by dividing the number of births in each state, month, age, and education group by the total population of women in each respective group. Population data come from the CPS. Birth rates are then merged with monthly state unemployment data, which also come from the CPS, and monthly COVID death rates from the CDC.[5]

Fertility Expectations

The analysis of fertility expectations relies on two sources. The first is the GSS, which provides a nationally representative survey of behaviors and opinions of Americans, conducted by NORC annually from 1972 to 1994 and biennially since then.[6] The sample sizes fluctuate between about 1,000 to 5,000 per year. The survey consists of common and rotating questions across years, which include questions regarding the ideal number of children. We limit our sample to women ages 20-39, which results in a sample size of 5,838 women across 11 survey years during the 2000-2021 period, or an average of 530 respondents per survey year. Although the sample is small, it is the only currently available survey that captures fertility expectations during COVID.

The second source for fertility expectations is the NLSY79YA, a nationally representative survey that follows children of the original NLSY79 cohort biennially from 1994. The survey includes information on expected and realized fertility, as well as education, employment experiences, household and family characteristics, income and assets, and more. Our final NLSY sample consists of 1,325 women who were born between 1970-1989 and surveyed at least once after age 30. Importantly, the respondents born in the 1980s were in their 20s during the Great Recession. We merge the NLSY with restricted state of residence data from the Census to help identify local economic characteristics. Additional state-level data on housing prices and median income come from the *All Transaction Housing Index* from the Federal Housing and Finance Agency, the *Current Employment Statistics* (CES), and the U.S. Census Bureau, respectively.

[5] COVID Data Tracker "Trends in Number of COVID-19 Cases and Deaths in the US Reported to CDC, by State/Territory" Available at: https://covid.cdc.gov/covid-data-tracker/#trends_totaldeaths_select_00

[6] The GSS is typically an in-person survey. As a result, the 2020 survey was delayed due to the pandemic and data collection did not begin until December 2020 and was primarily over the web without any interviewer assistance. It is unclear whether this change would result in comparable answers across years.

Methods

The goal of the analysis is to understand whether fluctuations in fertility in the wake of COVID are temporary or represent a more permanent shift. The first step is to separate any COVID-induced changes in fertility from the general trend, by age and education group. This step involves an event study to compare births of children conceived pre- and post-March 2020 to births of children conceived before and after the same months in 2016-2019 using birth data from the *NVSS*. The equation is as follows:

$$y_{a,i,s,t+9} = \alpha T_{s,t} + \theta Year_t + \gamma D_{s,t} + \delta_1 U_{s,t} + \delta_2 U_{i,t} + \beta_i + \rho_t + \sigma_s + \varepsilon_{a,i,s,t} \quad (1)$$

where the dependent variable $y_{a,i,s,t+9}$ is the birth rate for women in age group a, with educational attainment i, in state s, in month $t + 9$.[7] The effect of COVID on births is reflected in α, where $T_{s,t}$ is a dummy that takes a value of zero in the months before pandemic-related advisory orders were put in place and a one after.[8] The trend across years is represented with linear time trend, $Year_t$. To capture the seriousness of public health or economic consequences, the equation includes $D_{s,t}$, which represents the state-month COVID death rate; $U_{s,t}$, which represents the state-month-level unemployment rate; and $U_{i,t}$, which represents the national level unemployment rate for education group i. The regression also includes education group, month, and state fixed-effects, represented by β_i , ρ_t and σ_s, respectively. The regressions are weighted by the population in each age-education-state group. Effectively, this regression estimates how much of the change in fertility in 2020 among different age and educational groups is a direct result of the pandemic, as opposed to the general birth trends. The analysis is then repeated with birth data from both 2020 and 2021. However, since the 2021 data do not include state of birth, the new equation with the full pandemic period does not include state fixed-effects or any other state-level variables.

Understanding how the pandemic affected the fertility of women by age and education groups can provide insight into whether the decline may be temporary or permanent. Changes in births for women in their late 30s and 40s or older may be more permanent, while for younger women they can reflect merely shifts in timing or changes in the total number of children they will have.

[7] The conception date will be estimated using the birth date and gestation period.
[8] Lockdowns are defined as when stay-at-home advisories were announced.

Therefore, to better understand whether these fluctuations are temporary or more permanent, the second step in the analysis turns to expectations, which are an important predictor of how many children women will end up having. The expectations analysis begins by examining whether the total number of children desired among women in their 20s and early 30s has changed during COVID. The questions are based on questions pertaining to the ideal number of children from the *GSS.*[9] As part of the expectations analysis, we also compare the most recent expectations data during and after the Great Recession for women in their 20s and early 30s. This exercise allows us to examine how fertility expectations evolve almost ten years after the Great Recession to see the potential effect on actual fertility. Data on expectations come from the *NLSY79YA* sample, many of whom were in their 20s and early 30s during the Great Recession. If women who were in their childbearing years during the Great Recession adjusted their fertility expectations downward and these lower expectations persisted, then declines in fertility expectations among women today may also result in lower completed fertility.

Results

The results are presented in two parts. The first shows how the pandemic affected fertility trends and expectations. The second part turns to the experience of the Great Recession in an effort to determine whether the changes in fertility occurring today could be expected to have an impact on completed fertility.

Changes in Birth Rates During the Pandemic

To set the stage for how the pandemic impacted fertility, it is important to first understand pre-pandemic trends in fertility (see Figure 3). From 2006-2019, births among women ages 20-24 and 25-29 declined rapidly. Part of this decline was due to delays in the timing of births, as fertility among women in their 30s and 40s was increasing. However, interestingly, births among women ages 30-34 also declined from 2016-2019. With an

[9] The GSS is a nationally representative survey of adults in the United States conducted since 1972 by the National Opinion Research Center (NORC) at the University of Chicago. The GSS collects data on contemporary American society in order to monitor and explain trends in opinions, attitudes, and behaviors. The GSS is the single best source for a broad range of sociological and attitudinal data, although other surveys have higher quality data for specific questions, such as birth expectations.

understanding of pre-existing birth trends, we can now evaluate the pandemic's effect on fertility.

Table 1 reports the results of an initial regression that compares the births of children conceived pre- and post-March 2020 to births of children conceived before and after the same months in 2016-2019 among different age and educational groups. The first row shows that the initial economic and health shock in March-April 2020 led to lower conceptions and fewer births in December 2020, relative to trend. Since typical gestation periods are around nine months, only children conceived in the first month of the pandemic would have been born by the end of 2020.[10] Despite capturing only the effect of the first month of the pandemic, the resulting additional decline in births, beyond the general downward trend, was large.[11] Interestingly, despite the ongoing pandemic through 2021, birth rates ticked up as the economy recovered. This uptick is captured in the regression results presented in Table 2, which follows the exact same approach as the initial equation, except now with births from 2021 included to present a fuller picture of the COVID period. The first row shows that fertility rebounded to above what recent fertility trends would predict, for most age groups. The exception is births among women ages 20-24, for whom the pandemic did not result in a statistically significant difference from the existing declining trend (row 2 in Table 2).[12] So the net effect of COVID on fertility rates during this period was positive. To be clear, though, this finding does not mean that overall births rebounded to above pre-pandemic levels, simply that births were higher than what recent trends would imply.

The next question is whether this COVID uptick is merely a shift in timing or a sign that births will increase in the future. For women 40+, and to some extent women ages 35-39, the higher-than trend birth rates during the pandemic likely reflect permanent increases rather than shifting childbirth earlier. These increases, however, may have limited impact on aggregate completed fertility, since births to women 35+ account for only 20 percent of total births. The more relevant groups for considering future births are women in their 20s and early 30s; these

[10] One other COVID impact on birth rates would show up earlier. Lockdowns globally and travel restrictions meant many foreign-born mothers could not travel or return to the United States, resulting in a decline in births beginning earlier in 2020 (Bailey, Currie, and Schwandt 2022).

[11] Interestingly, the birth rate among 25-29-year olds increased from their pre-pandemic trend. This outcome does not mean that fertility increased among this group but rather that births were higher than recent trends would imply.

[12] Actual birth rates among women ages 35-30 and 40+ are increasing over the period 2016-2021, with March 2020-December 2021 defined as the pandemic period. The equation presents birth rate estimates, all else equal. Since the unemployment rates are declining over this period, the estimates for the trend in this age group becomes positive.

groups also account for the bulk of births. For these groups, fertility expectations, a strong predictor of completed fertility (particularly for those in their early 30s), may provide some insight as to whether the uptick is temporary or permanent for women ages 25-29 and 30-34 and whether the decline is temporary or permanent for women ages 20-24.

Changes in Fertility Expectations During COVID and the Great Recession

The analysis begins by looking at currently available data on expectations for the past two years to assess the COVID period and then explores whether expectations patterns during a previous crisis – the Great Recession – were only temporary or persisted.

Expectations Data from COVID. The GSS provides an early indicator for how COVID might have affected the fertility expectations of women, though the sample size is small and confidence intervals are large. According to the GSS, the number of children that women in their 20s viewed as ideal plummeted in 2021 (see Figure 4). So, despite the small uptick in births among 25-29 year olds during the pandemic, women in their 20s now want fewer children than they did pre-pandemic. If these early indicators are confirmed in more robust fertility expectation surveys, such as the *National Survey of Family Growth,* they suggest that the continued decline in births among women in their 20s may be a more permanent phenomenon.[13] In contrast, though, the fertility expectations of women in their 30s did not change, suggesting that the pandemic decrease reflects a shift in timing rather than a change in the ideal number of children (see Figure 5). For women in their 30s, as noted, our main interest is the early 30s. With the GSS data, though, it is not feasible to break out the early and late 30s separately, so we assume that the stability for the whole group also reflects those in their early 30s.

Expectations Data from the Great Recession. The dramatic decline in the number of children viewed as ideal among women in their 20s may merely reflect the initial reaction to the shock of the pandemic. To examine if the declines in fertility expectations after an economic shock persist, the analysis turns to the Great Recession for insights.

Figure 6 shows that fertility expectations among women who were ages 20-24 and 25-29 during the Great Recession initially plummeted, just as we observe after COVID. Fertility expectations then continued to decrease as these age groups entered their 30s over the past

[13] The more widely used surveys on expectations, the *National Survey of Family Growth* and the NLSY, will not have data on fertility expectations after COVID until 2023 or later.

decade. This pattern suggests that the decline in expectations among today's 20-24 and 25-29 year olds may continue in future years. Mirroring the early indicators of women in their 30s today, fertility expectations among women 30-34 during the Great Recession also remained stable during that time. The stability of this group's expectations has persisted in the years since the Great Recession, providing support for the hypothesis that women currently in their 30s are not likely to increase the total number of children they have.

The overall takeaway from the expectations data is that fertility will continue to decline, driven by women currently 20-24 and 25-29. And despite increases in recent birth rates, completed fertility among women 30-34 is unlikely to increase.

Conclusion

When COVID brought on a health crisis and shut down many parts of the economy in 2020, many expected the fertility rate to drop even more than it has in recent years. While initially the severity of the crisis did result in a large drop in fertility, the swift labor market recovery and income support for families led to an uptick in 2021.

Expectations data offer two pieces of evidence to suggest that this uptick only reflects a shift in the timing of births, not a change in the total number of children overall. First, early data on fertility expectations fell among women ages 20-29 in 2021 and did not change for women ages 30-34, so the increases in births in 2021 likely do not reflect a reversal of trends and increased birth rates going forward. Second, an analysis of the decline in fertility expectations for women 20-24 and 25-29 during the Great Recession finds that this decline persisted over the next 10 years – as these women entered their 30s – despite improving economic conditions. Similar to today, the fertility expectations of women 30-34 during the Great Recession remained stable during that economic crisis; and that stability persisted years after the Great Recession. Taken together, the current data suggest that completed fertility is likely to continue to decline, driven primarily by women 20-29 today.

A decline in fertility will likely result in a smaller workforce, slower economic growth, and higher required tax rates for pay-as-you-go programs such as Social Security, but it also reflects shifts in the preferences of women today as we have seen earlier in other developed nations.

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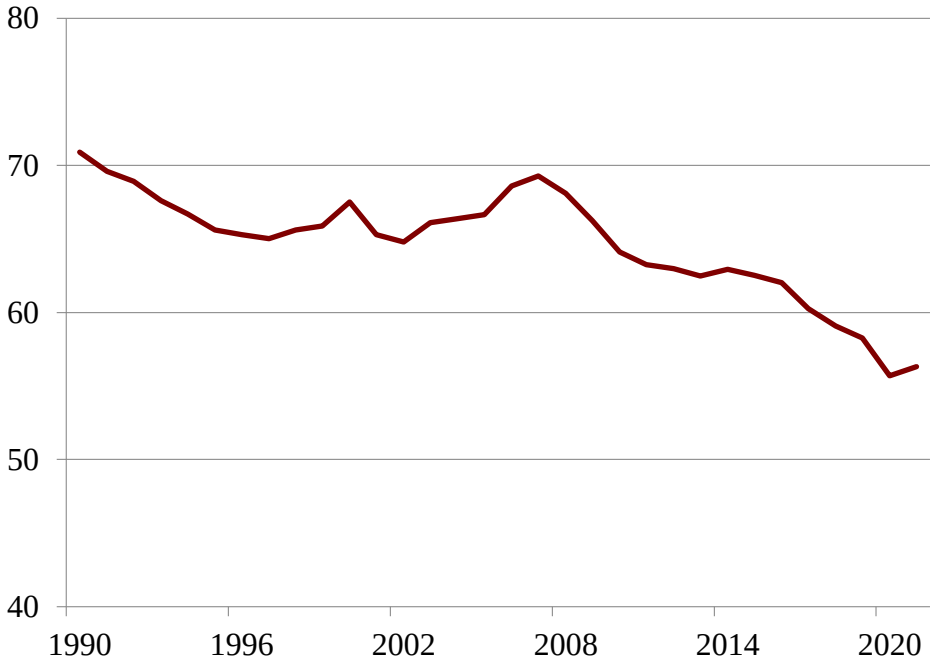
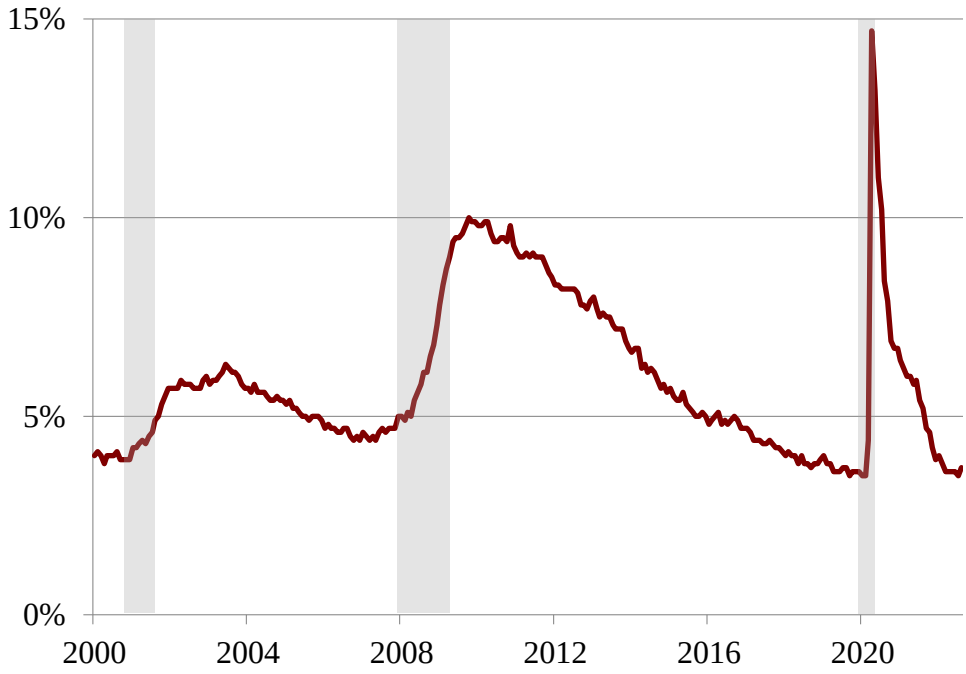
Figure 1. *Trends in Birth Rates per 1,000 Women Ages 15-44, 1990-2021*



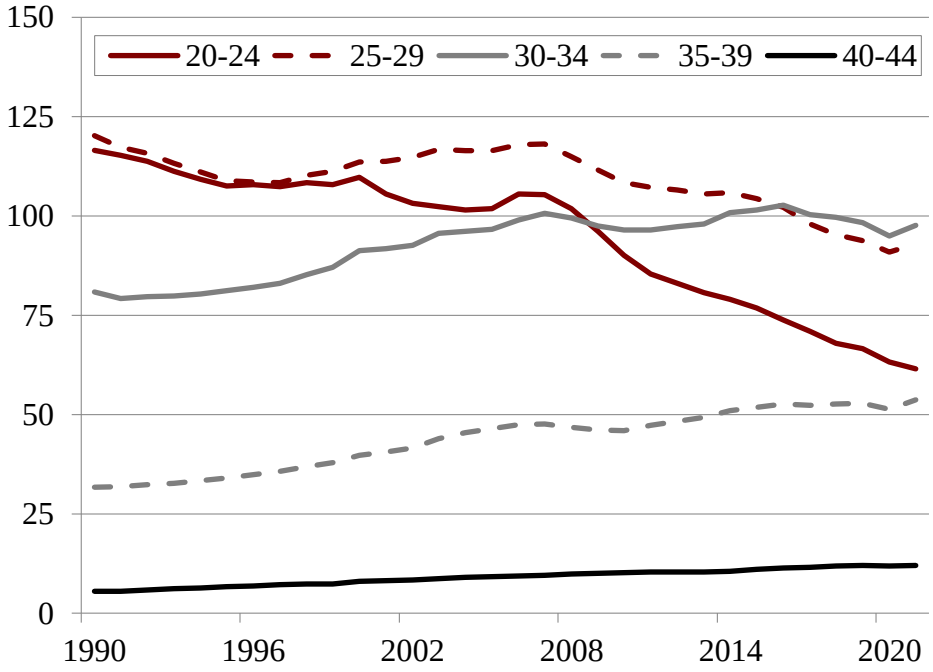
Sources: Joyce et al. (2012) and Osterman et al. (2022).

Figure 2. *Unemployment Rate, January 2000-August 2022*



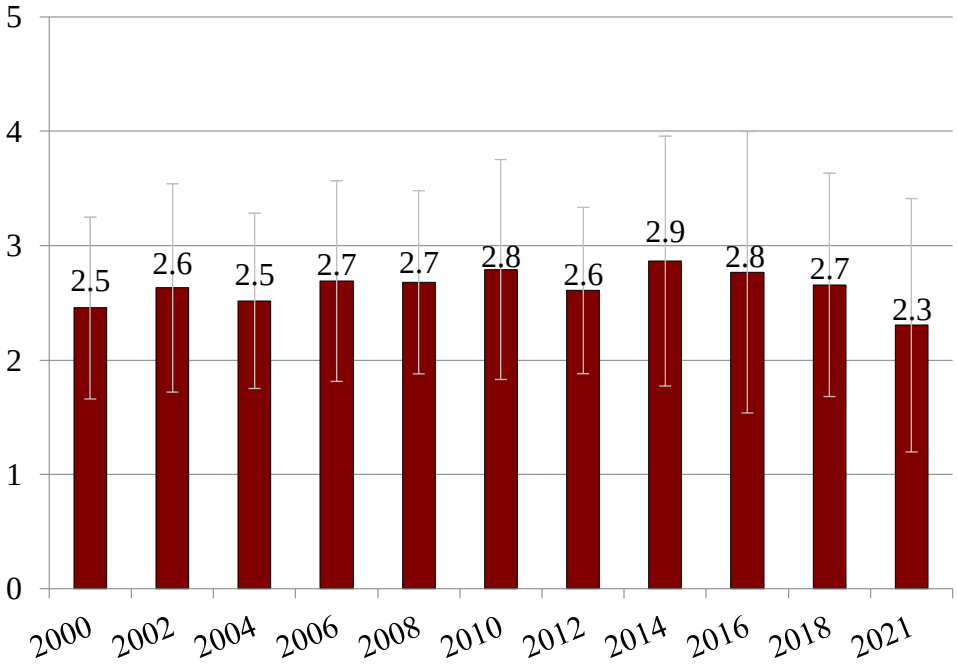
Note: Gray areas are recessions.
Source: Federal Reserve Bank of St. Louis (2022).

Figure 3. *Trends in Birth Rates per 1,000 Women Ages 15-44, 1990-2021*



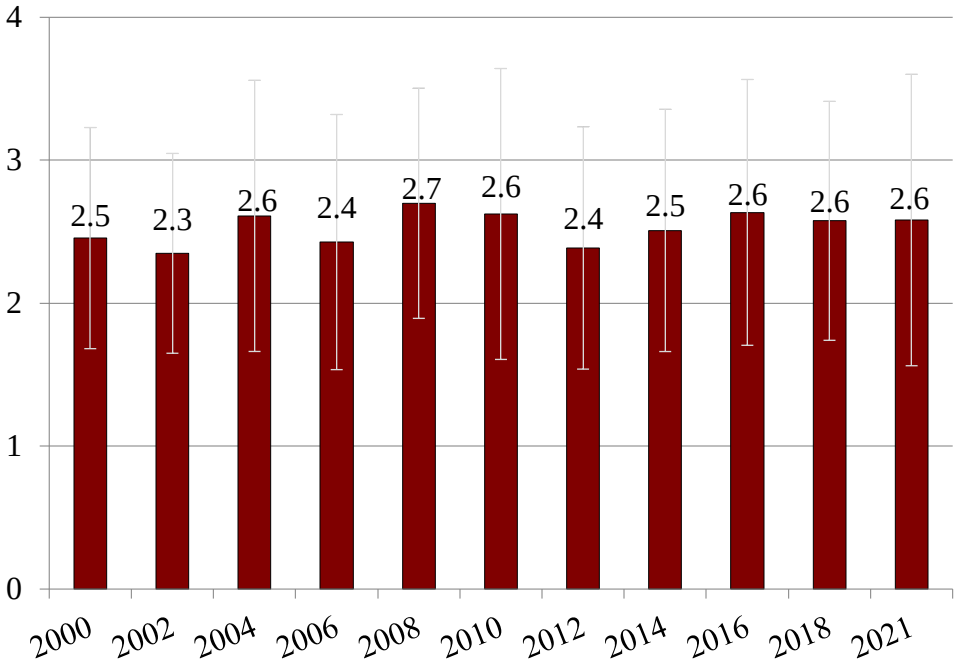
Sources: Joyce et al. (2012) and Osterman et al. (2022).

Figure 4. *Ideal Number of Children Reported for Women Ages 20-29, 2000-2021*



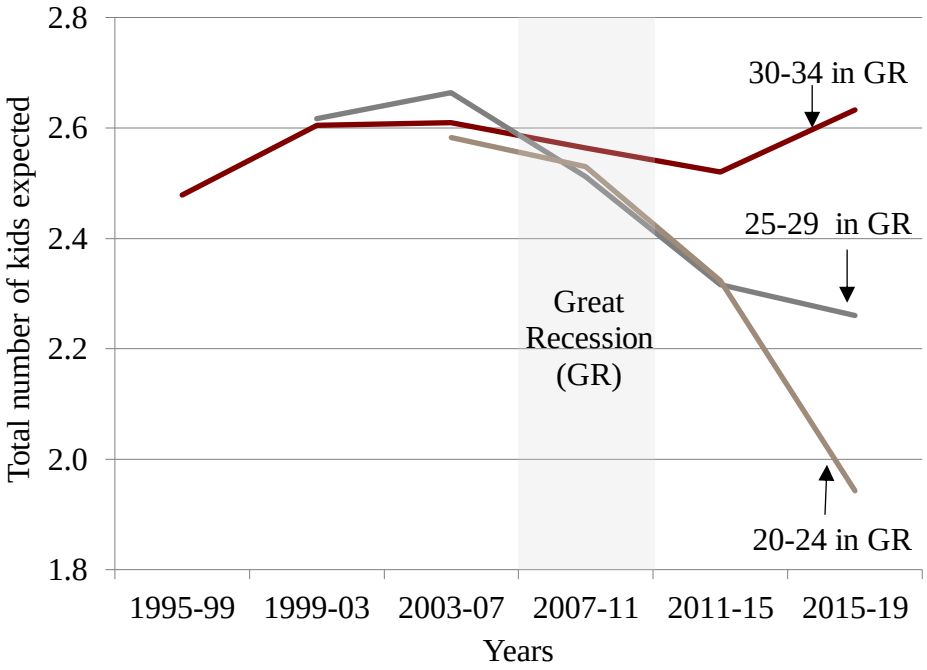
Note: 2021 GSS was collected from December 2020-May 2021.
Source: GSS (2000-2021).

Figure 5. *Ideal Number of Children Reported for Women Ages 30-39, 2000-2021*



Note: 2021 GSS was collected from December 2020-May 2021.
Source: GSS (2000-2021).

Figure 6. *Fertility Expectations by Age Group in the Great Recession, 1995-2019*



Source: Authors' calculations using *National Longitudinal Survey of Youth 79 Young Adult (*NLSY79YA).

Table 1. *Fixed-Effect Regression of COVID-19 on Birth Rates by Age Group, January 2016-December 2020*

	Fertility rate				
	20-24	25-29	30-34	35-39	40+
COVID-19	-0.200*	0.328**	-0.195*	-0.281***	-0.0625***
	(0.0876)	(0.1010)	(0.0933)	(0.0506)	(0.0098)
Year	-0.131***	-0.300***	-0.212***	-0.0518***	0.00664**
	(0.0189)	(0.0225)	(0.0210)	(0.0114)	(0.0022)
Average deaths per 1,000	-1.342	4.645*	4.317*	2.210*	0.148
	(1.6830)	(1.8980)	(1.7560)	(0.9510)	(0.1850)
UR in state	-0.0148	-0.0626	-0.0512	-0.0449*	0.000329
	(0.0353)	(0.0398)	(0.0368)	(0.0199)	(0.0039)
UR in education group	0.231***	-0.0612	-0.102*	0.0166	-0.00449
	(0.0372)	(0.0452)	(0.0424)	(0.0229)	(0.0044)
Some college	-6.274***	-2.448***	-0.479***	-0.059	-0.0479***
	-0.096	-0.117	-0.11	-0.0593	-0.0113
College or more	-8.549***	-4.691***	2.400***	1.983***	0.187***
	-0.0536	-0.0622	-0.0581	-0.0313	-0.00598
Constant	273.5***	615.5***	435.1***	107.8***	-13.01**
	(38.2700)	(45.6600)	(42.5500)	(23.0400)	(4.4600)
N	7,803	7,803	7,803	7,803	7,803

Notes: Regressions include state and month fixed-effects. Pandemic start date is assumed to be March 2020. Standard errors are in parentheses. * p<0.05 ** p<0.01 *** p<0.00
Source: Authors' calculations.

Table 2. *Fixed-Effect Regression of COVID-19 on Birth Rates by Age Group, January 2016-December 2021*

	Fertility rate				
	20-24	25-29	30-34	35-39	40+
COVID-19	0.0914	0.476***	0.325**	0.228***	0.0703***
	(0.0737)	(0.0712)	(0.114)	(0.0529)	(0.00811)
Year	-0.152***	-0.250***	-0.130***	-0.0417**	0.00969***
	(0.0196)	(0.0191)	(0.0308)	(0.0143)	(0.00216)
Some college	-6.956***	-1.118***	0.723***	0.286***	-0.00803
	(0.0474)	(0.0528)	(0.0872)	(0.0405)	(0.00604)
College or more	-8.931***	-4.580***	2.331***	1.815***	0.171***
	(0.0602)	(0.0490)	(0.0785)	(0.0360)	(0.00541)
Constant	317.1***	513.5***	268.6***	87.60**	-19.18***
	(39.55)	(38.52)	(62.08)	(28.80)	(4.367)
N	189	189	189	189	189

Notes: Regressions include month fixed-effects as state of birth is not yet available for 2021. Sample period is January 2016 – March 2021. Pandemic start date is assumed to be March, 2020. Standard errors are in parentheses.
* p<0.05 ** p<0.01 *** p<0.00.
Source: Authors' calculations.

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