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Attempts to conceive and the COVID-19 pandemic: data from the Apple Women’s Health Study

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BACKGROUND: Previous studies have suggested that emergent events may affect pregnancy planning decisions. However, few have investigated the effect of factors related to the COVID-19 pandemic on pregnancy planning, measured by attempting conception, and how attempting conception status may differ by individual-level factors, such as social status or educational level.

OBJECTIVE: This study aimed to examine the effects of factors related to the COVID-19 pandemic, until March 2021, on attempting conception status and to assess the effect measure modification by educational level and subjective social status.

STUDY DESIGN: We conducted a longitudinal analysis within a subgroup of 21,616 participants in the Apple Women’s Health Study who enrolled from November 2019 to March 2021, who met the inclusion criteria, and who responded to the monthly status menstrual update question on attempting conception status (yes or no). Participants reporting hysterectomy, pregnancy, lactation, or menopause were excluded. We used generalized estimating equation methodology to fit logistic regression models that estimate odds ratios and 95% confidence intervals for the association between the proportion of participants attempting conception and the month of response (compared with a prepandemic reference month of February 2020) while accounting for longitudinal correlation and adjusting for age, race and ethnicity, and marital status. We stratified the analysis by social status and educational level.

RESULTS: We observed a trend of reduced odds of attempting conception, with an 18% reduction in the odds of attempting conception in August 2020 and October 2020 compared with the prepandemic month of February 2020 (August odds ratio: 0.82 [95% confidence interval, 0.70—0.97]; October odds ratio: 0.82 [95% confidence interval, 0.69—0.97]). The participants with lower educational level (no college education) experienced a sustained reduction in the odds of attempting to conceive from June 2020 to March 2021 compared with February 2020, with up to a 24% reduction in the odds of attempting to conceive in October 2020 (odds ratio, 0.76; 95% confidence interval, 0.59—0.96). Among participants that were college educated, we observed an initial reduction in the odds of attempting to conceive starting in July 2020 (odds ratio, 0.73; 95% confidence interval, 0.54—0.99) that returned near prepandemic odds. Moreover, we observed a reduction in the odds of attempting to conceive among those with low subjective social status, with a decline in the odds of attempting to conceive beginning in July 2020 (odds ratio, 0.83; 95% confidence interval, 0.63—1.10) and continuing until March 2021 (odds ratio, 0.79; 95% confidence interval, 0.59—1.06), with the greatest reduction in odds in October 2020 (odds ratio, 0.67; 95% confidence interval, 0.50—0.91).

CONCLUSION: Among women in the Apple Women’s Health Study cohort, our findings suggested a reduction in the odds of attempting to conceive during the COVID-19 pandemic, until March 2021, particularly among women of lower educational level and lower perceived social status.

Key words: desire to conceive, educational level, health-related decision-making, pandemic social and environmental factors, perceived social status, pregnancy planning, women’s health

Introduction

Many factors influence pregnancy planning and the desire to conceive, including economic stability, education, and access to public services. During the COVID-19 pandemic, these factors may affect individual pregnancy decisions more acutely. However, empirical data describing the effect of the pandemic on personal decisions, such as attempting to conceive, are limited.

Recent research has focused more on “pregnancy planning” during the COVID-19 pandemic. For instance, a UK study found that approximately half of women reported that COVID-19 had modified their pregnancy plans, with most deliberately postponing pregnancy. Other studies from Italy and Shanghai demonstrated similar changes in pregnancy plans during the pandemic. Furthermore, a Guttmacher Institute survey reported that >40% of women changed their pregnancy plans during the COVID-19 pandemic. Alternatively, a US study observed that almost half of the cohort had an increased desire to have children since the pandemic onset but that a quarter of the cohort’s desire to have children decreased. However, no published study has longitudinally assessed “monthly attempts to conceive” throughout the COVID-19 pandemic or has evaluated variations related to individual factors, such as education.

This study aimed to examine the proportion of women attempting pregnancy in the United States during the COVID-19 pandemic among Apple Women’s Health Study (AHWS) participants who enrolled from November 2019 to March 2021. AHWS participants...
Why was this study conducted?
Longitudinal studies investigating the effect of circumstances related to the COVID-19 pandemic on pregnancy planning, measured by attempting conception, are limited, especially when examining variations by individual-level factors, such as educational level.

Key findings
Among Apple Women’s Health Study participants, we observed a slight increase in the odds of attempting to conceive among women as the pandemic began in May 2020, followed by a decline starting in July 2020, compared with pre-pandemic levels. Our findings suggested a reduction in the odds of attempting to conceive during the COVID-19 pandemic to March 2021.

What does this add to what is known?
The findings indicated a noteworthy trend in the decline in attempts to conceive related to factors associated with the COVID-19 pandemic, especially among participants with lower educational levels, and demonstrated environmental and social factors influencing health-related decision-making.

Methods
Study population
AWHS is an ongoing longitudinal study of women’s health. The study launched recruitment in November 2019, as previously described. Eligibility for enrollment included women who had menstruated at least once, had a compatible iPhone iOS, and provided informed consent. The study focused on digital recruitment and raising awareness through media engagement to reach potential participants. Primary methods of recruitment included sharing materials through digital and social media, increasing awareness of the study through press and media engagement, and executing recruitment campaigns with organizations focused on research or health (eg, PCOS Challenge [pcoschallenge.org] and Trialfacts [trialfacts.com]). The primary methods of retention included app notifications as a reminder of survey availability and study updates. The study was approved by the institutional review boards at Advarra (CIRB #PRO0037562) and was registered to ClinicalTrials.gov (NCT04196595). After enrollment, participants completed surveys monthly regarding their conception attempts through the Monthly Survey: Menstrual Update (MSMU). Starting in January 2020, the MSMU was available on the Research app on the first Sunday of each month, after at least 4 weeks since enrollment. We assigned February 2020 as a baseline month (the month before the United States declared a COVID-19 national emergency) and evaluated data through March 2021. We included 21,616 participants who met the eligibility criteria, enrolled before March 31, 2021, and responded to at least 1 MSMU. We excluded participants who self-reported hysterectomy at baseline, menopause, current pregnancy, or lactation. At enrollment, participants provided their year of birth, race and ethnicity, gender identity, marital status, and educational level. Participants were able to update demographic information during the study. We categorized education into 3 groups: (1) no college education, (2) college education, and (3) graduate degree. The MacArthur Scale of Subjective Social Status (SSS) was assessed at enrollment. The SSS measures relative social status based on the participant’s perceptions of their educational level, socioeconomic status (SES), opportunity, and current life circumstances. We categorized SSS scores as low (score of 0–3), moderate (score of 4–5), and high (score of 6–9).

Outcome assessment: attempting conception status
Participants were asked their attempt to conceive status as part of the MSMU with the question: “Did you actively try to get pregnant in the previous calendar month?” Responding participants selected from one of the following responses: (1) Yes, I tried to conceive naturally; (2) Yes, with the help of methods, such as artificial insemination or in vitro fertilization; (3) No; and (4) I prefer not to answer. We defined attempting to conceive as a dichotomous variable. We categorized participants selecting either response 1 or 2 above as attempting to conceive. Apart from that, we designated participants as not attempting to conceive (Supplemental Table 1).

Of 97,052 total MSMU responses from active participants during the follow-up period, 14,543 (15.0%) were missing responses for one or more months. We singly imputed those missing responses with concordant survey responses before and after the response gap (n=14,020 [14.4%]). Supplemental Table 2 summarizes response concordance among these participants (Supplemental Table 2).
Statistical analysis
We used generalized estimating equations (GEEs) to fit logistic regression models for the association between the proportion of participants attempting conception and the month of response while accounting for longitudinal correlation.13–16 We computed month-specific odds ratios (ORs) and 95% confidence intervals (CIs) for the dichotomous outcome of attempting to conceive (yes vs no), about the prepandemic month of February 2020. All models were adjusted for age, race and ethnicity, and marital status. GEEs allow for missing nonconcordant responses before and after the response gap (n=523), with the assumption of missing completely at random. We specified an autoregressive covariance structure. Within the main models, we assessed the effect modification by education status, as education may indicate personal agency vs physical risks of exposure and lifestyle associated with the ability to work remotely during the pandemic. We stratified using the SSS as a secondary analysis. We used unidentified data for all analyses and described aggregate results.

We performed a sensitivity analysis to adjust for seasonal trends modeled by sine and cosine functions, as previously described as an applicable test for sea-sine and cosine functions, as previously adjusted for seasonal trends modeled by gate results.

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We performed a sensitivity analysis to adjust for seasonal trends modeled by sine and cosine functions, as previously described as an applicable test for sea-sine and cosine functions, as previously adjusted for seasonal trends modeled by gate results.

In February 2020, 6.3% of participants were attempting conception (Figure 1). We observed stability in the odds of attempting to conceive as the pandemic began in March 2020 (OR, 1.01; 95% CI, 0.94–1.08) and May 2020 (OR, 1.02; 95% CI, 0.89–1.15), followed by a sustained decrease starting in August 2020 (OR, 0.82; 95% CI, 0.70–0.97) to March 2021 (OR, 0.88; 95% CI, 0.74–1.04), compared with the reference month of February 2020 (Figure 2,A; Supplemental Table 7). The strongest negative association was observed for August 2020 (OR, 0.82; 95% CI, 0.70–0.97) and October 2020 (OR, 0.82; 95% CI, 0.69–0.97), with the odds of attempting to conceive decreasing by 18% in these months compared with February 2020.

When we stratified by education status, we observed a more sustained reduction in the odds of attempting to conceive among the non—college-educated participants, with a decline in the odds of attempting to conceive beginning in September 2020 (OR, 0.79; 95% CI, 0.63–1.00) and continuing until March 2021 (OR, 0.80; 95% CI, 0.64–1.01). We found the strongest reduction in the odds of attempting to conceive in October 2020, with the odds decreasing by 24% (OR, 0.76; 95% CI, 0.59–0.96) compared with February 2020 (Figure 2,B; Supplemental Table 7). Among participants that were college educated, we observed a greater reduction in the odds of attempting to conceive in August 2020 (OR, 0.71; 95% CI, 0.51–0.99) compared with February 2020. By March 2021, the odds of attempting to conceive among college-educated participants rose slightly and were closer to prepandemic levels (OR, 0.91; 95% CI, 0.64–1.31) (Figure 2,C; Supplemental Table 7). For those participants with a graduate school degree, we observed monthly odds of attempting conception that were elevated throughout the study period compared with February 2020. ORs ranged from 1.04 (95% CI, 0.73–1.48) for July 2020 to 1.21 (95% CI, 0.83–1.77) for September 2020, although the CIs were wide. The odds of attempting to conceive continued to be elevated until March 2021 (OR, 1.16; 95% CI, 0.80–1.69) (Figure 2,D) among participants with a graduate school degree.

Within our secondary analysis, stratifying using the SSS, we observed a sustained reduction in the odds of attempting to conceive among those with low SSS (SSS score of 0–3), with a notable decline in the odds of attempting to conceive from July 2020 (OR, 0.83; 95% CI, 0.63–1.10) to March 2021 (OR, 0.79; 95% CI, 0.59–1.06). We found the strongest reduction in the odds of attempting to conceive in October 2020, with a 33% reduction in odds compared with February 2020 (OR, 0.67; 95% CI, 0.50–0.91) (Supplemental Table 8). Among participants with moderate SSS (SSS score of 4–5), the effect estimates were more stable and were closer to the null. Trends among participants with high SSS (SSS score of 6–9) were generally similar to those with low SSS (Supplemental Table 8). The sensitivity analysis adjusting for seasonality yielded similar results to those unadjusted for...
| Characteristic                        | All participants (N=21,616) | Participants attempting conception at least once during the study period (n=1647) | Participants never attempting conception during the study period (n=19,969) |
|--------------------------------------|-----------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Age, mean (SD)                       | 32.1 (8.6)                  | 31.4 (5.7)                                                                       | 32.1 (8.8)                                                          |
| Race and ethnicity                   |                             |                                                                                 |                                                                     |
| White                                | 15,468 (71.6)               | 1142 (69.3)                                                                      | 14,326 (71.7)                                                       |
| Hispanic, Latina, Spanish, or other Hispanic | 2684 (12.4)               | 222 (13.5)                                                                       | 2462 (12.3)                                                        |
| Black                                | 1140 (5.3)                  | 128 (7.8)                                                                        | 1012 (5.1)                                                         |
| Asian                                | 812 (3.8)                   | 47 (2.9)                                                                          | 765 (3.8)                                                          |
| More than 1 race                     | 1044 (4.8)                  | 71 (4.3)                                                                          | 973 (4.9)                                                          |
| Other                                | 431 (2.0)                   | 33 (2.0)                                                                          | 398 (2.0)                                                          |
| I prefer not to answer               | 37 (0.2)                    | 4 (0.2)                                                                           | 33 (0.2)                                                           |
| Education                            |                             |                                                                                 |                                                                     |
| Not college educated                 | 9689 (44.8)                 | 795 (48.3)                                                                        | 8894 (44.5)                                                        |
| College educated                     | 7141 (33.0)                 | 460 (27.9)                                                                        | 6681 (33.5)                                                        |
| Graduate school degree               | 4786 (22.1)                 | 392 (23.8)                                                                        | 4394 (22.0)                                                        |
| Employment status                    |                             |                                                                                 |                                                                     |
| Employed for pay (part-timer, full-timer, self-employed) | 16,037 (74.2)         | 1319 (80.1)                                                                       | 14,718 (73.7)                                                      |
| Unemployed                           | 1117 (5.2)                  | 92 (5.6)                                                                           | 1025 (5.1)                                                         |
| Unable to work (ie, disability, illness, or other circumstances) | 637 (2.9)                   | 54 (3.3)                                                                           | 583 (2.9)                                                          |
| In school                            | 2532 (11.7)                 | 60 (3.6)                                                                           | 2472 (12.4)                                                        |
| Taking care of house or family       | 1128 (5.2)                  | 116 (7.0)                                                                          | 1012 (5.1)                                                         |
| In retirement                        | 69 (0.3)                    | 1 (0.1)                                                                            | 68 (0.3)                                                           |
| I prefer not to answer               | 96 (0.4)                    | 5 (0.3)                                                                            | 91 (0.5)                                                           |
| Marital status                       |                             |                                                                                 |                                                                     |
| Married                              | 8324 (38.5)                 | 1078 (65.5)                                                                        | 7246 (36.3)                                                        |
| Divorced                             | 1559 (7.2)                  | 88 (5.3)                                                                           | 1471 (7.4)                                                         |
| Widowed                              | 90 (0.4)                    | 2 (0.1)                                                                            | 88 (0.4)                                                           |
| Separated                            | 377 (1.7)                   | 24 (1.5)                                                                           | 353 (1.8)                                                          |
| Never married                        | 7677 (35.5)                 | 222 (13.5)                                                                         | 7455 (37.3)                                                        |
| A member of an unmarried couple       | 3456 (16.0)                 | 223 (13.5)                                                                         | 3233 (16.2)                                                        |
| Skip or missing                      | 133 (0.6)                   | 10 (0.6)                                                                           | 123 (0.6)                                                          |
| MacArthur Scale of Subjective Social Status |                   |                                                                                 |                                                                     |
| Low (0—3)                            | 5478 (25.3)                 | 425 (25.8)                                                                         | 5053 (25.3)                                                        |
| Moderate (4—6)                       | 9454 (43.7)                 | 763 (46.3)                                                                         | 8691 (43.5)                                                        |
| High (7—9)                           | 6684 (30.9)                 | 459 (27.9)                                                                         | 6225 (31.2)                                                        |

Data are presented as number (percentage), unless otherwise specified.

SD, standard deviation.

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sine and cosine functions (Supplemental Table 9).

Within the additional sensitivity analysis, the effect estimates for quarter cohort models were often less precise than GEE models and were closer to the null following quarter 2 2020 (Supplemental Tables 10 and 11). For education-stratified models, the odds of attempting to conceive within the quarter continued to be elevated among participants with graduate degrees until March 2021 (Supplemental Table 10), similar to main models (Supplemental Table 7). Results were more attenuated among non—college-educated participants. Among college-educated participants, we observed a reduction in the odds of attempts to conceive in quarter 4 2020 (OR, 0.75; 95% CI, 0.54–1.04) compared with quarter 1 2020 (P trend=.06) (Supplemental Table 10), although the findings were imprecise. The trends for SSS-stratified models were generally consistent with the main models (Supplemental Table 11). The trends among participants with high SSS were generally comparable with those with low SSS following quarter 2 2020.

**Comment**

**Principal findings**

Among AWHS participants, we evaluated the relationship between the duration of the COVID-19 pandemic and the participants’ attempts to conceive a child. We observed a slight increase in the odds of attempting to conceive as the pandemic began in May 2020, followed by a decline starting in July 2020, compared with prepandemic levels. Our findings suggested a reduction in the odds of attempting to conceive during the pandemic. In March 2021, we observed that the reduction in the odds was the strongest among participants that were not college educated compared with prepandemic levels. Moreover, our results suggested an increase in the odds of attempting to conceive among participants with a graduate degree.

**Results in the context of what is known**

Our findings were concordant with other studies performed within the context of the pandemic. A previous study from the United Kingdom found that the COVID-19 pandemic affected pregnancy plans for 53% of women, with 72% of those women reporting postponement of pregnancy. However, this study was based on surveys administered at 1 time point during the pandemic (July 2020). Although our results were not directly comparable with the Guttmacher Survey design, the 2020 Guttmacher Survey also reported that 34% of women desired to delay pregnancy or have fewer children because of the COVID-19 pandemic, indicating that women of lower income were slightly more likely to change their plans.

Our primary research question and the focus of this study were based on measuring attempts to conceive, to understand the intent to conceive during the pandemic. Although fertility and birth rates do not exclusively indicate intent to conceive, we can compare these rates with our findings to assess general trends. Our results have comparable trends with publicly available fertility rate data and birth rate data. For example, the US National Center for Health Statistics from the National Vital Statistics System reported some reduction in fertility rates during the pandemic, from the third quarter of 2020 to the third quarter of 2021. In

### TABLE 2

Sample size by month—participants responding to the Monthly Survey: Menstrual Update

| Month      | Total (N) | Attempting conception (n) | % attempting | New participants | Retained participants | Lost to follow-up* |
|------------|-----------|---------------------------|--------------|------------------|-----------------------|--------------------|
| February 2020 | 2144     | 136                       | 6.3          | 2144             | 0                     | 0                  |
| March 2020   | 2890     | 161                       | 5.6          | 931              | 1959                 | 185                |
| April 2020   | 3642     | 208                       | 5.7          | 959              | 2683                 | 207                |
| May 2020     | 4039     | 247                       | 6.1          | 658              | 3381                 | 261                |
| June 2020    | 4676     | 268                       | 5.7          | 960              | 3716                 | 323                |
| July 2020    | 5080     | 272                       | 5.4          | 765              | 4315                 | 361                |
| August 2020  | 5526     | 286                       | 5.2          | 831              | 4695                 | 385                |
| September 2020 | 6013   | 313                       | 5.2          | 943              | 5070                 | 456                |
| October 2020 | 6128     | 301                       | 4.9          | 614              | 5514                 | 499                |
| November 2020| 8711     | 443                       | 5.1          | 3079             | 5632                 | 496                |
| December 2020| 10,050   | 497                       | 4.9          | 2498             | 7552                 | 1159               |
| January 2021 | 11,314   | 569                       | 5.0          | 2170             | 9144                 | 906                |
| February 2021| 12,643   | 639                       | 5.1          | 2608             | 10,035               | 1279               |
| March 2021   | 13,673   | 684                       | 5.0          | 2281             | 11,392               | 1251               |

*MSMU: Menstrual Survey: Menstrual Update.
addition, the National Vital Statistics System reported greater reductions in births in the latter half of 2020 compared with the beginning of 2020 (before June), although we found that data for the rest of 2021 and 2022 were not currently available.

**Clinical and research implications**

Our results may potentially be attributed to increased financial security and flexibility to work from home among advanced-degree workers. Working from home may reduce the potential for exposure to COVID-19 and enable participants to focus on pregnancy planning rather than daily concern about virus exposure at work. In this way, education may serve as a proxy for financial security and personal agency vs physical risks of exposure associated with the ability to work remotely and thereby act as a potential mitigatory factor for the effect of the pandemic. In contrast to our study, other research studies found that the desire for children is generally higher among those of lower educational levels and that women of higher SES had lower net fertility, potentially because those of higher SES respond faster to changing family norms. However, these analyses were performed with data collected from a nonpandemic period.

When comparing results stratified by SSS vs educational level, we observed a trend of reduced odds in attempting conception among those participants with the lowest SSS score (Supplemental Table 8), which was similar to the trend among those participants with no college education. Low SSS and no college education may each indicate factors, such as financial insecurity. Attempts to conceive among those participants with a high SSS were similar to those participants with a low SSS, which was notably different from the findings that we observed for attempts to conceive among participants with the highest educational level. This variation may likely be related to the contextual differences in the SSS, which incorporates measures of relative social status based on current life circumstances, rather than being an indication of objective education or income alone. This distinction between SSS and educational attainment is demonstrated by the matrix in Supplemental Table 12.

**Strengths and limitations**

Our study has many strengths. Our study focused on combining educational levels and that women of higher SES had lower net fertility,22-24 potentially because those of higher SES respond faster to changing family norms. However, these analyses were performed with data collected from a nonpandemic period.

Our study has several limitations. The generalizability of this study may be limited as the AWHS cohort was restricted to iPhone users and demographic characteristics from this cohort of participants may not be representative of the US population. The AWHS cohort included more White participants (71.6% in the AWHS vs 60.1% in the United States) and fewer Black participants (5.3% in the AWHS vs 13.4% in the United States) than the US population, per the US census. Because of the racial homogeneity of participants in the study population, we were not able to evaluate racial disparities in COVID-19 burden and attempts to conceive. In addition, women who are attempting conception may be more likely to enroll in the AWHS study. However, pregnancy planners were not likely to be oversampled as they were not targeted in recruitment efforts. Moreover, the study was an open cohort, with changes in the study population over time, as demonstrated in Table 2.

Furthermore, we did not confirm self-reported conception attempts with sexual activity logging. However, the purpose of our investigation did not focus on outcomes, such as time to pregnancy. Another potential concern was attrition bias because of the potential effect of COVID-19 and pandemic-related factors on fertility. If these factors did reduce fertility, we would likely not see a bias because of attrition. However, we might find increases in the level of the month-specific pool of participants reporting yes to attempting conception that may potentially inflate the

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**FIGURE 1**

Percentage of participants attempting conception, February 2020 to March 2021

*Frush. Attempts to conceive and the COVID-19 pandemic. Am J Obstet Gynecol 2022.*
proportion of those attempting in any given month during the pandemic.

Because of the timing of the study, we were unable to account for seasonality based on historic data before COVID-19, but we incorporated sine and cosine functions to account for seasonality and did not find varying results. Moreover, although we did not collect data on the type of employment, income, or work-from-home status, we were able to evaluate educational level. Although education may be a poor proxy for SES, education is an objective measure and may in its way predict some behavioral factors related to lifestyle, such as work-from-home status. As the SSS was a subjective measure of social status and did not objectively measure education, SES, or income status, we included this assessment as part of a secondary analysis.

Another potential limitation may be related to informative clustering. The longer a participant has attempted to conceive at any point within the study, and stays within the study, the more likely the participant may be to attempt to conceive in any month thereafter. To assess findings independent of cluster size, we performed a sensitivity analysis assigning participants to quarter cohorts and found similar results, although less precise (Supplemental Tables 10 and 11). Finally, we experienced loss to follow-up in this cohort, although we did not observe changes in demographics among participants who were vs were not lost to follow-up.

Conclusions
Overall, these findings indicated a potentially noteworthy trend in the decline in the attempts to conceive related to factors associated with the COVID-19 pandemic, especially among participants with lower educational levels. Barriers to
healthcare and loss of financial security have disproportionally affected low-income communities during the pandemic. This research demonstrated the importance of collecting such detailed and granular data for women's health studies to better understand environmental and social factors that influence health-related decision-making.

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### SUPPLEMENTAL TABLE 1

**Raw responses to the Monthly Survey: Menstrual Update, by month**

| Month       | No     | Prefer not to answer | Yes, I tried to conceive naturally | Yes, with the help of methods, such as artificial insemination or in vitro fertilization |
|-------------|--------|----------------------|-----------------------------------|----------------------------------------------------------------------------------|
| February 2020 | 2051 (93.2) | 10 (0.5) | 127 (5.8) | 12 (0.5) |
| March 2020    | 2781 (93.9)  | 15 (0.5) | 155 (5.2) | 12 (0.4) |
| April 2020    | 3499 (93.8)  | 16 (0.4) | 207 (5.5) | 8 (0.2)  |
| May 2020      | 3880 (93.6)  | 14 (0.3) | 246 (5.9) | 6 (0.1)  |
| June 2020     | 4502 (93.9)  | 18 (0.4) | 262 (5.5) | 12 (0.3) |
| July 2020     | 4924 (94.3)  | 18 (0.3) | 266 (5.1) | 12 (0.2) |
| August 2020   | 5378 (94.5)  | 17 (0.3) | 284 (5)   | 11 (0.2) |
| September 2020| 5864 (94.6)  | 14 (0.2) | 311 (5)   | 9 (0.1)  |
| October 2020  | 5976 (94.9)  | 15 (0.2) | 294 (4.7) | 13 (0.2) |
| November 2020 | 8459 (94.7)  | 21 (0.2) | 430 (4.8) | 23 (0.3) |
| December 2020 | 9795 (94.9)  | 17 (0.2) | 488 (4.7) | 20 (0.2) |
| January 2021  | 11,027 (94.8)| 19 (0.2) | 569 (4.9) | 17 (0.1) |
| February 2021 | 12,357 (94.9)| 14 (0.1) | 624 (4.8) | 28 (0.2) |
| March 2021    | 13,358 (94.9)| 19 (0.1) | 661 (4.7) | 36 (0.3) |

Data are presented as number (percentage).

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### SUPPLEMENTAL TABLE 2

**Transition matrix of survey month gaps**

| Response before missed survey (t₀) | Attempting | Lactation | Menopause | Not attempting | Pregnant |
|-----------------------------------|------------|-----------|-----------|----------------|----------|
| Attempting                        | 356 (69.7) | 2 (0.4)   | 1 (0.2)   | 82 (16)        | 70 (13.7) |
| Lactation                         | 3 (1.7)    | 148 (83.6)| 0 (0)     | 25 (14.1)      | 1 (0.6)  |
| Menopause                         | 0 (0)      | 0 (0)     | 1 (4.2)   | 23 (95.8)      | 0 (0)    |
| Not attempting                    | 102 (1.2)  | 2 (0.0)   | 34 (0.4)  | 8038 (97.4)    | 79 (1.0) |
| Pregnant                          | 62 (19.4)  | 73 (22.9) | 0 (0)     | 126 (39.5)     | 58 (18.2) |

Data are presented as number (percentage of total at t₀).

*If the subject responded to a survey at t₀, missed k≥1 surveys, and then responding to a survey at t₀+1.*

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### SUPPLEMENTAL TABLE 3

**Number of subjects attempting conception**

| Category                                                                 | n (%)       |
|--------------------------------------------------------------------------|-------------|
| Participants attempting conception at least once during the study period | 1647 (7.6)  |
| Participants attempting conception at baseline                          | 1308 (6.1)  |
| Women attempting conception at baseline, who later stopped attempting, excluding those who achieved pregnancy | 228 (1.1)   |
| Women not attempting conception at baseline, who attempted for the first time during follow-up | 339 (1.6)   |

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### SUPPLEMENTAL TABLE 4

**Number of months attempting conception**

| Category                                      | Mean (SD) |
|-----------------------------------------------|-----------|
| Number of months attempting                   | 3.1 (2.7) |
| Number of months attempting, for continuous attempts | 4.4 (2.8) |

*SD, standard deviation.*

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## SUPPLEMENTAL TABLE 5
### Participants attempting conception in the current month and previous month and conceiving the following month

| Month       | Total responses | Attempting conception in the current and previous months<sup>a</sup> | Newly attempting conception in the current month<sup>b</sup> | Conceiving in the following month<sup>c</sup> |
|-------------|-----------------|---------------------------------------------------------------|------------------------------------------------|-----------------------------|
| February 2020 | 2144 (93.5)     | 0 (0)                                                         | 136 (5.9)                                                   | 12 (0.5)                     |
| March 2020   | 2890 (94.4)     | 104 (3.4)                                                    | 57 (1.9)                                                     | 9 (0.3)                      |
| April 2020   | 3642 (94.4)     | 132 (3.4)                                                    | 76 (2.0)                                                     | 8 (0.2)                      |
| May 2020     | 4039 (93.8)     | 186 (4.3)                                                    | 61 (1.4)                                                     | 20 (0.5)                     |
| June 2020    | 4676 (94.1)     | 192 (3.9)                                                    | 76 (1.5)                                                     | 25 (0.5)                     |
| July 2020    | 5080 (94.6)     | 206 (3.8)                                                    | 66 (1.2)                                                     | 20 (0.4)                     |
| August 2020  | 5526 (94.7)     | 212 (3.6)                                                    | 74 (1.3)                                                     | 26 (0.4)                     |
| September 2020 | 6013 (94.6)   | 210 (3.3)                                                    | 103 (1.6)                                                   | 32 (0.5)                     |
| October 2020 | 6128 (95)       | 237 (3.7)                                                    | 64 (1.0)                                                     | 20 (0.3)                     |
| November 2020 | 8711 (94.7)    | 240 (2.6)                                                    | 203 (2.2)                                                   | 40 (0.4)                     |
| December 2020 | 10,050 (94.9)   | 321 (3.0)                                                    | 176 (1.7)                                                   | 38 (0.4)                     |
| January 2021 | 11,314 (94.8)   | 390 (3.3)                                                    | 179 (1.5)                                                   | 47 (0.4)                     |
| February 2021 | 12,643 (94.9)  | 404 (3.0)                                                    | 235 (1.8)                                                   | 47 (0.4)                     |
| March 2021   | 13,673 (95)     | 479 (3.3)                                                    | 205 (1.4)                                                   | 43 (0.3)                     |

Data are presented as number (percentage).

<sup>a</sup> Includes participants who attempted conception in both the current month and the previous month; for example, the March 2020 row indicates participants who attempted conception in both February and March 2020.

<sup>b</sup> Includes participants who attempted conception in the current month but not the previous month; for example, the March 2020 row indicates participants who attempted conception in March 2020 but not in February 2020.

<sup>c</sup> Includes participants who attempted conception in the current month and reported that they conceived in the following month; for example, the March 2020 row indicates participants who attempted conception in March 2020 and reported that they were pregnant in April 2020.

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| Month         | Total N | Not college educated | College educated | Graduate school degree |
|--------------|---------|----------------------|------------------|------------------------|
| February 2020 | 2144    | 806 (37.6)           | 481 (22.4)       | 857 (40.0)             |
| March 2020    | 2890    | 1036 (35.8)          | 656 (22.7)       | 1198 (41.5)            |
| April 2020    | 3642    | 1293 (25.5)          | 806 (22.1)       | 1543 (42.4)            |
| May 2020      | 4039    | 1411 (34.9)          | 897 (22.2)       | 1731 (42.9)            |
| June 2020     | 4676    | 1631 (34.9)          | 1061 (22.7)      | 1984 (42.4)            |
| July 2020     | 5080    | 1767 (34.8)          | 1176 (23.1)      | 2137 (42.1)            |
| August 2020   | 5526    | 1921 (34.8)          | 1292 (23.4)      | 2313 (41.9)            |
| September 2020| 6013    | 2081 (34.5)          | 1407 (23.4)      | 2525 (42.0)            |
| October 2020  | 6128    | 2114 (34.2)          | 1456 (23.8)      | 2558 (41.7)            |
| November 2020 | 8711    | 2981 (34.0)          | 1956 (22.5)      | 3774 (43.3)            |
| December 2020 | 10,050  | 3418 (34.0)          | 2302 (22.9)      | 4330 (43.1)            |
| January 2021  | 11,314  | 3844 (34.0)          | 2694 (23.8)      | 4776 (42.2)            |
| February 2021 | 12,643  | 4354 (34.4)          | 3085 (24.4)      | 5204 (41.2)            |
| March 2021    | 13,673  | 4714 (34.5)          | 3394 (24.8)      | 5565 (40.7)            |

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### SUPPLEMENTAL TABLE 7

OR of attempting conception by month, overall and stratified by education

| Month          | Total OR (95% CI) | Not college educated OR (95% CI) | College educated OR (95% CI) | Graduate school degree OR (95% CI) |
|----------------|-------------------|----------------------------------|-------------------------------|----------------------------------|
| February 2020  | Ref (Ref)         | Ref (Ref)                        | Ref (Ref)                     | Ref (Ref)                        |
| March 2020     | 1.01 (0.94—1.08)  | 1.02 (0.91—1.14)                 | 0.96 (0.84—1.08)              | 1.07 (0.92—1.25)                 |
| April 2020     | 1.00 (0.90—1.12)  | 1.03 (0.88—1.22)                 | 0.90 (0.73—1.10)              | 1.10 (0.88—1.38)                 |
| May 2020       | 1.02 (0.89—1.15)  | 1.08 (0.89—1.31)                 | 0.88 (0.69—1.12)              | 1.08 (0.84—1.39)                 |
| June 2020      | 0.92 (0.80—1.06)  | 0.87 (0.70—1.07)                 | 0.86 (0.66—1.12)              | 1.12 (0.82—1.53)                 |
| July 2020      | 0.85 (0.73—1.00)  | 0.85 (0.69—1.05)                 | 0.73 (0.54—0.99)              | 1.04 (0.73—1.48)                 |
| August 2020    | 0.82 (0.70—0.97)  | 0.81 (0.65—1.02)                 | 0.71 (0.51—0.99)              | 1.05 (0.72—1.53)                 |
| September 2020 | 0.86 (0.73—1.02)  | 0.79 (0.63—1.00)                 | 0.77 (0.55—1.08)              | 1.21 (0.83—1.77)                 |
| October 2020   | 0.82 (0.69—0.97)  | 0.76 (0.59—0.96)                 | 0.73 (0.52—1.03)              | 1.19 (0.82—1.72)                 |
| November 2020  | 0.84 (0.71—0.99)  | 0.79 (0.63—1.00)                 | 0.75 (0.53—1.07)              | 1.17 (0.81—1.69)                 |
| December 2020  | 0.85 (0.72—1.00)  | 0.79 (0.63—0.99)                 | 0.85 (0.59—1.21)              | 1.10 (0.76—1.60)                 |
| January 2021   | 0.86 (0.73—1.02)  | 0.80 (0.64—1.01)                 | 0.90 (0.63—1.29)              | 1.04 (0.72—1.52)                 |
| February 2021  | 0.88 (0.74—1.04)  | 0.79 (0.63—0.99)                 | 0.93 (0.65—1.34)              | 1.14 (0.79—1.66)                 |
| March 2021     | 0.88 (0.74—1.04)  | 0.80 (0.64—1.01)                 | 0.91 (0.64—1.31)              | 1.16 (0.80—1.69)                 |

The data have been adjusted for age, race, and marital status.

CI, confidence interval; OR, odds ratio; Ref, reference.

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### SUPPLEMENTAL TABLE 9
Odds ratio of attempting conception during COVID-19 vs pre—COVID-19

| Variable                  | OR (95% CI)   | Model 1 \(^a\) | Model 2 \(^b\) |
|---------------------------|---------------|----------------|----------------|
| Pre—COVID-19 (February 2020) | Ref           | Ref            |                |
| During COVID-19           | 0.99 (0.91—1.07) | 0.98 (0.90—1.06) |       |

\(^a\) Adjusted for age, race, and marital status; \(^b\) Adjusted for age, race, marital status, sine, and cosine terms.

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SUPPLEMENTAL TABLE 10
Odds ratio of attempting conception at least once in quarter, closed cohort, including only first quarter of response to the Monthly Survey: Menstrual Update, overall and stratified by educational attainment

| Quarters<sup>a</sup> | Total OR (95% CI) | Not college educated OR (95% CI) | College educated OR (95% CI) | Graduate school degree OR (95% CI) |
|----------------------|------------------|----------------------------------|-------------------------------|---------------------------------|
| Q1 2020              | Ref              | Ref                              | Ref                           | Ref                             |
| Q2 2020              | 1.16 (0.95–1.43) | 1.12 (0.83–1.51)                 | 1.06 (0.72–1.55)              | 1.48 (0.95–2.32)                |
| Q3 2020              | 0.98 (0.79–1.22) | 1.00 (0.74–1.37)                 | 0.79 (0.52–1.18)              | 1.22 (0.77–1.93)                |
| Q4 2020              | 0.90 (0.75–1.07) | 0.94 (0.73–1.22)                 | 0.75 (0.54–1.04)              | 1.05 (0.71–1.56)                |
| Q1 2021              | 0.97 (0.81–1.15) | 0.97 (0.75–1.26)                 | 0.80 (0.59–1.09)              | 1.25 (0.87–1.81)                |
| Trend test           |                 | P=.13                            | P=.43                         | P=.06                           | P=.71                           |

Data have been adjusted for age, race, and marital status. Data have been restricted to the first quarter of the response to assess conception attempts at least once within each quarter. Participants were removed from all subsequent quarters to create 5 closed cohorts.

CI, confidence interval; OR, odds ratio; Ref, reference.

<sup>a</sup> Q1 2020 = quarter 1 2020 (January 2020 to March 2020); Q2 2020 = quarter 2 2020 (April 2020 to June 2020); Q3 2020 = quarter 3 2020 (July 2020 to September 2020); Q4 2020 = quarter 4 2020 (October 2020 to December 2020); Q1 2021 = quarter 1 2021 (January 2021 to March 2021).

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### SUPPLEMENTAL TABLE 11
Odds ratio of attempting conception at least once in quarter, closed cohort, including only first quarter of response to the Monthly Survey: Menstrual Update, overall and stratified by the MacArthur Scale of Subjective Social Status

| Quartersa | Total         | Low SSS      | Moderate SSS | High SSS     |
|-----------|---------------|--------------|--------------|--------------|
|           | OR (95% CI)   |              |              |              |
| Q1 2020   | Ref           |              |              |              |
| Q2 2020   | 1.16 (0.95−1.43) | 1.00 (0.67–1.51) | 1.27 (0.94–1.74) | 1.14 (0.77–1.68) |
| Q3 2020   | 0.98 (0.79–1.22)    | 0.97 (0.63–1.47) | 0.99 (0.71–1.38) | 0.96 (0.65–1.42) |
| Q4 2020   | 0.90 (0.75–1.07)    | 0.84 (0.59–1.19) | 1.00 (0.76–1.31) | 0.78 (0.56–1.09) |
| Q1 2021   | 0.97 (0.81–1.15)    | 0.92 (0.65–1.15) | 1.07 (0.82–1.39) | 0.86 (0.63–1.18) |

Trend test

|            | P=.13 | P=.43 | P=.78 | P=.11 |

The data have been adjusted for age, race, and marital status. The data have been restricted to the first quarter of the response to assess conception attempts at least once within each quarter. Participants were removed from all subsequent quarters to create 5 closed cohorts. The MacArthur Scale of SSS scores as low SSS (SSS score of 0–3), moderate SSS (SSS score of 4–5), and high SSS (SSS score of 6–9).

Ref, reference; SSS, Subjective Social Status.

a Q1 2020 = quarter 1 2020 (January 2020 to March 2020); Q2 2020 = quarter 2 2020 (April 2020 to June 2020); Q3 2020 = quarter 3 2020 (July 2020 to September 2020); Q4 2020 (October 2020 to December 2020); Q1 2021 (January 2021 to March 2021).

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### SUPPLEMENTAL TABLE 12
Comparison matrix between educational attainment and MacArthur Scale of Subjective Social Status

| MacArthur Scale of SSS | Not college educated (n=9689) | College educated (n=7141) | Graduate school degree (n=4786) |
|------------------------|-------------------------------|---------------------------|-------------------------------|
| n (%)                  |                               |                           |                               |
| Low                    | 3765 (38.9)                   | 1310 (18.3)               | 403 (8.4)                     |
| Moderate               | 4328 (44.7)                   | 3296 (46.2)               | 1830 (38.2)                   |
| High                   | 1596 (16.5)                   | 2535 (35.5)               | 2553 (53.5)                   |

The MacArthur Scale of SSS scores as low SSS (SSS score of 0–3), moderate SSS (SSS score of 4–5), and high SSS (SSS score of 6–9).

SSS, Subjective Social Status.

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