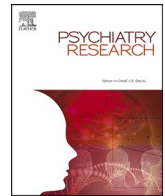




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# COVID-19-related health worries and generalized anxiety symptoms: Higher risks in perinatal women without a pre-existing generalized anxiety diagnosis

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## ABSTRACT

The perinatal period has been well-established as a time of vulnerability to anxiety, as has the COVID-19 pandemic. Perinatal women with a prior diagnosis of Generalized Anxiety Disorder (GAD) may be anticipated to be at particular risk for elevated symptom burden when facing the overlay of these stressors. This study examined whether pre-existing anxiety exacerbates COVID-19-related health worries on anxiety symptom severity among a sample of women who entered perinatal status during the COVID-19 pandemic. We assessed COVID-19-related health worries, past diagnosis of GAD, and current generalized anxiety symptoms cross-sectionally in 1,587 perinatal U.S. women during the COVID-19 pandemic (May 21, 2020 to June 24, 2021). Among perinatal women who reported high levels of COVID-19-related health worries, those with a pre-existing GAD diagnosis were 3.56 times more likely to score at clinically significant levels of generalized anxiety, while those without a pre-existing GAD diagnosis were 6.51 times more likely. COVID-19-related health worries posed a larger risk for elevated anxiety symptoms among those without a pre-existing diagnosis of GAD. Greater access to treatment and psychoeducation for such individuals may be warranted for individuals without a pre-existing mental health diagnosis.

## 1. Introduction

The accumulating research studies related to the COVID-19 pandemic suggest an increase in mental health problems, with anxiety emerging as a key symptom of concern. Elevated rates of generalized anxiety have been consistently observed over the course of the pandemic, with estimated rates ranging from 17.9% to 32.6% in the general population (Cordaro et al., 2021; Daly and Robinson, 2021; Kantor and Kantor, 2020; Liu et al., 2021; Pashazadeh Kan et al., 2021; Turna et al., 2021). Compared to the year prior, rates of anxiety in the United States at the beginning of the pandemic were estimated to be 2.5-10 times higher (Cordaro et al., 2021; Daly and Robinson, 2021) and have remained persistently elevated across all demographics (Daly and Robinson, 2021), with rates similar to or higher than reported depressive symptoms (Turna et al., 2021). Numerous studies have identified women as a subgroup particularly at risk for increased anxiety levels during the pandemic (Özdin and Bayrak Özdin, 2020), suggesting an

additional acute burden in a population with higher rates of anxiety disorder prevalence, and thus pre-existing diagnoses, at baseline (McLean et al., 2011).

The symptom experiences among those with pre-existing generalized anxiety during the pandemic are critical to understand given the existing high rates of GAD and related impairment (Hendriks et al., 2016). The pandemic has produced new worries about health (Tull et al., 2020) with such worries posing risks for clinically elevated anxiety (Esteban-Gonzalo et al., 2021). Those with a pre-existing diagnosis of anxiety may be particularly prone to these worries. COVID-19 has been described as an 'acute-on-chronic' stress both in the context of physical and mental health concerns (Gabielli and Lund, 2020). Vulnerability-stress models suggest that those with pre-existing mental health concerns such as having had a generalized anxiety disorder are predisposed to increased symptomatology following stress exposure (Cox et al., 2020; Turna et al., 2021). There is evidence from studies conducted during the pandemic to indicate that those with pre-existing

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mental health concerns are indeed more vulnerable (Turna et al., 2021), with some work showing COVID-19-related distress to be higher among those with pre-existing anxiety disorders (Bendau et al., 2021; Liu et al., 2020a, 2020b; McLoughlin et al., 2021). For these reasons, it is reasonable to anticipate and address the psychological impacts of the pandemic on those with pre-existing mental health disorders.

Furthermore, health worries may be particularly salient to perinatal women with pre-existing mental health disorders. Even under pre-pandemic conditions, pregnant and postpartum women are commonly concerned about various risks to their health, risks to the health of the developing fetus or newborn, and experience fear of birth (Kim et al., 2013; Vismara et al., 2020), such that pregnancy-specific anxiety has been proposed as a distinct anxiety subtype (Brunton et al., 2019). Pregnancy itself is a time of vulnerability associated with new diagnoses on the anxiety spectrum (Viswasam et al., 2021). However, given that the rate of lifetime generalized anxiety is already high among those within child-bearing age, many perinatal women enter pregnancy with a pre-existing diagnosis of anxiety, with pregnancy often associated with symptom exacerbations in this subgroup. In addition to the established stressor of the pregnancy itself, the COVID-19 pandemic presents an additional acute stressor to this population. Within the context of the pandemic, many of the direct health risks from COVID-19 were largely unknown or uncertain, with worry about the impact of COVID-19 on pregnancy associated with worse mental health outcomes for new mothers (Ayaz et al., 2020; Esteban-Gonzalo, et al., 2021; Hessami et al., 2020; Moyer et al., 2020; Tomfohr-Madsen et al., 2021). It is plausible that the effect of the pandemic on mental health would be even more pronounced amongst perinatal women with a pre-existing mental health concern, resulting in exacerbation of generalized anxiety symptoms.

The purpose of our study was to test the hypothesis that pre-existing anxiety exacerbates COVID-19-related health worries on anxiety symptom severity among a sample of perinatal women – those who were pregnant or who had given birth during the COVID-19 pandemic. We utilized the PEACE Study (Perinatal Experiences and COVID-19 Effects Study; www.peacestudy2020.com), which began in May 2020 to understand the mental health and well-being of pregnant and postpartum women within the U.S. during the COVID-19 pandemic.

## 2. Methods

### 2.1. Study population

Our cross-sectional analysis used data from the PEACE Study which included over 2,000 women who provided self-reported data between May 21, 2020 and June 24, 2021. The purpose of the PEACE Study was to investigate the experiences related to maternal perinatal mental health during the COVID-19 pandemic. Participation was open to women aged 18 years and above, ranging from the second trimester of pregnancy to six months postpartum. Participants were recruited mostly via word of mouth, email lists, and social media. Participants completed a 30-40 minute online survey via REDCAP. Standardized measures in the survey included assessments of resilience, perceived relationship with fetus/infant, COVID-19-related experiences, family-social risk, and health outcomes. Additional questions were included for human verification and attention checks and the data were visually assessed by study staff for response irregularities prior to analysis. All participants provided informed consent before participation. The Institutional Review Board of Mass General Brigham approved all study procedures.

### 2.2. Measures

#### 2.2.1. Predictors

Generalized anxiety disorder diagnoses that took place before the pregnancy were included as a primary predictor in the model. Mothers were asked to indicate any previous diagnoses of generalized anxiety 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 of pre-existing generalized anxiety diagnosis was created by combining “No” with “Suspected, but not diagnosed” to represent a category of “No pre-existing generalized anxiety diagnosis.” The two other remaining options represented a category of “Yes, received a pre-existing generalized anxiety diagnosis.”

COVID-19-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; Nikolaidis et al., 2021). 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 the measured items was 0.85, indicating very good reliability. Items were summed to create a total score reflecting COVID-19-related health worries. A binary score was calculated with scores  $\geq 16$ , thus 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.

#### 2.2.2. Outcomes

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 clinically significant levels of anxiety.

#### 2.2.3. Covariates

Sociodemographic variables including maternal race, highest education level attained, household income from the past year, and current perinatal status (pregnant or postpartum) and whether the recent pregnancy was their first were obtained by self-report.

Participants were presented with a list of major life events and asked to indicate whether any had occurred in the past six months. These items included events such as “I moved to a new address,” “my partner lost their job,” and “I argued with my partner more than usual.” The analyses relied on the total number of events endorsed.

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, as some studies have shown some attenuation in anxiety symptoms over time (Twenge and Joiner, 2020; Yarrington et al., 2021).

### 2.3. Statistical Analyses

Prior to analysis, an inspection of variables indicated a normal distribution, with predictors showing acceptable levels of collinearity (VIF  $< 5$ ). To determine differences between those with and without a pre-existing diagnosis of GAD on key variables, we conducted proportion and means tests using chi-square and t-tests, respectively. Following this, we performed unadjusted logistic regression models to calculate the likelihood in predicting generalized anxiety symptoms based on pre-existing GAD diagnosis status (yes/no) and COVID-19-related health worries (high/low). We also performed a model adjusting for maternal age, race, education, household income, perinatal status (pregnant/postpartum), first pregnancy (yes/no), number of life events in the past six months, and pandemic duration (days). All analyses were performed using SPSS 26.0.

### 3. Results

**Table 1** displays sociodemographic characteristics and descriptive data of the key variables pertaining to expectant or new mothers during the COVID-19 era. Among all participants, the mean age was 32.9 years (SD=3.67), with the majority White (90.0%), college educated (91.5%) and reporting a household income of at least 75,000 per year (86.4%). The average number of life events that occurred in the past 12 months based on self-report was 1.38 (SD=1.41). Of all the participants, 45.1% indicated that their pregnancy was their first and 55.5% were pregnant at the time of the survey. Among those who were pregnant, 58.9% were in their third trimester. Those who had given birth at the time of the survey were on average 12.11 weeks postpartum, with 8.1% who reported having had an infant born premature (<37 weeks). Among all participants, 18.1% reported high levels of COVID-19-related health worries and 24.8% scoring above the clinical cut off for generalized anxiety, with the mean score of GAD-7 at 6.23 (SD=5.01). The participants completed the survey on average 142.84 days (SD=66.31) after the designation of the COVID-19 pandemic on March 13, 2020.

Among our sample, 24.8% reported having received a GAD diagnosis prior to the pregnancy. Significant differences in rate and means between those with and without pre-existing GAD were observed across almost all variables with exception to infant age and infant prematurity among postpartum participants, and time between the pandemic survey and survey completion. Briefly, those reporting pre-existing GAD were slightly younger, more likely to be White, be less educated, have a lower income, have a higher number of life events, be pregnant (versus having already given birth at the time of the survey), report the recent pregnancy to be their first pregnancy, score high (versus low) on COVID-19-related health worries, and score above the clinical cut off for generalized anxiety. Among those who were pregnant, those with pre-existing GAD were more likely to be in their second (versus third) trimester of pregnancy.

**Table 2** and **Table 3** present logistic regression models predicting likelihood of probable generalized anxiety based on reported COVID-19-related health worries, unadjusted and adjusted for covariates. Here, we report the adjusted model. First, two main effects were observed: those with a pre-existing GAD diagnosis were more likely to score in the probable range of anxiety (OR=3.01, CI=2.18-4.17) as with those with high levels of COVID-19-related health worries (OR=6.47, CI=4.54-9.22). Second, a pre-existing GAD and COVID-19-related health worries interaction effect was observed (OR=0.52, CI=0.28-0.96). We then proceeded to stratify the logistic regression analyses by pre-existing GAD diagnosis. While those with high levels of COVID-19-related health worries were more likely to score in the probable range for generalized anxiety for both those with and without a pre-existing GAD diagnosis, COVID-19-related health worries were more predictive for probable generalized anxiety for those with no pre-existing GAD diagnosis (OR=6.51, CI=4.55-9.32) compared to those with a pre-existing GAD diagnosis (OR=3.56, CI=2.14-5.93).

### 4. Discussion

Calls for attention to support those with pre-existing mental health problems have been made throughout the pandemic, given the anticipated exacerbation of symptoms with increased worries about contracting COVID-19 (Chatterjee et al., 2020; Osborne et al., 2021). Our study tested the hypothesis that those with pre-existing generalized anxiety disorder would be more vulnerable to the effects of COVID-19-related health worries on anxiety symptom severity in a sample U.S. perinatal women. While COVID-19-related health worries did confer a risk of increased generalized anxiety symptoms among those with and without pre-existing anxiety, contrary to our hypothesis, COVID-19 health worries posed a larger risk for elevated anxiety symptoms among women *without* a pre-existing diagnosis of anxiety compared to those with such a diagnosis.

**Table 1**

Demographic characteristics from the PEACE Study among perinatal respondents, data collected between May 21, 2020 to June 24, 2021, proportions unless otherwise indicated.

Predictors	Total (n = 1587) Means or %	No pre-existing GAD (n = 1193) Means or %	Pre-existing GAD (n = 394) Means or %	Proportion or means tests
Pre-existing GAD				
No	75.2 %	–	–	
Yes	24.8 %	–	–	
Maternal Age (years)	M=32.93, SD=3.67	M=33.02, SD=3.61	M=32.68, SD=3.81	t (1585) = 3.66, p < .001
Maternal Race				$\chi^2$ (4) = 22.69, p < .001
White	90.0 %	88.5 %	94.7 %	
Black or African American	0.9 %	1.0 %	0.5 %	
Hispanic or Latino	3.5 %	3.8 %	2.8 %	
Asian and Pacific Islander	3.1 %	3.9 %	0.8 %	
Other	2.5 %	2.8 %	1.3 %	
Maternal Education				$\chi^2$ (3) = 32.84, p < .001
Less than college	8.5 %	7.4 %	11.9 %	
College	30.0 %	30.2 %	29.4 %	
Masters	43.2 %	41.9 %	47.2 %	
Doctorate	18.3 %	20.5 %	11.4 %	
Household Income (USD/year)				$\chi^2$ (3) = 24.86, p < .001
< \$74,999	13.6 %	12.4 %	17.3 %	
\$75,000 - 149,999	41.1 %	40.0 %	44.4 %	
\$150,000 - 224,999	27.5 %	28.5 %	24.6 %	
≥ \$225,000	17.8 %	19.1 %	13.7 %	
Life Events (total number in past year)	M=1.38, SD=1.41	M=1.31, SD=1.38	M=1.58, SD=1.48	t (500.14) = -7.57 p < .001
Perinatal Status				$\chi^2$ (1) = 4.95, p < .05
Pregnant	55.5 %	54.1 %	59.6 %	
Postpartum	44.5 %	45.9 %	40.4 %	
First pregnancy				$\chi^2$ (1) = 3.62, p < .01
Yes	45.1 %	43.9 %	48.7 %	
No	54.9 %	56.1 %	51.3 %	
Pregnancy trimester (among those pregnant)				$\chi^2$ (1) = 4.45, p < .05
Second	41.1 %	38.7 %	46.5 %	
Third	58.9 %	61.3 %	53.5 %	
Child characteristics (among postpartum women)				
Infant age (weeks)	M=12.11, SD=7.40	M=12.53, SD=7.46	M=10.61, SD=7.07	t (697) = -1.38, p = .17
Baby born premature (<37 weeks)				$\chi^2$ (1) = 3.16, p = .07
No	90.7 %	92.8 %	88.4 %	
Yes	8.1 %	7.2 %	11.6 %	
COVID-19-related health worries				$\chi^2$ (1) = 21.01, p < .001
Low (<16)	81.9 %	83.8 %	76.1 %	

(continued on next page)

**Table 1** (continued)

Predictors	Total (n = 1587)	No pre-existing GAD (n = 1193)	Pre-existing GAD (n = 394)	Proportion or means tests
	Means or %	Means or %	Means or %	
High (≥16)	18.1 %	16.2 %	23.9 %	$\chi^2(1) = 107.56, p < .001$
Generalized anxiety (GAD-7)				
Low (<10)	75.2 %	77.3 %	63.2 %	
High (≥10)	24.8 %	22.7 %	36.8 %	$t(1585) = -52.68, p < .001$
Mean score	M=6.23, SD=5.01	M=5.73, SD=4.75	M=8.20, SD=5.31	
Days between survey completion and pandemic start	M=142.84, SD=66.31	M=142.41, SD=65.99	M=144.14, SD=67.35	

**Table 2**

Unadjusted logistic regression predicting probable generalized anxiety among perinatal women from the PEACE Study by pre-existing GAD diagnosis, data collected between May 21, 2020 to June 24, 2021.

Unadjusted Model	Total (n = 1587)		No pre-existing GAD (n = 1193)		Pre-existing GAD (n = 394)	
	OR	95% CI	OR	95% CI	OR	95% CI
<i>Pre-existing GAD</i>						
No	1.0	–	–	–	–	–
Yes	2.93**	2.15-4.00	–	–	–	–
<i>COVID-19-related health worries</i>						
Low	1.0	–	1.0	–	1.0	–
High	6.44***	4.58-9.04	6.44***	4.58-9.04	3.71***	2.29-6.01
<i>Pre-existing GAD * COVID-19 health worries</i>						
	0.58†	0.32-1.04	–	–	–	–

†  $p < 0.1$ , \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

There are several possible interpretations to this surprising finding. One interpretation is that those with a pre-existing diagnosis of anxiety may have had more experience managing their anxiety via pharmacologic treatment or engagement of coping strategies prior to COVID-19 (Plunkett et al., 2021); support for this interpretation comes from research showing that emotion-focused coping strategies improved mental health outcomes for pregnant women during the pandemic (Khoury et al., 2021). These individuals may also have been actively receiving treatment for pre-existing anxiety prior to the pandemic, and/or benefiting from established access to mental health care, with skills to cope with stress. In contrast, individuals experiencing symptoms for the first time may be less equipped to cope with new experiences of anxiety, and those who sought professional help may have been confronted by long waitlists for an evaluation during the COVID-19 pandemic.

Another interpretation is that those with a pre-existing diagnosis of anxiety simply experienced less anxiety symptoms due to COVID-19-related health worries compared to those without a pre-existing diagnosis. As suggested in another study that also showed less risk among those with pre-existing anxiety (Pan et al., 2021), individuals with pre-existing anxiety may have experienced a decrease in symptom severity with quarantine measures, producing a greater sense of safety despite having the same level of COVID-19-related health worries. On the other hand, for someone without a prior experience of anxiety, having a new experience of worry, such as the potential threat of COVID-19 on health, may itself be anxiogenic and a means for

**Table 3**

Adjusted logistic regression predicting probable maternal anxiety among perinatal women from the PEACE Study by pre-existing GAD diagnosis, data collected between May 21, 2020 to June 24, 2021.

Adjusted Model	Total (n = 1587)		No pre-existing GAD (n = 1193)		Pre-existing GAD (n = 394)	
	OR	95% CI	OR	95% CI	OR	95% CI
<i>Pre-existing GAD</i>						
No	1.0	–	–	–	–	–
Yes	3.01***	2.18-4.17	–	–	–	–
<i>COVID-19-related health worries</i>						
Low	1.0	–	1.0	–	1.0	–
High	6.47***	4.54-9.22	6.51***	4.55-9.32	3.56***	2.14-5.93
<i>Pre-existing GAD * COVID-19-related health worries</i>						
Maternal age	0.94**	0.91-0.98	0.94*	0.90-0.99	0.94	0.88-1.01
<i>Maternal race</i>						
White	1.0	–	1.0	–	1.0	–
Black or African American	2.10	0.62-7.18	2.41	0.62-9.39	1.11	0.64-19.13
Hispanic or Latino	1.14	0.58-2.22	1.10	0.50-2.42	1.06	0.30-3.82
Asian and Pacific Islander	0.85	0.38-1.90	0.79	0.33-1.89	1.16	0.10-13.3
Other	1.06	0.46-2.47	1.13	0.45-2.85	0.78	0.08-8.03
<i>Maternal education</i>						
Less than college	1.0	–	1.0	–	1.0	–
College	1.43	0.85-2.41	1.60	0.79-3.22	1.26	0.56-2.81
Masters	1.31	0.78-2.20	1.43	0.70-2.89	1.18	0.53-2.62
Doctorate	1.73†	0.96-3.12	1.66	0.77-3.60	2.13	0.78-5.84
<i>Household income</i>						
<\$74,999	1.0	–	1.0	–	1.0	–
\$75,000 - 149,999	0.77	0.49-1.23	0.82	0.48-1.39	0.69	0.35-1.36
\$150,000 - 224,999	0.77	0.56-1.55	1.03	0.58-1.84	0.45†	0.21-1.00
≥ \$225,000	0.93	0.68-1.16	1.11	0.58-2.09	0.67	0.27-1.66
<i>Pregnant</i>						
No	1.0	–	1.0	–	1.0	–
Yes	0.89	0.68-1.16	0.78	0.56-1.08	1.18	0.74-1.86
<i>First pregnancy</i>						
No	1.0	–	1.0	–	1.0	–
Yes	0.95	0.72-1.25	0.96	0.68-1.35	0.90	0.56-1.43
<i>Life events</i>						
	1.32***	1.21-1.44	1.37***	1.23-1.53	1.21*	1.03-1.42
<i>Pandemic duration (days)</i>						
	0.99	0.99-1.00	1.00	0.99-1.00	1.00	0.99-1.00

†  $p < 0.1$ , \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

amplifying symptoms.

It is worth contemplating whether some individuals without a pre-existing diagnosis of anxiety were more predisposed to developing elevated anxiety symptoms in response to COVID-19-related health worries. On average, patients who present with GAD experience their illness for an average of 15 years before seeking help (Ballenger, 2001). Perhaps in the ‘no preexisting GAD’ category lies a subset of those who would have met GAD criteria previously had they been assessed, but who were limited in seeking care due to willingness, insight, or access, and who had not been formally diagnosed. If so, they might be the subgroup at highest risk, and the category of having no pre-existing



diagnosis of GAD could in fact show a bimodal distribution for GAD risk.

One possible subgroup that might have driven this finding are women who display a different phenotype of anxiety, for instance, those who may have a more somatic experience of worry or preoccupation with health concerns, which may not have been previously interpreted as generalized anxiety. Those with high trait anxiety but with subclinical symptom burden prior to the pandemic may also contribute to our finding. Indeed, COVID-19 fear appears to mediate the relationship between anxiety sensitivity (i.e., the tendency to misattribute the meaning of anxiety-relevant sensations) and anxiety symptoms (Warren et al., 2021). The pandemic both introduced a long-term stressor with an unclear endpoint and simultaneously disrupted many coping outlets, such as exercise classes, relying on family and social support, and community support groups. Those who were previously able to self-manage their anxious tendencies without pursuing a formal diagnosis and/or treatment may have found themselves unable to cope as well when confronted with extraordinary circumstances. For these reasons, anxiety symptoms may have become sufficiently elevated among those without a pre-existing diagnosis and thus detectable through the GAD-7 measure. In contrast, those with pre-existing anxiety may include those who are chronically anxious; if so, new sources of stress may limit one's subjective experience of increased anxiety symptoms, leading to a ceiling effect of reported symptoms.

One limitation of this study is the heterogeneity of anxiety as a construct; postpartum anxiety (Fallon et al., 2016) and pregnancy-specific anxiety (Brunton et al., 2019) have both been proposed as distinct from anxiety in the larger population. While this study assessed anxiety symptoms using the GAD-7 assessment tool to measure generalized anxiety, it is possible that measures more specific to this subpopulation could be informative as well. Additionally, incorporating further data collection from study participants could also help clarify the underlying factors driving these findings; in particular, whether the group without a prior GAD diagnosis may have had clinically meaningful anxiety predating the pandemic but been unable to receive a formal diagnosis. For this study we did attempt to correct for this possibility by including variables which often modulate access to mental health care, including income, race, and education. Similarly, prior diagnoses of GAD in this cohort were self-reported and thus subject to the patient's memory; for some patients, their provider may have discussed and validated their anxiety in a general sense without intending to assign a medical diagnosis. Confirmation of clinical diagnosis would be valuable to ensure proper group assignment, and in the latter case would be predicted to strengthen findings. Further exploration of the influence of medical and psychiatric comorbidities on these findings could also clarify the robustness of our findings, as patients who contracted COVID-19 have also experienced increased anxiety rates (Nowacka et al., 2021), and major depressive disorder often co-presents with GAD (Kaufman and Charney, 2000) or can have features of anxious distress. Finally, the inherently self-selecting nature of participation in a survey study likely produced a sample skewed toward high SES and White participants. Additional research would be needed to confirm the generalizability of our findings.

There are several clinical implications of these findings. If prior treatment is a protective factor against the effects of stress, this suggests that treatment for anxiety may have a robust effect over time. This is an exciting clinical possibility, as one goal of psychiatric treatment is to not only treat current symptoms, but to prophylax against future exacerbations as well. Further analysis of the group with prior GAD by prior treatment and type of treatment may reveal which types of treatment (whether particular medications or therapeutic approaches) confer resilience against future anxiogenic experiences. Additionally, if one source of this difference in anxiety symptoms is due to differences in interpreting anxiety sensations, psychoeducation could be a meaningful intervention in this population. In other words, if understanding anxiety as normal has a protective effect, normalizing the experience of anxiety for women with high COVID-19-related health worries may protect

against the development of new anxiety symptoms. This could also be studied more generally, to determine whether psychoeducation in times of high stress is protective against the development of new anxiety. Finally, the possibility that patients with a different phenotype of anxiety were not able to previously obtain a diagnosis of GAD points to the importance of further describing different subtypes of anxiety in future research in order to identify the optimal treatment for women.

## 5. Data availability statement

Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data is not available.

## CRedit authorship contribution statement

**Cindy H. Liu:** Conceptualization, Formal analysis, Investigation, Writing – original draft, Writing – review & editing, Project administration, Funding acquisition. **Amanda Koire:** Investigation, Writing – original draft, Writing – review & editing. **Natalie Feldman:** Investigation, Writing – original draft, Writing – review & editing. **Carmina Erdei:** Writing – review & editing. **Leena Mittal:** Writing – review & editing.

## Declaration of Competing Interest

The authors have no conflicts to disclose.

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