## BRIEF REPORTS

# Pandemic Birthing: Childbirth Satisfaction, Perceived Health Care Bias, and Postpartum Health During the COVID-19 Pandemic

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## Abstract

**Objective** To examine the impact of the COVID-19 pandemic on birth satisfaction and perceived health care discrimination during childbirth, and in turn, the influence of these birth experiences on postpartum health.

**Study Design** We conducted a cross-sectional, bilingual web survey of 237 women who gave birth at two hospitals in New York City and assessed patient-reported experience and outcomes following the first wave of SARS-CoV-2 infections in the New York region. We ascertained SARS-CoV-2 status at delivery from the electronic medical record using participant-reported name and date of birth. We compared birth experience during the COVID-19 pandemic (March 15, 2020–May 11, 2020) to a pre-pandemic response period (January 1, 2020–March 14, 2020). We estimated risk ratios for associations between birth experience and anxiety, depressive symptoms, stress, birth-related PTSD, emergency department visits, timely postpartum visit, and exclusive breastfeeding. Multivariable models adjusted for age, race-ethnicity, insurance, education, parity, BMI, previous experience of maltreatment/abuse and cesarean delivery.

**Results** Women who gave birth during the peak of the pandemic response, and those that were SARS-CoV-2 positive, Black, and Latina, had lower birth satisfaction and higher perceived health care discrimination. Women with lower birth satisfaction were more likely to report higher postpartum anxiety, stress, depressive symptoms, and lower exclusive breastfeeding. Experiencing one or more incident of health care discrimination was associated with higher levels of postpartum stress and birth-related PTSD.

**Conclusion** Hospitals and policy-makers should institute measures to safeguard against a negative birth experience during the ongoing COVID-19 pandemic, particularly among birthing people of color.

**Keywords** COVID-19 · SARS-CoV-2 · Birth experience · Health care discrimination · Race · Ethnicity · Postpartum mental health · Breastfeeding

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## Significance

Recent reports have documented the negative psychological impact of the COVID-19 pandemic among pregnant and postpartum women. Our findings add to this literature by examining the potential contribution of birth satisfaction and perceived healthcare discrimination on perinatal mental health. To our knowledge, this is the first report of perceived health care discrimination during the COVID-19 pandemic. We find birthing during the COVID-19 pandemic was associated with poor birth experience, which in turn was associated with postpartum anxiety, stress, depressive symptoms, birth-related PTSD and lower exclusive breastfeeding. A particularly negative influence was observed among SARS-CoV-2 positive women and women of color.

## Introduction

In March 2, 2020, the first SARS CoV-2 positive patient was discovered in New York, and the city and surrounding areas soon became the epicenter of the COVID-19 pandemic in the US (Tekbali et al., 2020). Labor and delivery and postpartum units rapidly evolved in response (Peña et al., 2020), instituting visitor restrictions, practice changes such as unavailability of nitrous oxide, and early postpartum discharge (Bornstein et al., 2020). In addition, most hospitals in New York City initiated universal screening for SARS-CoV-2 followed by isolation protocols (Bianco et al., 2020). These changes potentially influenced the childbirth experience and subsequently postpartum health (Dekel et al., 2019). The stay-at-home directive, "NY Pause," posed additional challenges for women caring for their newborns.

Birth experience is an essential dimension of quality of care that may influence both short-term and long-term women's health (Bossano et al., 2017). Two aspects of birth experience potentially affected by the COVID-19 pandemic are childbirth satisfaction (Martin & Martin, 2014), which is multifaceted but includes perceptions of stress and control, and perceived health care discrimination, which is the perception of differential treatment by clinicians (Attanasio & Kozhimannil, 2017). Recent reports have documented detrimental psychological impacts of the COVID-19 pandemic on pregnant and postpartum women (Ceulemans et al., 2020; Durankuş & Aksu, 2020; Parra-Saavedra et al., 2020; Zanardo et al., 2020). However, research is lacking on how the unprecedented changes in maternity care during the pandemic influenced birth experience, and if these experiences are associated with poorer postpartum health.

In a postpartum survey of women that gave birth at two New York City hospitals, our objective was to test if birth satisfaction and perceived health care discrimination worsened among women who delivered during the pandemic compared to a pre-pandemic comparison group. Our second objective was to examine associations between birth experience and postpartum health, including anxiety, depressive symptoms, stress, birth-related trauma, emergency department visits, timely postpartum visit, and exclusive breastfeeding.

## Materials and Methods

The coronaVirus Impact on Birth Equity (VIBE) Study is a cross-sectional bilingual electronic survey of patients who delivered in New York City. The IRB for the Icahn School of Medicine at Mount Sinai approved the study.
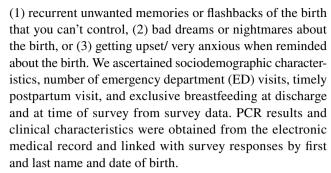
The study team obtained a limited data list of all women who delivered between January 1, 2020 and May 11, 2020 at two study hospitals (n = 4058) from the data warehouse of included institutions. We randomly sampled 25% of women who delivered prior to March 15 (n = 654) and retained all who delivered after March 15 (n = 1441). Exclusion criteria were birth date outside of included range, and inability to speak and read English, Spanish, Mandarin, or Bengali. Recruiters who were student volunteers or health care providers called 1960 patients, of whom 1,091 were contacted. 891 agreed to be sent the survey link by text message or email. 237 patients opened the link, filled out an e-consent form online, and completed the survey (27%). This percent is typical for postpartum web surveys (Harrison et al., 2020). Participants were similar in sociodemographic characteristics as our health system delivery population, suggesting minimal potential for selection bias. For example, respondents were similar in race-ethnicity (all deliveries vs. respondents = 12% vs. 9% Black, 17% vs. 15% Latina, 52% vs. 62% white, 12% vs. 15% Asian), and a similar proportion were insured by Medicaid (all deliveries vs. respondents = 18% vs. 16%). As an incentive to participate, we offered patients the opportunity to enter a raffle to win a $150 gift card if they completed the survey.

We classified deliveries between March 15, 2020 (when hospital visitor restrictions began), and May 11, 2020 as "peak." We classified deliveries from January 1, 2020 to March 14, 2020 as "pre-pandemic." On March 15, the study health system implemented a policy in which no support person was allowed to laboring persons. After two days, leaders changed the policy to allow one support person in the labor and delivery unit, but only during birth and recovery. A series of executive orders by New York State on March 28 and March 30 echoed this policy. On April 29, an executive order extended the amount of time a support person should be allowed on the postpartum unit to the duration of the birthing hospital stay, the health system changed its

policy accordingly. The order also specified that doulas are allowed to be present during labor and delivery as an additional support person. Universal testing for the presence of SARS-CoV-2 by reverse transcription polymerase chain reaction (PCR) tests performed on a nasopharyngeal swab began on March 26 (Bianco et al., 2020; Peña et al., 2020). SARS-CoV-2 positive women were isolated as were persons of unknown status until the results of the testing was known. Soon after, support persons who were tested and found positive prior to admission were not allowed to accompany the birthing person. Those who tested positive but were asymptomatic during labor were allowed to stay. Other pandemic-related practice changes which may have influenced patient experience and quality of care include discontinued use of nitrous oxide, early placement of epidural, mandatory rooming in of infants, and early discharge postpartum (day 1 following vaginal birth, day 2 following cesarean birth). Throughout the period of this study, no visitors (additional to a support person) were allowed.

Birth experience was assessed using the Birth Satisfaction Scale- Revised (BSS-R) and Discrimination in Medical Settings Scale (DMS). The BSS-R includes ten items to measure three domains of the birth experience: quality of care provision, women's personal attributes, and stress experienced during labor (Martin & Martin, 2014). We dichotomized the BSS-R at the median value, due to the positive skew distribution of the data. The Discrimination in Medical Settings (DMS) Scale asks a series of items regarding perceived treatment, e.g. "You were treated with less respect than other people", then asks "what do you think is the main reason for these experiences… race, ethnicity or national origin, insurance status", to which we added coronavirus status (Peek et al., 2011). We dichotomized the DMS as having experienced any discriminatory events vs. none. The General Anxiety Disorder-7 scale (GAD-7) is a brief self-reported questionnaire, validated both in the clinical and research setting for diagnosing generalized anxiety disorder (Löwe et al., 2008). The GAD-7 cut-off scores (total score ranges from 0 to 21) are classified as minimal anxiety (0–4), mild anxiety (5–9), moderate anxiety (10–14) and severe anxiety (15 and over). These criteria were collapsed to create a dichotomous variable: 'less anxious' (score of 0–9) and 'more anxious' (score of 10–21). We assessed depressive symptoms using the Patient Health Questionnaire (PHQ)-2, dichotomized using standard categories as 'not depressed' (score of 0–2) and 'depressive symptoms (score of 3–6) (Löwe et al., 2005). Stress was measured using the Perceived Stress Scale (PSS). PSS scores followed an approximate normal distribution and were dichotomized at the scale midpoint as 'less stressed' (score of 0–20) and 'more stressed' (score of 21–40) (Cohen et al., 1983). Birth-related PTSD was assessed by a respondent indicating 'yes' to any of the following three symptoms outlined in the DSM-V:

(1) recurrent unwanted memories or flashbacks of the birth that you can't control, (2) bad dreams or nightmares about the birth, or (3) getting upset/ very anxious when reminded about the birth. We ascertained sociodemographic characteristics, number of emergency department (ED) visits, timely postpartum visit, and exclusive breastfeeding at discharge and at time of survey from survey data. PCR results and clinical characteristics were obtained from the electronic medical record and linked with survey responses by first and last name and date of birth.

We used Chi-Square tests for bivariate analyses. To estimate the relative risk of postpartum health and quality of care outcomes by birth experience, we conducted multivariable Poisson regression using robust error variance and adjusting for age, race-ethnicity, insurance, education, parity, body mass index (BMI), nativity, and previous experience of abuse/maltreatment (proxy for mental health status). Analyses of birth satisfaction also adjust for cesarean delivery, given a significant association between birth satisfaction and cesarean delivery in the bivariate analysis. We conducted a complete case analysis (n = 149) and excluded women with missing values on covariates. Finally, to account for the gradual nature of the pandemic response, we performed a sensitivity analysis to classify the pre-peak period January 1 to March 7, 2020 and the peak period from March 15, 2020 to May 11, 2020. We used Stata version 15 for all analyses.

## Results

Most of the sample delivered during the peak pandemic response period (73.7%), and 11.9% tested positive for SARS-CoV-2 (N = 21), including two women who were reported as presumptive positive. About two-thirds (61.7%) of women were white, followed by Hispanic (14.5%), Asian (12.3%), Black (8.5%) and Other (3.0%). Of the seven who identified as "other", one was West Indian, one Indo-Caribbean, one Native Hawaiian/Pacific Islander, two described themselves as "mixed" or multiple categories without specification and two did not report.

In bivariate analyses, delivery during the COVID-19 pandemic "peak" and testing positive for SARS-CoV-2 were associated with lower birth satisfaction and higher perceived health care discrimination, although SARS-CoV-2 positivity and perceived discrimination was only marginally statistically significant (p = 0.063) (Table 1). Of women who delivered during the peak-pandemic response period (3/15/2020–5/11/2020), only 43.1% reported high birth satisfaction, compared to 58.6% in the pre-peak period (01/01/2020–3/14/2020). Similarly, a substantially higher proportion of women who reported at least one discriminatory event in medical care settings delivered in the peak, rather than pre-peak pandemic response period (42.5% vs.

**Table 1** Patient characteristics and childbirth experience among women who delivered in two New York City hospitals, January, 1 2020–May 11, 2020

| Indicator | Total sample (N = 237) | | Birth Satisfaction (N = 227) | | | Discrimination in Medical Settings Scale (N = 237) | | |
|---|---|---|---|---|---|---|---|---|
| | Total N[a] | Percent (%) | % Low birth satisfaction | % High birth satisfaction | P-value[b] | % No event | % At least one event | P-value[b] |
| SARS-CoV-2 exposure | | | | | | | | |
| Delivery in pre-peak/peak pandemic response | | | | | | | | |
| Pre-peak (1/1/2020–3/14/2020) | 58 | 26.3 | 41.4 | 58.6 | 0.042 | 85.0 | 15.0 | < 0.001 |
| Peak (3/15/2020 -5/11/2020) | 168 | 73.7 | 56.9 | 43.1 | | 57.5 | 42.5 | |
| SARS-CoV-2 status[c] | | | | | | | | |
| Negative | 155 | 88.1 | 52.6 | 47.4 | 0.019 | 63.9 | 36.1 | 0.063 |
| Positive / Presumptive positive | 21 | 11.9 | 82.4 | 17.7 | | 42.9 | 57.1 | |
| Patient characteristics (mother) | | | | | | | | |
| Age group | | | | | | | | |
| 19–24 | 7 | 3.0 | 14.3 | 85.7 | 0.059 | 71.4 | 28.6 | 0.617 |
| 25–29 | 27 | 11.6 | 72.0 | 28.0 | | 59.3 | 40.7 | |
| 30–34 | 90 | 38.8 | 55.6 | 44.4 | | 70.0 | 30.0 | |
| 35–39 | 85 | 36.6 | 48.2 | 51.8 | | 60.0 | 40.0 | |
| 40–49 | 23 | 9.9 | 47.8 | 52.2 | | 69.6 | 30.4 | |
| Race-ethnicity | | | | | | | | |
| Hispanic | 34 | 14.5 | 58.6 | 41.4 | 0.465 | 64.7 | 35.3 | 0.054 |
| Black | 20 | 8.5 | 63.2 | 36.8 | | 60.0 | 40.0 | |
| White | 145 | 61.7 | 48.3 | 51.7 | | 67.6 | 32.4 | |
| Asian | 29 | 12.3 | 57.1 | 42.9 | | 72.4 | 27.6 | |
| Other | 7 | 3.0 | 71.4 | 28.6 | | 14.3 | 85.7 | |
| Education | | | | | | | | |
| Not college graduate | 37 | 15.7 | 52.3 | 47.7 | 0.831 | 56.8 | 43.2 | 0.221 |
| College graduate or higher | 198 | 84.3 | 54.3 | 45.7 | | 67.2 | 32.8 | |
| Number of previous live births[d] | | | | | | | | |
| None | 103 | 50.5 | 60.4 | 39.6 | 0.123 | 60.1 | 39.8 | 0.470 |
| One | 75 | 36.8 | 45.8 | 54.2 | | 61.3 | 38.7 | |
| Two or more | 26 | 12.8 | 45.8 | 54.2 | | 73.1 | 26.9 | |
| Body mass index (pre-pregnancy) | | | | | | | | |
| Underweight (< 18.5) | 6 | 2.7 | 66.7 | 33.3 | 0.007 | 66.7 | 33.3 | 0.866 |
| Normal weight (18.5–24.9) | 144 | 63.7 | 49.0 | 51.1 | | 66.7 | 33.3 | |
| Overweight (25.0–29.9) | 47 | 20.8 | 42.6 | 57.5 | | 63.8 | 36.2 | |
| Obese (30.0–39.9) | 29 | 12.8 | 81.5 | 18.5 | | 58.6 | 41.4 | |
| Employment | | | | | | | | |
| Unemployed looking for work | 16 | 6.8 | 73.3 | 26.7 | 0.093 | 50.0 | 50.0 | 0.180 |
| Employed/ not seeking work | 218 | 93.2 | 50.9 | 49.1 | | 66.5 | 33.5 | |
| Nativity | | | | | | | | |
| US born | 165 | 70.2 | 51.2 | 48.8 | 0.494 | 64.2 | 35.8 | 0.523 |
| Foreign born | 70 | 29.8 | 56.3 | 43.8 | | 68.6 | 31.4 | |
| Insurance status | | | | | | | | |
| Public or no insurance | 37 | 16.0 | 60.0 | 40.0 | 0.330 | 64.9 | 35.1 | 0.927 |
| Private insurance | 195 | 84.1 | 51.1 | 49.0 | | 65.6 | 34.4 | |
| Delivery characteristics | | | | | | | | |
| Cesarean section delivery[d] | | | | | | | | |
| No | 118 | 69.4 | 49.6 | 50.4 | 0.005 | 57.6 | 42.4 | 0.809 |
| Yes | 52 | 30.6 | 73.1 | 26.9 | | 59.6 | 40.4 | |

**Table 1** (continued)

| Indicator | Total sample (N=237) | | Birth Satisfaction (N=227) | | | Discrimination in Medical Settings Scale (N=237) | | |
|---|---|---|---|---|---|---|---|---|
| | Total N[a] | Percent (%) | % Low birth satisfaction | % High birth satisfaction | P-value[b] | % No event | % At least one event | P-value[b] |
| Pre-term birth (<37 weeks)[d] | | | | | | | | |
| No | 158 | 93.5 | 56.2 | 43.8 | 0.285 | 58.2 | 41.8 | 0.811 |
| Yes | 11 | 6.5 | 72.7 | 27.3 | | 54.6 | 45.5 | |

[a]n of some covariates do no not total 237 due to missing data

[b]Chi-Square test

[c]SARS-CoV-2 status defined from PCR test results (if available) using medical record data, or self-reported results (if no record); percentages are of the total women tested

[d]Based on medical record data

15.0%). Women with detected SARS-CoV-2 infection were less likely to report high birth satisfaction than women without a detected infection (17.7% vs. 47.4%). Cesarean delivery and BMI were also associated with lower birth satisfaction, but not perceived discrimination. Only 26.9% of women who had cesarean delivery reported high birth satisfaction, compared to 50.4% of those who had vaginal delivery. A lower proportion of women who were underweight (33.3%) and obese (18.5%) reported high satisfaction relative to normal or overweight women (51.1% and 57.5%). Age was marginally associated with birth satisfaction, with women aged 25–29 reporting the lowest satisfaction of all age groups. Perceived healthcare discrimination was highest among women who identified as 'Other' (85.7%), followed by those who were Black (40.0%), and Latina (35.3%). Perceived discrimination was lowest among white (27.6%) and Asian (32.4%) women. Perceived discrimination was also non-significantly higher among unemployed women (50.0%) than employed women or women not seeking work (33.5%).

Sensitivity analyses defining the end of the "pre-" period earlier in March produced similar results. For example, perceived discrimination in medical settings was higher in the peak vs. pre-peak pandemic response (42.5% vs. 15.0%, $p<0.001$ in reported results; 42.1% vs. 14.3%, $p<0.001$ in sensitivity analysis), and high birth satisfaction was less frequent among women who gave birth in the peak vs. pre-peak response period (43.1% vs. 58.6%, $p=0.042$ in reported results; 43.9% vs. 57.4%, $p=0.082$ in sensitivity analysis).

Higher birth satisfaction was associated with lower postpartum anxiety and birth-related PTSD (Table 2). Higher perceived health care discrimination was similarly associated with greater postpartum stress and birth-related PTSD. In the multivariable analyses, higher birth satisfaction was associated with lower risk of anxiety, perceived stress, depressive symptoms and higher exclusive breastfeeding at discharge and follow-up (Table 3). Notably, birth-related PTSD could not be analyzed in the multivariable analysis

due to perfect prediction: no women who reported birth-related PTSD symptoms also reported high birth satisfaction.

Experiencing any discrimination in medical settings was associated with higher perceived stress and birth-related PTSD symptoms (Table 3). Of those who reported perceived discrimination during their birth experience (multiple responses possible), main reasons were predominately related to the Covid-19 pandemic (Table 4). These included stressed or overworked staff due to increased demands on hospital staff during the pandemic (33.3%) and Covid-19 positive status or staff fear of the patient having Covid-19 (25.9%). When examining the reasons for differential treatment by race-ethnicity, 60% of Asian women, 38% of Black women, 25% of Latina women, and 2% of White women attributed the treatment to race, ethnicity, or national origin (Table 4).

## Discussion

Our study provides new evidence that the COVID-19 pandemic in NYC had a negative influence on birth experience, particularly among SARS-CoV-2 positive women and women of color. Women with poor birth experiences were more likely to report higher postpartum anxiety, stress, depressive symptoms, and birth-related PTSD. Women with poor birth experiences also reported lower exclusive breastfeeding at discharge as well as later in the postpartum period.

Recent reports have documented the psychological impact of the COVID-19 pandemic among pregnant and postpartum women, including increased incidence of depression and anxiety (Ceulemans et al., 2020; Durankuş & Aksu, 2020; Parra-Saavedra et al., 2020; Zanardo et al., 2020). Additionally, a report from Spain observed associations between giving birth during the pandemic with poorer birth experience and postpartum depression (Mariño-Narvaez et al., 2020). Our findings add to this literature by demonstrating

**Table 2** Association of birth experiences with postpartum outcomes among women who delivered in two New York City hospitals, January, 1 2020–May 11, 2020

| Postpartum outcomes | Birth Satisfaction (N = 227) | | | | Discrimination in Medical Settings Scale (N = 237) | | | |
|---|---|---|---|---|---|---|---|---|
| | n[a] | % Low birth satisfaction | % High birth satisfaction | P-value[b] | n[a] | % No event | % At least one event | P-value[b] |
| **Postpartum mental health indicators** | | | | | | | | |
| *Generalized Anxiety Disorder (GAD-7)* | | | | | | | | |
| Less anxious | 191 | 49.7 | 50.3 | 0.047 | 198 | 67.2 | 32.8 | 0.383 |
| More anxious | 37 | 67.6 | 32.43 | | 40 | 60.0 | 40.0 | |
| *Perceived Stress Scale (PSS)* | | | | | | | | |
| Less stressed | 157 | 49.0 | 51.0 | 0.115 | 160 | 70.6 | 29.4 | 0.009 |
| More stressed | 66 | 60.6 | 39.4 | | 70 | 52.9 | 47.1 | |
| *Patient Health Questionnaire (PHQ2)* | | | | | | | | |
| Not depressed | 210 | 51.4 | 48.6 | 0.212 | 216 | 65.3 | 34.7 | 0.940 |
| Depressed | 13 | 69.2 | 30.8 | | 14 | 64.3 | 35.7 | |
| *Birth-related PTSD* | | | | | | | | |
| No symptoms | 206 | 47.6 | 52.4 | <0.001 | 216 | 69.0 | 31.0 | 0.002 |
| At least one symptom | 22 | 100.0 | 0.0 | | 22 | 36.4 | 63.6 | |
| **Postpartum quality of care indicators** | | | | | | | | |
| *Timely postpartum health visit (virtual or in-person)* | | | | | | | | |
| Not timely (>6 weeks or no visit) | 45 | 42.2 | 57.8 | 0.177 | 45 | 68.9 | 31.1 | 0.459 |
| Timely (within 6 weeks) | 170 | 53.5 | 46.5 | | 170 | 62.9 | 37.1 | |
| *ED visit (mother) since birth* | | | | | | | | |
| 0 times | 214 | 52.1 | 47.9 | 0.508 | 215 | 64.2 | 35.8 | 0.712 |
| 1+ times | 13 | 61.5 | 38.5 | | 13 | 69.2 | 30.8 | |
| *Exclusive breastfeeding at hospital discharge* | | | | | | | | |
| No | 118 | 53.4 | 46.6 | 0.661 | 118 | 57.6 | 42.4 | 0.036 |
| Yes | 106 | 50.5 | 49.5 | | 107 | 71.0 | 29.0 | |
| *Exclusive breastfeeding at follow-up* | | | | | | | | |
| No | 102 | 53.9 | 46.1 | 0.599 | 102 | 60.8 | 39.2 | 0.360 |
| Yes | 122 | 50.4 | 49.6 | | 123 | 66.7 | 33.3 | |

[a] Denominators do not total to column heading for some variables due to missing data from participant non-response

[b] Chi-Square test

**Table 3** Unadjusted and adjusted risk ratios for associations of birth experiences with postpartum outcomes among women who delivered in two New York City hospitals, January, 1 2020–May 11, 2020

| Birth experience | Generalized anxiety disorder | | Perceived Stress | | Depressive symptoms | | Any birth PTSD symptoms | | Timely postpartum health visit within 6 weeks | | ER visit (mother) since birth | | Exclusive breastfeeding at hospital discharge | | Exclusive breastfeeding at follow-up | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unadjusted | RR (95 CI) | P-value | RR (95 CI) | P-value | RR (95 CI) | P-value | RR (95 CI) | P-value | RR (95 CI) | P-value | RR (95 CI) | P-value | RR (95 CI) | P-value | RR (95 CI) | P-value |
| Birth satisfaction | | | | | | | | | | | | | | | | |
| High | 0.3 (0.1, 0.8) | 0.012 | 0.5 (0.3, 0.9) | 0.016 | 0.2 (0.02, 1.2) | 0.070 | 1—Omitted | | 0.9 (0.8, 1.1) | 0.265 | 0.5 (0.1, 2.4) | 0.368 | 1.4 (1.0, 2.0) | 0.048 | 1.4 (1.0, 1.8) | 0.028 |
| Low | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | |
| Discrimination in medical settings | | | | | | | | | | | | | | | | |
| Any | 1.6 (0.7, 3.5) | 0.239 | 3.0 (1.6, 5.4) | <0.001 | 1.7 (0.5, 6.0) | 0.437 | 3.7 (1.2, 11.0) | 0.021 | 1.0 (0.9, 1.2) | 0.797 | 1.0 (0.2, 4.3) | 0.996 | 0.8 (0.6, 1.1) | 0.189 | 0.9 (0.6, 1.2) | 0.314 |
| None | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | |
| Adjusted | aRR* (95 CI) | P-value | aRR (95 CI) | P-value | aRR (95 CI) | P-value | aRR (95 CI) | P-value | aRR (95 CI) | P-value | aRR (95 CI) | P-value | aRR (95 CI) | P-value | aRR (95 CI) | P-value |
| Birth satisfaction | | | | | | | | | | | | | | | | |
| High | 0.3 (0.1, 0.7) | 0.010 | 0.4 (0.2, 0.8) | 0.008 | 0.1 (0.03, 0.7) | 0.015 | 1—Omitted | | 1.0 (0.8, 1.1) | 0.530 | 0.4 (0.1, 1.7) | 0.192 | 1.4 (1.0, 2.0) | 0.050 | 1.4 (1.1, 1.9) | 0.020 |
| Low | 1.0 | | 1.00 | | 1.00 | | 1.00 | | 1.00 | | 1.00 | | 1.00 | | 1.00 | |
| Discrimination in medical settings | | | | | | | | | | | | | | | | |
| Any | 1.4 (0.7, 3.1) | 0.351 | 3.1 (1.7, 5.7) | <0.001 | 1.3 (0.3, 5.5) | 0.724 | 3.2 (1.1, 9.4) | 0.033 | 1.0 (0.9, 1.2) | 0.8992 | 1.2 (0.3, 4.7) | 0.747 | 0.8 (0.5, 1.1) | 0.161 | 0.9 (0.7, 1.2) | 0.375 |
| None | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | 1.0 | |

*aRR=adjusted risk ratio; 95 CI=95% confidence interval; Models adjust for age, race/ethnicity, education, insurance status, nativity, previous number of live births, body mass index, history of abuse/maltreatment and cesarean delivery (birth satisfaction model only). N=149 is based on complete case analysis

**Table 4** Main reasons for being treated differently as reported in the Discrimination in Medical Settings Scale (of those who report any discrimination)

| Reason | Percent (%) | Total N (N=81) | Latina % (N=12) | Black % (N=8) | White % (N=47) | Asian % (N=8) | Other % (N=6) |
|---|---|---|---|---|---|---|---|
| COVID-19 positive | 16.0 | 13 | 8.3 | 62.5 | 10.6 | 0.0 | 0.0 |
| Race/ethnicity or national origin | 16.0 | 13 | 25.0 | 37.5 | 2.1 | 62.5 | 16.7 |
| Insurance status | 2.5 | 2 | 8.3 | 0.0 | 0.0 | 0.0 | 16.7 |
| Other (respondent specified) | 74.1 | 60 | 75.0 | 37.5 | 83.0 | 50.0 | 100.0 |
| Main reasons for 'others' | | | | | | | |
| Stress/overworked staff (due to Covid-19) | 33.3 | 27 | 25.0 | 12.5 | 34.0 | 25.0 | 16.7 |
| Fear of patient having SARS-CoV-2 | 9.9 | 8 | 16.7 | 0.0 | 4.3 | 0.0 | 50.0 |
| Medical staff inexperience/ personality | 6.2 | 5 | 8.3 | 25.0 | 12.8 | 0.0 | 0.0 |
| Don't know | 8.6 | 7 | 8.3 | 0.0 | 8.5 | 12.5 | 16.7 |
| Other or not stated | 16.0 | 13 | 16.7 | 0 | 23.4 | 12.5 | 16.7 |

Multiple responses possible

the potential contribution of birth experience on these detrimental perinatal mental health effects of the pandemic. Our study identifies birth-related PTSD as an additional concern. Our study also suggests that the degree of dissatisfaction and discrimination experienced during birth may influence the likelihood of negative mental health outcomes.

Policies to protect women, newborns, and healthcare workers, such as limiting visitors and isolation, may have unintended consequences on birth experience and postpartum health (Jago et al., 2020). Our data support this hypothesis. Further, women who were SARS-CoV-2 positive, and therefore more likely to experience stress and isolation, reported poorer birth satisfaction and more incidents of health care discrimination. This finding supports the assertion that SARS-CoV-2 testing measures must be implemented with concern for potential stigma (Earnshaw et al., 2020).

Our finding that Black and Latina women were more likely to report perceived health care discrimination during childbirth fuels concerns that the co-pandemics of COVID-19 and racism may exacerbate existing racial-ethnic disparities in adverse maternal outcomes (Howell et al., 2020; Lemke & Brown, 2020). Women of color are more likely to be infected with SARS-CoV-2 during pregnancy (Emeruwa et al., 2020), suffer from higher risk of COVID-19 disease and adverse outcomes (Woodworth et al., 2020), and experience higher rates of COVID-19 pandemic stress and anxiety (Gur et al., 2020; Preis et al., 2020). Reduced childbirth satisfaction and increased healthcare bias could add to these risks.

Perceived health care discrimination and its impact on maternal health outcomes is a relatively unexplored area of research. To our knowledge, this is the first report of perceived health care discrimination during the COVID-19 pandemic. We found Black, Latina and Asian women were more likely to report race, ethnicity, or national origin as a reason for differential treatment. However, we had insufficient sample size to explore if associations between health care discrimination and postpartum outcomes differed for this subgroup. Further, a sizeable proportion of women indicated they did not know the reason for differential treatment, or listed some other reason, suggesting the measure we used may not have adequately captured perceived health care discrimination in the obstetric context. Future research on the measurement health care bias in the maternal health context is needed.

Our study has several limitations. Our survey was cross-sectional so poor mental health postpartum could influence perceptions of birth experience. Unmeasured factors associated with poor birth experience and poor postpartum health may account for the reported associations. Another important point is that we do not know if the change in birth experience we report during the pandemic is actually reasonable, and represents a strong effort on the part of institutions to mitigate the unprecedented circumstances and stress of the emerging pandemic. Without these efforts, the change in birth experience may have been much greater, and thus more devastating to birthing people. Strengths of our study include a pre-pandemic comparison group and strong validated measures. Our findings are likely generalizable to other large, urban hospitals.

## Conclusion

We report decreased childbirth satisfaction and increased perceived healthcare bias during the COVID-19 pandemic, and in turn, worse postpartum health. Hospitals and policy-makers should institute measures to safeguard against

a negative birth experience during the ongoing COVID-19 pandemic, particularly among birthing people of color.

**Data Availability** Requests for data may be sent to the corresponding author.

**Code availability** Requests for code may be sent to the corresponding author.

## Declarations

**Conflict of interest** The authors report no conflicts of interest.

**Ethical Approval** Ethical approval from the Institutional Review Board for the Icahn School of Medicine at Mount Sinai was obtained prior to data collection.

**Consent to Participate** All research subjects provided written informed consent prior to study participation.

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