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Anxiety, Fear, and Self-Efficacy in Pregnant Women in the United States During the COVID-19 Pandemic

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Abstract: The COVID-19 pandemic has brought significant challenges and uncertainty for expectant mothers. The current study examined anxiety, fear of childbirth, and childbirth self-efficacy in pregnant women, and investigated whether greater expected changes to previous birthing plans related to higher rates of negative emotions. The current study included 104 pregnant women currently living in the United States. Participants reported high levels of anxiety and fear related to both greater perceived changes to birth plans, and lowered expectations about the efficacy of coping mechanisms during childbirth, which predicted greater fear of childbirth. Psychoeducational interventions aimed at reducing anxiety and increasing childbirth self-efficacy may be particularly beneficial during this time, especially in light of continued restrictions to social support for laboring women.

Keywords: COVID-19 pandemic, anxiety, fear of childbirth, labor, self-efficacy

Negative emotions regarding childbirth in expectant mothers can signal an increased risk for negative childbirth experiences. For instance, high levels of anxiety, stress, and fear have been found to be associated with a greater risk of fetal distress and an increased need for medical interventions, such as an instrumental delivery or an emergency cesarean section (Handelzalts et al., 2015; Monk et al., 2000; Ryding et al., 1998). In particular, previous research has identified two psychological factors important for predicting positive birthing experiences: a low fear of childbirth and childbirth self-efficacy. Prenatal fear of childbirth has been found to predict increased negative childbirth experiences, such as reporting greater feelings of being disappointed, in pain, upset, excited, worried, traumatized, and feeling like a failure after giving birth

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(Elvander et al., 2013). Fear of childbirth is also negatively correlated with self-efficacy, or confidence in one's ability to influence the birthing experience (Schwartz et al., 2015). Lower self-efficacy scores and negative expectations of childbirth have also been found to be significantly associated with post-traumatic stress disorder symptoms (Soet et al., 2003). Additionally, increased self-efficacy has been found to predict decreased pain and stress in labor and increased overall birth satisfaction (Berentson-Shaw et al., 2009), making fear and self-efficacy important factors to explore together.

In March 2020, COVID-19 was declared a global pandemic. By the end of 2020, cases worldwide were estimated at more than 81 million, with the largest number of cases, over 19 million, occurring in the United States (Dong et al., 2020). COVID-19 has brought significant challenges and uncertainty for expectant mothers. The US Centers for Disease Control and Prevention places pregnant women at an increased risk for severe illness compared to non-pregnant women (CDC, 2020). At many hospitals in the US, labor support persons, including doulas and partners, have been limited or even completely restricted as a risk-reduction measure (Zephyrin, 2020). At the same time, midwives in the US reported a surge of requests from patients looking to change their birthing plans to have an at-home birth (Carmon, 2020). One empirical study of pregnant women in China found that a significant number of women reported alterations in their obstetric decisions, including delaying or cancelling prenatal appointments, preferring a planned caesarean section, and preferring to recover at home rather than in a hospital (Liu et al., 2020).

There is also previous research to suggest concern over the potential impact of such a large-scale pandemic on both maternal mental health and child development. A systematic review of 49 peer-review studies on the relationship between disasters (e.g., terrorist attacks, environmental/chemical disasters, natural disasters) and pregnancy outcomes found that experiences during pregnancy had a negative impact on maternal mental health, which in turn had a negative influence on child development (Harville et al., 2010). Another study (Simeonova, 2011) examined historical data of these kinds of disasters on infant outcomes in the US, particularly birth weight and premature births. The study found decreases in both variables among mothers who experienced natural disasters during pregnancy, such as hurricanes, landslides, and floods, compared to mothers who did not.

Recent research conducted during the COVID-19 pandemic found frequent reports of psychological distress, including increased symptoms of anxiety and depression in pregnant women (Ceulemans et al., 2020; Davenport et al., 2020; Durankuş & Aksu, 2020; Mappa et al., 2020; Taubman-Ben-Ari et al., 2020). Two recent cohort studies directly

assessed changes in psychological distress before and during the COVID-19 outbreak. A survey of 4,124 pregnant women across 10 provinces in China found higher rates of depressive and anxiety symptoms after public declaration of the country's epidemic (January 21, 2020—February 9, 2020) as compared to before the declaration (January 1, 2020—January 20, 2020) (Wu et al., 2020). Another survey of 1,754 pregnant women in Quebec, Canada found that pregnant women surveyed during the pandemic (April 2, 2020—April 13, 2020) were more likely to show clinically significant levels of both depressive and anxiety symptoms than pregnant women surveyed before the pandemic (April, 2018—March 1, 2020) (Berthelot et al., 2020), highlighting the need for increased attention to the mental health of pregnant women. However, none of the studies looked at the relationship between increases in general anxiety and measures specific to the childbirth experience, such as increased childbirth fear and decreased childbirth self-efficacy, which may put pregnant women at even greater risk of negative childbirth experiences (Berentson-Shaw et al., 2009; Elvander et al., 2013).

One study of 200 pregnant women in Italy asked participants to use three words to describe their expectations for childbirth both before the onset of the COVID-19 pandemic, and afterwards. The researchers found that the women were more likely to use positive words and less likely to use negative words to describe their childbirth expectations before the pandemic began than after the onset of the pandemic. For example, women listed "fear" about childbirth 49% of the time after the onset of the pandemic, compared to only 7.5% of the time prior to the pandemic (Ravaldi et al., 2020). A further study conducted in Italy between March and May of 2020, examined anxiety and fear of childbirth in a sample of 575 pregnant women (Molgora & Accordini, 2020). Pregnant women were also asked about their expectations of how COVID-19 may impact their births, including whether they believed they would be allowed to have partners present at childbirth, visitors at the hospital, and social support after the child was born. The researchers found that the pregnant mothers who were unsure of whether their partner would be allowed to enter the delivery room were more likely to have high state anxiety and high fear of childbirth. Additionally, the study revealed increased rates of anxiety and fear of childbirth compared to previously-conducted studies prior to the COVID-19 pandemic. For instance, previous research estimated that 15% of pregnant women have anxiety spectrum disorders (Dennis et al., 2017) while their study found scores above the clinical cut-off for anxiety in 44% (trait anxiety) and 64% (state anxiety) (Molgora & Accordini, 2020).

Similarly, a meta-analysis conducted prior to the onset of the COVID-19 pandemic, estimated clinically significant fear of childbirth in 14% of pregnant women worldwide (O'Connell et al., 2017), while 51% of

pregnant women in the Molgora & Accordini study (2020) exceeded the same cut-off scores. However, 40% of the pregnant women in the Molgora and Accordini (2020) study sample were previously clinically diagnosed with an anxiety disorder, which may have inflated findings regarding the impact of stressors on psychological distress amongst the general pregnant population. Additionally, more than 40% of the pregnant women in the study had already experienced non-COVID related complications during their pregnancy, which may itself have led to increased anxiety in the sample. Thus, there is some evidence to suggest that in addition to state anxiety, both fear and negative expectations specific to childbirth are also significantly increased during this time. There is also preliminary evidence to suggest that these increases may be related to COVID-relevant impacts on childbirth plans, such as lack of social support (Molgora & Accordini, 2020).

The aim of the current study was to further investigate the psychological impact of the COVID-19 pandemic on pregnant women across the United States in relation to their upcoming childbirth, including anxiety, fear of childbirth, and childbirth self-efficacy. Specifically, the current study focused on exploring whether anticipated disruptions to existing birth plans due to the pandemic related to increased negative expectations regarding childbirth.

It was predicted that changes to birthing plans and heightened state anxiety, rather than trait anxiety, would relate to higher levels of fear of childbirth and lower levels of childbirth self-efficacy. Given previous research findings showing that negative childbirth expectations can predict negative childbirth experiences and post-traumatic symptomatology, the results of the current study may have important physical and psychological health implications for pregnant women.

Methods

Participants and Recruitment

All procedures in the study were reviewed and approved by the author's University Institutional Review Board. Between March 31st and May 18th, 2020, a convenience sample of women in the US (n = 212) who were in their third trimester was recruited from social media. Invitations to participate were posted in pregnancy-related Facebook groups and through targeted Facebook advertising. Screening questions were used to verify that pregnant women met the inclusion criteria, including that they were currently in their third trimester (gestational age of at least 27 weeks), that their pregnancy was not considered medically high-risk, and that they had not previously been diagnosed with either clinical

depression or anxiety. Respondents who did not meet inclusion criteria were excluded from the study (n = 78). A further 30 participants were eliminated due to incomplete surveys (n = 29) or for reporting a positive COVID-19 infection (n = 1). The final sample size was 104 women in the third trimester of pregnancy.

A power analysis was performed based on correlational data from previously published studies using the same validated surveys as the current study (Beebe et al., 2007, n = 35; Hall et al., 2009, n = 650; Heimstad et al., 2006, n = 1321; Johnson & Slade, 2002, n = 424; Jokić-Begić et al., 2014, n = 200; Schwartz et al., 2015, n = 1410; Spice et al., 2009, n = 110). The effect sizes in these studies (*r)* ranges from .28 to .55, which are considered to be small-to-large effect sizes using Cohen's (1988) criteria. The mean effect size across these studies (r = .455) was used for the current power analysis (G*Power 3.1). With an alpha of .05, a sample size of 56 enables .95 power in detecting an effect size of .455. The current sample of 104 would result in a power of .999.

Measures

Measures included three standardized instruments: the Wijma Delivery Expectancy Questionnaire (WDEQ-A; Wijma et al., 1998; Pallant et al., 2016), the Childbirth Self-Efficacy Inventory (CBSEI; Lowe, 1993), and the State-Trait Anxiety Inventory (STAI; Spielberger et al., 1983).

The WDEQ-A (Wijma et al., 1998; Pallant et al., 2016) revised scale, is a 17-item, 6-point Likert scale questionnaire and is one of the most commonly used measures to assess fear of childbirth. Participants are asked to imagine how they will feel during labor and childbirth (e.g., confident, safe, relaxed, happy, weak, afraid) on a scale a 0 (extremely) to 5 (not at all). Items with positively formulated questions were reverse-scored such that higher scores reflect more negative expectations regarding childbirth. An overall sum score was then calculated (possible range from 0 to 85). In addition, mean subscale scores were calculated for each of the following: negative emotions (5 items), lack of positive emotions (5 items), social isolation (4 items) and moment of birth (3 items). One participant was missing multiple items on the WDEQ measure and their scores were excluded from analysis. There was no other missing data for individual items.

The CBSEI (Lowe, 1993) assesses expectations for coping with childbirth. In the full 62-item measure, participants are asked to first think about the stage of active labor (AL; when contractions are five minutes apart or less) and then think about the second stage of labor (SS; when the pregnant woman's cervix is completely dilated and they may be pushing). For each stage, participants are presented with a list of coping

behaviors (relax my body, keep myself calm, think positively) and asked to indicate, on a scale of 1 to 10: a) how helpful the behavior *could* be to cope with labor (outcome expectancy; OE) and b) how certain one is of their ability to use the behaviors to cope with labor (self-efficacy expectancy; EE).

This author's early piloting of this measure before collecting data in the current study found higher rates of missing data for SS questions and no significant differences between AL and SS scores for either OE or EE; thus, only AL measures were collected in the current study (see also Schwartz et al., 2015 for discussion of usefulness of both AL vs SS). Summary scores were then calculated for both OE and EE (possible range 15-150) with higher scores reflecting more positive expectancies. One participant did not complete any items on the CBSEI measure. Missing data for individual items (total of two items across all participants) was replaced with that participant's scale average.

The STAI (Spielberger et al., 1983) includes two subscales. The State Anxiety Scale (S-Anxiety) includes 20 items that measure the current state of anxiety, or how respondents feel "right now, at this moment." The Trait Anxiety Scale (T-anxiety) includes 20 items that measure stable aspects of general anxiety proneness, or how one "generally feels." S-Anxiety scores are increased under stressful conditions, whereas T-Anxiety scores are not impacted by current stressors. Each question was answered on a four-point response scale from 1 (not at all) to 4 (very much so). Scoring was reversed for anxiety-absent items and each subscale was then summed (possible range from 20 to 80), such that higher scores indicate greater anxiety. Missing data for individual items (total of 6 items across all participants) was replaced with that participant's scale average. Previous research (Grant et al., 2008) with pregnant women found that 40 is an optimal cutoff score for reliable identification of those at risk for postnatal anxiety or depression. Thus, pregnant women were classified as either high state anxiety (S-Anxiety score > 40) or low state anxiety (S-Anxiety score $\leq$ 40) and as either high trait anxiety (T-Anxiety score > 40) or low trait anxiety (T-Anxiety score $\leq$ 40).

Additionally, participants were asked four questions about the extent to which they expected COVID-19 to impact their existing birth plans. They answered on a 5-point Likert scale of 0 (none) to 4 (a great deal), including changes to planned birth location, medical provider, support person(s), and delivery method. A sum score was calculated with higher scores reflecting a greater amount of anticipated change to their birth plans (range from 0—16; $\alpha = .663$). Missing data for individual items (total of 1 item across all participants) was replaced with that participant's scale average.

Procedure

Qualtrics was used to collect survey responses. After completing the informed consent and eligibility screening questions, participants completed questions related to their pregnancy. Participants were asked about their due date, number of previous pregnancies, and labor and birth plans (location, type of doctor, anticipated delivery method). Next, participants completed the four questions about disruptions to birthing plans. Participants completed the standardized questionnaires in a set order: WDEQ-A, CBSEI, STAI. Finally, participants completed the socio-demographic questions. Demographic questions included the participant's location in the US (state), age, highest level of education, employment status, race/ethnicity, and marital status. Upon completion, participants were given contact information for organizations providing phone and/or virtual support for women's health, pregnancy, and postpartum support.

Statistical Analyses

The distributions of WDEQ, CBSEI, and STAI scores were assessed to determine whether scores were normally distributed. Two extreme outlier cases (identified via box plot as more than three interquartile range's from first or third quartile) were removed from analyses for outcome efficacy (CBSEI-OE). With these cases removed, normality assumptions were met ($p > .050$) for all variables (Shapiro & Wilk, 1965).

Descriptive statistics are presented in Table 1 to demonstrate central tendencies and distributions of variables. Independent samples *t*-tests were carried out to compare outcome variables between women who had given birth previously and those who had not. Wilcoxon rank test (Rey & Neuhäuser, 2011) was used to compare state and trait anxiety scores within participants. Independent samples *t*-tests were carried out to compare outcome variables between those categorized with low and high state and trait anxiety. Effect sizes for *t*-tests were determined using Cohen's *d* (Lakens, 2013).The Pearson correlation coefficient (Freedman et al., 2007) was used to look at relationships between fear of childbirth, childbirth self-efficacy, anxiety scores, and degree of disruption to birth plans. Finally, a stepwise multiple regression analysis was conducted to determine the influence of anxiety, childbirth self-efficacy, and disruptions to birthing plans on fear of childbirth. For all tests, statistical significance was defined as $p < 0.05$. Statistical analyses were conducted using SPSS Statistics version 26.0.

Table 1: Descriptive Data on Prenatal Questionnaires (n = 104)

Measure	***M***	***SD***	***R***
WDEQ- Overall Score (possible range 0-85)	35.88	14.80	1-78
WDEQ- Negative Emotions (possible range 0-5)	2.44	.95	.2-5
WDEQ- Lack of Positive Emotions (possible range 0-5)	2.42	.90	0-4.6
WDEQ- Social Isolation (possible range 0-5)	1.70	1.45	0-5
WDEQ- Moment of Birth (possible range 0-5)	1.60	1.14	0-4.67
CBSEI			
CBSEI-OE (possible range 15-150)	107.56	23.81	39-150
CBSEI-EE (possible range 15-150)	91.23	26.73	15-150
STAI			
S-Anxiety (possible range 20-80)	45.47	12.13	20-77
T-Anxiety (possible range 20-80)	37.68	8.65	20-66
Impact to Birth Plans (possible range 0-16)	5.76	3.70	0-16

Note. WDEQ = Wijma Delivery Expectancy Questionnaire; CBSEI = Childbirth Self-Efficacy Inventory; CBSEI-OE = Outcome Expectancy scores; CBSEI-EE = Efficacy Expectancy subscale scores; STAI = State Trait Anxiety Inventory

Table 2: Demographic Characteristics of the Sample (n = 104)

Age (n = 103)	
Mean (SD)	31.03 (4.47)
Range	19-43
Number of Weeks Pregnant (n = 103)	
Mean (SD)	33.17 (3.52)
Range	27-40
Parity (n = 104)	
Nulliparous	42 (40.4%)
Multiparous	62 (59.6%)
Marital Status (n = 104)	
Single	7 (6.7%)
Married/Committed Partnership	97 (93.3%)

Highest Level of Education (*n* = 104)	
HS Degree or Less	5 (4.8%)
Some College	13 (12.5%)
College Degree	31 (29.8%)
Graduate Degree	55 (52.9%)
Ethnicity (*n* = 104)	
Asian/Indian/Pacific Islander	10 (9.6%)
Black/African American	2 (1.9%)
Caucasian	87 (83.7%)
Hispanic/Latinx	11 (10.6%)
Middle Eastern/North African	3 (2.9%)
Native American	2 (1.9%)

Results

Table 2 contains a summary of all sample demographics. Participants' average age was 31 years old (M = 31.02 years, SD = 4.47, range = 19—43) and average gestational age was 33 weeks (M = 33.17 weeks, SD = 3.52, range = 27—40). The majority of participants were Caucasian (84%), college educated (83%), and in a committed partnership (93%). Preliminary analyses were conducted to look at differences between pregnant women who had given birth before (n = 62) and those who were having their first baby (n = 42) across all measures (WDEQ, CBSEI, STAI, degree of birth plan disruption). There were no significant differences found. Thus, pregnant women of all parities are analyzed together in the following analyses.

Table 3 details the percentages of pregnant women anticipating different levels of changes to birthing plans as a result of COVID-19. Just over half of the sample anticipated some degree of change to birth location, medical professionals, and/or delivery method, while more than 88% anticipated some change to their plans for support persons.

Table 3: Percent of women anticipating changes to birthing plans as a result of COVID-19

	None	A little	A moderate amount	A lot	A great deal	Choose not to answer
Birth Location	43.3%	13.5%	25.0%	7.7%	10.6%	0
Medical Professional	48.1%	19.2%	14.4%	13.5%	4.8%	0
Support Persons	11.5%	17.3%	16.3%	21.2%	32.7%	1%
Delivery Method	47.1%	26.0%	17.3%	3.8%	5.8%	0

High state anxiety (S-anxiety score > 40) was identified in 65.4% of pregnant women while high trait anxiety (T-anxiety score > 40) was identified in only 34.6% of pregnant women. The correlation between state and trait anxiety measurements showed a moderate relationship, $r(104) = .445$, $p < .001$. A Wilcoxon Signed-Ranks Test indicated that S-anxiety scores (median = 45) were significantly higher than T-anxiety scores (median = 37), $Z = 5.98$, $p < .001$. Independent-samples *t*-tests were used to examine differences in fear of childbirth, self-efficacy, and disruptions to birth plans in participants categorized as high or low state and trait anxiety (see Table 4). For trait anxiety, the only difference found was that pregnant women high in trait anxiety scored lower in childbirth self-efficacy than those low in trait anxiety, $t(101) = 2.08$, $p = .040$, $d = .44$. For state anxiety, all tests were significant: Pregnant women high in state anxiety were significantly higher in fear of childbirth, lower in self-efficacy, and anticipated greater changes to their birthing plans than pregnant women low in state anxiety.

Table 4: Mean scores (and standard deviations) for study measures within participants grouped according to high (>40) and low (≤ 40) state anxiety and trait anxiety.

	Low T-anxiety (*n* = 68)	**High T-anxiety (*n* = 36)**	***p***	**Low S-anxiety (*n* = 36)**	**High S-anxiety (*n* = 68)**	***p***
WDEQ	35.96 (15.56)	35.75 (13.46)	.947	28.03 (13.63)	40.10 (13.71)	.001
CBSEI-OE	110.12 (23.42)	102.74 (24.12)	.139	115.29 (19.60)	103.47 (24.94)	.017
CBSEI-EE	95.18 (27.12)	83.89 (24.71)	.040	99.03 (22.54)	87.22 (27.96)	.033
Impact to Birth Plans	5.88 (3.76)	5.53 (3.64)	.645	4.50 (2.85)	6.43 (3.94)	.005

Table 5: Correlations between Prenatal Measures

Measure	**1**	**2**	**3**	**4**	**5**
1. WDEQ	—				
2. CBSEI-OE	-.482**	—			
3. CBSEI-EE	-.445**	.769**	—		
4. STAI S-Anxiety	.573**	-.414**	-.426**	—	
5. STAI T-Anxiety	.020	-.238*	-.271**	.445**	—
6. Impact to Birth Plans	.420**	-.137	-.185	.275**	.008

**p ≤ 0.01; *p ≤ 0.05

Correlational analyses were used to test relationships between fear of childbirth, self-efficacy, anxiety, and degree of disruption to birth plans

(Table 5). There was no correlation between degree of disruption and either measure of childbirth self-efficacy or trait anxiety. However, pregnant women who anticipated more changes also reported higher state anxiety ($r(104) = .275$, $p = .005$) and greater fear of childbirth ($r(103) = .420$, $p < .001$). Additionally, pregnant women who had greater fear of childbirth also had lower outcome expectancy ($r(100) = -.482$, $p < .001$), lower childbirth self-efficacy ($r(102) = -.445$, $p < .001$), higher state anxiety ($r(103) = .573$, $p < .001$), and higher anticipated impacts to birthing plans ($r(103) = .420$, $p < .001$). There was no relationship between trait anxiety and fear of childbirth, $p = .84$. Finally, a stepwise regression analysis was conducted looking at the four significant variables as possible predictors of fear of childbirth (see Table 6). Higher state anxiety, lowered outcome expectancy, and greater disruptions to birthing plans were all significant predictors of increased fear of childbirth, $R^2 = .450$, $F(3, 99) = 26.17$, $p < .001$. The model accounted for 45% of the variance.

Table 6: Summary of Regression Analysis for Variables Predicting Fear of Childbirth ($n = 99$)

Variable	**B**	**SEB**	**B**
STAI S-Anxiety	.475	.101	.403**
CBSEI-OE	-.169	.051	-.277**
Impact to Birth Plans	.907	.319	.223**
R^2	.450		
F	26.17**		

Note: * $p < .05$, ** = $p < .01$; B: unstandardized beta, SEB: standard error for the unstandardized beta, ß: standardized beta

Discussion

The COVID-19 pandemic has introduced unique challenges for pregnant women, with increased risk for severe illness (CDC, 2020) and changes to access for social support persons during labor and childbirth (Zephyrin, 2020). Consequently, studies conducted after the onset of the COVID-19 pandemic have found higher than expected levels of psychological distress, such as anxiety, in pregnant women (Berthelot et al., 2020; Ceulemans et al., 2020; Davenport et al., 2020; Durankuş & Aksu, 2020; Mappa et al., 2020; Taubman-Ben-Ari et al., 2020; Wu et al.,

2020). The current study explored the ways in which the challenges faced by pregnant women, including disruptions to their birth plan, may contribute to increases in anxiety and fear of childbirth in a sample of women in the US.

The current study revealed heightened anxiety levels among the current sample of pregnant women in the United States; pregnant women in the current study had an average state anxiety score of 45 with 65% of women exceeding the cutoff score (> 40) for high state anxiety. In contrast, a recent pre-COVID-19 pandemic study found that only 24% of pregnant women in their sample met the same cutoff score for high state anxiety, with a sample average score of only 29 (Adhikari et al., 2020). Increased state anxiety during the COVID-19 pandemic has also been found in two recent studies with pregnant women in Italy; the median state anxiety score in one sample was 49, with 77% of pregnant women meeting criteria for high state anxiety (Mappa et al., 2020), while 64% of pregnant women in the other sample met the criteria for high state anxiety (Molgora & Accordini, 2020).

Additionally, there was only a moderate correlation between state and trait anxiety (r = .45) in the current sample. Lower correlations on the STAI are reflective of more stressful situations; in neutral, non-stress situations, the average correlation coefficient for adult women was .70, while in situations of high stress, that correlation dropped to .30 (Spielberger et al., 1983). Another study of 1,073 pregnant women in their third trimester (~32 weeks gestation) under normal circumstances found a correlation coefficient of .81 between the state and trait measures of the STAI (Huizink et al., 2017). Altogether, the current findings are reflective of increased state anxiety scores during the COVID-19 pandemic among this sample of pregnant women in the US.

Additionally, pregnant women in the current sample reported high levels of fear specific to the childbirth experience. Previous research indicates that scores exceeding the midpoint of each subscale of the WDEQ (2.50 out of 5) may be used to identify pregnant women who are considered extremely high in fear of childbirth (Pallant et al., 2016). In that research, the authors found that only 21.5% of pregnant women would be categorized as high on the negative emotions subscale. In contrast, 44.2% of pregnant women in the current sample scored higher than the midpoint. Similarly, 28.8% of pregnant women in the current study had a score higher than the midpoint on social isolation (questions include feeling lonely, abandoned, and deserted) compared to 3.8% in the previous study. This suggests heightened fear of childbirth in the current sample compared to what has been observed pre-pandemic.

All but three participants in the current sample perceived the COVID-19 pandemic to have some degree of impact on their birthing plans,

especially in regard to social support during childbirth. Critically, the degree of perceived impact to their birthing plans was significantly correlated with measures of both state anxiety and fear of childbirth, suggesting that the impact of the pandemic on pregnant women's birthing plans may be causing additional psychological distress. Previous research with pregnant women in Italy also found that anticipated partner support during childbirth predicted less fear of childbirth (Molgora & Accordini, 2020). Finally, the current study explored the role of anxiety, self-efficacy, and disruptions to birth plans as joint predictors of fear of childbirth. Higher state anxiety, lower outcome expectancy, and greater impact to birth plans all significantly contributed to higher fear of childbirth. The model accounted for a high degree of variance, 45%, suggesting that these are all important variables for reducing fear in pregnant women.

Limitations

A number of limitations apply to the interpretation of findings in the current study. Pre-pandemic data was not collected from the current sample. The indirect comparisons between the current findings of fear and anxiety and previous studies do suggest heightened levels compared to pre-pandemic times; however, statistical changes within the current sample cannot be determined. Two other studies that have compared pre- and post-pandemic data of psychological distress in pregnant women also support that increases in anxiety symptoms observed in the current sample are the direct result of the pandemic (Berthelot et al., 2020; Wu et al., 2020).

Further, participants were not asked questions about the ways they were concerned about COVID-19, nor ways the virus had impacted their lives more generally, such as fear of getting sick, job or income loss, changes to daily activity, childcare concerns, etc. Thus, it is not known whether effects of the pandemic on their lives outside of the childbirth experience also impacted state anxiety in the current sample.

One previous study did explore additional potential causes of COVID-19-related anxiety in pregnant women in Israel. Researchers found the most frequent causes of high anxiety were related to avoiding exposure to COVID-19 in public, concerns about family members or themselves being infected, and concerns about the baby and delivery, with fewer concerns due to non-health related consequences such as economic recession (Taubman-Ben-Ari et al., 2020). Given that this is a different population than the current study, it is unknown whether similar concerns outside of pregnancy were also related to the high levels of state anxiety observed in the current sample.

Additionally, Internet recruitment of a convenience sample of pregnant women in the US led to a largely Caucasian, educated, married demographic, which is a biased, non-representative sample, despite efforts to share in a variety of Facebook groups that contained demographically diverse members. There may be significant psychological differences between those who saw the recruitments and chose to participate and those who did not. The current sample also included both multiparous and nulliparous women. Mothers who have given birth before certainly have a different point of view, being able to compare their current experience with their experience from a previous pregnancy and childbirth. While there were no differences found between these two groups of pregnant women on the measures used in the current study, future research may want to further explore the ways in which their perceptions and experiences differ.

Conclusion

The current study is important for underscoring the need for additional support for pregnant women. Healthcare providers should be particularly sensitive to the increased need for support to improve mental and physical health outcomes for pregnant mothers during the current pandemic. Previous research has found that simple interventions can be implemented remotely, such as telephone counseling, and can be effective in reducing childbirth fear and increasing self-efficacy (Toohill et al., 2014). Additionally, previous research has explored a number of different interventions to reduce symptoms of anxiety during pregnancy, including cognitive behavioral therapy, mindfulness, and psycho-educational interventions, with pregnant women viewing these experiences as overwhelmingly positive (Evans et al., 2020). Similar interventions may be particularly helpful at the current time.

The current findings suggest elevated levels of childbirth fear among pregnant women during the COVID-19 pandemic. Research conducted with various other populations of pregnant women have also found increases in childbirth fear (Molgora & Accordini, 2020; Ravaldi et al., 2020), suggesting that this is a widespread problem for pregnant women at this time. Importantly, the current results suggest psychosocial factors that may be related to the COVID-19 pandemic, including increased state anxiety and lack of social support during labor, contribute to a large degree of the observed increases in levels of fear of childbirth for pregnant women. Further research into childbirth experiences, as well as greater consideration by medical providers of the psychological needs of pregnant women at the current time, could help ensure more positive pregnancy and childbirth experiences during these challenging times.

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Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. The study was not funded by grant or reimbursement to the author.

Data Availability Statement

The datasets generated during the current study are available from the corresponding author upon reasonable request.

References

Adhikari, K., Patten, S.B., Williamson, T., Patel, A.B., Premji, S., Tough, S., Letourneau, N., Giesbrecht, G., & Metcalfe, A. (2020). Assessment of anxiety during pregnancy: Are existing multiple anxiety scales suitable and comparable in measuring anxiety during pregnancy? *Journal of Psychosomatic Obstetrics & Gynecology, 14*, 1–7. https://doi.org/ 10.1080/ 0167482x.2020.1725462

Beebe, K.R., Lee, K.A., Carrieri-Kohlman, V., & Humphreys, J. (2007). The effects of childbirth self-efficacy and anxiety during pregnancy on prehospitalization labor. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *36*(5), 410-418. https://doi.org/10.1111/j.1552-6909.2007.00170.x

Berentson-Shaw, J., Scott, K.M., & Jose, P.E. (2009). Do self-efficacy beliefs predict the primiparous labour and birth experience? A longitudinal study. *Journal of Reproductive and Infant Psychology*, *27*(4), 357-373. https://doi.org/10.1080/02646830903190888

Berthelot, N., Lemieux, R., Garon-Bissonnette, J., Drouin-Maziade, C., Martel, É., & Maziade, M. (2020). Uptrend in distress and psychiatric symptomatology in pregnant women during the COVID-19 pandemic. *Acta Obstetricia et Gynecologica Scandinavica*, *99*(7), 848–855. https://doi.org/10.1111/ aogs.13925

Carmon, I. (2020, March 26). Midwives are swamped with home birth requests. *The Cut*. https://www.thecut.com/2020/03/midwives-are-swamped-with-home-birth-requests.html

Centers for Disease Control and Prevention (2020, July 17). Coronavirus disease 2019: People with certain medical conditions. *Centers for Disease Control.* https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html

Ceulemans, M., Hompes, T., & Foulon, V. (2020). Mental health status of pregnant and breastfeeding women during the COVID-19 pandemic: A call for action. *International Journal of Gynecology & Obstetrics*, *151*(1), 146–147. https://doi.org/10.1002/ijgo.13295

Cohen J. (1988*). Statistical Power Analysis for the Behavioral Sciences*. Routledge.

Davenport, M.H., Meyer, S., Meah, V.L., Strynadka, M.C., & Khurana, R. (2020). Moms are not OK: COVID-19 and maternal mental health. *Frontiers in Global Women's Health*, *1*. https://doi.org/10.3389/fgwh.2020.00001

Dennis, C. L., Falah-Hassani, K., & Shiri, R. (2017). Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis. *The British Journal of Psychiatry, 210*(5), 315-323. https://doi.org/10.1192/bjp.bp.116.187179

Dong, E., Du, H., & Gardner, L. (2020). An interactive web-based dashboard to track COVID-19 in real time. *The Lancet Infectious Diseases*, *20*(5), 533-534. https://doi.org/10.1016/s1473-3099(20)30120-1

Durankuş, F., & Aksu, E. (2020). Effects of the COVID-19 pandemic on anxiety and depressive symptoms in pregnant women: A preliminary study. *The Journal of Maternal-Fetal & Neonatal Medicine*, 1-7. https://doi.org/10.1080/14767058.2020.1763946

Elvander, C., Cnattingius, S., & Kjerulff, K.H. (2013). Birth experience in women with low, intermediate or high levels of fear: Findings from the first baby study. *Birth, 40*(4), 289–296. https://doi.org/10.1111/birt.12065

Evans, K., Spiby, H., & Morrell, J.C. (2020). Non-pharmacological interventions to reduce the symptoms of mild to moderate anxiety in pregnant women. A systematic review and narrative synthesis of women's views on the acceptability of and satisfaction with interventions. *Archives of Women's Mental Health, 23*(1), 11–28. https://doi.org/10.1007/s00737-018-0936-9

Freedman, D., Pisani, R., & Purves, R. (2007). Statistics (international student edition). *Pisani, R. Purves, 4th Edition*. WW Norton and Company.

Grant, K.A., McMahon, C., & Austin, M.P. (2008). Maternal anxiety during the transition to parenthood: A prospective study. *Journal of Affective Disorders*, *108*(1-2), 101—111. https://doi.org/10.1016/j.jad.2007.10.002

Hall, W.A., Hauck, Y.L., Carty, E.M., Hutton, E.K., Fenwick, J., & Stoll, K. (2009). Childbirth fear, anxiety, fatigue, and sleep deprivation in pregnant women. *Journal of Obstetric, Gynecologic & Neonatal Nursing, 38*(5), 567–576. https://doi.org/10.1111/j.1552-6909.2009.01054.x

Handelzalts, J.E., Becker, G., Ahren, M.P., Lurie, S., Raz, N., Tamir, Z., & Sadan, O. (2015). Personality, fear of childbirth and birth outcomes in nulliparous women. *Archives of Gynecology and Obstetrics*, *291*(5), 1055-1062. https://doi.org/10.1007/s00404-014-3532-x

Harville, E.W., Xiong, X., & Buekens, P. (2010). Disasters and perinatal health: A systematic review. *Obstetrical & Gynecological Survey*, *65*(11), 713-728. https://doi.org/10.1097/ogx.0b013e31820eddbe

Heimstad, R., Dahloe, R., Laache, I., Skogvoll, E., & Schei, B. (2006). Fear of childbirth and history of abuse: Implications for pregnancy and delivery. *Acta*

Obstetricia et Gynecologica Scandinavia, *85*(4), 435–440. https://doi.org/10.1080/00016340500432507

Huizink, A.C., Menting, B., De Moor, M.H.M., Verhage, M.L., Kunseler, F.C., Schuengel, C., & Oosterman, M. (2017). From prenatal anxiety to parenting stress: A longitudinal study. *Archives of Women's Mental Health, 20*(5), 663–672. https://doi.org/10.1007/s00737-017-0746-5

Johnson, R. & Slade, P. (2002). Does fear of childbirth during pregnancy predict emergency caesarean section? *BJOG: An International Journal of Obstetrics and Gynaecology, 109*(11), 1213–1221. https://doi.org/10.1046/j.1471-0528.2002.01351.x

Jokić-Begić, N. Š., Žigić, L., & Nakić Radoš, S. (2013). Anxiety and anxiety sensitivity as predictors of fear of childbirth: different patterns for nulliparous and parous women. *Journal of Psychosomatic Obstetrics & Gynecology, 35*(1), 22–28. https://doi.org/10.3109/0167482x.2013.866647

Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: A practical primer for *t*-tests and ANOVAs. *Frontiers in Psychology, 4,* 863.https://doi.org/10.3389/fpsyg.2013.00863

Liu, X., Chen, M., Wang, Y., Sun, L., Zhang, J., Shi, Y., Wang, J., Zhang, H., Sun, G., Baker, P. N., Luo, X., & Qi, H. (2020). Prenatal anxiety and obstetric decisions among pregnant women in Wuhan and Chongqing during the COVID-19 outbreak: A cross-sectional study. *BJOG: An International Journal of Obstetrics & Gynaecology, 127*(10), 1229–1240. https://doi.org/10.1111/1471-0528.16381

Lowe, N.K. (1993). Maternal confidence for labor: Development of the childbirth self-efficacy inventory. *Research in Nursing & Health*, *16*(2), 141-149. https://doi.org/10.1002/nur.4770160209

Mappa, I., Distefano, F.A., & Rizzo, G. (2020). Effects of Coronavirus-19 pandemic on maternal anxiety during pregnancy: A prospectic observational study. *Journal of Perinatal Medicine*, *48*(6), 545-550. https://doi.org/10.1515/jpm-2020-0182

Molgora, S., & Accordini, M. (2020). Motherhood in the time of coronavirus: The impact of the pandemic emergency on expectant and postpartum women's psychological well-being. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.567155

Monk, C., Fifer, W.P., Myers, M.M., Sloan, R.P., Trien, L., & Hurtado, A. (2000). Maternal stress responses and anxiety during pregnancy: Effects on fetal heart rate. *Developmental Psychobiology, 36*(1), 67–77. https://doi.org/10.1002/(SICI)1098-2302(200001)36:1<67::AID-DEV7>3.0.CO;2-C

O'Connell, M.A., Leahy-Warren, P., Khashan, A.S., Kenny, L.C., & O'Neill, S.M. (2017). Worldwide prevalence of tocophobia in pregnant women: Systematic review and meta-analysis. *Acta Obstetricia et Gynecologica Scandinavica, 96*(8), 907–920. https://doi.org/10.1111/aogs.13138

Pallant, J.F., Haines, H.M., Green, P., Toohill, J., Gamble, J., Creedy, D.K., & Fenwick, J. (2016). Assessment of the dimensionality of the Wijma delivery expectancy/experience questionnaire using factor analysis and Rasch analysis. *BMC Pregnancy and Childbirth*, *16*(1), 361. https://doi.org/10.1186/s12884-016-1157-8

Ravaldi, C., Wilson, A., Ricca, V., Homer, C., & Vannacci, A. (2020). Pregnant women voice their concerns and birth expectations during the COVID-19 pandemic in Italy. *Women and Birth*. https://doi.org/10.1016/j.wombi.2020.07.002

Rey D., & Neuhäuser M. (2011). Wilcoxon-Signed-Rank Test. In: Lovric M. (ed.) *International Encyclopedia of Statistical Science*. Springer. https://doi.org/10.1007/978-3-642-04898-2_616

Ryding, E., Wijma, B., Wijma, K., & Rydhström, H. (1998). Fear of childbirth during pregnancy may increase the risk of emergency cesarean section. *Acta Obstetricia et Gynecologica Scandinavica*, 77(5), 542–547. https://doi.org/10.1034/j.1600-0412.1998.770512.x

Schwartz, L., Toohill, J., Creedy, D.K., Baird, K., Gamble, J., & Fenwick, J. (2015). Factors associated with childbirth self-efficacy in Australian childbearing women. *BMC Pregnancy and Childbirth*, *15*(1), 29. https://doi.org/10.1186/s12884-015-0465-8

Shapiro, S.S., & Wilk, M.B. (1965). An analysis of variance test for normality (complete samples). *Biometrika, 52*(3-4), 591-611. https://doi.org/10.1093/bio,et/ 52.3-4.591

Simeonova, E. (2011). Out of sight, out of mind? Natural disasters and pregnancy outcomes in the USA. *CESifo Economic Studies*, *57*(3), 403-431. https://doi.org/10.1093/cesifo/ifr005

Soet, J.E., Brack, G.A., & DiIorio, C. (2003). Prevalence and predictors of women's experience of psychological trauma during childbirth. *Birth*, *30*(1), 36-46. https://doi.org/10.1046/j.1523-536x.2003.00215.x

Spice, K., Jones, S.L., Hadjistavropoulos, H.D., Kowalyk, K., & Stewart, S.H. (2009). Prenatal fear of childbirth and anxiety sensitivity. *Journal of Psychosomatic Obstetrics & Gynecology, 30*(3), 168–174. https://doi.org/10.1080/01674820902950538

Spielberger, C.D., Gorsuch, R.L., Lushene, R., Vagg, P.R., & Jacobs, G.A. (1983*). Manual for the State-Trait Anxiety Inventory*. Consulting Psychologists Press.

Taubman–Ben-Ari, O., Chasson, M., Abu Sharkia, S., & Weiss, E. (2020). Distress and anxiety associated with COVID-19 among Jewish and Arab pregnant women in Israel. *Journal of Reproductive and Infant Psychology*, *38*(3), 340–348. https://doi.org/10.1080/02646838.2020.1786037

Toohill, J., Fenwick, J., Gamble, J., Creedy, D.K., Buist, A., Turkstra, E., & Ryding, E.L. (2014). A randomized controlled trial of a psycho-education intervention by midwives in reducing childbirth fear in pregnant women. *Birth*, *41*(4), 384-394. https://doi.org/10.1111/birt.12136

Wijma, K., Wijma, B., & Zar, M. (1998). Psychometric aspects of the W-DEQ: A new questionnaire for the measurement of fear of childbirth. *Journal of Psychosomatic Obstetrics & Gynecology*, *19*(2), 84-97. https://doi.org/10.3109/01674829809048501

Wu, Y., Zhang, C., Liu, H., Duan, C., Li, C., Fan, J., Li, H., Chen, L., Xu, H., Li, X., Guo, Y., Wang, Y., Li, X., Li, J., Zhang, T., You, Y., Li, H., Yang, S., Tao, X., Xu, Y., … Huang, H.F. (2020). Perinatal depressive and anxiety symptoms of pregnant women during the coronavirus disease 2019 outbreak in China. *American Journal of Obstetrics and Gynecology, 223*(2), 240.e1–240.e9. https://doi.org/10.1016/j.ajog.2020.05.009

Zephyrin, L. (2020, April 10). *The challenges of giving birth in the time of COVID-19.* STAT. https://www.statnews.com/2020/04/10/birth-in-the-time-of-covid-19/