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Risk Factors for Depression, Anxiety, and PTSD Symptoms in Perinatal Women during the COVID-19 Pandemic

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Abstract

Background: Pregnant women and women who recently gave birth are vulnerable to COVID-19-related psychosocial stresses.

Methods: We assessed COVID-19-related health worries and grief, and current mental health symptoms (depression, generalized anxiety, and PTSD) in 1,123 U.S. women during the COVID-19 pandemic (May 21 to August 17, 2020) through a cross-sectional study design.

Results: Among our respondents, 36.4% reported clinically significant levels of depression, 22.7% for generalized anxiety, and 10.3% for PTSD. Women with pre-existing mental health diagnoses based on their self-reported history were 1.6-to-3.7 more likely to score at clinically significant levels of depression, generalized anxiety, and PTSD. Approximately 18% reported high levels of COVID-19-related health worries and were 2.6-to-4.2 times more likely to score above the clinical threshold for mental health symptoms. Approximately 9% reported high levels of grief and were 4.7-to-5.5 times more likely to score above the clinical threshold for mental health symptoms.

Conclusions: Perinatal women with pre-existing mental health diagnoses show elevated symptoms during the COVID-19 pandemic. Although causation cannot be inferred, COVID-19-related health worries and grief experiences may increase the likelihood of mental health symptoms among those without pre-existing mental health concerns. Providers should develop strategies for addressing health-related worry and grief within their practice.

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Cindy Liu: Conceptualization, Methodology, Formal analysis, Investigation, Writing- original draft, Writing – Review and Editing, Project administration, Supervision, Funding acquisition

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Conflict of Interest

There are no conflicts of interest to declare.

Keywords

stress; women's health; pregnancy; postpartum; worry

1. Introduction

The COVID-19 pandemic has disrupted the lives of millions worldwide, with the death rate approaching 200,000 within the U.S as of September 2020 (Chappell, 2020). Beyond the direct effects of the disease, everyday routines and the marking of major life milestones have been dramatically altered for almost all Americans for much of 2020, with this experience characterized by heightened stress due to the uncertainty of the current situation (Estes and Thompson, 2020; Preis et al., 2020; Satici et al., 2020). There now exists evidence of the impact of the COVID-19 pandemic on mental health and overall psychological functioning among different segments of the population (Liu et al., 2020c; Rajkumar, 2020; Rodríguez-Rey et al., 2020; Wang et al., 2020), with documented increases in the levels of depression, anxiety, and PTSD and endorsements of anger and fear (Mertens et al., 2020; Trnka and Lorencova, 2020). Several commentaries by experts as well as the accumulation of research pertaining to the psychological effects of the COVID-19 pandemic point to concerns regarding its impact on vulnerable populations (Druss, 2020; Holmes et al., 2020; Liu et al., 2020a; Pfefferbaum and North, 2020), suggesting that those with certain socio-demographic backgrounds or of a certain age may be disproportionately affected by the pandemic.

Among those vulnerable to the stress effects from the COVID-19 pandemic are pregnant women and women who recently gave birth (Caparros-Gonzalez and Alderdice, 2020; Ceulemans et al., 2020; Thapa et al., 2020). In general, approximately 10–20% of women suffer from mental health concerns during the perinatal period (National Institute for Health and Care Excellence, 2020). Although the experience of pregnancy and of becoming a mother may be positively regarded, the perinatal period is a time fraught with increased risk for emotional complications including psychological distress as well as symptoms of depression, anxiety and trauma related disorders - all of which can be exacerbated with increased stress (George et al., 2013; Liu et al., 2016; Liu and Tronick, 2014).

The conditions of the COVID-19 pandemic are likely to produce additional stress for perinatal women (Berthelot et al., 2020). Concerns about the risk of infection during pregnancy and in the postpartum period, and transmission to the infant and other family members have been documented (Panahi et al., 2020; Preis et al., 2020). Given physical distancing and quarantine guidelines, the modalities and delivery of routine prenatal care have been altered and access to a variety of different perinatal professionals and caregivers (doulas, nighttime nurses) may be disrupted or not possible (Onwuzurike et al., 2020). While physical distancing guidelines have impeded access for social support across populations, it may be acutely felt by pregnant and postpartum women, especially after birth when caregiving and other social support is much needed by the family (Ali and Shahil Feroz, 2020; Farewell et al., 2020). Furthermore, the experiences of loss may be particularly acute during this time (Bertuccio and Runion, 2020; Zhai and Du, 2020); women may feel grief from losing the shared experience of important birth and postpartum routines such as being

unable to have a support person during labor and delivery or being unable to have in-person visits from friends and family.

The transitional nature of the perinatal period makes it an even more vulnerable time for those who report a history of mental health – referred here as individuals with pre-existing mental health problems - in the absence of other major life stress (Forray et al., 2010; Giardinelli et al., 2012; Heron et al., 2004; Jones et al., 2014). Accordingly, we would expect that perinatal women who also have a pre-existing mental health diagnosis would be more likely to experience an exacerbation of psychiatric symptoms during a pandemic due in part to the convergence of multiple stressors as described above. Moreover, for those with a history of mental health problems, the pandemic may have impeded their ability to continue or to seek treatment as needed. Of concern are those with a history of mood and anxiety disorders, given the prevalence of these disorders in the perinatal population (Fairbrother et al., 2016, 2015). Aside from the need to alleviate maternal distress, mood and anxiety symptoms that occur during pregnancy and in the postpartum period have been linked to subsequent maternal and infant outcomes (Madigan et al., 2018; Munhoz et al., 2017; O'Connor et al., 2016; Tietz et al., 2014). The potential for such consequences highlights the importance of understanding the contributors to maternal psychiatric distress among perinatal women during the COVID-19 pandemic.

This study sought to determine if health worries due to COVID-19 and grief from experiences of loss because of COVID-19 would be associated with higher levels of depression, generalized anxiety, and PTSD symptoms among perinatal U.S. women during the COVID-19 pandemic. The Perinatal Experiences and COVID-19 Effects Study (PEACE, www.peacestudy2020.com) is an online survey study that was launched to track the mental health and well-being of pregnant and postpartum women within the U.S. during the COVID-19 pandemic. In addition to describing the sample of women who participated in our study, we tested the hypothesis that respondents who endorsed higher levels of COVID-19 related health worries and grief experiences would be more likely to report above the clinical thresholds for depression, generalized anxiety, and PTSD symptoms during the pandemic. Unique to this study is our examination of symptoms among women with pre-existing mental health conditions, and our accounting of pre-existing mental health in understanding the association between COVID-19 related worries and grief on current mental health symptoms.

2. Methods

2.1. Study population

The present cross-sectional study assessed potential psychosocial risks for maternal perinatal mental health and experiences based on preliminary PEACE 2020 data collected from women ($N = 1061$) during May 21, 2020 to August 5, 2020. Eligible participants included U.S. women over the age of 18 starting from the second trimester of pregnancy and those who had given birth in the past six months. Recruitment of participants occurred primarily online via email distribution lists, social media, and dissemination via word of mouth (i.e., list serves and Facebook groups). Women were told that the purpose of the survey was to "learn more about the effects of COVID-19 on women during the perinatal period

(pregnancy and postpartum),” as it pertained to “stress, well being, resilience, and social support during this unprecedented time.”

After providing informed consent, qualifying participants were invited to complete a 30- to 40-minute online REDCAP survey which included standardized measures for assessment of COVID-19-related experiences, family-social risk, resilience, perceived relationship with fetus/infant, and health outcomes. Human verification and attention checks were implemented throughout the survey to ensure data quality. A total of four study staff further inspected data visually for response irregularities. Such irregularities included a series of survey completions that occurred within a short time frame (e.g., minutes of one another) that had the same responses, nonsensical language, or had similar email addresses. These patterns were indicative of programmed responses or bots and therefore removed prior to analyses. All study procedures were approved by the Institutional Review Board at Mass General Brigham.

2.2. Measures

2.2.1. Risk and protective factors—COVID-19 pandemic related health worries were assessed using four items that assessed worry about COVID-19 affecting one’s health and the health of family and friends. These items were obtained from the Coronavirus Health Impact Survey (CRISIS; Merikangas et al., 2020). Participants were asked to indicate how worried they were about contracting the virus, their friends and family becoming infected, and their physical and mental health being influenced by COVID-19 on a scale of 1 to 5, with 1 being *not at all* and 5 being *extremely*. Cronbach’s alpha for measure items was 0.85, indicating very good reliability. Items were summed to create a total score reflecting COVID-19-related health worries. Binary scores were created after calculating sum scores. Instead of using the sample characteristics to categorize our data (e.g., mean, median, tertile or quartile split), the cutoff score used for the COVID-related health worries was based on standard cutoffs from previous research, with scale response descriptors to determine the cutoffs. Thus, the score for COVID-19 worries was calculated with scores ≥16; those who endorsed “very” or “extremely” worried on average were recoded as having “high” levels of worry and the remainder of responses recoded as “low” levels of worry.

Maternal feelings of grief and perceived loss of meaningful experiences during the COVID-19 pandemic were assessed utilizing a six-item measure previously used by other colleagues (Liu et al., 2020b), as well as one item specific to the perinatal period. Several items were adapted from the Inventory of Complicated Grief to capture (Prigerson et al., 1995). The measure included assessment of feelings regarding lost experiences due to COVID-19 pandemic and associated public health measures, such as missing out on significant life events, limited support of family and friends due to social distancing, and loss of resources. Questions explored emotions such as feeling stunned or dazed over what happened, feeling that life is empty, feeling bitter over loss in daily routines and activities, and feeling sad for being unable to fully celebrate the pregnancy and/or birth of their child with loved ones to better understand maternal grief feelings unique to the COVID-19 era. Participants indicated the extent to which they agreed with these statements on a scale of 1 to 5, with 1 being *strongly disagree* and 5 being *strongly agree*. Cronbach’s alpha for

measure items was 0.78, indicating good reliability. A sum score of these seven items was calculated, with higher scores reflecting higher levels of grief. Consistent with the approach for creating a binary score for COVID-19 related health worries based on scale response descriptors, a binary score was calculated for COVID-19 related grief with scores ≥28 referring to those who "agreed' or "strongly agreed" to grief experiences. These individuals were recoded as having "high" levels of grief, with the remainder of respondents recoded as those with "low" levels of grief.

2.2.2 Outcomes—Participants' depression symptoms were assessed using the 20-item scale The Center for Epidemiologic Studies-Depression (CES-D; Radloff, 1977). Response options included: rarely or none of the time (less than 1 day); some or a little of the time (1–2 days); Occasionally or a moderate amount of the time (3–4 days), and most or all of the time (5–7 days). To create a dichotomous variable, a cutoff score of ≥16 was used with high scores indicating clinically significant symptoms of depression (Radloff, 1977).

Maternal anxiety symptoms were captured through the Generalized Anxiety Disorder Scale (GAD-7; Spitzer et al., 2006), a widely-used measure which evaluates the frequency of anxiety symptoms over the past two weeks on a scale of 0 to 3, with 0 being "not at all" and 3 being "nearly every day." Total scores can range from 0-to-21. Similar to other studies (Plummer et al., 2016), we recorded responses dichotomously based on a cutoff score of 10 or higher to determine clinical significant levels of anxiety.

The PTSD Checklist—Civilian Version (PCL-C) is a validated 17-item measure which we utilized to assess for maternal PTSD symptoms (Weathers et al., 1993). Responses sought to elicit how much participants were bothered by problems in response to stressful life events in the past month, with 1 as "not at all" and 5 as "extremely." Item scores were added and created into a dichotomous variable with a cutoff score of 45, as indicated by the measure's psychometric properties and as suggested by the National Center for PTSD (Blanchard et al., 1996).

2.2.2 Covariates—We relied on one's self-reported history of mental health concerns to determine pre-existing mental health conditions. Specifically, depression, generalized anxiety disorder, and PTSD diagnoses that took place before the pregnancy were included as covariates in the model. Mothers were asked to indicate any previous diagnoses of depression, generalized anxiety, and/or PTSD by a mental health professional. The options for response included *"No"*; *"Suspected, but not diagnosed"*; *"Yes, diagnosed but not treated"*; and *"Yes, diagnosed and treated."* From there, a binary variable for each condition was created (past depression diagnosis, past generalized anxiety diagnosis, and past PTSD diagnosis) by combining *"Suspected, but not diagnosed"* with *"No",* and other options into "*Diagnosed*" for each mental health diagnosis. The diagnoses were not mutually exclusive, that is, women previously diagnosed with depression could also have had a diagnosis of anxiety or PTSD.

We calculated an additional variable to represent the number of days between the date COVID-19 was formally declared a pandemic in the US (March 13, 2020) and the date the

participant began the survey. We included this covariate in the analyses, to account for possible changes in the respondent's experience based on duration of the pandemic.

2.2.3 Statistical Analyses—The variables were inspected and found to be normally distributed, with independent variables indicating acceptable levels of collinearity (VIF < 5). A series of unadjusted and adjusted logistic regression models were performed to examine the associations between COVID-19 related concerns (health worries and grief) with depression, anxiety, and PTSD symptoms. Adjusted models included sociodemographic variables (maternal age, race, education, income, cohabitation arrangement, whether this was mother's first pregnancy), the date they completed the survey, and any endorsement of having a pre-existing mental health diagnosis of either depression, generalized anxiety disorder, or PTSD. All analyses were performed using SPSS 26.0. Given the need to incorporate the covariates as well as the psychiatric symptoms, we included only women who had completed the survey in its entirety.

3. Results

Table 1 displays the demographic characteristics of our survey respondents. Among our respondents, 54.2% were pregnant and the remaining were within the postpartum period (≤6 months) with infants being at 11.6 weeks of age on average, and 7.9% born premature (<37 weeks); 42.4% indicated that their pregnancy was their first. The large majority of women were White (89.9%), and at least college educated (92.1%), and living with their spouse or partner (98.0%). Approximately 45.0% of the women had a household income of $150,000 and above. The average survey response took place between 3–4 months after the designation of COVID-19 as a pandemic (March 13, 2020).

Table 2 shows the proportions of individuals who endorsed mental health concerns. Among respondents, 17.5% reported having had a depression diagnosis before pregnancy, 24.5% reported having a diagnosis of generalized anxiety, and 4.1% reported having a diagnosis of PTSD. Among our participants, 36.4% reported clinically significant symptoms of depression from over the past week, 22.7% reported clinically significant symptoms of generalized anxiety from the past two weeks, and 10.3% reported clinically significant symptoms of PTSD from the past month. Finally, 18.2% of women reported COVID-19-related health worries that indicated that they were, on average "very" or "extremely" worried. Among respondents, 8.8% reported COVID-19 related grief indicating that they, on average, "agreed" or "strongly agreed" to specific experiences of grief.

Table 3 reports the likelihood of clinically significant symptoms of depression, generalized anxiety, and PTSD in the unadjusted model. The adjusted models include sociodemographic variables, the date they completed the survey, and any endorsement of having any pre-existing mental health diagnosis of depression, generalized anxiety, or PTSD. Pre-existing diagnoses of depression and generalized anxiety were significantly associated with a greater likelihood of clinically significant symptoms of depression (depression: OR=1.91, CI=1.30–2.81, p<.01; generalized anxiety: OR=1.58, CI=1.12–2.22, p<.01) and a diagnosis of generalized anxiety was significantly associated with a greater likelihood of clinically significant anxiety and PTSD symptoms (anxiety: OR=2.74, CI=1.88–4.00, p<.001, PTSD:

OR=1.73, CI=1.05–2.85, p<.05). A pre-existing diagnosis of PTSD was significantly associated with generalized anxiety and PTSD symptoms (generalized anxiety: OR=1.73, CI=1.05–2.85; PTSD: OR=3.73, CI=1.76–7.90, p<.01).

In the same models, the endorsement of high levels of COVID-19 health worries was significantly associated with clinically significant symptoms of depression, anxiety and PTSD (depression: OR=3.41, CI=2.42–4.81, p<.001; generalized anxiety: OR=4.23, CI=2.99–6.08, p<.001; PTSD: OR=2.56, CI=1.62–4.06, p<.001). High levels of COVID-19-related grief was significantly associated with clinically significant levels of depression, generalized anxiety, and PTSD symptoms (depression: OR=4.82, CI=2.91–8.00, p<.001; generalized anxiety: OR=4.75, OR=2.95–7.62, p<.001; PTSD: OR=5.45, CI=3.26–9.10, p<.001).

4. Discussion

This study is among the first to report maternal mental health experiences among a perinatal sample of U.S. women and to show the extent to which pre-existing mental health based on self-reported history, and COVID-19-related health worries and grief contribute to mental health symptomatology from May 21 to August 5, 2020.

Approximately one out of three women from our study reported clinically significant levels of depression (36.4%). Our rates of depression are higher than the generally accepted prevalence of up to 20% for perinatal depression (O'Hara and Wisner, 2014). Our scores based on the CES-D appear to be higher than U.S. based perinatal samples before the pandemic. For example, in a sample of U.S. women, 24% of pregnant and 16% postpartum women had probable depression (Goyal et al., 2010), and among a largely Hispanic sample of postpartum women, 33% scored in the probable depression range (Gress-Smith et al., 2012). However, our scores were comparable to probable depression rates based on CES-D scores from a Canadian sample of women with 0–18 month old children (33.2%), which were obtained during the pandemic from mid to late April of 2020 (Cameron et al., 2020).

In our study, one out of five reported above the clinical thresholds for generalized anxiety (22.7%), and one out of ten reported clinically significant levels of PTSD (10.3%). In comparison to studies conducted during COVID-19 using the GAD-7, our rate was lower than that of a study on Canadian women (36.2%) with 0–18 month old children (Cameron et al., 2020), and of another study on a general population of U.S. young adults (45.4%; Liu et al., 2020c). However, our rates were higher than a sample of Belgian women that were assessed during the pandemic, where 14% of both pregnant and postpartum women scored above the threshold for generalized anxiety (GAD-7 ≥10; Ceulemans et al., 2020). Fewer studies conducted during the COVID-19 pandemic have examined PTSD symptoms using the PCL-C, however our rate of 9.9% was much lower than the 31.8% rate obtained among U.S. young adults from April to May of 2020 (Liu et al., 2020c). The observed differences in our depression, anxiety, and PTSD rates may be attributable to sample variations across studies, as well as varying assessment time points within studies on the perinatal period or during the COVID-19 pandemic. Our findings add to the growing literature on mental health rates during the pandemic. Together, with the other studies conducted so far, it appears that

depression rates may be elevated during the COVID-19 pandemic for U.S. perinatal women more so than anxiety or PTSD.

As expected, our data showed that pregnant and postpartum women with pre-existing mental health diagnoses were more likely to score above clinical threshold based on reported experiences of depression, anxiety, and PTSD during the COVID-19 pandemic. Our goal was to identify the extent of this association. Individuals with a pre-existing diagnosis of depression were almost two times more likely to report clinically significant levels of depression, and individuals with a pre-existing diagnosis of PTSD were more than three times more likely to report clinically significant PTSD symptoms. Those who had a pre-existing diagnosis of generalized anxiety disorder were almost three times more likely to report clinically significant levels of anxiety but also 1.6 times more likely to report clinically significant levels of depression and 1.7 times more likely to report clinically significant levels of PTSD, reflecting the comorbid nature between depression and anxiety syndromes. These associations together suggest that perinatal women with pre-existing mental health diagnoses may be vulnerable to exacerbation of their mental health conditions as well as at risk of developing symptoms of additional conditions during the COVID-19 pandemic, consistent with studies showing elevated distress during the pandemic among those with a mental health diagnosis (Asmundson et al., 2020; Liu et al., 2020a).

Those who express worries regarding COVID-19-related health risks or who experience grief due to the COVID-19 pandemic are two presenting features that could increase the likelihood of mental health symptoms among those without a pre-existing mental health condition. First, we note that through the pandemic, there is an emergence of new worries. Among our sample, 18% of women reported feeling “very worried” or “extremely worried” about COVID-19 related health risks. Those endorsing high levels of worry were 2.5 to more than four times more likely to score above the clinical threshold for mental health symptoms, even when accounting for sociodemographic variables and pre-existing mental health diagnoses. Being concerned about health has been linked with clinically significant levels of mental health symptoms, and the pandemic has become a major source for such health concerns, as evidenced by the endorsement of reported worry about the risks of infection and its impact on health among our study sample. This may be particularly salient for perinatal and postpartum women and their families, given their responsibility to ensure the health and well-being of themselves and their new infants.

Second, approximately 9% of women had responses that, on average, largely agreed with statements reflecting grief across experiences that were presented to them in the survey, with this experience of grief potentially playing a role in reported psychiatric distress. Assessments of grief pertained to experiences that represent a sense of a loss (e.g., missing significant life events, losing touch with friends) as well feelings of bitterness and sadness (e.g., I feel bitter that COVID-19 caused me to experience loss in my routines and activities; I feel sad that I can’t fully celebrate the birth of my child with others). These grief experiences may be particularly challenging to bear for women already being confronted with complex emotional experiences which include the joys and challenges of parenthood. There has been limited discussion regarding the experience of grief due to widescale loss of experiences as a result of the pandemic, and it is unknown whether these experiences are

addressed by providers, yet our findings demonstrate that it has some bearing on the psychiatric distress of perinatal women.

Our data also demonstrates that those negatively affected by the pandemic based on their reported worry and grief are more likely to have elevated psychiatric distress, with this being true *regardless of having a pre-existing mental health condition*. Thus, worry and grief attributed to the pandemic may be a driver of clinically significant mental health symptoms even for those without a prior psychiatric history. This is consistent with our clinical observations where perinatal women without such a history are now presenting with elevated mental health symptoms as the pandemic unfolds, demonstrating the impact of the wide scale distress on individual functioning. These findings point to the COVID-19 pandemic being a life stressor that contributes to psychological distress, consistent with our knowledge that life stress serves as a major risk factor for perinatal mental health problems.

It is important to acknowledge the limitations of this study. First, our cross-sectional design does not allow us to determine causality in the relations between our variables. Thus, we cannot conclude that the pandemic has directly increased mental health distress among perinatal women. Second, our sample was obtained through convenience sampling, therefore, may not be generalizable to the overall U.S. population. In particular, we note that our sample comprised of largely White, educated, and affluent. While generalizability is limited, it is possible that the pre-existing mental health symptoms and COVID-19 risks may be even more prominent risk factors for disadvantaged groups. As well, we note that selection bias is possible, as those who report having a history of a mental health condition may be inclined to participate in such a study. Third, we rely on self-report of symptoms as well as self-reported history of mental health, which may be unreliable (Colombo et al., 2020), or in the case of a diagnosis, unsubstantiated by a provider. It is also possible that women with a pre-existing mental health condition may show a bias in reporting their psychosocial and mental health experiences (Ben-Zeev et al., 2009; Colombo et al., 2019). Furthermore, the use of standardized measures, while useful for its purpose in screening for those at risk for a mental health diagnosis, is not in and of itself diagnostic.

To summarize, mental health symptoms were assessed among U.S. perinatal women from May to August of 2020. Among our sample, one out of three women reported probable depression, one out of five reported probable anxiety, and one out of ten reported probable PTSD. Women with pre-existing mental health diagnoses of depression, anxiety, and PTSD were 1.5 to almost 4 times more likely to endorse current symptoms above the clinical threshold for symptoms that largely corresponded with these respective diagnoses. Importantly, COVID-19 related worries about health and the experience of grief due to the COVID-19 pandemic was associated with mental health symptoms, with the controlling of sociodemographic variables and pre-existing mental health in analyses. Those with high levels of worry and grief were four to five times more likely to endorse mental health symptoms above the clinical thresholds.

These findings allow us to prioritize intervention targets for addressing postpartum problems that might occur. While we acknowledge that the transitions to telehealth taking place at this moment may complicate the ability of providers to administer and score screening

questionnaires and gather history about preexisting mental health conditions, these findings underscore the importance of routine mental health screening in obstetric and pediatric settings which has been challenged by shifting approaches to care delivery. For instance, women with pre-existing mental health conditions should be considered at higher risk for symptom severity and the development of new symptoms; thus providers should consider preemptively engage women in care (Liu and Tronick, 2012), increase the frequency of mental health care, and if possible, consult with a local psychiatric access program to enlist new mental health resources. As well, providers may also consider inquiring about new emotional experiences that have arisen from the COVID-19 pandemic, including worries or feelings of grief due to the various losses that have occurred as a result of the pandemic. Referrals to providers who can address these concerns, through psychotherapy or case management may be necessary in mitigating potential effects on psychiatric symptoms. As an example, planning for social supports during and after labor and discussion of expectations for the birth experience within the context of the COVID-19 pandemic could perhaps address any worry regarding obtaining resources and/or feelings of grief and loss that arise from unmet expectations at this time. Because COVID-19 related health worries and grief experiences are risk factors for probable depression or anxiety, women who show elevated worries and grief should be screened further for these diagnoses. Taking all into consideration, taking these steps may help reduce maternal psychiatric distress – a pressing issue during this time given the potential for long term impairments to the mother, her baby, and their relationship.

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Highlights

- Pregnant and postpartum women are vulnerable to COVID-19-related stresses.
- Women with pre-existing mental health diagnoses had elevated mental health symptoms
- Pandemic health worries and grief increased the likelihood for mental health symptoms
- COVID-19 health worries and grief should be targets for mental health care

Table 1.

Data collected between May 21, 2020 to August 17, 2020, proportions unless otherwise indicated

Independent Variables	Means or %
Perinatal Status	
Pregnant	54.2 %
Postpartum	45.8 %
Maternal Age (years)	M=33.10, SD=3.77
Maternal Race	
White	89.9 %
Black or African American	0.9 %
Hispanic or Latino	3.6 %
Asian and Pacific Islander	3.5 %
Other	2.1 %
Maternal Education	
Less than college	7.9 %
College	30.7 %
Masters	41.6 %
Doctorate	19.8 %
Household Income (USD/year)	
< $74,999	13.4 %
$75,000 – 149,999	41.5 %
$150,000 – 224,999	26.7 %
≥ $225,000	18.3 %
Cohabitating with spouse/partner	
Yes	98.0 %
No	2.0 %
First pregnancy	
Yes	42.4 %
No	57.6 %
Pregnancy Characteristics	
Trimester in Pregnancy	
Second	39.3 %
Third	60.7 %
Postpartum Characteristics	
Infant age (weeks)	M=11.63, SD=7.43
Baby born premature (<37 weeks)	
No	92.1 %
Yes	7.9 %
Days between survey completion and pandemic start	M=111.10, SD=23.69

N = 1123

Table 2.

Maternal mental health and COVID-related concerns from Wave I of the PEACE Study, data collected between May 21, 2020 to August 17, 2020, proportions unless otherwise indicated

Target Variables	Rates
Pre-existing mental health diagnoses	
Depression	17.5 %
Generalized Anxiety	24.5 %
PTSD	4.1 %
Probable Clinical Mental Health Symptoms	
Depression (CES-D ≥ 16)	36.4 %
Generalized Anxiety (GAD-7 ≥ 10)	22.7 %
PTSD (PCL-C ≥ 45)	10.3 %
COVID-related concerns	
Worries about health	18.2 %
Grief	8.8 %

N = 1123

Table 3.

Logistic regression results with **maternal depression, anxiety, and PTSD** as outcomes from Wave I of the PEACE Study, data collected between May 21, 2020 to August 17, 2020

	Maternal Depression		Maternal Anxiety		Maternal PTSD	
Unadjusted Model						
COVID-19 related concerns						
Health worries						
Low	1.0	--	1.0	--	1.0	--
High	3.34***	2.41–4.64	4.21***	3.00–5.91	2.49***	1.60–3.86
Grief						
Low	1.0	--	1.0	--	1.0	--
High	5.12***	3.13–8.38	4.99***	3.16–7.88	5.64***	3.47–9.18
Adjusted Model						
Maternal age	0.99	0.97–1.03	0.97†	0.95–1.00	0.98	0.94–1.02
Maternal race						
White	1.0	--	1.0	--	1.0	--
Black or African American	1.90	0.51–7.07	2.49	0.64–9.74	2.46	0.46–13.22
Hispanic or Latino	0.61	0.28–1.30	1.06	0.46–9.74	3.02*	1.17–7.20
Asian and Pacific Islander	0.76	0.35–1.65	0.90	0.35–2.31	--	--
Other	0.82	0.31–2.12	1.22	0.41–3.59	1.91	0.51–7.11
Maternal education						
Less than college	1.0	--	1.0	--	1.0	--
College	0.69	0.40–1.19	1.15	0.62–2.14	0.68	0.33–1.41
Masters	0.63†	0.36–1.07	0.88	0.47–1.65	0.55	0.26–1.15
Doctorate	0.83	0.45–1.51	1.39	0.69–2.81	0.47	0.19–1.16
Household income						
<$74,999	1.0	--	1.0	--	1.0	--
$75,000 – 149,999	0.82	0.53–1.27	0.86	0.52–1.40	1.04	0.55–1.95
$150,000 – 224,999	0.73	0.45–1.18	0.68	0.39–1.19	0.77	0.37–1.63
≥ $225,000	0.61†	0.36–1.04	0.79	0.43–1.46	0.86	0.38–1.98
Cohabitating with spouse/partner						
No	1.0	--	1.0	--	1.0	--
Yes	1.42	0.53–3.80	1.18	0.40–3.49	1.29	0.35–4.67
First pregnancy						
No	1.0	--	1.0	--	1.0	--
Yes	0.99	0.75–1.31	0.99	0.71–1.37	0.76	0.48–1.18
Pandemic duration (days)	0.99	0.99–1.00	1.0	1.00–1.01	1.0	0.99–1.01
Pre-existing mental health diagnoses						
Depression						
No diagnosis	1.0	--	1.0	--	1.0	--
Diagnosis	1.91**	1.30–2.81	1.30	0.85–2.00	1.26	0.73–2.17

	Maternal Depression		Maternal Anxiety		Maternal PTSD	
Unadjusted Model						
Generalized Anxiety						
No diagnosis	1.0	--	1.0	--	1.0	--
Diagnosis	1.58**	1.12–2.22	2.74***	1.88–4.00	1.73*	1.05–2.85
PTSD						
No diagnosis	1.0	--	1.0	--	1.0	--
Diagnosis	1.27	0.65–2.50	1.40	0.68–2.89	3.73**	1.76–7.90
COVID-19 related concerns						
Health worries						
Low	1.0	--	1.0	--	1.0	--
High	3.41***	2.42–4.81	4.23***	2.99–6.08	2.56***	1.62–4.06
Grief						
Low	1.0	--	1.0	--	1.0	--
High	4.82***	2.91–8.00	4.75***	2.95–7.62	5.45***	3.26–9.10

$N = 1123$

† $p<0.1$

* $p<.05$

** $p<.01$

*** $p<.001$