



Unexpected changes in birth experiences during the COVID-19 pandemic: Implications for maternal mental health

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Abstract

Purpose This study examined the rates of unexpected birth experiences due to the COVID-19 pandemic and its association with women's postpartum mental health symptoms (depression, generalized anxiety, and PTSD).

Methods Our cross-sectional analysis included postpartum women ($N = 506$) who reported on birth plan changes attributed to the COVID-19 pandemic through the PEACE (Perinatal Experiences and COVID-19 Effects) Study, an online survey that took place between May 2020 and May 2021. Covariates included sociodemographic variables, number of days since the pandemic, pre-pregnancy mental health history, and protective factors such as social support, distress tolerance, and resilience.

Results Prevalent COVID-19 pandemic changes in the birth experience included not having support people (e.g., partners and friends) permitted to participate in the baby's delivery (33.5%), reduced access to preferred medications before or after delivery (9.7%), unavailable health care providers for the baby's birth as planned (9.6%), and other changes (13.8%). The reduced access to medications was associated with those reporting higher levels of depressive ($\beta = .10, p < .01$) and PTSD symptoms ($\beta = .07, p < .05$). Separation from their baby for a long period after delivery ($\beta = .10, p < .05$) and other changes ($\beta = .10, p < .01$) were associated with higher levels of PTSD symptoms.

Conclusion Unexpected changes to the birth experience due to the COVID-19 pandemic may have small but persistent effects on depressive and PTSD symptoms. Given increased vigilance and its association with subsequent PTSD, acknowledging any fear of viral contagion within the hospital setting but informing women the plans for ensuring safety may be preventive for later mental health symptomatology.

Keywords Birth plans · Depression · Generalized anxiety · PTSD · Separation · Social support

Introduction

The coronavirus (COVID-19) pandemic and the mitigation of its spread have led to unprecedented changes in healthcare around the world. The shifts in guidelines for patient care have had a tremendous impact on women, with the number of births for the U.S. in 2020 being 3.6 million [1]. To date, much of the research has focused on understanding the virus transmission from the mother to the infant and its impacts on

maternal physical health, with emerging research on the psychosocial experiences of childbirth during a pandemic [2–4].

The vast majority of population-level assessments of perinatal anxiety and depression in the past year and a half have highlighted negative impacts of the COVID-19 pandemic on maternal mental health, with clinically significant anxiety reported in the range of 34–71% [5–8] and clinically significant depressive symptoms in 34–43% among mothers [5–9], with the highest rates being documented in Europe and North America [5]. The COVID-19 pandemic has been shown to affect peripartum women in myriad ways, including the cancelation of labor and delivery preparation classes [10], the cancelation of prenatal appointments [8, 11], and decreases in exercise and quality of life due to quarantine [10].

A major concern is the effect of unexpected birth experiences on maternal well-being. One survey study on over one thousand U.S. pregnant women from April 16 to 20,

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2020 found that 42.2% of women had birth plan changes, with more than half attributing such changes to their own concerns (53.9%), and information provided by their medical providers (60.8%) [12]. Among these were changes in the planned hospital experience (shortening the hospital stay, altering pain management, or wearing a mask). As well, infection control measures such as the requirement to quarantine or restrictions to the presence of support people at birth have been a major source of concern for pregnant women [12, 13]. Concerns about the initial location of the birth due to fears of contagion or being unable to have support persons present at birth have led some women to pursue alternative birth plans, including home births [14, 15].

Maternal well-being includes having a “positive childbirth experience” [16], which is characterized by an experience that meets the women’s expectations for the birthing process. This includes giving birth to a healthy child under clinically and psychologically safe conditions [17] to support the mother–infant bonding process. The decisions for meeting such expectations and the actual experience itself are related to subsequent maternal well-being [18]. For example, under non-pandemic conditions, women who reported that their birth plans were followed were at lower risk for experiencing PTSD symptoms at 4–6 week postpartum [19]. Dissatisfaction in the birth process is linked to postpartum depression at 3–4 weeks, with unexpected disruptions during birth and inadequate support being a source of such dissatisfaction [20]. Although the maternal experience at birth plays an integral part in subsequent maternal mental health outcomes, the threat to the desired experience because of the pandemic, and its subsequent impact on mental health outcomes are largely unknown at this time.

The purpose of this study was to examine the rates of unexpected birth experiences due to the COVID-19 pandemic, and importantly, determine whether these experiences predicted women’s postpartum mental health symptoms (depression, generalized anxiety, and PTSD). Our present analysis focuses on postpartum women to capture reported changes that took place at birth. We also incorporated psychosocial protective factors to determine the contributing role of pre-pregnancy mental health conditions and concurrent social support, distress tolerance, and resilience on our outcomes [21].

Methods

Participants

This cross-sectional study investigated potential associations between unexpected changes in the birth experience due to the COVID-19 pandemic and postpartum mental health outcomes (depressive, anxiety, and PTSD symptoms). To

accomplish this, we used data collected between May 21, 2020 and May 24, 2021 ($N = 506$) through the Perinatal Experiences and COVID-19 Effects (PEACE) study [22]. Eligible participants had to be over the age of 18, had given birth in the prior 6 months, and residing in the U.S. Recruitment was performed via email listservs, social media, word of mouth, and Facebook groups. After obtaining informed consent, prospective participants who met eligibility criteria were asked to complete a 30- to 40-min online survey administered through REDCAP. The survey included standardized measures used for evaluating mental health outcomes and maternal psychological factors and social support, and included questions pertaining to maternal demographics, mental health history, and unexpected birth experiences. Study participants were not compensated for their participation. Multiple attention checks and human verification steps were included throughout the survey to safeguard data quality. Data were further inspected for potential response irregularities. The Institutional Review Board at Mass General Brigham approved all study procedures.

Measures

Predictors

Pre-pregnancy mental health diagnoses

Pre-pregnancy mental health conditions were obtained based on the self-report of participants given their association with postpartum mental health [23]. Participants were inquired about depressive disorder, generalized anxiety disorder (GAD), and post-traumatic stress disorder (PTSD) diagnoses predating pregnancy. Participants were presented with four options: ‘Yes, diagnosed and treated’, ‘Yes, diagnosed but not treated’, ‘Suspected, but not diagnosed’, and ‘No’. For each of the three conditions, a binary variable was generated in which those who had been diagnosed formed one group irrespective of treatment status and all other participants formed another; diagnoses were not treated as mutually exclusive.

Instrumental social support

To assess instrumental social support, the Two-Way Social Support Scale was used [24]. This self-report 4-item measure assesses support from the last 2 weeks such as “I have someone to help me if I am physically unwell,” and “There is someone who would give me financial assistance.” Participants were asked to indicate their response using a scale of 0–5 with 0 being ‘Not at all’ and 5 being ‘Always.’ Responses were summed and the higher sum scores reflected more instrumental support. The scale has shown

good internal consistency across studies ($\alpha = .81-.86$) [24–26], as well as good predictive validity with well-being measures and incremental validity with other social support measures [24]. The Cronbach's alpha for this scale was .80.

Distress tolerance

Participants were asked to complete the Distress Tolerance Scale [27], a 15-item measure that evaluates participants' ability to withstand and cope with emotional distress. Items include "Being distressed or upset is always a major ordeal for me," and "I'll do anything to stop feeling distressed or upset." This measure relies on a 5-point scale, ranging from 1 'strongly agree' to 5 'strongly disagree.' The mean was calculated with higher scores indicating greater distress tolerance. DTS has demonstrated convergent and discriminant validity, and has found to be reliable in prior published studies [27, 28]. The Cronbach's alpha for this scale was .93.

Resilience

To assess psychological resilience, the 10-item Connor-Davidson Resilience Scale (CD-RISC-10) was used [29]. With items such as "I can deal with whatever comes my way" and "I think of myself as a strong person when dealing with life's challenges and difficulties," the CD-RISC assesses one's ability to cope with adverse experiences. Participants indicated how they felt in the past month on a 5-point scale, with 0 indicating 'not true at all' and 4 indicating 'true nearly all the time.' The scores were summed which reflected greater resilience. Adequate internal consistency of $\alpha = .85-.89$ is shown for the CD-RISC-10 across studies [30, 31]. The Cronbach's alpha for this scale was .90.

Unexpected birth experiences

Unexpected birth experiences were captured using a 9-item list that allowed participants to indicate with a checkbox which changes to their birth plan, if any, occurred as a result of the COVID-19 outbreak. These items were adapted from the Epidemic-Pandemic Impacts Inventory Labor and Delivery Supplement (EPII-LD) [32]. The items inquired about alterations to the delivery including location, modality, assigned healthcare provider, medications, and limitations of support persons, as well as both short-term and long-term separations from the baby after birth. Respondents could affirm multiple changes if relevant and an option for 'Other' was also included. All participants were additionally provided the opportunity to elaborate in free text regarding the details of their birth plan change(s).

Outcomes

Depression symptoms

Participants' self-reported depressive symptomatology was evaluated using the Center for Epidemiologic Studies- Depression (CES-D) scale [33]. This measure is composed of 20 items that inquire about neurovegetative symptoms as well as feelings of worthlessness, hopelessness, and low mood over the past week. Four available response options indicated frequency of each experience, ranging from 'Rarely or none of the time (less than 1 day)' to 'Most or all of the time (5–7 days)'. Measure items were summed and higher sum scores reflected increased subjective depressive symptoms, with a potential score range from 0 to 60. The alpha value for the CES-D has been shown to be .85–.90 across studies [33–35]. The Cronbach's alpha for this scale was .90.

Anxiety symptoms

Participants' self-reported symptoms of generalized anxiety were evaluated using the Generalized Anxiety Disorder Scale (GAD-7) [36]. This measure is composed of 7 items that inquire about experiences such as restlessness, worry, irritability, and dread over the past 2 weeks. Four available response options indicated the frequency of each experience, ranging from 'Not at all' to 'Nearly every day'. Measure items were summed and higher sum scores reflected increased subjective anxiety, with a potential score range from 0 to 21 [37]. Reliability of the scale has been shown with $\alpha = .89-.92$ across studies [36, 38]. The Cronbach's alpha for this scale was .91.

PTSD symptoms

Participants' self-reported PTSD symptoms were evaluated using the PTSD Checklist-Civilian Version (PCL-C) [39]. This measure is composed of 17 items that inquire about experiences such as nightmares, flashbacks, avoidance, and hypervigilance. Five available response options indicated the subjective distress caused by each item over the past month, ranging from 'Not at all [bothered]' to 'Extremely'. Measure items were summed and higher sum scores reflected increased stress, with a potential score range from 0 to 68. The PCL-C has shown promising internal consistency with Cronbach's alpha of .83–.96 [40, 41]. The Cronbach's alpha for this scale was .92.

Covariates

Sociodemographic characteristics

Maternal characteristics including age, educational level, and household income were asked. Women were also asked

if they were living with a partner and whether this was their first pregnancy. Infant age was obtained as well as whether the infant was admitted to the NICU at birth [42].

Duration of pandemic

Pandemic duration was calculated as the difference between the date of the declaration of COVID-19 as a pandemic in the United States (March 13, 2020) and the participant's survey start date. Duration was reported in days. The variable was assessed to examine the potential evolution in experiences over the course of the pandemic.

Data analytic plan

We examined potential risk and protective factors for depressive, GAD, and PTSD symptoms using a hierarchical multiple regression model. Each mental health condition was regressed on sociodemographic characteristics and covariates (Block 1), self-reported pre-pregnancy diagnoses of depression, GAD, and PTSD (Block 2), psychosocial factors (Block 3), and unexpected birth experiences due to the COVID-19 pandemic (Block 4). Preliminary analyses indicated that maternal age, race, education, and income, as well as duration of the pandemic were not significantly associated with outcomes and therefore removed in subsequent blocks to conserve statistical power. Given the sample size and the number of comparisons, we employed a Bonferroni correction; therefore, significance was based on differences meeting a threshold of at least $p < .001$, with an alpha set at .05 and a total of 51 comparisons. Power analyses calculated through G*Power indicated power at 90% with a sample size of 506. We used SPSS 27.0 statistical software to perform all analyses.

Results

The sociodemographic characteristics of our study sample are presented in Table 1. The average age of the participants was 33.1 years. The large majority were White (89.5%), had at least a college education (91.3%), and a household income over \$75,000 (87.6%). Almost all the women reported cohabitating with their partner (98.1%). This was the first pregnancy for 41.9% of the women. Among the women, 11.5% had an infant admitted to the NICU and 8.0% had infants who were born premature (<37 weeks). The infants were, on average, 9.4 weeks of age at the time the survey was administered. The date when women completed the survey ranged from 69 to 419 days (average = 150.2 days) after March 13, 2020, the date with which the pandemic was declared as a national emergency in the U.S. Among this sample, 15.0% reported a diagnosis of depression, 23.3%

Table 1 Demographic characteristics from the PEACE Study, data collected between May 21, 2020 and May 24, 2021

Predictors	Means (range) or %
Infant age (weeks)	9.38 (0–28.0)
Maternal age (years)	33.1 (20.0–50.0)
Maternal race	
White	89.5%
Black or African American	0.6%
Hispanic or Latino	4.0%
Asian and Pacific Islander	3.4%
Maternal education	
Less than college	9.7%
College	28.1%
Masters	44.5%
Doctorate	17.8%
Household income (USD/year)	
< \$74,999	12.4%
\$75,000–149,999	41.0%
\$150,000–224,999	27.6%
≥ \$225,000	19.0%
Relationship	
Cohabitating with partner	98.6%
Not cohabitating	1.4%
First pregnancy	
No	58.1%
Yes	41.9%
NICU admissions	
No	88.5%
Yes	11.5%
Pandemic duration (days)	150.2 (69.0–419.0)
Pre-pregnancy mental health history	
Depression diagnosis	15.0%
Generalized anxiety diagnosis	23.3%
PTSD diagnosis	4.0%

N = 506

reported a diagnosis of GAD, and 4.0% reported a diagnosis of PTSD.

Table 2 displays the means of the key mental health symptoms and psychosocial experiences used in our analysis. As well, we present the rates of unexpected birth experiences due to COVID-19 pandemic, as reported by the participant. From our sample, 45.8% reported that support people were not permitted to attend the baby's delivery. Among our sample, 13.2% and 12.1% reported reduced access to preferred medications before or after delivery (i.e., nitrous oxide and epidural), and that their health care provider (e.g., doctor, doula, and midwife) was not available for the baby's birth as planned, respectively. A smaller percentage of women reported other events including the change from vaginal birth to induction or C-section (5.9%), a change in the

Table 2 Maternal mental health and other psychosocial experiences from the PEACE Study, data collected between May 21, 2020 and May 24, 2021

Key variables	Means (SD) or %
Mental health symptoms	
Depression (CES-D)	13.0 (9.4)
< 16	67.4%
≥ 16	32.6%
Generalized anxiety (GAD-7)	6.4 (5.2)
< 10	77.3%
≥ 10	22.7%
Post-traumatic stress disorder (PCL-C)	30.0 (11.9)
< 45	87.5%
≥ 45	12.5%
Psychosocial experiences	
Instrumental social support	17.9 (3.2)
Distress tolerance scale global	3.6 (0.8)
Resilience (CD-RISC)	28.1 (6.2)
Birth plan changes due to COVID-19	
Reduced access to preferred medications before or after delivery (i.e., nitrous oxide and epidural)	13.2%
Change to planned delivery location	4.3%
My elective induction or C-section was not permitted as planned	1.2%
My elective vaginal birth changed due to induction or C-section	5.9%
My health care provider (e.g., doctor, doula, and midwife) was not available for my baby's birth as planned	12.1%
Support people (e.g., partners and family) were not permitted to attend baby's delivery	45.8%
I was separated from baby immediately after delivery	3.6%
I was separated from baby for a long period after delivery (e.g., my baby was quarantined in the hospital nursery)	2.6%
Other	17.0%

N = 506

location for delivery (4.3%), being separated from the baby immediately after delivery (3.6%), being separated from baby for a long period after delivery (2.6%), and changes in planned elective induction or C-section was not permitted (1.2%). We also note that 17.0% indicated other changes, which the participant could describe in free form. These largely consisted of COVID-19-related restrictions involving no visitors after delivery, partners who were unable to leave and return to the hospital, and limited hospital personnel during labor and delivery.

Table 3 shows the associations between the key predictors and depressive, generalized anxiety, and PTSD symptoms. Infant age and having an infant admitted to the NICU were significantly positively associated with GAD symptoms. For all three outcomes, these infant characteristics and pre-pregnancy mental health diagnoses accounted for a statistically significant portion of the total variance (7.1% to 11.0%). When considering psychosocial experiences, we observed that higher levels of reported instrumental social support, distress tolerance, and resilience were all significantly associated with lower levels of depressive, generalized anxiety,

and PTSD symptoms. Finally, specific unexpected birth experiences due to the COVID-19 pandemic were associated with depressive and PTSD symptoms. Reduced access to preferred medications before or after delivery was associated with higher levels of depressive symptoms ($B = .136$, $p < .0002$). Other changes ($B = .134$, $p < .0002$) were associated with higher levels of PTSD symptoms.

Discussion

Throughout the pandemic, obstetric and other perinatal providers that manage maternal distress in pregnancy, childbirth, and postpartum (e.g., psychiatrists, psychologists, social workers, nurses, midwives, doulas, etc.) have been faced with responding to the maternal distress experienced by women during pregnancy and in childbirth. Their response has been critical as prenatal stress is a major risk factor for maternal mental health [43, 44]. Our study is aimed at providing information about the obstetrical experiences that might be a risk to maternal well-being.

Table 3 Multiple regression predicting depressive, generalized anxiety, and PTSD symptoms based on infant characteristics, pre-pregnancy mental health diagnoses, and psychosocial experiences

Blocks of variables entered in three steps	Depression			Generalized anxiety			PTSD		
	Total score			Total score			Total score		
	<i>B</i>	<i>R</i> ²	ΔR^2	β	<i>R</i> ²	ΔR^2	β	<i>R</i> ²	ΔR^2
1. Covariates		0.013	.013		0.022	0.022		0.051	0.051***
Infant age	−0.028			0.041**			0.115 [†]		
NICU admission (ref = no)	0.054			0.078*			0.076		
2. Pre-pregnancy mental health history		0.091	.077***		0.071	0.049**		0.110	0.059***
Depression diagnosis	0.031			−0.050			−0.017		
Generalized anxiety diagnosis	−0.026			0.056**			−0.017		
PTSD diagnosis	0.079			0.033			0.111		
3. Psychosocial experiences		0.490	.400***		0.364	0.303***		0.384	0.274***
Instrumental social support	−0.243***			−0.155***			−0.239***		
Distress tolerance	−0.309***			−0.385***			−0.359***		
Resilience	−0.310***			−0.188***			−0.120		
4. Birth plan changes due to COVID-19		0.529	.038**		0.371	0.018		0.440	0.055***
Reduced access to preferred medications before or after delivery (i.e., nitrous oxide and epidural)	0.136**			0.042			0.077		
Change to planned delivery location	0.058			−0.004			−0.027		
My elective induction or C-section was not permitted as planned	0.002			−0.017			−0.030		
My elective vaginal birth changed due to induction or C-section	0.042			0.053			0.060		
My health care provider (e.g., doctor, doula, and midwife) was not available for my baby's birth as planned	0.018			−0.009			0.039		
Support people (e.g., partners and family) were not permitted to attend baby's delivery	0.062			0.071			0.048		
I was separated from baby immediately after delivery	0.027			0.021			0.076		
I was separated from baby for a long period after delivery (e.g., my baby was quarantined in the hospital nursery)	−0.004			0.029			0.080		
Other	0.092			0.088			0.134**		

Model does not include maternal race due to multicollinearity

N = 506, [†]*p* < .002, **p* < .001, ***p* < .0002, ****p* < .00001

Among our respondents, the most prevalent pandemic-based changes in the birth experience were that support people (partners and family members) were not permitted to attend the baby's delivery, with nearly half of the participants reporting this change in their birth experience. Consistent with published reports, there was also frequent mention of not being able to have visitors after the birth among those who had indicated other changes [14]. That this occurred for women in our study reinforces the common anticipated stresses among pregnant women, as described among the few existing studies that have examined unexpected changes in the birth experiences or changes in birth plans during the pandemic [12]. Our survey responses also indicate an endorsement of other, less frequent changes

(< 15% of respondents), including those pertaining to the lack of access to preferred medication or the lack of an available provider at birth, and even fewer, changes pertaining to elective births, delivery location, or changes that led to the separation between the mother and baby.

At least one in eight women from our sample reported reduced access to preferred medicines before or after delivery. It is intriguing that not receiving the desired medication was associated with increased depressive symptoms in the postpartum period. While epidural anesthesia during labor is neither a risk factor nor a protective factor against postpartum depression [45–47], unmatched expectations of medications during labor have been demonstrated to result in higher rates of postpartum depression [48, 49]. Relative

risk of postpartum depression appears to be higher both for those who intended to deliver with epidural anesthesia during labor, but did not receive it [49], as well as those who intended not to deliver with epidural anesthesia but ultimately received it [48, 49]. Given that the survey language of the present study inquired about both epidural anesthesia and pain management alternatives to an epidural, both these experiences may have contributed to the association seen in our data between changes in intended pain management and higher levels of depressive and PTSD symptoms.

Contrary to expectations, not having a support person during birth was not associated with greater mental health symptoms. However, those who indicated “other” changes in their experience had higher levels of PTSD symptoms, and interestingly, the changes described by participants included many free responses referring to hospital guidelines that limited visitors after delivery or limited hospital personnel during labor and delivery. The voluntary free responses recalled by the women when inquired about the changes to the birth experience likely represent a salient birth experience for women. This observed association potentially reflects the importance of available support after delivery, and how pandemic-related impediments to key supports (e.g., restrictions in visitor policies) during the hospital stay may exert effects on postpartum mental health. Complementary research on the topic has further supported that birth support person changes are associated with increased rates of depression and anxiety, as are disruptions to prenatal care and changes to childcare during labor [50]. Although, in general, not having a support person was not associated with postpartum effects in our data, specific experiences that were easily recalled by women may have an enduring effect on PTSD symptoms, including not having consistent support at birth and delivery [51, 52].

Perceived separations at birth in which the infant was quarantined away from the mother for a long period were also not associated with postpartum mental health symptoms. While extensive research detailing the negative effects on infants of maternal separation has been conducted, relatively little has examined the converse experience for the mother [53]. For instance, prolonged maternal–infant separation immediately after delivery in the context of a pandemic has been studied in the setting of a tuberculosis outbreak in Finland, but focused only on psychiatric consequences to children [54]. Yet, 2–10 day separation after delivery for non-life-threatening neonatal health concerns has been perceived as a maternal trauma characterized by feelings of loss, powerlessness, and lack of control [55]. The timeframe of a COVID-19 quarantine may be especially challenging, as a non-pandemic-based study comparing the effects of different lengths of maternal–infant separation after delivery reported that mothers in dyads separated 10–24 days experienced the highest levels of distress and mental preoccupation

with the infant [56]. We note that our assessment did not quantify the length of time for such a quarantine which is a study limitation. Additional information regarding the circumstances of the separation is warranted in future research as specific features of separation as well as its perception as a potential stressful or traumatic experience may be linked to mental health outcomes.

It is also worth commenting on other observed associations in our data. Those with a pre-pregnancy diagnosis of GAD were more at risk for postpartum anxiety symptoms. A pre-pregnancy diagnosis of PTSD was highly associated with increased PTSD symptoms consistent with prior work, showing that individuals with a trauma history or with PTSD are at risk for post-traumatic stress after childbirth [57–59]. As well, social support, resilience, and distress tolerance appeared to be protective factors for postpartum mental health in our sample, reinforcing its protective effect on mental health in general [60–63].

Despite these risk and protective factors, our analysis indicates that certain changes in the birth experience due to the COVID-19 pandemic may have small but persistent effects on depressive and PTSD symptoms. Consistent with work under non-pandemic conditions, unexpected changes during birth and delivery in general have been associated with depression [17, 64] and PTSD with such outcomes occurring not only following births that result in medical complications for the infant but among deliveries with healthy infant outcomes [57]. Experiencing unexpected changes at childbirth can lead women to feel powerless, and without communication or reassurance about the circumstances, women may feel uninformed about these changes. Unmet expectations can bring about disappointment [65]. These negative experiences, even among women with healthy deliveries, may be particularly heightened given the COVID-19 pandemic, contributing to subsequent depressive and post-traumatic distress over time [64]. It appears from our study that the risks from the changes in birth experiences, as assessed by our survey, do not confer risks to symptoms across all domains, thus possibly providing reassurance that these experiences do not result in risks to generalized anxiety.

The study has several limitations. We relied on the self-reported experiences of childbirth and the postpartum period which is prone to recall bias. Reported experiences such as mental health history or childbirth experiences were not confirmed by a provider. The survey provided little information regarding circumstances of the unexpected changes to the birth experience. A number of these changes could have been initiated by the women or the provider [12], and this could have had a role on mental health. Greater specificity regarding the items would have been preferable; for instance, it would have been ideal to make distinct the specific support people who were unable to attend the birth, given the

potential differential effects on outcomes based on partner or family member. Single items to assess the specific changes in the birth experience were used, as no standardized measure was available in determining COVID-19-based changes. We were also unable to confirm whether some of the reported birth plan changes were indeed attributable to the pandemic versus other reasons; for example, a change in the mode of delivery (induced vaginal or cesarean section) could have also been related to obstetric indications rather than the pandemic itself. The cross-sectional design limits us in any interpretations regarding causality; longitudinal research is necessary to determine the directionality between changes in the birth experiences and mental health outcomes. The characteristic of the sample, which is predominantly White, highly educated, and financially well off based on reported income levels, is an additional shortcoming that prevents us from generalizing to the general population, especially as birth plans may be more prevalent among Whites compared to other racial/ethnic groups [66]. Future analyses focused on racial/ethnic minority and disadvantaged groups will be needed to determine if the changes to the birth experience changes similarly predict similar outcomes. For instance, negative impacts have been documented among the prenatal experiences among Black women during non-pandemic and pandemic times, with links to mental health concerns [67–69]. Given our findings, we would expect stronger links in the association between prenatal care changes and mental health outcomes among non-White populations. If true, our findings suggest that we channel our energies to address prenatal changes to mitigate against mental health concerns across communities of color.

When considering the clinical implications, it should be noted that in preparing for childbirth during the COVID-19 pandemic, women have reported feeling stressed about the experience. These stresses are not unwarranted; our study demonstrates that women have faced unexpected birth experiences and that such changes due to the COVID-19 pandemic are a risk factor for postpartum mental health. The specific childbirth experiences, particularly those that are unexpected, as well as the subsequent postpartum concerns have the potential to contribute to problems in maternal bonding. For these reasons, identifying risk factors related to unexpected birth experiences is informative; the circumstances surrounding a birth can provide opportunities for preventing or minimizing postpartum depression and PTSD. Similarly, identifying women who are more set in their vision of childbirth and working proactively to develop psychological flexibility prior to delivery may help moderate their distress if the birth does not proceed according to their plans. Additionally, given that pre-pregnancy mental health was associated with postpartum mental health, screening and addressing mental health concerns during preconception

planning and pregnancy are likely to be helpful in preventing an exacerbation of symptoms postpartum.

As part of the shared decision-making regarding a woman's preferences for their birth experience, women should be informed of the latest hospital guidelines and any possible changes that might take place during labor and delivery from medication delivery to available partner support. It should be acknowledged that policies vary widely between hospitals (e.g., visitation), and this together with other patient goals, wishes, and circumstances should be carefully weighed given their impacts on psychosocial experiences and when deciding on the course of care for patients. Particular care should be taken among individuals who are historically marginalized or underrepresented to ensure that these conversations are comprehensive, culturally sensitive, in their preferred language, and cover topics including their emotional health [70]. Given increased vigilance and its association with subsequent PTSD [59], acknowledging any fear of viral contagion within the hospital setting and developing collaborative safety plans through shared decision-making in keeping with institutional policies may be preventive for later mental health symptomatology. These strategies help women to anticipate the possible changes due to the pandemic that are aligned with the shared goal for a woman to have a positive birth experience. Empowering and supporting women are all the more necessary given the uncertainty that characterizes the COVID-19 pandemic.

Obstetric providers may also work with psychiatric consultants, psychologists, or counselors to obtain training on distress tolerance to be delivered at the bedside. As well, postpartum services may need to be expanded for patients giving birth during the pandemic, with additional support from mental health providers, including but not limited to perinatal psychiatrists who are well equipped to help women understand the nature of their mental health response in response to childbirth during this time. Other professionals included psychologists, counselors, and clinical social workers focused on therapy may also help expand access to mental health support for women for whom psychotherapeutic rather than psychopharmacologic intervention is preferred, and to continually engage other perinatal providers (nurses, midwives, and doulas) in identifying and supporting those in distress. These strategies altogether have the potential to reduce the birth-related postpartum mental health concerns during a pivotal public health crisis.

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Declarations

Conflict of interest There are no conflicts of interest to declare for any author.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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