

ORIGINAL ARTICLE

Perinatal depression and psychological factors during different periods of the COVID-19 outbreak in Italy

Running Title: Maternal perinatal depression and COVID-19

Silvia **Aviani**, Alessandra **Ammendola** *, Valeria **Lastra**, Cristiano **Scandurra**, Gabriele **Saccone**, Giovanni **Nazzaro**, Nelson Mauro **Maldonato**, Mariavittoria **Locci**

Department of Neuroscience, Reproductive Science and Odontostomatology, University of Naples Federico II, Naples, Italy.

***Corresponding author:** Dr. Alessandra **Ammendola**, M.D. Department of Neuroscience, Reproductive Science and Odontostomatology, University of Naples Federico II, via Pansini 5, 80131 Naples, Italy.

Email: ale.ammendola@gmail.com.

ORCID: 0009-0007-8688-3949.

Doi: 10.36129/jog.2024.170

ABSTRACT

Objective. The present study aimed to investigate whether psychological dimensions that are crucial during pregnancy (perinatal depression, anxiety, prenatal attachment, loneliness, and maternal support) may differ at different stages of the COVID-19 pandemic.

Materials and Methods. A cross-sectional study was conducted with 400 Italian women recruited during two periods of the Covid-19 pandemic in Italy (i.e., 200 Italian women T1 from September to December 2021, and 200 during T2 from March to September 2022). Descriptive statistics and between-group differences were analyzed, also considering the stage (prenatal vs. postnatal) and type (risk vs. physiological) of pregnancy.

Results. Except for perinatal depression, all other psychological dimensions differed between groups. Negative psychological dimensions (i.e., anxiety and loneliness) were significantly higher among women recruited during T2 than among women recruited during T1, whereas positive psychological dimensions (i.e., prenatal attachment and maternal support) were significantly higher among women recruited at T1 than among women recruited at T2. A similar trend was found when pregnancy stage and type were considered.

Conclusions. This study emphasizes the need to compare and define protection and risk factors in high-risk pregnant women during the pandemic period from Sars-Covid19 infection and in the immediate reopening in "pseudo-normality" thanks to the use of the first vaccination cycles; and addressing women's perinatal mental health during major stressful

events cited, such as the Covid-19 pandemic, high-risk pregnancy and experiences of loneliness in conditions of hospitalization and the pandemic.

Key words

Anxiety; COVID-19; loneliness; perinatal depression; support.

Introduction

The gestational period is inherently transformative [1]. Women often perceive it this way primarily due to significant hormonal changes and alterations in body and self-image as they prepare to nurture a new life [2]. Some women experience antenatal hospitalization for complications such as premature labor, premature rupture of membranes, hypertension/preeclampsia, intrauterine growth restriction, unmanaged diabetes, monochorionic twin pregnancies, and placental abnormalities, among others [3]. A pregnancy is considered "high-risk" when the progression of the pregnancy, the health of the expectant mother, or the health and development of the fetus are jeopardized [4]. Known risk factors for perinatal depression include these obstetric complications [5]. Women often identify the emotional response to their own pregnancy, and particularly to a high-risk pregnancy, as a fundamental socio-psychological challenge [6].

The declaration of the SARS-CoV-19 coronavirus infection as a pandemic by the World Health Organization on March 11, 2020, marked a significant point in Italy. Subsequently, there was a rapid development of maternal and perinatal health guidelines related to the virus, which were implemented in various settings including hospitals, to protect pregnant women from infection [7,8,9,10]. From this moment, a significant viral risk factor emerged abruptly, impacting pregnancies [11]. During the early stages of the pandemic and the initial phases of reopening to a "pseudo-normality," the protective and risk factors were distinct [12].

The availability of vaccination cycles, including for pregnant women, has had a profound socio-cultural and emotional impact on how new mothers manage and protect their pregnancies, as well as on their experiences and perceived support [13,14,15]. However, other protective factors were identified, including social support and adequate coping mechanisms, which can mitigate risks and reduce vulnerability. This support enables effective adaptation even in challenging circumstances. Examples include participation in childbirth preparation courses, access to information, and receiving instrumental and emotional support from healthcare professionals. This contrasts with the risk associated with potential mother-child separation [16].

In this context, the global pandemic emerged as a new risk factor alongside the usual risks associated with both physiological and high-risk pregnancies [17,18,19]. Paradoxically, this pandemic appeared to overshadow some clinical risks, creating new and emotionally charged experiences that were complex for individuals and institutions to manage [20,21,22].

Based on these premises, this study aimed to investigate whether key psychological dimensions during pregnancy (perinatal depression, anxiety, prenatal attachment, loneliness, and maternal support) may differ between the early stages of the COVID-19 pandemic [T1] and the initial return to normality, or "pseudo-normality" [T2]. The study focused on two groups: pregnant women recruited during T1 and those recruited during T2. We hypothesized that women in T2 would exhibit better scores across all psychological dimensions considered in this study compared to those in T1.

Materials and Method

Participants and Procedures

The inclusion criteria were (1) an age of ≥ 18 years; (2) Italian language proficiency; (3) no infection with Sars-Cov-2; and (4) the third trimester of pregnancy, if considered the post-natal period.

Two-hundred women were recruited during T1 (i.e., from September to December 2021) and 200 during T2 (i.e., from March to September 2022) in a single Italian prenatal clinic of the University Public Hospital *Blinded for Review*. Questionnaires were administered three days after the childbirth in the postnatal group. All participants provided their consent to participate in the study.

This study was approved by the local IRB of University of Naples Federico II, Naples, Italy (#208/19) on 21/10/2019 designed in accordance with the Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects, and developed in accordance with the EU General Data Protection Regulation.

Measures

Socio-Demographic and Clinical Characteristics

Sociodemographic and clinic variables included age, having a partner (yes vs. no), stage (prenatal vs. post-natal) and type (risk vs. physiological) of pregnancy.

Perinatal Depression

Perinatal depression was assessed through the Edinburgh Postnatal Depression Scale (EPDS) (Cox et al., 1987; Italian version by Benvenuti et al., 1999), a 10-item scale measuring pre- and postnatal depressive symptoms during the last 7 days. Response options range from 0 to 3, and the total score can range from 0 to 30. Higher scores reflect more severe depressive symptoms. The alpha coefficient for the current sample was 0.91 [23,24].

Anxiety

Anxiety was assessed through the Hamilton Anxiety Rating Scale (HAM-A; Maier et al., 1988; Italian version by Cassano and Pancheri, 1993), a 14-item scale measuring the severity of anxiety symptoms (e.g., psychological distress and physical complaints). Response options range from 0 ("not present") to 4 ("very severe"), with higher scores reflecting higher symptoms of anxiety. The alpha coefficient for the current sample was 0.87 [25,26,27,28].

Prenatal Attachment

Prenatal Attachment was assessed through the Prenatal Attachment Inventory (PAI; Muller, 1989, 1993; Italian Version by Busonera et al., 2017) a 21-item scale measuring emotional attachment between the woman and her fetus. Responses to this questionnaire are made on a four-point Likert Scale (4-point response set ranging from "almost always" to "almost never") and scores range from 21 to 84. Increased high scored attachment was indicated by attachment quality/intensity. The alpha coefficient for the current sample was 0.90 [29,30,31].

Loneliness

Loneliness was assessed through the UCLA Loneliness Scale (Russell et al., 1996; Italian version by Boffo et al., 2012), a 20-item scale measuring general loneliness and satisfaction with one's own social network. Response options range from 1 ("never") to 4 ("often"), with higher scores indicating greater loneliness. The alpha coefficient for the current sample was 0.83 [32,33].

Maternal Support

Maternal social support associated with perinatal depression was assessed through the Maternity Social Support Scale (MSSS; Webster et al., 2000; Italian version by Dabrassi et al., 2009), a 6-item scale measuring the levels of perceived social support. Low perceived social support, assessed by the MSSS tool, is usually associated with high levels of stress and depression. We chose this questionnaire to evaluate whether this was also true for a specific and unique condition such as high-risk pregnancy, not finding significant results to draw valid conclusions from.

Response options range from 1 ("never") to 5 ("always"), with higher scores reflecting greater maternal perceived support. The alpha coefficient for the current sample was 0.74 [34,35,36].

Statistical Analysis

All statistical analyses were performed using SPSS version 26.

First, we performed analyses to obtain descriptive information about the two samples. Possible differences in sociodemographic characteristics were examined with a Student's t-test for age and a chi-square (χ^2) test for all other variables. For non-parametric variables, the Mann-Whitney tests were used.

We then performed descriptive statistics (distribution of frequencies, means, and standard deviation) of the psychological dimensions and bivariate correlations between variables, splitting the sample according to the time of recruitment (T1 vs. T2)

Finally, differences between groups were analyzed using a Student's t test for means or a χ^2 test for percentages. Differences between groups based on stage (prenatal vs. postnatal) and type (risk vs. physiological) of pregnancy were also assessed. The effect size was calculated using Cohen's *d*, according to which 0.20, 0.50, and 0.80 represent small, medium, and large effect, respectively.

Results

Participants Characteristics

Participants ranged in age from 18 to 48 years ($M = 32.62$, $SD = 5.82$). Most of the sample had a stable partner ($n = 340$; 85%). Participants were almost equally divided between prenatal ($n = 202$; 50.5%) and postnatal ($n = 198$; 49.5%) periods, and exactly equally divided between high-risk pregnancy ($n = 200$; 50%) and physiological pregnancy ($n = 200$; 50%). The only difference between groups was related to actual partner, with women recruited in T2 having a significantly lower percentage of stable partnerships than those recruited in T1.

Socio-demographic characteristics for both the total sample and the sample divided by period of recruitment are shown in Table 1.

Descriptive Statistics and Bivariate Correlations

Means, standard deviations, and bivariate correlations between the psychological dimensions analyzed in this study (perinatal depression, anxiety, prenatal attachment, maternal support, and loneliness) are reported in Table 2.

Pearson correlation results showed that there were only two significant relationships among women recruited during T1. Specifically, loneliness correlated positively with anxiety and negatively with maternal support.

In contrast, among women recruited during T2, more relationships showed a significant correlation. In particular, perinatal depression correlated negatively with prenatal attachment and maternal support. In addition, prenatal attachment correlated positively with maternal support and negatively with loneliness, and maternal support correlated negatively with loneliness.

Between-Group Differences on Psychological Dimensions

The independent sample t-test showed that, except for perinatal depression, all other psychological dimensions differed between groups (Table 3). In particular, mean scores for anxiety and loneliness were significantly higher among women recruited during T2 than among women recruited during T1. In contrast, mean scores for prenatal attachment and maternal support were significantly higher among women recruited at T1 than among women recruited at T2.

The independent sample t-test performed considering the different timing of COVID -19 and pregnancy stage (prenatal vs. postnatal) showed that, except for perinatal depression in both the prenatal and postnatal groups and anxiety in the prenatal group, all other psychological dimensions differed based on pregnancy stage and recruitment period (Table 4). Specifically, negative psychological dimensions (i.e., anxiety and loneliness) were higher in prenatal and postnatal women recruited during T2 than in their counterparts, whereas positive psychological dimensions (i.e., prenatal attachment and maternal support) were higher in prenatal and postnatal women recruited at T1 than in women recruited at T2.

Finally, the independent sample t-test performed considering the different timing of COVID-19 and the type of pregnancy (high-risk pregnancy vs. physiological pregnancy) showed that, except for perinatal depression in both the high-risk and physiological groups and anxiety in the physiological group, all other psychological dimensions differed based on the type of pregnancy and the recruitment period (Table 5). Specifically, negative psychological dimensions (i.e., anxiety and loneliness) were higher in the risk group and physiological group recruited during T2 than in the physiological group, whereas positive psychological dimensions (i.e., prenatal attachment and maternal support) were higher in the risk group and physiological group recruited during T1 than in the group recruited during T2.

Discussion

It is now known that the adverse effects of the COVID-19 pandemic on maternal and perinatal health are not limited to the morbidity and mortality caused directly by the disease. Lockdowns, disruption of not urgent health-care services, the fear of attending hospitals and medical clinics and the reduced provision of maternity services might also have affected the

wellbeing of pregnant people and their babies [37,38,39]. In addition to the above factors, there has been a redeployment of maternity staff to support critical care and medical teams. This event has undoubtedly contributed to complicating access to care for patients during the pandemic period.

It also known that the stressful life events including relationship, emotional, and financial stress are all associated with risk for developing postpartum depression symptoms. Social isolation and poor social support among pregnant and postpartum women during the pandemic have significantly reduced opportunities for in-person social interaction with health care providers, family, and friends with several studies noting increased anxiety and depressive symptoms [40,41,42].

Previous studies have already shown that women with high-risk pregnancies admitted for hospital prenatal monitoring score high on coping strategies. [43]

The current study examined 400 physiological and high-risk pregnant women hospitalized for prenatal hospital monitoring during pandemic period from Sars-Covid19. They have been divided into two subgroups of 200 pregnant women and compared with each other.

This study aimed to evaluate how the timing of administration between the two groups T1 and T2 underline significant differences between the two samples in relation to the two time periods: "first pandemic period" (T1) and "pseudonormality" (T2) [1,44].

The study included all pregnant women with physiological pregnancy and high-risk pregnancy and showed higher levels of maternal protection in the first group (T1) in which there was environmental closure due to the global pandemic mentioned above, and less anguish perceived, compared to the second group (T2) which instead reports high values.

We therefore assume a greater focus on pregnancy by the women in question, and a greater environmental containment given by the total global closure, caused by the Sars-Covid19 pandemic for the first group analyzed (T1). Probably for the second group (T2) we hypothesize that due to the return to a "pseudo-normality" and therefore to an initial reopening "to everyday life" has brought with it a greater fear relating to exposure to personal risk.

The analyzed data emerging from the perinatal and postnatal administration of the Edinburgh Scale (EPDS) do not appear to be statistically significant. In fact, the first group (T1) reports a very high preventive risk of depression in pregnancy and postpartum (>13), while the second group (T2) reports data relating to a low preventive risk of depression in pregnancy and postpartum (= 9).

In fact, we hypothesize that the symptoms indicative of the prevention of depression in the perinatal and postpartum period, and the depression relating to this period of maternity, go beyond the aforementioned pandemic problem. This perhaps because it is probably more an issue related to motherhood itself and less to environmental or psychosocial factors.

Alternatively, we hypothesized from the results that emerged that the first sample (T1) perceived less realization of the traumatic experience deriving from the pandemic with a possible feeling of derealization, protective towards the aspects of motherhood and a greater focus on pregnancy.

Differently, the second group (T2) would have perceived more the traumatic socio-cultural situation due to the partial reopening to everyday life thanks to the vaccination cycles, but

also to a greater personal responsibility perceived with respect to the protection towards one's pregnancy.

This last observational interpretation relating to the Edinburgh Scale (EPDS) certainly represents a limit to the present study, which would be decidedly interesting to be explored in a subsequent study. The study was also limited by the small sample size of the two subgroups (T1 and T2) and the observational study design. Another limitation of the study is that partnership was not included in a logistic regression. Partnership is recognized as an essential support in pregnant women and a significant reduction in partnership was noted in women tested at T2.

Conclusions

In summary, we recruited two samples of physiological and high-risk pregnant women during the first pandemic period from Sars-Covid19 (T1) and during the second pandemic period of "pseudo-normality" and first reopening after the first vaccination cycles (T2) comparing them with respect to the variables relating to the prevention of depression in the perinatal period and in the postpartum period; perceived loneliness, anxiety, support, prenatal attachment; in relation to the two samples T1 and T2.

It emerged that among the women recruited during group 1, loneliness was positively correlated with anxiety and negatively with maternal support.

Conversely, among women recruited during T2, perinatal depression was negatively correlated with prenatal attachment and maternal support. Furthermore, prenatal attachment was positively correlated with maternal support and negatively with loneliness, and maternal support was negatively correlated with loneliness.

Notably, mean scores for anxiety and loneliness were significantly higher among women recruited during T2 than among those recruited during T1. In contrast, mean scores for prenatal attachment and maternal support were significantly higher among women recruited in T1 than among those recruited in T2.

Except for perinatal depression in both the high-risk and physiologic groups and anxiety in the physiologic group, all other psychological dimensions differed by pregnancy type and recruitment period (Table 5). Specifically, negative psychological dimensions (i.e. anxiety and loneliness) were higher in the risk group and in the physiological group recruited during T2 than in the physiological group, while positive psychological dimensions (i.e. prenatal attachment and maternal support) were higher in the risk group and physiological group recruited during T1 versus group recruited during T2. Notably, mean scores for anxiety and loneliness were significantly higher among women recruited during T2 than among those recruited during T1. In contrast, mean scores for prenatal attachment and maternal support were significantly higher among women recruited in T1 than among those recruited in T2.

Therefore, a thorough screening approach for peripartum women should be implemented. It would be advisable to identify risk classes of patients in order to be able to stratify them and apply more specific support measures for each. This need seems particularly relevant for health systems under the pressure of the Covid-19 pandemic emergency, helping to reduce the workload by referring only the screened, most vulnerable women for targeted intervention. Specific attention to these vulnerabilities must be considered in order to provide efficacious interventions.

Ethical Standards

Authors contribution

S.A.: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

A.A.: Conceptualization, Data curation, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing

V.L.: Data curation

C.S.: Supervision, Validation, Visualization

G.S.: Formal Analysis, Supervision

G.N.: Supervision

N.M.M.: Supervision, Validation, Visualization

M.L.: Supervision, Validation, Visualization

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Disclosure of Interests

The authors declare that they have no disclosure of interest.

Ethical Approval

This study was approved by the local IRB of University of Naples Federico II, Naples, Italy (#208/19) on 21/10/2019 conducted in accordance with the EU General Data Protection Regulation (GDPR), and designed in the respect of principles of the Declaration of Helsinki.

Informed consent

For this study written informed consent from patients, allowing data collection for research purpose is done. All patients gave their written consent to the study and for publication of aggregate data.

Data sharing

The data and materials that support the findings of this study are available from the corresponding author upon reasonable request.

References

[1] Scandurra C, Mezzalana S, Aviani S, Lastra V, Bochicchio V, Zapparella R et al. Prenatal Depression during the Second Wave of the Covid-19 Outbreak in a Single Prenatal Clinic in Southern Italy: The Role of Loneliness, Anxiety and Maternal Support. *J Affect Disord Rep.* 2023;13:100585. doi: 10.1016/j.jadr.2023.100585.

[2] Biaggi, A, Conroy S, Pawlby, S, Pariante CM. Identifying the women at risk of antenatal anxiety and depression: A systematic review. *J Affect Disord.* 2016;191:62-77. doi: 10.1016/j.jad.2015.11.014.

- [3] Cena L, Mirabella F, Palumbo G, Gigantesco A, Trainini A, Stefana A. Prevalence of maternal antenatal and postnatal depression and their association with sociodemographic and socioeconomic factors: A multicentre study in Italy. *J Affect Disord.* 2021;15:279:217-221. doi: 10.1016/j.jad.2020.09.136
- [4] Lev-Wiesel R, Chen R, Daphna-Tekoah S, Hod M. Post traumatic events: are they a risk factor for high-risk pregnancy, delivery complications, and postpartum posttraumatic symptoms? *J Womens Health.* 2009;18(1):119-25. doi: 10.1089/jwh.2008.0774.
- [5] Mahale N, Prabhu M, Pai K, Mahale A, Nayak A. A study of post-partum depression and its risk factors in a Tertiary Hospital in India. *Ital J Gynaecol Obstet.* 2021 - Vol. 33 - N. 2 - Quarterly - ISSN 2385 – 0868. DOI: 10.36129/jog.33.02.06
- [6] Dagher RD, Bruckheim HE, Colpe LJ, Edwards E, White DB. Perinatal depression: Challenges and opportunities. *J Women's Health.* 2021;30(2):154-159. doi: 10.1089/jwh.2020.8862.
- [7] Basu A, Kim HH, Basaldua R, Choi KW, Charron L, Kelsall N et al. A cross-national study of factors associated with women's perinatal mental health and wellbeing during the COVID-19 pandemic. *PLoS One.* 2021;16(4):e0249780. doi: 10.1371/journal.pone.0249780.
- [8] Berthelot N, Lemieux R, Garon-Bissonnette J, Drouin-Maziade C, Martel É, Maziade M. Uptrend in distress and psychiatric symptomatology in pregnant women during the coronavirus disease 2019 pandemic. *Acta Obstet Gynecol Scand.* 2020;99(7):848-855. doi: 10.1111/aogs.13925.
- [9] Tomfohr-Madsen LM, Racine N, Giesbrecht GF, Lebel C, Madigan S. Depression and anxiety in pregnancy during Covid-19: A rapid review and meta-analysis. *Psychiatry Res.* 2021;300:113912. doi: 10.1016/j.psychres.2021.113912.
- [10] Craig F, Gioia MC, Muggeo V, Cajiao J, Aloï A, Martino I et al. Effects of maternal psychological distress and perception of COVID-19 on prenatal attachment in a large sample of Italian pregnant women. *J Affect Disord.* 2021;1:295:665-672. doi: 10.1016/j.jad.2021.08.102.
- [11] Mappa I, Distefano FA, Rizzo G. Effects of coronavirus 19 pandemic on maternal anxiety during pregnancy: a prospective observational study. *J Perinat Med.* 2020 Jul 28;48(6):545-550
- [12] Carver CS, Scheier MF, Weintraub JK. Assessing coping strategies: A theoretically based approach. *J Pers Soc Psychol.* 1989;56(2):267-83. doi: 10.1037//0022-3514.56.2.267.
- [13] Carbone L, Di Girolamo R, Mappa I, Saccone G, Raffone A, Di Mascio D, De Vivo V, D'Antonio F, Guida M, Rizzo G, Maria Maruotti G. Worldwide beliefs among pregnant women on SARS-CoV-2 vaccine: a systematic review. *Eur J Obstet Gynecol Reprod Biol.* 2022 Jan;268:144-164
- [14] Della Vedova AM, Dabrassi F, Imbasciati A. Assessing prenatal attachment in a sample of Italian women. *J Reprod Infant Psychol.* 2008;26:2, 86-98, DOI: 10.1080/02646830701805349
- [15] Emmanuel E, St John W, Sun J. Relationship between social support and quality of life in childbearing women during the perinatal period. *J Obstet Gynecol Neonatal Nurs.* 2012;41(6):E62-70. doi: 10.1111/j.1552-6909.2012.01400.x

- [16] Righetti PL, Quatralo F, Longo S, Maggino T, Cavicchioli P, Panizzo F, Fava Vizziello G. Puerperal depression risk assessment in new mothers hospitalized during COVID-19 lockdown measures. *Ital J Gynaecol Obstet*. Vol. 34 (No. 3) 2022 September, 154-160 doi: 10.36129/jog.2021.03
- [17] Allotey J, Stallings E, Bonet M, Yap M, Chatterjee S, Kew T et al. Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: living systematic review and meta-analysis. *BMJ*. 2020;1:370:m3320. doi: 10.1136/bmj.m3320.
- [18] Erzen E, Çikrikci Ö. The effect of loneliness on depression: A meta-analysis. *Int J Soc Psychiatry*. 2018;64(5):427-435. doi: 10.1177/0020764018776349.
- [19] Farewell CV, Jewell J, Walls J, Leiferman JA. A mixed-methods pilot study of perinatal risk and resilience during COVID-19. *J Prim Care Community Health*. 2020;11:2150132720944074. doi: 10.1177/2150132720944074.
- [20] Fawcett EJ, Fairbrother N, Cox ML, White IR, Fawcett JM. The prevalence of anxiety disorders during pregnancy and the postpartum period: A multivariate Bayesian meta-analysis. *J Clin Psychiatry*. 2019;23;80(4):18r12527. doi: 10.4088/JCP.18r12527.
- [21] Ciardulli A, Saccone G, Anastasio H, Berghella V. Less-restrictive food intake during labor in low-risk singleton pregnancies: A systematic review and meta-analysis. *Obstet Gynecol*. 2017 ;129(3):473-480. doi: 10.1097/AOG.0000000000001898.
- [22] Colli C, Penengo C, Garzitto M, Driul L, Sala A, Degano M, et al. Prenatal stress and psychiatric symptoms during early phases of the COVID-19 pandemic in Italy. *Int. J Womens Health*. 2021;6:13:653-662. doi: 10.2147/IJWH.S315467.
- [23] Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *Br J Psychiatry*. 1987;150:782-6. doi: 10.1192/bjp.150.6.782.
- [24] Benvenuti P, Ferrara M, Niccolai C, Valoriani V, Cox JL. The Edinburgh Postnatal Depression Scale: Validation for an Italian sample. *J Affect Disord*. 1999;53(2):137-41. doi: 10.1016/s0165-0327(98)00102-5.
- [25] Matza LS, Morlock R, Sexton C, Malley K, Feltner D. Identifying HAM-A cutoffs for mild, moderate, and severe generalized anxiety disorder. *Int J Methods Psychiatr Res*. 2010;19(4):223-32. doi: 10.1002/mpr.323
- [26] Cassano GB, Pancheri P. *Trattato Italiano di Psichiatria. Italian Essay of Psychiatry*. Milan, IT: Masson. 1999. Edition 2.
- [27] Maier W, Buller R, Philipp M, Heuser I. The Hamilton Anxiety Scale: reliability, validity and sensitivity to change in anxiety and depressive disorders. *J Affect Disord*. 1988;14(1):61-8. doi: 10.1016/0165-0327(88)90072-9.
- [28] Hamilton M. The assessment of anxiety states by rating. *Br J Med Psychol*. 1959;32(1):50-5. doi: 10.1111/j.2044-8341.1959.tb00467.x.
- [29] Busonera A, Cataudella S, Lampis J, Tommasi M, Zavattini GC. Prenatal Attachment Inventory: expanding the reliability and validity evidence using a sample of Italian women. *J Reprod Infant Psychol*. 2017;35(5):462-479. doi: 10.1080/02646838.2017.1349896.

- [30] Muller ME. A critical review of prenatal attachment research. *Sch Inq Nurs Pract.* 1992;6(1):5-22; discussion 23-6. doi: 10.1080/09503159208411570.
- [31] Muller ME. Development of the prenatal attachment inventory. *West J Nurs Res.* 1993 ;15(2):199-211; discussion 211-5. doi: 10.1177/019394599301500205
- [32] Boffo M, Mannarini S, Munari C. Exploratory Structure Equation Modeling of the UCLA Loneliness Scale: A contribution to the Italian adaptation. *TPM Test Psychom Methodol Appl Psychol.* 2012;19:345-363 doi:10.4473/TPM19.4.7
- [33] Russell DW. UCLA Loneliness Scale (Version 3): Reliability, validity, and factor structure. *J Pers Assess.* 1996;66(1):20-40. doi: 10.1207/s15327752jpa6601_2.
- [34] Webster J, Linnane JW, Dibley LM, Hinson JK, Starrenburg SE, Roberts JA. Measuring social support in pregnancy: Can it be simple and meaningful? *Birth.* 2000;27(2):97-101. doi: 10.1046/j.1523-536x.2000.00097.x.
- [35] Umuziga MP, Gishoma D, Hynie M, Nyirazinyoye L. Antenatal depressive symptoms in Rwanda: rates, risk factors, and social support. *BMC Pregnancy Childbirth.* 2022;8;22(1):193. doi: 10.1186/s12884-022-04522-4.
- [36] Penengo C, Colli C, Garzitto M, Driul L, Cesco M, Balestrieri M. Validation of the Italian version of the Revised Prenatal Coping Inventory (NuPCI) and its correlations with pregnancy-specific stress. *BMC Pregnancy Childbirth.* 2020;14;20(1):466. doi: 10.1186/s12884-020-03159-5.
- [37] Chmielewska B, Barrat I, Townsend R, Kalafat E, van der Meulen J, Gurol-Uganci I et al. Effects of the COVID-19 pandemic on maternal and perinatal outcomes: a systematic review and meta-analysis. *Lancet Glob Health.* 2021;9(6):e759-e772. doi: 10.1016/S2214-109X(21)00079-6. Epub 2021 Mar 31.
- [38] Goyal D, Selix NW. Impact of COVID-19 on Maternal Mental Health. *MCN Am J Matern Child Nurs* 2021;46(2):103-109. doi: 10.1097/NMC.0000000000000692.
- [39] Naidu SAG, Clemens RA, Pressman P, Zaigham M, Davies KJA, Naidu AS. COVID-19 during Pregnancy and Postpartum. *J Diet Suppl.* 2022;19(1):78-114. doi: 10.1080/19390211.2020.1834047.
- [40] Ahmad M, Vismara L. The Psychological Impact of COVID-19 Pandemic on Women's Mental Health during Pregnancy: A Rapid Evidence Review. *Int J Environ Res Public Health.* 2021;2;18(13):7112. doi: 10.3390/ijerph18137112.
- [41] Coluccia A, Ferretti F, Fagiolini A, Pozza A. Psychometric properties and relations with coping and family strain of the Health Services and Caregiver Experience questionnaire (HSCE): An outcome measure of informal caregivers' experience for inpatient care in Italy. *BMC Health Serv Res.* 2017;17;17(1):494. doi: 10.1186/s12913-017-2317-x
- [42] Fumagalli S, Ornaghi S, Borrelli S, Vergani P, Nespola A. The experiences of childbearing women who tested positive to COVID-19 during the pandemic in northern Italy. *Women Birth.* 2022;35(3):242-253. doi: 10.1016/j.wombi.2021.01.001.
- [43] Aviani S, Lastra V, Ammendola A, Saccone G, Gragnano E, Nazzaro G, Miranda M, Tesorone M, Locci M. Coping strategies in pregnant women with high risk pregnancies during COVID-19 pandemic. *Clin Case Rep Int.* 2022; 6: 1327.

[44] Gail C. McCain RN, Janet A, Deatrck RN. The Experience of High-Risk Pregnancy; J Obstet Gynecol Neonatal Nurs. 1994 ;23(5):421-7. doi: 10.1111/j.1552-6909.1994.tb01899.x.

Manuscript accepted for publication

Table 1. Socio-Demographic Characteristics of the Sample

	Total (<i>n</i> = 400)	Women in T1 (<i>n</i> = 200)	Women in T2 (<i>n</i> = 200)	
	<i>n</i> (%) or <i>M</i> ± <i>SD</i>	<i>n</i> (%) or <i>M</i> ± <i>SD</i>	<i>n</i> (%) or <i>M</i> ± <i>SD</i>	<i>p</i>
Age	32.62 ± 5.82	32.75 ± 6.11	32.48 ± 5.51	0.643
Actual partner (yes)	340 (85)	191 (95.5)	149 (74.5)	< 0.001
Pregnancy stage				1.00
Prenatal	202 (50.5)	101 (50.5)	101 (50.5)	
Postnatal	198 (49.5)	99 (49.5)	99 (49.5)	
Pregnancy stage				1.00
Risk	200 (50)	100 (50)	100 (50)	
Physiological	200 (50)	100 (50)	100 (50)	

Note: *M* = Mean; *SD* = Standard Deviation. Group differences in age were assessed using the Student's *t*-test. Group differences in all other variables were assessed through the χ^2 test.

Table 2. *Bivariate Correlations between Psychological Dimensions in Women Recruited During T1 and T2*

	1	2	3	4	5	<i>M</i> ± <i>SD</i>
depression	–	0.45***	-0.16*	-0.17*	0.01	11.33 ± 49.91
commitment	-0.01	–	-0.04	-0.03	-0.03	8.46 ± 7.91
support	0.01	-0.05	–	0.59***	-	66.30 ± 12.59
					0.29***	
	0.08	-0.01	0.12	–	-0.23**	20.27 ± 2.70
	-0.03	0.41***	-0.09	-	–	41.83 ± 7.93
				0.21***		

Notes. *M* = Mean; *SD* = Standard Deviation; *Mdn* = Median; **p* < .05, ***p* < .01, ****p* < .001. Scores of women recruited during T1 are below the diagonal; scores of women recruited during T2 are above the diagonal. Means and standard deviation refer to the values of the entire sample.

Manuscript accepted

Table 3. Group Differences on Psychological Dimensions based on COVID-19 Periods

	Women in T1		Women in T2		<i>t</i>	<i>p</i>	<i>d</i>
	(<i>n</i> = 200)		(<i>n</i> = 200)				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
<i>Psychological dimensions</i>							
Perinatal depression	3.17	1.47	3.01	1.38	1.12	0.26	-
Anxiety	7.57	8.36	9.35	7.34	-2.26	0.02	0.22
Prenatal attachment	68.89	10.75	63.72	13.74	4.20	<0.001	0.42
Maternal support	21.12	2.29	19.43	2.81	6.66	<0.001	0.66
Loneliness	37.96	8.21	45.70	5.34	-11.18	<0.001	1.12

Notes. *M* = Mean; *SD* = Standard deviation; *t* = Student's *t*-test; *d* = Cohen's *d*;

Table 4. Group Differences on Psychological Dimensions based on COVID-19 Periods and Pregnancy Stage

	Women in T1		Women in T2		<i>t</i>	<i>p</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Perinatal depression							
Prenatal (<i>n</i> = 202)	10.09	6.19	10.02	5.90	0.09	0.93	–
Postnatal (<i>n</i> = 198)	16.56	9.98	8.67	5.77	0.78	0.43	–
Anxiety							
Prenatal (<i>n</i> = 202)	9.48	9.11	11.02	8.36	-1.25	0.21	–
Postnatal (<i>n</i> = 198)	5.63	7.05	7.65	5.70	-2.22	0.03	0.31
Prenatal attachment							
Prenatal (<i>n</i> = 202)	67.67	12.52	63.07	13.85	2.47	0.01	0.35
Postnatal (<i>n</i> = 198)	70.15	8.48	64.37	13.67	3.58	<0.001	0.51
Maternal support							
Prenatal (<i>n</i> = 202)	21.03	2.49	19.55	3.36	3.56	<0.001	0.50
Postnatal (<i>n</i> = 198)	21.21	2.08	19.32	2.23	6.34	<0.001	0.87
Loneliness							
Prenatal (<i>n</i> = 202)	38.56	7.61	46.09	4.53	-8.54	<0.001	1.20
Postnatal (<i>n</i> = 198)	37.34	8.77	45.29	6.06	-7.43	<0.001	1.05

Notes. *M* = Mean; *SD* = Standard deviation; *t* = Student's t-test; *d* = Cohen's *d*;

Table 5. Group Differences on Psychological Dimensions based on COVID-19 Periods and Type of Pregnancy

	Women in T1		Women in T2		<i>t</i>	<i>p</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Perinatal depression							
Risk (<i>n</i> = 200)	18.10	9.94	10.27	6.40	0.79	0.43	–
Physiological (<i>n</i> = 200)	8.51	5.79	8.44	5.13	0.09	0.93	–
Anxiety							
Risk (<i>n</i> = 200)	6.70	7.30	9.92	8.17	-2.94	0.01	0.41
Physiological (<i>n</i> = 200)	8.45	9.25	8.78	6.41	-0.30	0.77	–
Prenatal attachment							
Risk (<i>n</i> = 200)	68.76	10.36	64.72	12.39	2.50	0.01	0.35
Physiological (<i>n</i> = 200)	69.04	11.18	62.70	14.97	3.39	0.001	0.48
Maternal support							
Risk (<i>n</i> = 200)	21.11	2.32	19.23	3.36	4.60	<0.001	0.65
Physiological (<i>n</i> = 200)	21.13	2.28	19.63	2.13	4.79	<0.001	0.68
Loneliness							
Risk (<i>n</i> = 200)	38.40	8.71	46.58	3.71	-8.64	<0.001	1.22
Physiological (<i>n</i> = 200)	37.51	7.69	44.82	6.49	-7.26	<0.001	1.03

Notes. *M* = Mean; *SD* = Standard deviation; *t* = Student's t-test; *d* = Cohen's *d*;