

Placenta Previa is Associated with Maternal Psychological Distress: A Mediation Analysis of Depression, Anxiety, and Post-Traumatic Stress Symptoms

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Background: Placenta previa (PP) is a major obstetric complication that can cause significant physical and emotional stress for expectant mothers. However, its psychological impact has received limited research attention. The purpose of this study was to examine perceived stress, depression, anxiety, post-traumatic stress symptoms, and sleep disturbances in patients diagnosed with PP.

Methods: This cross-sectional study with prospectively collected obstetric outcomes included 70 cases of PP and 78 healthy pregnant women (HPs) in the third trimester of pregnancy. Depression, anxiety, post-traumatic stress symptoms, sleep disturbances, perceived stress, and resilience were assessed using the Patient Health Questionnaire (PHQ-9), Generalized Anxiety Disorder-7 (GAD-7), Impact of Events Scale-Revised (IES-R), Jenkins Sleep Scale (JSS), Perceived Stress Scale (PSS-10), and Brief Resilience Scale (BRS), respectively.

Results: According to the cutoff scores of the scales, 50%, 42.9%, 62.9%, and 51.4% of those diagnosed with PP met the criteria for depression, anxiety, sleep disturbances, and post-traumatic stress disorder, respectively, which were significantly higher than those in the HP group. After controlling for maternal age, gravida, parity, and resilience, the PHQ-9, GAD-7, and IES-R scale scores were significantly higher in patients with PP than in the HP group. The mediation model indicated that depression and anxiety partially mediate the relationship between perceived stress and post-traumatic stress symptoms (PSS-10 → GAD-7/PHQ-9 → IES-R).

Conclusion: The findings of this study suggest that women diagnosed with PP who are anticipating labor have a significantly increased likelihood of developing depression, anxiety, sleep disturbances, and post-traumatic stress symptoms. Raising awareness of the adverse psychological effects associated with PP may help facilitate the implementation of screening, assessment, and intervention strategies for these patients.

Keywords: pregnancy, prevalence, perinatal depression, high-risk, preterm, PTSD

Introduction

Placenta previa (PP) is a major obstetric complication associated with increased risks of maternal morbidity, hemorrhage, and perinatal mortality. PP is a condition where the placenta is positioned such that it fully or partially covers the cervix during pregnancy. This anomaly occurs in about 0.3–0.6% of all pregnancies.^{1–3} In Türkiye, recent obstetric reports indicate a prevalence of placenta previa ranging between 0.2% and 0.8% of all deliveries, comparable to international estimates.^{4,5} Typically diagnosed through ultrasonography in the second or third trimester, placenta previa is a complication that carries a risk of severe hemorrhage throughout pregnancy.⁶ The closeness of the placenta to the cervix determines the severity of placenta previa and the potential complications that may arise during childbirth.⁷ Managing this condition usually involves measures such as bed rest, careful timing and method of delivery, and cesarean section when necessary.⁶ It can lead to preterm births, low Apgar scores, fetal and neonatal mortality, maternal

intrapartum and postpartum hemorrhage, the need for blood transfusion, sepsis, and hysterectomy.^{1,8} Given that placenta previa can significantly affect maternal and infant health during pregnancy, early diagnosis and appropriate management strategies are essential.^{7,9}

Risky pregnancies are marked by potential complications that may affect both the mother and fetus, leading to significant physical and psychological impacts on the mother.^{10,11} Issues such as placenta previa can significantly limit the daily activities of expectant mothers and create considerable stress.¹² In these situations, expectant mothers must prioritize their physical health while managing the uncertainties and anxieties that accompany them.¹³ The likelihood of developing mental disorders, including depression and anxiety, notably increases during these pregnancies.¹⁴ Research has shown that about 20–25% of women with risky pregnancies exhibit symptoms of depression.¹⁵ Other mental health issues, such as anxiety disorders, panic attacks, and post-traumatic stress disorder (PTSD), are also more common among these women.¹⁶ Prolonged periods of bed rest, hospitalization, regular ultrasound examinations for fetal monitoring, and medical interventions can further increase the psychological strain on the expectant mother.¹⁷ These situations may lead to feelings of isolation and helplessness during pregnancy. As a result, closely monitoring the mental health of women with risky pregnancies and providing necessary professional psychological support is vital for both maternal and infant health.^{18,19}

Previous research on placenta previa has primarily focused on medical aspects and has not adequately addressed the psychological experiences of expectant mothers.^{12,16} However, emerging evidence suggests that pregnancy complications such as preeclampsia, threatened preterm labor, or the diagnosis of a fetal anomaly are associated with elevated perceived stress, anxiety, and depressive symptoms, which may, in turn, increase the risk of post-traumatic stress disorder following delivery.^{20–22} Building on this literature, we hypothesized that the psychological burden of PP might similarly operate through a stress-related pathway, in which perceived stress contributes to higher levels of depression and anxiety, thereby exacerbating post-traumatic stress symptoms. This study aims to investigate the psychological symptoms experienced by pregnant women with placenta previa in the third trimester and to test a mediation model linking perceived stress, depression, anxiety, and trauma-related symptoms. To our knowledge, no study in the literature has simultaneously examined depression, anxiety, sleep disturbances, post-traumatic stress symptoms, and perceived stress in pregnant women diagnosed with PP during this period and compared them with healthy pregnant women. The results of this study may provide valuable insights into psychological screening, early diagnosis, and prenatal care for patients with PP. They could contribute to a better understanding of the relationship between placenta previa and the risk of mental disorders.

Materials and Methods

Data Collection and Study Population

A cross-sectional study with prospectively collected obstetric outcomes was conducted with 148 pregnant women, including 70 with placenta previa (PP) and 78 healthy pregnant women (HP) scheduled for cesarean section (C/S). During the 1.5 years when ultrasonography and clinical outcome data were available, PP was diagnosed between 20 and 36 weeks of gestation. Pregnancies diagnosed with placenta accreta, increta, or percreta were evaluated under the umbrella term placenta accreta spectrum (PAS).¹⁹ Among the 70 participants diagnosed with PP, 20 also presented with PAS. Because these cases constituted a small proportion of the total sample and were managed under the same clinical protocol at our center, they were pooled with the placenta previa group for the analyses. Following approved guidelines, transvaginal and transabdominal ultrasound scans confirmed the placenta previa.³

Inclusion criteria for patients with PP were:

- Pregnant women aged 18–45 years with a confirmed diagnosis of placenta previa (PP) by ultrasonography,
- Inpatients in the Maternal–Fetal Medicine Unit between January 2023 and June 2024,
- Scheduled for a planned C/S delivery,
- Able to provide informed consent and complete self-report scales during hospitalization.

Exclusion criteria of patients with PP were:

- Unstable medical illnesses or adverse obstetric conditions unrelated to PP.
- Patients discharged against medical advice,
- Those with missing clinical or psychometric data,
- Women with a past or current mental disorder,
- Hospital stay < 1 day.

Moreover, HPs consisted of women without a past or current diagnosis of any adverse obstetric disorder, unstable medical illness, or mental disorder during pregnancy. The gestational age of the HPs was greater than 28 weeks. Data were collected in the Maternal-Fetal Medicine Unit of Ankara Bilkent City Hospital, Ankara, Türkiye. This center is part of the national referral centers, and patients referred prenatally were included in the study. The procedures used in this study followed the protocol approved by the participating institution. All participants were between 18 and 45 years old and able to provide informed consent. The study adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

The gestational age, history of gravida, parity, and abortions, as well as any concomitant medical conditions and prenatal hemoglobin values of women, were recorded before delivery. The scales used to assess the mental status of pregnant women were administered on the first or second day of hospitalization. All pregnant women participating in the study underwent a cesarean section (C/S) delivery. Data such as birth weight, sex, umbilical arterial blood pH at delivery, Apgar scores at 1 and 5 minutes, whether the newborn required follow-up in the intensive care unit, and the mother's postoperative hemoglobin value were obtained from hospital records.

Measurement Tools for the Mental Status of Pregnant Women

All pregnant women were given the Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder-7 (GAD-7), Jenkins Sleep Scale (JSS), Impact of Events Scale-Revised (IES-R), Perceived Stress Scale (PSS-10), and Brief Resilience Scale (BRS). All psychological instruments used in this study have demonstrated good psychometric properties and have been validated in the Turkish population. The PHQ-9 (Cronbach's $\alpha = 0.86$) and GAD-7 (Cronbach's $\alpha = 0.85$) have been previously validated for use among perinatal women. The JSS (Cronbach's $\alpha = 0.82$) and the IES-R (Cronbach's $\alpha = 0.93$) have shown satisfactory internal consistency in obstetric and trauma-related contexts. The PSS-10 (Cronbach's $\alpha = 0.84$) and the BRS (Cronbach's $\alpha = 0.83$) were also found to be reliable for use in Turkish adults, including pregnant samples. These instruments are widely used for screening psychological symptoms in pregnancy and are considered suitable for assessing emotional well-being among high-risk obstetric populations.

The PHQ-9 is a widely used screening tool for depression in primary care settings.^{23,24} Its effectiveness comes from its simplicity, both in completion for the patient and in scoring and interpreting the results. The PHQ-9 consists of 9 items, each with a score range of 0–3, with higher scores indicating greater severity of depressive symptoms. The scores range from 0 to 27, and a cutoff of 10 or higher has been recommended for identifying cases of current depression.²³ The interpretation of PHQ-9 scores follows a five-tier structure: normal (0–4), mild (5–9), moderate (10–14), moderately severe (15–19), and severe (20–27). The PHQ-9 is recognized for its high sensitivity and specificity in screening for perinatal depression.²⁵

The GAD-7 is a seven-item, self-reported measure of anxiety designed to evaluate a patient's health status over the preceding two-week period.^{26,27} It generates a total score ranging from 0 to 21, which is interpreted as follows: normal (0–4), mild (5–9), moderate (10–14), and severe (15–21).²¹ A cut-off score of ≥ 10 is typically used to determine the presence of anxiety symptoms.²⁶ The GAD-7 is reported to be a clinically useful scale for detecting generalized anxiety disorder (GAD) in perinatal women.^{28,29}

The JSS is a 4-item scale that assesses sleep quality by asking about sleep problems encountered over the past 4 weeks.^{30,31} The JSS offers six possible responses, each corresponding to a different number of days: never (0 points), 1–3 days (1 point), 4–7 days (2 points), 8–14 days (3 points), 15–21 days (4 points), and 22–31 days (5 points). The final

score is calculated by summing the scores of the four items, resulting in a range of 0 to 20. A participant is considered to have sleep difficulties if they experienced 8–14 nights (3 or higher) on any of the items.³²

The IES examines the psychological consequences of various types of trauma.³³ While the IES is a valuable tool, a comprehensive assessment of an individual's response to traumatic events requires monitoring their hyperarousal symptoms.³⁴ The IES-R consists of 22 items that measure symptoms of intrusion (dreams about the event), avoidance and numbing (efforts to evade reminders of the event), and hyperarousal (feeling alert and vigilant) related to a specific life-threatening event.³⁴ Participants rate the extent to which each item applies to their experiences over the past seven days on a 5-point Likert scale (ranging from 0 to 4 points).³⁵ The scale ranges from 0 to 88, with a higher score indicating a greater level of trauma-related stress. A score of 33 or higher on the IES-R indicates significant trauma symptoms.³⁵ In our study, we aimed to explore the adverse experiences associated with complications during pregnancy in patients with PP. The IES-R is frequently used to assess post-traumatic stress symptoms in pregnant women.^{36,37}

The PSS-10 assesses perceived stress.^{38,39} Each item in the 10-item questionnaire is scored 0–4, with higher scores indicating greater stress. Although there is no predetermined cutoff for PSS-10 scores, some studies have used score ranges of 0 to 13, 14 to 26, and 27 to 40 to define low, moderate, and high levels of perceived stress, respectively.⁴⁰ The PSS-10 is a commonly used scale for assessing perceived stress in pregnant women.⁴¹

The BRS is a 6-item scale designed to assess psychological resilience.^{42,43} It evaluates an individual's ability to recover from stress and adversity. Responses are rated on a 5-point Likert scale from “strongly disagree” (1) to “strongly agree” (5). It is important to note that there is no specific cut-off score for this scale; however, a higher BRS score generally indicates greater resilience in the individual being assessed.⁴³

Data Analysis

Statistical analysis was conducted using the IBM Statistical Package for the Social Sciences (SPSS), version 25 (USA). Before analyzing the data, they were examined for missing and extreme values. A priori power analysis was conducted using G*Power 3.1 to justify the adequacy of the sample size. Assuming a medium effect size ($f^2 = 0.15$), $\alpha = 0.05$, power ($1 - \beta$) = 0.80, and four covariates (maternal age, gravida, parity, and resilience) in a multivariate model, the minimum total sample required was $N = 107$. Our final sample of 148 participants (70 PP, 78 controls), therefore, provided sufficient statistical power to detect medium-sized effects in both MANCOVA and mediation analyses.⁴⁴ Skewness and kurtosis values were checked to determine whether the groups were normally distributed. The data were considered normally distributed if the skewness and kurtosis values fell within the range of -1.5 to $+1.5$, as suggested by Tabachnick and Fidell. Socio-demographic and clinical characteristics were summarized as frequencies and percentages for categorical variables and mean $\pm$ standard deviation (SD) or median and interquartile range (IQR) for continuous variables. Differences in socio-demographic and clinical characteristics between the two groups were compared using the Chi-square test and Student's *t*-test, where appropriate. The significance level was set at $\alpha = 0.05$, and all the tests were 2-tailed. In addition to significance testing, effect sizes (Cohen's *d*) were calculated for between-group comparisons to quantify the magnitude of differences in psychological outcomes. Cohen's *d* values of approximately 0.2, 0.5, and 0.8 were interpreted as small, medium, and large effects, respectively.

A multivariate analysis of covariance (MANCOVA) was performed with mental symptoms (depression, anxiety, and sleep problems) as the dependent variable ($n = 3$). Diagnostic groups (PP and HP) were included as fixed factors, and maternal age, gravida, parity, and resilience were covariates. These covariates were selected because they are well-known factors that can influence psychological outcomes during pregnancy. Maternal age, gravidity, and parity have been associated with differences in emotional adaptation, pregnancy-related anxiety, and perinatal depression risk, whereas resilience (BRS score) reflects individual coping capacity that can moderate stress and affective responses. Controlling for these variables allowed us to isolate the effect of placenta previa on psychological outcomes more precisely. Analysis of covariance (ANCOVA) was then used to evaluate the effects of maternal age, gravidity, parity, and resilience on the mental symptoms of patients diagnosed with PP and HPs. Before performing the MANCOVA and ANCOVA analyses, key statistical assumptions were tested. Multicollinearity among continuous predictors was examined using variance inflation factors ($VIF < 2.0$), indicating no violation. Homogeneity of variances and covariances was verified using Levene's test and Box's M test, both of which yielded non-significant results. Normality was assessed using skewness–

kurtosis (± 1.5) and visual inspection of Q–Q plots. These checks confirmed that the data met the assumptions required for MANCOVA and ANCOVA. However, the significance was set at $p \leq 0.017$ for the Bonferroni-corrected MANCOVA and $p \leq 0.025$ for the Bonferroni-corrected ANCOVA to reduce type I errors.

A mediation analysis was performed to examine the indirect effects of depression and anxiety on the relationship between perceived stress and post-traumatic stress symptoms. The proposed model assumed that perceived stress (PSS-10 total score) would predict post-traumatic stress symptoms (IES-R total score) both directly and indirectly through depression (PHQ-9 total score) and anxiety (GAD-7 total score) as mediators. The analysis was conducted using the jAMM module in JAMOVİ (version 2.5.6), which employs maximum likelihood estimation (MLE). The significance of indirect effects was evaluated using bootstrapped 95% confidence intervals (5,000 samples). Model fit indices, including χ^2 , RMSEA, CFI, and TLI, were examined to assess overall adequacy. Indirect effects were considered statistically significant if the 95% confidence interval did not include zero. This approach reduces Type I error and provides more reliable inference regarding indirect pathways. All analyses were adjusted for maternal age, gravida, parity, and resilience (BRS total score), which were entered as covariates.

Results

Patients and Newborn Characteristics

The mean age of the pregnant women was 30.76 ± 4.97 years (min: 18, max: 43). The mean gestational age at study inclusion was 34.51 ± 3.31 weeks. The mean birth week of the newborn was 37.04 ± 2.1 weeks (Table 1).

Table 1 Sociodemographic and Clinical Variables

	PP with or without PAS (N = 70)	Controls (N = 78)	P- value
Maternal			
Maternal age (years)	31.37 ± 5.03	30.23 ± 4.88	0.168
< 20 years (n, %)	1 (1.4%)	1 (1.3%)	0.811
20–34 years (n, %)	51 (72.9%)	62 (79.5%)	
≥ 35 years (n, %)	16 (22.9%)	15 (19.2%)	
Missing	2 (2.9%)	-	
Primiparity (n, %)	21 (30.0%)	56 (71.8%)	<0.001*
Previous cesarean delivery (n, %)	37 (52.9%)	22 (28.2%)	<0.001*
Gravida (median, IQR)	3 (2–4)	2.5 (2–3)	0.979
Parity (median, IQR)	1 (0–2)	1 (1–2)	0.968
Abortions (median, IQR)	1 (1–2)	1 (1–2)	0.817
GDM diagnosis (n, %)	10 (14.3%)	4 (5.1%)	0.064
Delivery			
Gestation (weeks)	35.69 ± 2.03	38.45 ± 0.9	<0.001*
Birthweight (grams)	2681 ± 599	3200 ± 412	<0.001*
Male fetus (n, %)	27 (38.6%)	37 (47.4%)	0.434
1-min APGAR score	6.66 ± 1.29	7.73 ± 0.63	<0.001*
5-min APGAR score	9.53 ± 1.06	9.0 ± 0.52	0.683

(Continued)

Table 1 (Continued).

	PP with or without PAS (N = 70)	Controls (N = 78)	P- value
Umbilical arterial blood pH	7.28 ± 0.07	7.33 ± 0.06	0.057
Pre-op maternal Hb (gr/dL)	11.68 ± 1.19	11.72 ± 1.21	0.823
Post-op maternal Hb (gr/dL)	9.77 ± 1.76	11.0 ± 1.14	<0.001*
Monitoring of the newborn in intensive care (n, %)	35 (50.0%)	9 (11.5%)	<0.001*

Notes: *Indicates statistical significance ($p < 0.05$).

Abbreviations: PP, Patients with placenta previa; PAS, Placenta accreta spectrum.

There were no differences in maternal age, gravida, parity, and number of abortions between the groups (all $p > 0.05$). Gestational age at birth, birth weight, and Apgar score at 1 minute were significantly lower in newborns of mothers with a PP diagnosis (all $p < 0.05$). Newborns of mothers with PP required follow-up in the intensive care unit at a higher rate ($p < 0.001$). Additionally, the hemoglobin levels of patients with PP were significantly lower after C/S ($p < 0.001$) but not before C/S ($p = 0.823$).

Psychological Outcomes

Table 2 presents the results of intergroup comparisons regarding psychological outcomes. Among the PP diagnoses, 31.4% ($n = 22$) were mild, 28.6% ($n = 20$) were moderate, and 20% ($n = 14$) were severe depression. The total score on the depression scale (PHQ-9 total score), the proportion of individuals diagnosed with depression (PHQ-9 total score $\geq$

Table 2 Comparison of the Groups in Terms of Mental Symptoms

Scales	PP with or without PAS (N = 70)	Controls (N = 78)	P- value	Cohen's d
<i>PHQ-9 (Depression)</i>				
PHQ-9, total score	9.94 ± 5.03	8.47 ± 3.5	0.048*	0.34
PHQ-9, total score ≥ 10 (n, %)	35 (50.0%)	25 (32.1%)	0.020*	
PHQ-9, total score ≥ 15 (n, %)	14 (20.0%)	4 (5.1%)	0.010*	
<i>GAD-7 (Anxiety)</i>				
GAD-7, total score	8.14 ± 5.48	4.46 ± 4.61	<0.001*	0.73
GAD-7, total score ≥ 10 (n, %)	30 (42.9%)	12 (15.4%)	<0.001*	
GAD-7, total score ≥ 15 (n, %)	9 (12.9%)	3 (3.8%)	<0.001*	
<i>JSS (Sleep problems)</i>				
JSS, total score	9.34 ± 6.45	8.68 ± 6.29	0.528	0.10
JSS, sleep disorder (n, %)	44 (62.9%)	34 (43.6%)	0.019*	
<i>IES-R (Trauma)</i>				
IES-R, total score	31.93 ± 17.29	25.05 ± 13.06	0.008*	0.45
IES-R, total score ≥ 33 (n, %)	36 (51.4%)	18 (23.1%)	<0.001*	

(Continued)

Table 2 (Continued).

Scales	PP with or without PAS (N = 70)	Controls (N = 78)	P- value	Cohen's d
<i>PSS-10 (Perceived stress)</i>				
PSS-10, total score	20.5 ± 5.53	19.83 ± 3.79	0.399	0.14
PSS-10, total score ≥27	6 (8.6%)	2 (2.6%)	0.150	
<i>BRS (resilience)</i>				
BRS, total score	21.59 ± 5.16	21.45 ± 3.18	0.848	0.03

Notes: *Indicates statistical significance ($p < 0.05$).

Abbreviations: PP, Patients with placenta previa; PAS, Placenta accreta spectrum; PHQ-9, Patient Health Questionnaire-9; GAD-7, Generalized Anxiety Disorder-7; JSS, Jenkins Sleep Scale; IES-R, Impact of Events Scale-Revised; PSS-10, Perceived Stress Scale; BRS, Brief Resilience Scale.

10, moderate-to-severe), and the number of individuals exhibiting more severe depressive symptoms (PHQ-9 total score ≥ 15 , severe depression) were significantly higher in pregnant women with PP compared to HPs (all $p < 0.05$). When the items on the PHQ-9 scale were compared, depressed mood, changes in appetite, and retardation or agitation were more prominent in patients with PP (all $p < 0.001$). Maternal age and the number of abortions were not associated with depression in patients with PP ($p = 0.783$ and $p = 0.733$, respectively).

In pregnant women with PP, both the total anxiety score (GAD-7 total score) and the percentage of those who met the criteria for anxiety disorder (GAD-7 total score ≥ 10 , moderate-to-severe anxiety), as well as those with severe anxiety symptoms (GAD-7 total score ≥ 15 , severe anxiety), were significantly higher compared to healthy pregnant women (all $p < 0.05$). When evaluating the items of the GAD-7 scale individually, it was found that scores on all items were higher in patients diagnosed with PP (all $p < 0.05$).

The prevalence of sleep disorders among pregnant women was higher in the PP group ($p = 0.019$). Furthermore, when comparing the items of the JSS scale, waking up several times during the night was significantly more common among those diagnosed with PP ($p = 0.048$).

Both the total score of the IES-R, which assesses the psychological effects of trauma, and the proportion of participants with scores ≥ 33 , indicating significant trauma symptoms, were notably higher in PP patients. The hyperarousal subscale score of the IES-R scale differed significantly between the two groups ($p < 0.001$), while the intrusion subscale showed a non-significant trend ($p = 0.051$). However, no significant difference was found between the groups regarding perceived stress (PSS-10) and resilience (BRS) (all $p > 0.05$). The comparison of all scale total scores is shown in Figure 1.

The MANCOVA, adjusted for maternal age, gravida, parity, and resilience, revealed a significant difference between the groups concerning depression, anxiety, and sleep disorders (Pillai's Trace 0.231, $F = 13.29$, $p < 0.001$, $\eta^2 = 0.23$), indicating overall differences in mental symptoms between the groups. Additionally, the ANCOVA analysis revealed that after adjusting for maternal age, gravida, parity, and resilience, total scores of PHQ-9, GAD-7, and IES-R were significantly higher in pregnant women with PP than in HP ($p = 0.012$, $\eta^2 = 0.05$; $p < 0.001$, $\eta^2 = 0.16$; $p = 0.004$, $\eta^2 = 0.06$, respectively), but not for JSS ($p = 0.44$).

Predictors of Post-Traumatic Stress Symptoms

When the GLM mediation model was applied to investigate the mediating roles of depression and anxiety in the relationship between perceived stress and post-traumatic stress symptoms, the total effect of perceived stress on post-traumatic stress symptoms was found to be significant ($\beta = 0.57$, $p < 0.001$). The direct effect of perceived stress on post-traumatic stress symptoms was also notable ($\beta = 0.27$, $p < 0.001$). However, the direct effect was smaller than the total effect, indicating partial mediation. Depression and anxiety scores served as mediators in the relationship, as the indirect

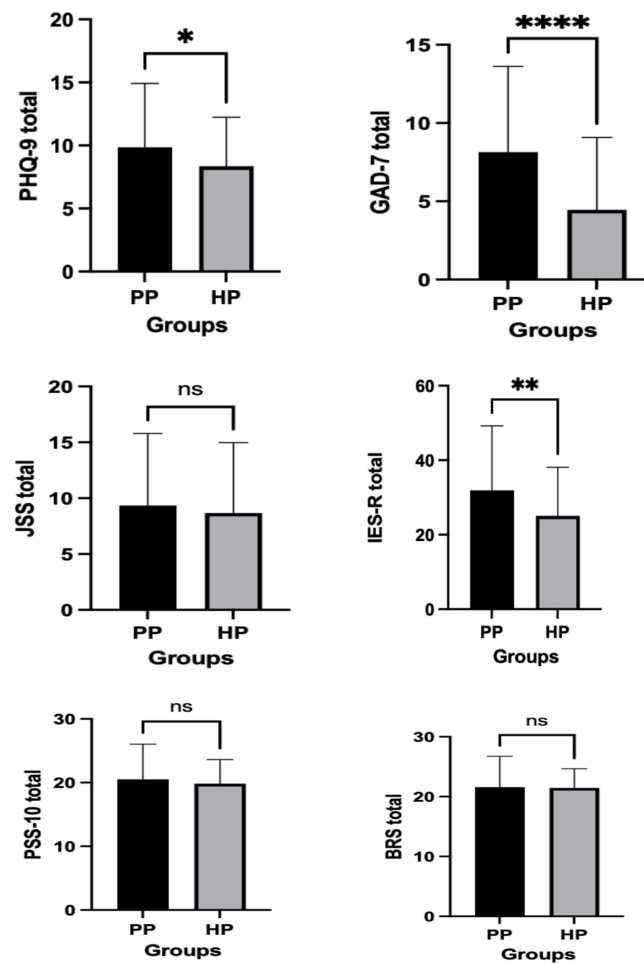


Figure 1 Comparing groups based on their scale scores. ns: $p \geq 0.05$; * $p < 0.05$; ** $p < 0.01$; **** $p < 0.0001$.

Abbreviations: PP, Patients with placenta previa; HP, Healthy pregnant women; PHQ-9, Patient Health Questionnaire-9; GAD-7, Generalized Anxiety Disorder-7; JSS, Jenkins Sleep Scale; IES-R, Impact of Events Scale-Revised; PSS-10, Perceived Stress Scale; BRS, Brief Resilience Scale.

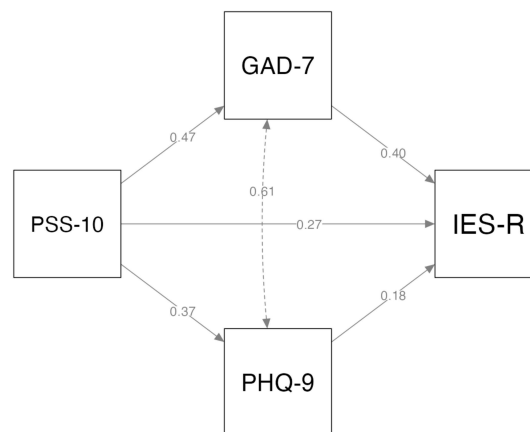


Figure 2 Mediation Analysis. The values shown with arrows are Beta values.

Abbreviations: PHQ-9, Patient Health Questionnaire-9; GAD-7, Generalized Anxiety Disorder-7; IES-R, Impact of Events Scale-Revised; PSS-10, Perceived Stress Scale.

Table 3 Direct, Indirect, and Total Effects of the GLM Mediation

Type	Effect	Estimate	SE	95% C.I.		β	p
				Lower	Upper		
Indirect Component	PSS-10 $\Rightarrow$ PHQ-9 $\Rightarrow$ IES-R	0.229	0.115	0.004	0.454	0.066	0.046
	PSS-10 $\Rightarrow$ GAD-7 $\Rightarrow$ IES-R	0.659	0.173	0.319	0.998	0.190	<0.001
	PSS-10 $\Rightarrow$ PHQ-9	0.377	0.078	0.224	0.530	0.374	<0.001
	PHQ-9 $\Rightarrow$ IES-R	0.608	0.277	0.065	1.152	0.177	0.028
	PSS-10 $\Rightarrow$ GAD-7	0.580	0.0890	0.403	0.756	0.475	<0.001
	GAD-7 $\Rightarrow$ IES-R	1.136	0.241	0.664	1.608	0.401	<0.001
Direct	PSS-10 $\Rightarrow$ IES-R	0.942	0.233	0.486	1.399	0.272	<0.001
Total	PSS-10 $\Rightarrow$ IES-R	1.876	0.225	1.434	2.317	0.566	<0.001

Notes: Confidence intervals computed with method: Standard (Delta method). Arrows ($\Rightarrow$) denote the direction of paths in the mediation model. Indirect Effect: Estimate= 0.934, Proportion mediated= 49.8%. Direct Effect: Estimate= 0.942, Proportion mediated= 50.2%. Full Model Effect: $R^2=0.502$, $F=46.7$, $p < 0.001$.

Abbreviations: PHQ-9, Patient Health Questionnaire-9; GAD-7, Generalized Anxiety Disorder-7; IES-R, Impact of Events Scale-Revised; PSS-10, Perceived Stress Scale.

effects and regression coefficients of these components were statistically significant. The mediation model is illustrated in Figure 2, and the results are presented in Table 3.

Discussion

We investigated the association between placenta previa and mental disorders. To our knowledge, this is the first study to examine depressive, anxiety, and stress symptoms in pregnant women with placenta previa. Firstly, our significant findings indicated that pregnant women diagnosed with placenta previa have higher rates of depression, anxiety, and post-traumatic stress symptoms than healthy pregnant women. Secondly, depression and anxiety played a mediating role between perceived stress and post-traumatic stress symptoms in patients with placenta previa. In addition, as expected, newborns of pregnant women with placenta previa were found to have lower birth weights and Apgar scores at one minute.

High-risk pregnancies can significantly impact the psychological well-being of expectant mothers and can negatively affect both the mother's and the baby's health. Despite extensive medical research on this topic, the psychological experiences of women with high-risk pregnancies have not been comprehensively studied. As a result, there are limited programs available to provide psychological support for these women. The fact that relatively few structured psychological-support programs exist for pregnant women, especially those with high-risk obstetric conditions, can be attributed to several interrelated factors. First, most clinical guidelines for antenatal care remain predominantly medically oriented and provide only limited detail on psychological assessment or intervention; a recent systematic review found considerable variability in guideline depth, with only a few offering comprehensive psychological or psychosocial care recommendations.^{12,45} Second, logistical and resource barriers—such as limited time during antenatal visits, lack of integrated mental-health staffing in obstetric settings, and the challenge of tailoring interventions to diverse high-risk populations—have hindered widespread implementation of targeted psychological programs.⁴⁶ Finally, although evidence suggests that high-risk pregnancies are associated with increased psychological distress and reduced well-being, studies are largely survey-based and non-interventional in nature, limiting their transferability to routine care pathways.⁴⁷ These combined factors help explain why, despite the heightened risk of depression, anxiety, and post-traumatic stress in conditions like placenta previa, structured support services remain underdeveloped.

Empirical evidence indicates that pregnancy, particularly during high-risk periods, may elicit strong emotional and psychological responses, including frustration, grief, anger, sadness, guilt, and mental disorders such as depression and post-traumatic stress disorder.¹² Although society defines pregnancy as a simple 9-month period in which a healthy baby is brought into the world at the end, evolving into a high-risk situation due to complications can affect expectant mothers mentally. The risk of bleeding and premature birth, hospitalization, the possibility of the baby being born with low birth weight, and the thought that “the pregnancy is not normal” often accompany several emotional and psychological experiences. In this respect, it is not surprising to observe an increased prevalence of mental disorders in patients with placenta previa.

Half of the pregnant women with placenta previa had a current diagnosis of perinatal depression, and one-fifth had moderately severe or severe depression. In a recent meta-analysis, the pooled prevalence of perinatal depression in upper-middle-income countries was 24.7%, which is lower than the prevalence reported in our study.⁴⁸ The main difference in this rate may stem from the fact that the expectant mothers in our study faced risky pregnancies due to a diagnosis of placenta previa. Previous studies have also found that expectant mothers suffer from depression in high-risk pregnancy situations.^{49–51} A previously published scoping review reported that antenatal depression rates in pregnant women with high-risk pregnancies ranged from 12.5% to 44.2%.⁵² After experiencing a high-risk pregnancy, mothers are often left with feelings of guilt, depression, and worthlessness due to their inability to meet the idealized expectations of motherhood. Pregnant women recognize the fact that placenta previa constitutes a “high-risk” pregnancy as an indication that they and/or their unborn baby are at risk due to a medical or obstetric condition.⁵³ Women may find the “high-risk” pregnancy label stressful because of concerns about their health and the health of their unborn baby.⁵⁴ Antenatal attachment issues, perceived stress, and factors related to threatened preterm labor caused by placenta previa may also trigger depressive symptoms.^{55,56}

In our study, approximately 43% of patients diagnosed with placenta previa were diagnosed with anxiety disorder, and symptoms were severe in about 30% of these patients, both figures higher than in healthy pregnant women. In previous studies, the rate of anxiety disorder in high-risk pregnant women was found to be 13–39%, reported to be more common than in normal pregnancies.^{50,57} Anxiety symptoms are widely known to be exacerbated in high-risk pregnancies due to increased stress and uncertainty.^{58,59} High-risk pregnancies can threaten both the life of the fetus and the expectant mother, increasing maternal stress and anxiety.²⁰ The risk that the baby’s development will be hampered by the placenta previa diagnosis, along with the possibility of adverse outcomes such as premature birth or low birth weight, may heighten perceived stress in mothers and lead to anxiety disorders. Additionally, the increased risk of stillbirth related to placenta previa can also trigger and exacerbate anxiety symptoms.

Post-traumatic stress symptoms in pregnancy can arise from interpersonal violence, abuse, and natural disasters, as well as pregnancy-related events such as the diagnosis of fetal anomaly, pregnancy complications, or severe fears of birth.^{21,22} If the pregnant woman has a history of post-traumatic stress symptoms, it is also possible that these can be triggered again by events during pregnancy and labour.⁶⁰ The prevalence of PTSD in high-risk pregnant women was found to be 16–19%, which is higher than the postnatal prevalence of the community samples.⁶¹ In patients with PP, bright red bleeding from the vagina can be a traumatic experience; urgent hospital admission after bleeding, interventions to stop the bleeding, or having to be hospitalized are secondary traumatic experiences related to this condition. A history of bleeding and high-risk pregnancy may increase perceived pregnancy-related stress in expectant mothers. There is a relationship between perceived stress and post-traumatic stress symptoms, and the presence of depression and anxiety symptoms plays a mediating role in this relationship. Our results show that post-traumatic symptoms following diagnosis of placenta previa are significantly associated with perceived stress, depression, and anxiety.

The mediation analysis in our study provides an essential insight into the psychological mechanisms linking placenta previa with post-traumatic stress symptoms. Specifically, perceived stress was found to increase PTSD-related symptoms both directly and indirectly through elevated depression and anxiety scores. This suggests that the emotional distress associated with a high-risk pregnancy does not manifest solely as an acute stress reaction but is amplified through mood and anxiety pathways. In other words, women experiencing placenta previa may perceive their condition as a chronic threat, leading to heightened emotional dysregulation and negative cognitive appraisal, which in turn exacerbate post-traumatic stress symptomatology. These findings are consistent with prior models indicating that anxiety and depressive symptoms act as mediators between perceived stress and trauma outcomes in obstetric and perinatal contexts.^{10,22,56,62,63} The presence of these mediating effects underscores the importance of screening for both anxiety and depression among women diagnosed with placenta previa, as addressing these symptoms early may reduce subsequent post-traumatic stress responses. Integrating brief, evidence-based interventions such as cognitive-behavioral or stress-reduction therapies during antenatal hospitalization could therefore be beneficial for this vulnerable population.

Beyond psychosocial explanations, several biological stress pathways may also underlie the association between PP and adverse mental health outcomes. Dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis is a plausible mechanism: high-risk pregnancies are associated with chronic activation of the stress response, leading to elevated

cortisol and corticotropin-releasing hormone (CRH) levels. Persistent HPA axis activation may, in turn, contribute to heightened anxiety, depressive symptoms, and impaired emotional regulation. Moreover, alterations in placental function—such as reduced 11 β -hydroxysteroid dehydrogenase type 2 (11 β -HSD2) activity—can increase fetal and maternal exposure to glucocorticoids, amplifying psychological vulnerability.^{64–67} These findings suggest that both psychological and biological stress systems may interact bidirectionally in PP, supporting the need for integrative research approaches that combine hormonal biomarkers with psychological assessments.

These findings emphasize the psychological vulnerability of women diagnosed with placenta previa and underline the need for multidisciplinary attention. The present results also have several clinical implications. Early psychological screening should be considered a standard component of antenatal care for high-risk pregnancies. Incorporating brief, validated instruments such as the PHQ-9 and GAD-7 into routine evaluations may help identify women at risk of depression, anxiety, or trauma-related symptoms during hospitalization. Developing integrated care pathways that involve obstetricians, psychiatrists, and perinatal psychologists could enable early interventions—such as psychoeducation, stress management, or brief cognitive-behavioral techniques—to prevent symptom progression into the postpartum period. Such multidisciplinary and preventive approaches have been associated with better maternal mental health and improved obstetric outcomes.^{11,68,69} Future research should explore the feasibility and effectiveness of implementing these integrated screening and support programs within tertiary obstetric centers.

Although essential findings were observed, this study had several limitations. Firstly, our analyses are based on cross-sectional data collected on mothers' mental health, which may be subject to recall bias. Second, the single-center study design limited the generalizability of the findings. Third, the participants did not undergo formal diagnostic examinations for mental symptoms. The presence of self-assessment scales may introduce some differences in the findings. Although specific cut-off scores on the scales used may indicate the need for further assessment, it is essential to remember that these scales are not diagnostic tools for mental disorders. Fourth, the presence of trauma may have been overlooked when evaluating post-traumatic stress symptoms in pregnant women using the IES-R. Lastly, several potentially relevant covariates were not assessed in this study and should be acknowledged as limitations. Variables such as socioeconomic status, previous psychiatric history beyond the exclusion criteria, and perceived social support could influence psychological outcomes in pregnant women. These unmeasured factors may have contributed to residual confounding. Future research should address these factors to improve model precision.

Conclusion

The results of this study provide significant insight into placenta previa and its consequences on the mental health of expectant mothers. In summary, our findings indicate that depression, anxiety, and post-traumatic stress symptoms are prominent in pregnant women with placenta previa, and these psychological conditions are more common than in healthy pregnancies. This underscores the need for clinicians and healthcare providers to recognize the importance of comprehensive screening and management of depression, anxiety, and post-traumatic stress symptoms in pregnant women as soon as placenta previa is diagnosed. It is crucial to help women with identified mental disorders receive appropriate therapeutic intervention. The high prevalence of mental disorders in pregnant women with placenta previa suggests that clinicians should maintain a low threshold for suspecting and screening for depression, anxiety, and post-traumatic stress symptoms. Psychiatric consultation and liaison are essential to promote the most appropriate management, care, and support for these women. Effective care requires a multidisciplinary approach that integrates obstetric and psychiatric collaboration. However, because this study used a cross-sectional design to assess pregnant women, the directionality of the relationships cannot be definitively determined. It should be borne in mind that pre-existing anxiety or depression in early pregnancy may also influence perceived stress or the reporting of obstetric complications. Longitudinal studies are needed to evaluate the short- and long-term effects on the mental health of pregnant women with placenta previa.

Data Sharing Statement

The data supporting this study's findings are available from the corresponding author upon reasonable request.

Ethics Approval and Consent to Participate

Informed consent was obtained from all participants included in this study. All methods in this study were performed in accordance with the guidelines of the Declaration of Helsinki. The Ethics Review Committee of Ankara Bilkent City Hospital has approved it (IRNo. E2-23-3482, 01.03.2023).

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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References

- Monterde-Fernández ME, Díaz-Vallejo JJ, Rodríguez-Parissi I, Venegas-Espinoza B, Cruz-Perez E. Prevalence and risk factors for placenta previa in a specialty hospital. *Rev Bras Ginecol Obstet.* **2025**;47:e-rbgo30. doi:10.61622/rbgo/2025rbgo30
- Cresswell JA, Ronsmans C, Calvert C, Filippi V. Prevalence of placenta praevia by world region: a systematic review and meta-analysis. *Trop Med Int Health.* **2013**;18(6):712–724. doi:10.1111/tmi.12100
- Silver RM. Abnormal placentation: placenta previa, vasa previa, and placenta accreta. *Obstet Gynecol.* **2015**;126(3):654–668. doi:10.1097/AOG.0000000000001005
- Bestel M, Türk VA, Ekiz A, et al. Placenta previa and adverse neonatal outcomes in a tertiary center. *Bagcilar Med Bull.* **2024**;9(2):106–113. doi:10.4274/BMB.galenos.2024.2024-03-029
- Kalelioğlu I, Çorbacioğlu Esmer A, Has R, et al. Management of placenta invasion anomaly and cesarean hysterectomy: eight-year experience of a tertiary center. *J Turk Soc Obstet Gynecol.* **2013**;10(3):143–150.
- Rao KP, Belogolovkin V, Yankowitz J, Spinnato JA. Abnormal placentation. *Obstet Gynecol Surv.* **2012**;67(8):503–519. doi:10.1097/OGX.0b013e3182685870
- Jauniaux E, Alfirevic Z, Bhide AG, et al. Placenta praevia and placenta accreta: diagnosis and management: green-top guideline no. 27a. *BJOG.* **2019**;126(1):e1–e48. doi:10.1111/1471-0528.15306
- Oyelese Y, Smulian JC. Placenta previa, placenta accreta, and vasa previa. *Obstet Gynecol.* **2006**;107(4):927–941. doi:10.1097/01.AOG.0000207559.15715.98
- Adere A, Mulu A, Temesgen F. Neonatal and maternal complications of placenta praevia and its risk factors in Tikur anbesa specialized and Gandhi memorial hospitals: unmatched case-control study. *J Pregnancy.* **2020**;2020:1–9. doi:10.1155/2020/5630296
- Kingston D, Tough S, Whitfield H. Prenatal and postpartum maternal psychological distress and infant development: a systematic review. *Child Psychiatry Hum Dev.* **2012**;43(5):683–714. doi:10.1007/s10578-012-0291-4
- Howard LM, Molyneux E, Dennis C-L, Rochat T, Stein A, Milgrom J. Non-psychotic mental disorders in the perinatal period. *Lancet.* **2014**;384(9956):1775–1788. doi:10.1016/S0140-6736(14)61276-9
- Isaacs NZ, Andipatin MG. A systematic review regarding women's emotional and psychological experiences of high-risk pregnancies. *BMC Psychol.* **2020**;8(1):45. doi:10.1186/s40359-020-00410-8
- Grote NK, Bridge JA, Gavin AR, Melville JL, Iyengar S, Katon WJ. A meta-analysis of depression during pregnancy and the risk of preterm birth, low birth weight, and intrauterine growth restriction. *Arch Gen Psychiatry.* **2010**;67(10):1012–1024. doi:10.1001/archgenpsychiatry.2010.111
- Alder J, Fink N, Bitzer J, Hösl I, Holzgreve W. Depression and anxiety during pregnancy: a risk factor for obstetric, fetal and neonatal outcome? A critical review of the literature. *J Matern Fetal Neonatal Med.* **2007**;20(3):189–209. doi:10.1080/14767050701209560
- Lancaster CA, Gold KJ, Flynn HA, Yoo H, Marcus SM, Davis MM. Risk factors for depressive symptoms during pregnancy: a systematic review. *Am J Obstet Gynecol.* **2010**;202(1):5–14. doi:10.1016/j.ajog.2009.09.007
- Tol ID, Yousif M, Collins SL. Post-traumatic stress disorder (PTSD): the psychological sequelae of abnormally invasive placenta (AIP). *Placenta.* **2019**;81:42–45. doi:10.1016/j.placenta.2019.04.004
- Glover V. Maternal depression, anxiety and stress during pregnancy and child outcome; what needs to be done. *Best Pract Res Clin Obstet Gynaecol.* **2014**;28(1):25–35. doi:10.1016/j.bpobgyn.2013.08.017

18. Yonkers KA, Smith MV, Forray A, et al. Pregnant women with posttraumatic stress disorder and risk of preterm birth. *JAMA Psychiatry*. 2014;71(8):897–904. doi:10.1001/jamapsychiatry.2014.558
19. Silver RM, Barbour KD. Placenta accreta spectrum: accreta, increta, and percreta. *Obstet Gynecol Clin North Am*. 2015;42(2):381–402. doi:10.1016/j.ogc.2015.01.014
20. Cetin O, Guzel Ozdemir P, Kurdoglu Z, Sahin HG. Investigation of maternal psychopathological symptoms, dream anxiety and insomnia in preeclampsia. *J Matern Fetal Neonatal Med*. 2017;30(20):2510–2515. doi:10.1080/14767058.2016.1254185
21. Horsch A, Brooks C, Fletcher H. Maternal coping, appraisals and adjustment following diagnosis of fetal anomaly. *Prenat Diagn*. 2013;33(12):1137–1145. doi:10.1002/pd.4207
22. Yildiz PD, Ayers S, Phillips L. The prevalence of posttraumatic stress disorder in pregnancy and after birth: a systematic review and meta-analysis. *J Affect Disord*. 2017;208:634–645. doi:10.1016/j.jad.2016.10.009
23. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001;16(9):606–613. doi:10.1046/j.1525-1497.2001.016009606.x
24. Yazici Güleç M, Güleç H, Şimşek G, Turhan M, Aydın Sünbül E. Psychometric properties of the Turkish version of the patient health questionnaire-somatic, anxiety, and depressive symptoms. *Compr Psychiatry*. 2012;53(5):623–629. doi:10.1016/j.comppsy.2011.08.002
25. Wang L, Kroenke K, Stump TE, Monahan PO. Screening for perinatal depression with the patient health questionnaire depression scale (PHQ-9): a systematic review and meta-analysis. *Gen Hosp Psychiatry*. 2021;68:74–82. doi:10.1016/j.genhosppsych.2020.12.007
26. Spitzer RL, Kroenke K, Williams JBW, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med*. 2006;166(10):1092–1097. doi:10.1001/archinte.166.10.1092
27. Konkan R, Şenormancı Ö, Güçlü O, Aydın E, Sungur MZ. Yaygın Anksiyete Bozukluğu-7 (YAB-7) testi Türkçe uyarlaması, geçerlik ve güvenirliği. *Noro Psikiyatrs Ars*. 2013;50(1):53–58. doi:10.4274/npa.y6308
28. Gong Y, Zhou H, Zhang Y, et al. Validation of the 7-item generalized anxiety disorder scale (GAD-7) as a screening tool for anxiety among pregnant Chinese women. *J Affect Disord*. 2021;282:98–103. doi:10.1016/j.jad.2020.12.129
29. Vogazianos P, Motrico E, Domínguez-Salas S, Christoforou A, Hadjigeorgiou E. Validation of the generalized anxiety disorder screener (GAD-7) in Cypriot pregnant and postpartum women. *BMC Pregnancy Childbirth*. 2022;22(1):841. doi:10.1186/s12884-022-05127-7
30. Jenkins CD, Stanton BA, Niemcryk SJ, Rose RM. A scale for the estimation of sleep problems in clinical research. *J Clin Epidemiol*. 1988;41(4):313–321. doi:10.1016/0895-4356(88)90138-2
31. Duruöz MT, Erdem D, Gencer K, Ulutatar F, Baklacioğlu HŞ. Validity and reliability of the Turkish version of the jenkins sleep scale in psoriatic arthritis. *Rheumatol Int*. 2018;38(2):261–265. doi:10.1007/s00296-017-3911-2
32. Pinto J, van Zeller M, Amorim P, et al. Sleep quality in times of COVID-19 pandemic. *Sleep Med*. 2020;74:81–85. doi:10.1016/j.sleep.2020.07.012
33. Horowitz M, Wilner N, Alvarez W. Impact of Event Scale: a measure of subjective stress. *Psychosom Med*. 1979;41(3):209–218. doi:10.1097/00006842-197905000-00004
34. Weiss DS, Marmar CR. The impact of events scale-revised. In: Wilson JP, Keane TM, editors. *Assessing Psychological Trauma and PTSD*. New York, NY: Guilford Press; 2004:399–411.
35. Creamer M, Bell R, Failla S. Psychometric properties of the Impact of Event Scale-Revised. *Behav Res Ther*. 2003;41(12):1489–1496. doi:10.1016/j.brat.2003.07.010
36. Luo X, Chen B, Shen Q. Psychological distress in subsequent pregnancy among women with a history of pregnancy loss: a latent profile analysis. *Midwifery*. 2023;127:103845. doi:10.1016/j.midw.2023.103845
37. Moreira Ramiro AC, Côrtes Ribeiro C, Leles Vieira de Souza B, Santana Dos Passos F. Assessment of the psychological impact of the COVID-19 pandemic on pregnant women. *J Matern Fetal Neonatal Med*. 2024;35(25):6461–6465. doi:10.1080/14767058.2021.1915976
38. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav*. 1983;24(4):385–396. doi:10.2307/2136404
39. Yılmaz Koğar E, Koğar H. A systematic review and meta-analytic confirmatory factor analysis of the perceived stress scale (PSS-10 and PSS-14). *Stress Health*. 2024;40(1):e3285. doi:10.1002/smi.3285
40. Gambetta-Tessini K, Mariño R, Morgan M, Evans W, Anderson V. Stress and health-promoting attributes in Australian, New Zealand, and Chilean dental students. *J Dent Educ*. 2013;77(6):801–809. doi:10.1002/j.0022-0337.2013.77.6.tb05532.x
41. Tanpradit K, Kaewkiattikun K. The effect of perceived stress during pregnancy on preterm birth. *Int J Womens Health*. 2020;12:287–293. doi:10.2147/IJWH.S239138
42. Tunç EB. Assessing the psychometric properties of the brief resilience scale: a rasch modeling approach. *Int J Eurasian Educ Culture*. 2023;8(23):2116–2137.
43. Smith BW, Dalen J, Wiggins K, Tooley E, Christopher P, Bernard J. The brief resilience scale: assessing the ability to bounce back. *Int J Behav Med*. 2008;15(3):194–200. doi:10.1080/10705500802222972
44. Faul F, Erdfelder E, Buchner A, Lang AG. Statistical power analyses using G*Power 3.1: tests for correlation and regression analyses. *Behav Res Methods*. 2009;41(4):1149–1160. doi:10.3758/BRM.41.4.1149
45. O'Brien J, Gregg L, Wittkowski A. A systematic review of clinical psychological guidance for perinatal mental health. *BMC Psychiatry*. 2023;23(1):790. doi:10.1186/s12888-023-05173-1
46. Feyissa GT, Pouget ER, Kitila SB, Terfa YB, Wong T. Integrating mental health services into perinatal care: challenges and opportunities. *J Multidiscip Healthc*. 2025;18:4317–4339. doi:10.2147/JMDH.S536732
47. Williamson SP, Moffitt RL, Broadbent J, Neumann DL, Hamblin PS. Coping, wellbeing, and psychopathology during high-risk pregnancy: a systematic review. *Midwifery*. 2023;116:103556. doi:10.1016/j.midw.2022.103556
48. Roddy Mitchell A, Gordon H, Lindquist A, et al. Prevalence of perinatal depression in low- and middle-income countries. *JAMA Psychiatry*. 2023;80(5):425–433. doi:10.1001/jamapsychiatry.2023.0069
49. Denis A, Michaux P, Callahan S. Factors implicated in moderating the risk for depression and anxiety in high-risk pregnancy. *J Reprod Infant Psychol*. 2012;30(2):124–134. doi:10.1080/02646838.2012.677020
50. Byatt N, Hicks-Courant K, Davidson A, et al. Depression and anxiety among high-risk obstetric inpatients. *Gen Hosp Psychiatry*. 2014;36(6):644–649. doi:10.1016/j.genhosppsych.2014.07.011
51. Scabia A, Donati MA, Primi C, et al. Depression, anxiety, self-efficacy, and self-esteem in high-risk pregnancy. *Minerva Obstet Gynecol*. 2024;76(1):14–20. doi:10.23736/S2724-606X.22.05116-8

52. Tsakiridis I, Bousi V, Dagklis T, Sardeli C, Nikolopoulou V, Papazisis G. Epidemiology of antenatal depression among women with high-risk pregnancies due to obstetric complications: a scoping review. *Arch Gynecol Obstet*. 2019;300(4):849–859. doi:10.1007/s00404-019-05270-1
53. Stahl K, Hundley V. Risk and risk assessment in pregnancy—Do we scare because we care? *Midwifery*. 2003;19(4):298–309. doi:10.1016/S0266-6138(03)00041-X
54. Simmons HA, Goldberg LS. “High-risk” pregnancy after perinatal loss: understanding the label. *Midwifery*. 2011;27(4):452–457. doi:10.1016/j.midw.2010.02.013
55. Melville JL, Gavin A, Guo Y, Fan M-Y, Katon WJ. Depressive disorders during pregnancy. *Obstet Gynecol*. 2010;116(5):1064–1070. doi:10.1097/AOG.0b013e3181f60b0a
56. 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
57. Thiagayson P, Krishnaswamy G, Lim ML, et al. Depression and anxiety in Singaporean high-risk pregnancies—Prevalence and screening. *Gen Hosp Psychiatry*. 2013;35(2):112–116. doi:10.1016/j.genhosppsych.2012.11.006
58. Cumberbatch CJ, Birndorf C, Dresner N. Psychological implications of high-risk pregnancy. *Int J Fertil Womens Med*. 2005;50(4):180–186.
59. King NMA, Chambers J, O'Donnell K, Jayaweera SR, Williamson C, Glover VA. Anxiety, depression and saliva cortisol in women with a medical disorder during pregnancy. *Arch Womens Ment Health*. 2010;13(4):339–345. doi:10.1007/s00737-009-0139-5
60. Halvorsen L, Nerum H, Øian P, Sørli T. Giving birth with rape in one's past: a qualitative study. *Birth*. 2013;40(3):182–191. doi:10.1111/birt.12054
61. Horsch A, Garthus-Niegel S. Posttraumatic stress disorder following childbirth. In: *Childbirth, Vulnerability and Law*. Routledge; 2019:49–66.
62. Premji SS, Lalani S, Ghani F, et al. Allostatic load as a mediator and perceived chronic stress as a moderator in the association between maternal mental health and preterm birth: a prospective cohort study of pregnant women in Pakistan. *Psychopathology*. 2025;58(1):13–32. doi:10.1159/000540579
63. Acoba EF. Social support and mental health: the mediating role of perceived stress. *Front Psychol*. 2024;15:1330720. doi:10.3389/fpsyg.2024.1330720
64. Van den Bergh BRH, van den Heuvel MI, Lahti M, et al. Prenatal developmental origins of behavior and mental health: the influence of maternal stress in pregnancy. *Neurosci Biobehav Rev*. 2020;117:26–64. doi:10.1016/j.neubiorev.2017.07.003
65. Mina TH, Reynolds RM. Mechanisms linking in utero stress to altered offspring behaviour. *Curr Top Behav Neurosci*. 2014;18:93–122. doi:10.1007/7854_2014_291
66. Hoffman MC. Stress, the placenta, and fetal programming of behavior: genes' first encounter with the environment. *Am J Psychiatry*. 2016;173(7):655–657. doi:10.1176/appi.ajp.2016.16050502
67. Togher KL, Treacy E, O'Keefe GW, Kenny LC. Maternal distress in late pregnancy alters obstetric outcomes and the expression of genes important for placental glucocorticoid signalling. *Psychiatry Res*. 2017;255:17–26. doi:10.1016/j.psychres.2017.05.013
68. Stewart DE, Vigod SN. Postpartum depression: pathophysiology, treatment, and emerging therapeutics. *Annu Rev Med*. 2019;70:183–196. doi:10.1146/annurev-med-041217-011106
69. Manolova G, Waqas A, Chowdhary N, Salisbury TT, Dua T. Integrating perinatal mental healthcare into maternal and perinatal services in low and middle income countries. *BMJ*. 2023;381:e073343. doi:10.1136/bmj-2022-073343

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