

# The impact of prepartum pandemic-related perceived stress on anxiety symptoms in the postpartum: The role of perceived childbirth experiences

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## ARTICLE INFO

### Keywords:

Postpartum anxiety  
Childbirth experience  
Perceived stress  
Anxiety symptoms  
Mental health  
Covid-19

## ABSTRACT

Postpartum anxiety is a significant component of postpartum maternal distress and is related to adverse outcomes for both the mother and the child. Although previous research reported higher anxiety symptoms in pregnant women during the Covid-19 pandemic, no studies evaluated the negative impact of pandemic-related perceived stress on postpartum anxiety symptomatology over time. This study aimed to examine the impact of prepartum pandemic-related stress on postpartum anxiety and to evaluate the role of subjective labor and delivery experiences on this relationship. A sample of 172 pregnant women completed an online questionnaire evaluating pandemic-related perceived stress and anxiety symptoms in the second or third trimester of pregnancy. In the postpartum, they completed a second questionnaire retrospectively evaluating their childbirth experience and assessing anxiety symptoms in the last two weeks. A mediation analysis was conducted. Prepartum pandemic-related perceived stress was significantly associated with postpartum anxiety symptoms. Moreover, childbirth experiences significantly and partially mediated this relationship. Findings highlighted the importance of evaluating perceived stress levels during pregnancy to prevent negative consequences on postpartum mental health. Clinicians need to foster better management of factors included in the childbirth experience that may potentially trigger or counteract anxiety risk.

## 1. Introduction

Childbirth is a significant event, and the subsequent period may importantly impact women's health and well-being, increasing their vulnerability to mental disorders (Goodman et al., 2016). Evidence suggests that psychopathology during the postpartum period is common (O'Hara & Wisner, 2014; Grekin, O'Hara, 2014; Falah-Hassani et al., 2017). However, while postpartum depression has received significant attention (e.g., Stewart & Vigod, 2019; Shorey et al., 2018), anxiety has been less studied, despite being identified as a significant component of postpartum maternal distress (Dennis et al., 2018; Fawcett et al., 2019). Indeed, postpartum anxiety has a high prevalence, affecting 15–30% of women (Zappas et al., 2021; Cena et al., 2021).

### 1.1. Postpartum anxiety outcomes for women and children

Growing evidence shows that postpartum anxiety is associated with adverse outcomes for both the mother and the child (Glasheen et al., 2010; Paul et al., 2013). Postnatal anxiety can lead to worsened

comorbidities including postpartum depression (Farr et al., 2016), poor adherence to medical regimens, substance use disorders, suicide, and even infanticide (Kendig et al., 2017). Anxiety can also interfere with the mother-infant interactions and the mother's ability to engage and tune in with the baby (Dubber et al., 2014), and outcomes are not restricted to infancy (Field, 2018). Longitudinal studies, for instance, revealed that infants of mothers with anxiety symptomatology might have an increased risk of deficits in behavioral, cognitive, temperamental, and emotional domains (Rogers et al., 2020).

### 1.2. Risk factors for postpartum anxiety

Several factors during the perinatal period may increase anxiety levels and exacerbate postpartum symptoms (Furtado et al., 2018). These factors include a low socioeconomic status, ethnic minority, and poor educational attainment (Dennis et al., 2017), poor quality partner relationships and low perceived social support (Asselmann et al., 2020), a past of poor mental health (Furtado et al., 2019), earlier adverse life events or a history of abuse/domestic violence (Gartland et al., 2016),

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<https://doi.org/10.1016/j.janxdis.2023.102762>

Received 12 June 2022; Received in revised form 19 July 2023; Accepted 10 August 2023

Available online 12 August 2023

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single parenting (Jordan & Minikel, 2019), and unwanted pregnancy (Martini et al., 2015).

### 1.2.1. Covid-related perceived stress and women's anxiety

The COVID-19 pandemic posed a considerable challenge to the psychological well-being of the entire population (Wilke et al., 2021). Covid-related stress factors included quarantine and social isolation, fear of contracting the virus, changes in daily routine, difficulties in household finances, and concerns about family members' potential infection and deaths (Galea et al., 2020). Pregnant women have also faced restrictions in prenatal routine care and in-person medical visits, along with concerns about becoming infected while hospitalized and potential fetus complications (Luo et al., 2022; Qi et al., 2020).

Moreover, reduced rates of social support as a result of quarantine measures and lockdowns, limited access to hospitals for partners and family members, and the interruption of face-to-face prenatal courses or other pregnant-related social activities may have exacerbated the sense of uncertainty and intensified the adverse effects of stress (Meaney et al., 2022; Coxon et al., 2020). Consistently, evidence suggested that the COVID-19 pandemic had a profound impact on pregnancy-related anxiety (Saccone et al., 2020). Several studies, for instance, showed that during the global emergency, women's prenatal anxiety symptoms were higher than pre-pandemic values (Iyengar et al., 2021), particularly among women who perceived higher pandemic-related stress levels (Mappa et al., 2020). Even though it has been noted that prenatal stress exposure harms women's mental health in the postpartum period (Stone et al., 2015), no studies to our knowledge have prospectively examined the impact of perceived stress during pregnancy, including pandemic-related stress, on the subsequent development of postpartum anxiety.

### 1.2.2. Childbirth experience and postpartum outcomes

Another factor exacerbating postpartum anxiety is the childbirth experience (Bell et al., 2016). Evidence reported that women's subjective childbirth experiences are directly connected to postnatal psychological well-being (MacKinnon et al., 2017) and to the quality of mother-baby interactions (Simpson & Catling, 2016), showing how stressful intrapartum experiences increase postpartum adjustment problems (Molgora et al., 2019) and exacerbate anxiety symptoms in the subsequent period (Clout et al., 2015). For these reasons, the World Health Organization (2018) published recommendations on childbirth care, stressing the importance of a positive experience during labor and delivery, and highlighting the importance of partners' and health professionals' empowerment and support, including perceptions of a clinically and psychologically safe environment (WHO, 2018). Indeed, high perceived personal control and security experienced during labor and delivery resulted in a lower risk of developing postpartum disorders and parental distress (McKelvin et al., 2021).

### 1.3. The present study

Two important issues emerged from the literature discussed so far: (a) Perceiving high levels of pandemic-related stress increase anxiety symptoms in pregnant women, and (b) a negative childbirth experience is associated with a higher risk of developing anxiety symptoms in the postpartum period.

Besides this evidence, it has to be also considered that perceiving higher stress during pregnancy is related to greater difficulties during labor and delivery and to a higher risk of negative birth experiences and adverse pregnancy outcomes (Monk et al., 2020; Bryanton et al., 2008) including preeclampsia (Zhang et al., 2013), impaired fetal growth and preterm births (Tanpradit & Kaewkiattikun, 2020) and miscarriage (Wainstock et al., 2013).

In light of these observations, we hypothesize a model in which prepartum pandemic-related perceived stress negatively influenced childbirth perceptions, which in turn negatively impacted postpartum

anxiety levels. Consistently, the present study aimed to examine the association between prepartum pandemic-related stress and postpartum anxiety and to investigate the role of childbirth experience as a mediator of this relationship.

## 2. Methods

### 2.1. Participants and procedures

This longitudinal study was conducted in Italy during the COVID-19 pandemic. Participants were 172 women who were enrolled from July 2020 and provided complete data for prepartum (T1) and postpartum (T2) assessments by January 2022. Eligible women had to be over 18 years old, in the second or third trimester of pregnancy, and able to complete questionnaires in Italian. Recruitment was performed via different social media platforms. All participants took part voluntarily and were not remunerated. After explaining the study and obtaining online informed consent, women were asked to complete an online questionnaire (T1). At T1 (i.e., second or third trimester of pregnancy), women provided sociodemographic and pregnancy information (i.e., age, education, and parity) and completed the COVID-19-related Perceived Stress Scale and the Generalized Anxiety Disorder Scale (Gad-7). In addition, participants were required to provide an email address for further contact. One month after the delivery, participants were contacted again by email or via social media and asked to complete a second online questionnaire (T2). At this time point, mothers were asked to report childbirth-related measures (i.e., childbirth method, length of hospital stay after the delivery, preterm birth, and underweight at birth), to answer the Wijma Delivery Experience Questionnaire and to repeat the Generalised Anxiety Disorder Scale. This study was approved by the Institution Review Board of the Psychology Department, Sapienza University of Rome (Prot. N. 2017BC4MST).

### 2.2. Measures

#### 2.2.1. COVID-19 perceived stress

Perceived stress related to the COVID-19 pandemic was measured using the Italian 10-item version of the Perceived Stress Scale (PSS) (Cohen et al., 1983; Mondo et al., 2021). The PSS measures the individual's experience of perceived stress during the previous month through items that evaluate how unpredictable, uncontrollable, and overloaded respondents found their lives. We changed the stem question of the scale to evaluate the stress related to the COVID-19 pandemic. An example of an adapted item was: "Considering the current COVID-19 pandemic condition of the last month, how often have you felt that you could not cope with everything you had to do?" (Cohen et al., 1983). Responses to each item were scored on a 4-point Likert scale ranging from 0 (never) to 4 (very often). After reversing the score of positive items, scores were summed to produce a total score, ranging from 0 to 40, with higher scores indicating higher levels of perceived stress. The scale has good validity and reliability (Cohen et al., 1983; Mondo et al., 2021; Taylor, 2015), and was used in many recent studies to evaluate the perceived stress related to the COVID-19 pandemic (i.e. di Fronso et al., 2022; Pieh et al., 2021; She et al., 2021), showing good psychometric properties for assessing perceived stress among pregnant women (Beneditsson et al., 2017). In the current study, the Cronbach  $\alpha$  coefficient was 0.85.

#### 2.2.2. Childbirth experience

The Wijma Delivery Experience Questionnaire (WDEQ – B) was used to assess women's retrospective perception of childbirth experience (Wijma et al., 1998). We used the reduced Italian version of the WDEQ-B, which consists of 14 items (Fenaroli et al., 2019). An example item was: "How did you feel during labor and delivery?", with responses scoring on a 6-point Likert scale ranging from 1 (*extremely safe*) to 6 (*not safe at all*). Higher scores indicated a worse labor and delivery

experience (Fenaroli & Saita, 2013). In the current study, the Cronbach  $\alpha$  coefficient was 0.89.

### 2.2.3. Anxiety symptoms

Anxiety symptoms were captured through the Generalised Anxiety Disorder Scale (GAD – 7) (Spitzer et al., 2006), a widely-used screening measure that evaluates the frequency of seven core anxiety symptoms over the preceding two weeks. The response scale ranges from 0 ("not at all") to 3 ("nearly every day"). Total scores range from 0 to 21, with higher scores representing more severe anxiety symptoms. A cut-off point of  $\geq 7$  was adopted in the pregnant population to indicate clinically significant anxiety symptoms (Gong et al., 2021; Zhong et al., 2015). The GAD-7 showed good reliability and validity in different populations (Rutter & Brown, 2017; Spitzer et al., 2006), and has been validated for being used in the peripartum period (Simpson et al., 2014; Zhong et al., 2015). The Cronbach  $\alpha$  coefficients of reliability in this study were 0.84 both at prepartum and postpartum.

### 2.2.4. Covariates

Participants' age, education, and parity were recorded at prepartum assessment, whereas childbirth method, length of hospital stay after the delivery, preterm birth, and delivery of underweight child were recorded at postpartum assessment. Education was classified into six groups ranging from low to high levels of education. The childbirth method was classified into four groups (spontaneous vaginal delivery, induced vaginal delivery, elective cesarean section, and emergency cesarean section). Parity, preterm birth (i.e., births before 37 completed weeks of gestation), and underweight at birth were measured as binary variables (primiparous/multiparous, yes/no, and underweight/non-underweight, respectively).

### 2.3. Statistical analyses

To examine whether participants recruited in the prepartum assessment differed from those who completed the study, independent t-tests and  $\chi^2$  tests were used. The effect sizes for all these comparisons were reported. In particular, Cohen's  $d$  was used for the independent t-tests and Cramer's  $V$  for  $\chi^2$  tests. Women were compared on age, education, parity, prepartum COVID-19 perceived stress, and prepartum anxiety. The demographic, clinical, and psychological variables were described by their means (M)  $\pm$  standard deviations (SD) or by the number of participants (N) with the percentage in parenthesis. Paired t-test was used to explore the change in anxiety from the prepartum to the postpartum period and the effect size (i.e.,  $d$ ) was reported. Correlations between variables of the study were assessed using Pearson's  $r$ , and all results are reported as Pearson's  $r$  and  $p$ -value. To examine whether childbirth experience would mediate the relationship between prepartum COVID-19 perceived stress and postpartum anxiety symptoms, bootstrap mediation analysis for simple mediation through model 4 of SPSS PROCESS macro 4.0 was applied (Hayes, 2017; Preacher & Hayes, 2008). The method included 5000 bootstrap samples for coefficient and indirect estimation and 95% bias-corrected confidence intervals (CI) for the indirect effect. In the final model, the independent variable was pandemic-related perceived stress, the mediator was childbirth experience, and the dependent variable was postpartum anxiety symptomatology. Age, education, parity, delivery method, length of hospital stay, preterm birth, underweight child, and prepartum anxiety symptoms were entered as covariates. We reported the unstandardized effect size ( $b$ ) and the 95% bias-corrected CI for the indirect effect model. The mediation effect is significant if the 95% CI does not include zero. To assess the power of the mediation model, a post hoc power analysis was performed using a Monte Carlo power analysis simulation (Schoemann et al., 2017). The results showed that for a single mediation model with a sample of 172, setting a confidence level of 95% and using 50,000 Monte Carlo replications with 20,000 draws, the statistical power to detect a significant indirect effect was 0.95. Data analyses were conducted using

IBM SPSS Statistic version 25 (SPSS Inc.).

### 3. Results

Of the initial sample of 287 pregnant women recruited for the prepartum assessment, 115 did not participate in the postpartum assessment one month later, leaving a final sample of 172, resulting in a 59.9% participation rate. The analyses of the differences between those who participated only in the first assessment and those who completed both pre- and postpartum questionnaires revealed that women who did not complete the postpartum assessment had higher anxiety levels during pregnancy ( $t(285) = 2.326, p = 0.021, d = 0.280$ ). There were no other significance differences: age ( $t(285) = -1.372; p = 0.171, d = 0.165$ ), parity status ( $\chi^2(1) = 0.030, p = 0.895$ , Cramer's  $V = 0.010$ ), education ( $t(285) = -1.137; p = 0.256, d = 0.137$ ), and prepartum COVID-19 perceived stress ( $t(285) = 1.290; p = 0.198, d = 0.155$ ).

Table 1 presents the demographic and clinical characteristics of the sample. The average age of the sample was 31.60 (SD = 4.21) years, with an age range between 19 and 41. Most participants had at least a high education (95.9%), were in their first pregnancy (70.3%), and had a vaginal delivery (78.0%).

Anxiety symptoms did not change significantly over the peripartum period ( $t = 1.682, p = 0.094, d = 0.128$ ). Prepartum anxiety scores ranged from 0 to 20, with 24.4% of women above the cut-off of 7. Postpartum anxiety symptoms scores ranged from 0 to 21, with 21.5% of women above the cut-off score. Table 2 reported the correlations among the variables of interest. The results showed that prepartum COVID-19 perceived stress was positively associated with childbirth experience ( $r = 0.332, p < 0.001$ ) and with both pre- and postpartum anxiety symptoms ( $r = 0.624, p < 0.001$  and  $r = 0.482, p < 0.001$ , respectively). Moreover, worse childbirth experience was associated with higher anxiety symptoms at postpartum ( $r = 0.385, p < 0.001$ ).

We examined the indirect effect of prepartum COVID-19 perceived stress on postpartum anxiety symptoms through childbirth experience. Preacher and Hayes' (2008) bootstrapping estimates of indirect effects were employed. The overall model was significant,  $F(10, 161) = 7.635, p < 0.001, adj. R^2 = 0.322$ . Fig. 1 displays the standardized regression coefficients among the model variables. Higher levels of perceived stress

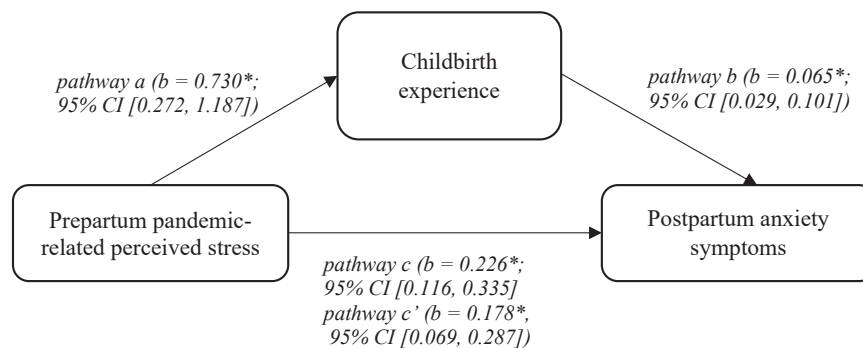
**Table 1**  
Descriptive characteristics of participants (N = 172).

| Variable                                   | Mean $\pm$ SD or N (%) |
|--------------------------------------------|------------------------|
| <b>Age</b>                                 | 31.60 $\pm$ 4.21       |
| <b>Education</b>                           |                        |
| Middle School                              | 7 (4.1)                |
| High School                                | 56 (32.6)              |
| Bachelor                                   | 42 (24.4)              |
| Master's degree                            | 40 (23.3)              |
| Post-lauream specialization courses        | 18 (10.5)              |
| PhD                                        | 9 (5.1)                |
| <b>Parity status</b>                       |                        |
| Primiparous                                | 121 (70.3)             |
| Multiparous                                | 51 (29.7)              |
| <b>Childbirth method</b>                   |                        |
| Spontaneous vaginal delivery               | 92 (53.5)              |
| Induced vaginal delivery                   | 42 (24.5)              |
| Elective caesarean section                 | 19 (11.0)              |
| Emergency caesarean section                | 19 (11.0)              |
| <b>Length of hospital stay</b>             | 3.01 $\pm$ 1.37        |
| <b>Preterm birth</b>                       |                        |
| Yes                                        | 6 (3.5)                |
| No                                         | 165 (96.5)             |
| <b>Weight of child</b>                     |                        |
| Underweight                                | 8 (4.7)                |
| Non-underweight                            | 164 (95.3)             |
| <b>Prepartum COVID-19 perceived stress</b> | 17.14 $\pm$ 5.85       |
| <b>Childbirth experience</b>               | 25.02 $\pm$ 14.29      |
| <b>Prepartum anxiety</b>                   | 5.94 $\pm$ 3.79        |
| <b>Postpartum anxiety</b>                  | 5.41 $\pm$ 3.66        |

**Table 2**

Correlation between variables of the present study (N = 172).

| Variable                               | 1                   | 2                   | 3                   | 4      | 5                  | 6       | 7      | 8       | 9       | 10      |
|----------------------------------------|---------------------|---------------------|---------------------|--------|--------------------|---------|--------|---------|---------|---------|
| 1. Age                                 | -                   |                     |                     |        |                    |         |        |         |         |         |
| 2. Education                           | 0.370 *             | -                   |                     |        |                    |         |        |         |         |         |
| 3. Parity                              | 0.201 *             | 0.150 <sup>^</sup>  | -                   |        |                    |         |        |         |         |         |
| 4. Delivery method                     | 0.044               | 0.021               | -0.095              | -      |                    |         |        |         |         |         |
| 5. Length of hospital stay             | 0.047               | 0.044               | -0.162 <sup>^</sup> | 0.134  | -                  |         |        |         |         |         |
| 6. Preterm birth                       | -0.005              | -0.181 <sup>^</sup> | 0.154 <sup>^</sup>  | -0.055 | 0.185 <sup>^</sup> | -       |        |         |         |         |
| 7. Underweight child at birth          | 0.100               | -0.056              | 0.038               | 0.017  | 0.121              | 0.560 * | -      |         |         |         |
| 8. Prepartum COVID-19 perceived stress | -0.155 <sup>^</sup> | -0.085              | -0.034              | 0.071  | -0.064             | -0.048  | -0.039 | -       |         |         |
| 9. Childbirth experience               | 0.047               | 0.087               | -0.092              | 0.100  | 0.022              | 0.031   | -0.056 | 0.332 * | -       |         |
| 10. Prepartum anxiety symptoms         | -0.209 *            | -0.099              | 0.105               | -0.036 | 0.042              | -0.055  | -0.069 | 0.625 * | 0.219 * | -       |
| 11. Postpartum anxiety symptoms        | -0.044              | -0.061              | -0.036              | 0.074  | 0.063              | -0.022  | 0.005  | 0.482 * | 0.385 * | 0.414 * |

Notes: <sup>^</sup>  $p < 0.05$ , \*  $p < 0.01$ **Fig. 1.** Notes: Indirect effect:  $b = 0.047$ , 95% CI [0.012, 0.099]; \*  $p < 0.05$ .

were associated with a worse childbirth experience ( $b = 0.730$ , 95% CI [0.272, 1.187]). Moreover, the relationship between childbirth experience and postpartum anxiety symptoms was significant ( $b = 0.065$ , 95% CI [0.029, 0.101]). The total effect of prepartum perceived stress on postpartum anxiety symptoms was significant ( $b = 0.226$ , 95% CI [0.116, 0.335]), as well as the direct effect of perceived stress during pregnancy on postpartum anxiety symptoms even when the childbirth experience was included in the model (pathway c',  $b = 0.178$ , 95% CI [0.069, 0.287]). The indirect effect of childbirth experience was significant ( $b = 0.047$ , SE = 0.022, 95% CI [0.012, 0.099]). These results indicated that childbirth experience significantly and partly mediated the relation between COVID-19 perceived stress during pregnancy and postpartum anxiety symptoms.

## 4. Discussion

### 4.1. Summary of main findings

The present study aimed to examine the impact of prepartum pandemic-related stress experienced during pregnancy on postpartum anxiety. Moreover, the mediation effect of the childbirth experience was investigated. We hypothesized both a direct influence of prepartum pandemic-related perceived stress during pregnancy on postpartum anxiety and an indirect relationship via childbirth experiences. Findings indicated that women with higher prepartum pandemic-related perceived stress reported more postpartum anxiety symptoms and that negative childbirth experiences partially mediated this relationship. To our knowledge, these findings are the first to evaluate the effect of pandemic-related perceived stress on postpartum anxiety's symptomatology and to highlight the mediational role of the childbirth experience.

### 4.2. Impact of prepartum pandemic-related perceived stress on postpartum anxiety

Italy was one of the first countries to be severely affected by the spread of the virus, which caused a total number of 7611,614 confirmed cases with 138,651 deaths up to January 2022 (Istituto Superiore di Sanità, 2022) and for which drastic restrictive measures were introduced (i.e. generalized lockdown of the entire country, restraint from physical contact, and the order to maintain social distancing). This scenario, together with the reorganization of hospital services (Stampini et al., 2021), including the interruption of prepartum courses and the prohibition of family members and friends to enter hospitals (Smorti et al., 2022) might have increased the risk of mental health issues for pregnant women. Indeed, previous studies showed a significant association between the Covid-19 pandemic and maternal anxiety during pregnancy, reporting higher anxiety levels in pregnant women during the pandemic than before the global emergency (Mappa et al., 2020; Moyer et al., 2019). Our study extends previous findings, highlighting that pandemic-related perceived stress during pregnancy is associated over time with a higher risk of developing anxiety symptoms at 1-month postpartum.

Our findings are also in line with previous research, showing an association between prenatal perceived stress and consequent mental health disorder in the postpartum period (Stone et al., 2015; Furtado et al., 2018) but are the first, to our knowledge, highlighting the association of stressful events perceived during pregnancy (i.e. the pandemic) with postpartum anxiety symptoms. Considering that more than one-third of postpartum women in our study reported mild anxiety symptoms, it may be important to preventively evaluate prenatal stress levels perceived by future mothers monitoring the well-being of women who are more at risk. The assessment of prenatal distress is also imperative, considering its impact on postpartum maternal psychopathology and infant and child's health (Field et al., 2017; Rogers et al., 2020). This should also be considered in light of the fact that those women who did not participate in the postpartum follow-up were

referred to feel even more anxious during pregnancy than those who completed both assessments.

#### 4.3. Mediation role of the childbirth experience

Our findings indicated that the relationship between prepartum pandemic-related stress and postpartum anxiety symptoms was mediated by childbirth experience. Considering the pathway that links prenatal pandemic-related distress to childbirth experiences, our findings suggested that higher levels of perceived stress during pregnancy might have predisposed women to experience worse subsequent labor and delivery experiences, in line with previous research (McKelvin et al., 2021; Congdon et al., 2016). It is possible that during the pandemic, women may have experienced some lack of security and an unsafe environment which may have interfered with a satisfactory experience of childbirth. Threats to this possibility might have included changes in the prenatal routine care and limited access to the delivery room with reduced possibility of receiving adequate social support, and concerns for the newborn's health (Coxon et al. (2020); Smorti et al. (2022); Basu et al. (2021)).

Our findings evidenced that fear, loneliness and uncertainties, lack of personal control, and concerns about the newborn's health and potential complications at the moment of labor and delivery, were negatively associated with postpartum anxiety symptoms. The lack of partner support at the moment of the delivery, due to the Covid-19-related restrictions, might have contributed to this sense of insecurity (Zhang et al., 2022; Molgora & Accordini, 2020). Indeed, studies evidenced that women who received greater support from caregivers during labor reported reduced pain perception, increased childbirth satisfaction, and better delivery-related memories over time (McGrath & Kennell, 2008; Coo et al., 2021; Grekin, O'Hara, 2014). Conversely, women who gave birth alone experienced greater emotional distress compared to those who were accompanied by their partner or by another trusted person (Oddo-Sommerfel et al., 2022; Sacchi et al., 2023; Arnold & Kalibatseva, 2021).

The mode of delivery was also previously investigated as a possible variable influencing childbirth experience perceptions (Sommerlad et al., 2021) and post-partum maternal mental health (Skov et al., 2022; Zanardo et al., 2018). In particular, cesarean delivery, especially if under emergency circumstances, was associated with increased childbirth-related traumatic symptoms and emotional distress in the first year postpartum (Sommerlad et al., 2021; Skov et al., 2022; Ponti et al., 2022) although not all studies confirmed this relation (Bell et al., 2016; Floris et al., 2017). In our findings, the delivery method was not significantly associated with postpartum anxiety symptoms or with childbirth experiences. It is possible that during the pandemic, other factors could have a stronger contribution to the relationship between childbirth experience and postpartum anxiety.

While previous studies evidenced the influence of childbirth experiences on postpartum anxiety (Türkmen et al., 2020; Bell et al., 2016; Coo et al., 2021; Ahmadpour et al., 2023), our findings extend this literature, evidencing that negative childbirth experiences interact with prenatal perceived stress in determining higher postpartum anxiety levels. It is also possible that a generally negative attitude of women in evaluating events might have influenced both stress perceptions and childbirth-referred experiences.

Consistent with our findings and in line with the WHO's most recent recommendations on intrapartum care for a positive childbirth experience (2018), clinicians need to foster better management of factors included in childbirth experience that may potentially trigger or counteract anxiety risk. In addition, giving birth in a clinically and psychologically safe environment (WHO, 2018) has also crucial importance due to the importance of this moment on mothers' global functioning and mother-infant bonding (Molgora et al., 2019; Ponti et al., 2020).

#### 4.4. Strengths and Limitations

Our study has several strengths. The longitudinal design allows us to evaluate the association of the pandemic-related stress perceived during pregnancy with anxiety symptomatology over time. Moreover, the mediational model highlights the importance of considering the childbirth experience as a crucial factor implicated in the relationship between prenatal distress and postpartum anxiety, which may have a protective effect against potential adverse outcomes.

The findings of this study have to be seen in light of some limitations. First, anxiety symptoms were measured through a self-report questionnaire. However, it should be noted that the instrument used is thoroughly validated in organized clinical interviews and is broadly used among pregnant women. Second, even though the PSS demonstrated good reliability and validity in previous studies measuring pandemic-related stress, including studies on pregnant women (Stepowics et al., 2020; Medina-Jimenez et al., 2020), it is a measure of general perceived stress. It would have been more informative to evaluate specific pregnancy-related stress factors and how the pandemic situation may have amplified the perceived threat of pregnancy-critical situations. Third, we retrospectively assessed childbirth experiences, which may be subjected to potential *recall bias*. One month after childbirth, women may have given different answers than they would have provided if less time had elapsed. However, evidence suggests that childbirth experiences are accurately remembered in the first months, even for prolonged periods (Takehara et al., 2014). Finally, we considered a follow-up at one month. It would be noteworthy to evaluate this relationship over a more extended period of time.

#### 5. Conclusions

In conclusion, we found that the way women experience childbirth partially mediated the relationship between prenatal perceived stress and postpartum anxiety symptoms. The present findings highlight the importance of evaluating perceived stress levels during pregnancy to prevent negative consequences on postpartum mental health. Childbirth experience is a factor that mediates this relationship and that could be easily modified through targeted interventions.

#### Funding

This work was supported by PRIN grant (Progetti di Ricerca di Rilevante Interesse Nazionale, Edit. 2017, Prot. n. 2017BC4MST) (to C. V. and C.G.).

#### CRediT authorship contribution statement

C.G. and C.S.S. conceived the study, C.S.S., and C.G., analyzed data, M.S. wrote a first draft and CG revised the manuscript. All authors read and agreed to the published version of the manuscript.

#### Declaration of Competing Interest

None.

#### Acknowledgments

We thank all participants who took part in this study.

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