

Impact of Adverse Pregnancy History and Demographics on Antenatal Mental Health: A Cross-Sectional Study of 897 Women

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Background: Common mental health disorders among pregnant women—including anxiety, insomnia, and post-traumatic stress disorder (PTSD)—significantly impair maternal well-being, quality of life, and pregnancy outcomes.

Objective: This study aimed to investigate the prevalence and influencing factors (specifically adverse pregnancy history and demographics) of anxiety, insomnia, and PTSD to inform targeted interventions.

Methods: A cross-sectional survey was conducted among 897 pregnant women in China from June 9, 2024, to June 9, 2025. Participants completed validated questionnaires: a general information form, the Insomnia Severity Index (ISI), the Generalized Anxiety Disorder Scale (GAD-7), and the Impact of Event Scale-Revised (IES-R). Adverse pregnancy history was defined to include miscarriage, stillbirth, and preterm birth. Multiple stepwise linear regression analysis was performed to identify factors influencing mental health outcomes.

Results: Among 897 participants, the prevalence of clinically significant symptoms was: anxiety 13.9% ($n=125$, $GAD-7 \geq 10$), insomnia 28.4% ($n=255$, $ISI \geq 8$), and PTSD 24.1% ($n=216$, $IES-R \geq 33$). The mean scores were: GAD-7 (5.64 ± 4.28), ISI (6.83 ± 5.25), and IES-R (22.43 ± 17.84). Multiple stepwise linear regression analysis indicated that adverse pregnancy history was a significant risk factor for anxiety ($\beta = 1.53$, $p < 0.05$), insomnia ($\beta = 1.22$, $p < 0.05$), and PTSD ($\beta = 5.38$, $p < 0.05$). Conversely, continuous employment and higher family income were inversely associated with symptom severity ($p < 0.05$).

Conclusion: Anxiety, insomnia, and PTSD are prevalent among pregnant women in China. Adverse pregnancy history increases susceptibility, while maintaining active employment may serve as a protective factor. This finding opens new avenues for future effective interventions aimed at alleviating negative emotions among pregnant women.

Keywords: adverse pregnancy history, anxiety, insomnia, post-traumatic stress disorder, mental health, attention bias modification

Introduction

Anxiety, insomnia, and post-traumatic stress disorder (PTSD) are highly prevalent and often co-occurring mental health challenges during pregnancy, particularly among women with a history of adverse pregnancy outcomes or complications.^{1,2} Recent literature (2023–2024) has further solidified this association. For instance, Kulshreshtha et al (2023)³ highlighted the unique “mental anguish” and heightened anxiety observed in “rainbow pregnancies” following prior loss. Similarly, Albertini and co-authors (2024)⁴ and Zhao and associates (2024)² have documented elevated rates of PTSD and insomnia in this vulnerable population, attributing these symptoms to the compounding effects of prior trauma and current pregnancy-related stress. These interrelated conditions significantly increase the risk of adverse obstetric outcomes—such as preterm birth, low birth weight, and impaired maternal-infant bonding.^{5–7}

However, a critical limitation of the current evidence base is the contextual confounder of the COVID-19 pandemic. Although the pandemic highlighted these vulnerabilities and was associated with exceptionally high prevalence rates of these conditions (anxiety: 27.88%–57.7%; insomnia: 16.50%–38.2%; PTSD: 2.77%–72.2%) due to its unique stressor,^{1–3}

data on maternal mental health trajectories beyond the acute pandemic phase, particularly under normalized societal conditions, remain scarce. Research during the pandemic peak identified context-specific factors mitigating anxiety, such as public health control measures.² This significant gap necessitates an investigation into this vulnerable group after major public health emergencies and restrictions subsided.

To address this gap, this study investigates the prevalence and multidimensional influencing factors of anxiety, insomnia, and PTSD in pregnant women following the acute phase of major public health emergencies and restrictions. Our findings aim to inform targeted psychological interventions to safeguard perinatal mental health in both post-pandemic and routine settings.

Materials and Methods

Research Objectives

A total of 897 pregnant women, who were under the attentive care of nurses at the First Affiliated Hospital of Henan University of Chinese Medicine during the period from June 9, 2024, to June 9, 2025, were methodically selected for participation in a comprehensive questionnaire survey utilizing a random sampling method. The inclusion criteria for this study were as follows: (1) Pregnant women receiving prenatal care in the obstetrics department; (2) Age ≥ 18 years; (3) Not currently using medication affecting sleep or mental health; (4) Participants were required to have adequate cognitive capacity and be physically able to complete the survey independently; (5) Willingness to participate. Exclusion criteria: (1) History of mental illness or current mental disorders; (2) Decision to terminate pregnancy; (3) Severe communication barriers (reading/hearing impairments). Participants retain the right to withdraw at any time.

Research Methodology

This study is designed as a cross-sectional study, which allows for a snapshot analysis of the variables in question. This study received approval from the hospital's ethics committee under ethics number 2024HL-320-01. Data were systematically collected via the Question Star platform. Standardized instructions were meticulously crafted to clearly explain the purpose and significance of the survey, as well as the specific method for filling it out, all in an effort to obtain informed consent from the patients involved. Patients selected through random sampling were provided with a QR code to access the questionnaire at their convenience. To ensure consistency and clarity, all questionnaires were explained by the same dedicated full-time investigator, who employed uniform instructions to guide participants on the filling requirements and to address any inquiries they might have had. After the data collection phase, each questionnaire was thoroughly checked one by one to ensure quality, leading to the removal of any unqualified questionnaires that contained illogical answers—such as contradictions between responses given at different times, inconsistencies, and those that were completed in less than 100 seconds due to simple repeat answering. In total, 1000 questionnaires were distributed, and an impressive 897 valid responses were returned, resulting in an effective response rate of 89.7%. The reporting of our study strictly followed the Consensus-Based Checklist for Reporting of Survey Studies ([Supplementary Table 1](#)).⁸

Research Content

General Information Questionnaire

General information questionnaires, meticulously crafted by researchers to gather valuable insights, are typically structured into two distinct yet complementary parts: the first part focuses on demographic information, which encompasses essential details such as the participant's age, level of education, current employment status, and average monthly family income; the second part delves into pregnancy history, exploring critical aspects such as the stage of pregnancy, any adverse pregnancy experiences that may have occurred, and the presence of complications during the pregnancy. Participants were stratified based on the following demographic and obstetric characteristics: Age was categorized into three groups (<30 years, 30–34 years, ≥ 35 years); Education level was classified into four levels (junior high School or below, high school/technical school, junior college, bachelor's degree or above); Employment status was divided into three groups (unemployed, employed, and on leave due to pregnancy); Monthly Family income was categorized into four groups (<4000 RMB, 4000–8000 RMB, 8000–12000 RMB, >12000 RMB); Gestational stage was classified as early

pregnancy (≤ 12 weeks), mid-pregnancy (12–28 weeks), and late pregnancy (≥ 28 weeks); Adverse pregnancy history was categorized into three groups (none, 1–2 times, ≥ 3 times), with adverse pregnancy outcomes including biochemical pregnancy, embryonic arrest, stillbirth, and neonatal death; Pregnancy complications were divided into two categories (present or absent). The complications included gestational diabetes, gestational hypertension, systemic lupus erythematosus, and other pregnancy-related disorders. The full survey questionnaire is available in [Supplementary Table 2](#).

Generalized Anxiety Disorder Scale

Generalized Anxiety Disorder Scale-7 items: The GAD-7 is a self-administered 7-item questionnaire for measuring general anxiety. Each item is scored on a 3-point Likert scale (0 = not at all to 3 = nearly every day). Scores can range from 0 to 21, with higher scores reflecting higher levels of anxiety. Cut-off intervals for anxiety include 0–4 (no anxiety), 5–9 (mild anxiety), 10–15 (moderate), and 16–21 (severe). In this study, we established a cutoff score of 10 as the threshold for high clinical risk of anxiety. The excellent internal consistency (Cronbach's $\alpha = 0.92$) and good test-retest reliability (intraclass correlation = 0.83) were reported.^{9,10}

Severe Insomnia Quantity Index

The Insomnia Severity Index (ISI) is a brief 7-item tool designed to assess the perceived severity of insomnia symptoms over the past 2 weeks. A five-point Likert scale is used to rate each item, yielding a total score ranging from 0 to 28. Higher scores indicate more severe sleep difficulties. A score of 0 to 7 indicates no clinically significant insomnia; 8–14 is classified as mild insomnia; 15–21 denotes moderate insomnia; and ≥ 22 denoted severe insomnia. In this study, we determined a score of 8 as the threshold for clinically significant insomnia. The Cronbach's- α coefficient of this scale is 0.843, and the retest reliability is 0.506, which has good validity and reliability, and can be used as a screening tool for insomnia.^{11,12}

Impact of Event Scale-Revised

The Impact of Event Scale-Revised (IES-R) is a 22-item self-reported questionnaire designed to assess symptoms of intrusive thoughts (8 items), avoidance (8 items), and hyperarousal (6 items) resulting from traumatic life events. This scale is used to assess the degree of psychological stress caused by traumatic events, measuring the severity of each symptom that occurred in the past two weeks; each item is rated on a 5-point scale using anchors between 0 (not at all) and 4 (extremely), and total scores range from 0 to 88. The cut-off intervals for interpretation include 0–8 (no impact), 9–25 (mild impact), 26–43 (moderate), and 44–88 (severe). The IES-R cut-off score of 33 was used in this study. This threshold is widely accepted and consistently employed in recent studies investigating PTSD symptomatology in comparable populations,^{3,11,12} offering a good balance between sensitivity and specificity for identifying probable clinical caseness. The Cronbach's- α coefficient ranged from 0.76 to 0.89.^{11,13,14}

Statistical Methods

Data processing was performed using SPSS 27.0 statistical software. For continuous data, mean $\pm$ standard deviation (SD) is used, and for categorical data, percentages are presented. For single-factor analysis, independent t-tests or analysis of variance (ANOVA) are used. Multiple factors are analyzed using multiple stepwise linear regression, with $P < 0.05$ considered statistically significant. Multicollinearity among independent variables was assessed using the Variance Inflation Factor (VIF), with values < 10 considered indicative of no significant multicollinearity. Given the large sample size ($N=897$), the regression models were considered robust to minor deviations from normality.

Results

General Information of the Survey Subjects

Pregnant women under the age of 30 accounted for 334 (37.2%), 375 (41.8%) were aged 30 to 34, and 188 (21.0%) were aged 35 and above; 99 (11.0%) had an education level of junior high school or below, 100 (11.1%) had senior high school or technical secondary school education, 209 (23.3%) had junior college education, and 489 (54.5%) had a bachelor's degree or above; in terms of work status, 226 (25.2%) were unemployed, 479 (53.4%) worked continuously, and 192 (21.4%) had to rest during pregnancy due to work reasons; 155 (17.3%) had an average monthly income of less than 4000 yuan, 405 (45.2%) had 4000–8000 yuan, 223 (24.9%) had 8000–12000 yuan, and 114 (12.7%) had more than

12000 yuan; among all the surveyed pregnant women, 279 (31.1%) were in the early pregnancy period, 322 (35.9%) were in the middle pregnancy period, and 296 (33.0%) were in the late pregnancy period; 375 (41.8%) had no adverse pregnancy history, 475 (53.0%) had 2 or fewer adverse pregnancy histories, and 47 (5.2%) had 3 or more adverse pregnancy histories; 826 (92.1%) had no pregnancy complications, while 71 (7.9%) had pregnancy complications; for more detailed information, please refer to [Tables 1 and 2](#).

Table 1 Univariate Analysis of Anxiety, Insomnia, and Stress Disorder in Pregnant Women (n = 897)

Item	Total (%)	Anxiety			Insomnia			Post-Traumatic Stress Disorder		
		GAD-7 Score (Mean ± SD)	Test Statistic (t/F)	P-value	ISI Score (Mean ± SD)	Test Statistic (t/F)	P-value	IES-R Score (Mean ± SD)	Test Statistic (t/F)	P-value
Age group [name (percent, %)]	—	—	1.563 ^a	0.210	—	2.766 ^a	0.063	—	6.290 ^a	0.002 ^b
<30 years old	334 (37.2)	5.62 ± 4.35	—	—	6.79 ± 5.06	—	—	21.59 ± 17.88	—	—
30–34 years old	375 (41.8)	5.42 ± 4.04	—	—	6.49 ± 5.00	—	—	21.15 ± 16.51	—	—
≥35 years old	188 (21.0)	6.10 ± 4.58	—	—	7.59 ± 6.02	—	—	26.49 ± 19.71	—	—
Educational level [name (hundred%)]	—	—	0.576 ^a	0.631	—	1.151 ^a	0.328	—	1.139 ^a	0.332
Junior high school or below	99 (11.0)	6.06 ± 4.54	—	—	6.47 ± 5.54	—	—	24.55 ± 20.73	—	—
High school/technical school	100 (11.1)	5.85 ± 4.54	—	—	7.70 ± 5.78	—	—	24.30 ± 19.91	—	—
Junior college	209 (23.3)	5.65 ± 4.56	—	—	6.87 ± 5.48	—	—	21.37 ± 16.94	—	—
Bachelor's degree or above	489 (54.5)	5.50 ± 4.05	—	—	6.71 ± 4.96	—	—	22.08 ± 17.11	—	—
Employment status [name (percent, %)]	—	—	3.502 ^a	0.031 ^b	—	2.397 ^a	0.092	—	4.871 ^a	0.008 ^b
Unemployed	226 (25.2)	6.23 ± 4.77	—	—	7.46 ± 6.08	—	—	25.23 ± 19.54	—	—
On leave due to pregnancy	192 (21.4)	5.72 ± 4.22	—	—	6.85 ± 5.14	—	—	23.12 ± 16.30	—	—
Employed	479 (53.4)	5.32 ± 4.03	—	—	6.53 ± 4.84	—	—	20.84 ± 17.43	—	—
Family income [name (%)]	—	—	5.163 ^a	0.002 ^b	—	2.796 ^a	0.039 ^b	—	2.365 ^a	0.070
<4000 CNY	155 (17.3)	6.32 ± 5.01	—	—	7.81 ± 5.91	—	—	24.92 ± 20.30	—	—
4000–8000 CNY	405 (45.2)	5.95 ± 4.23	—	—	6.87 ± 5.02	—	—	22.77 ± 17.27	—	—
8000–12000 CNY	223 (24.9)	4.83 ± 3.89	—	—	6.29 ± 5.29	—	—	20.08 ± 17.22	—	—
>12000 CNY	114 (12.7)	5.19 ± 3.85	—	—	6.45 ± 4.88	—	—	22.46 ± 17.07	—	—

Notes: Data are presented as n (%) for categorical variables and Mean ± SD for continuous variables. Statistical tests: a is F-value derived from Analysis of Variance (ANOVA); b is t-value derived from independent samples t-test. All p-values are two-tailed.

Abbreviations: SD, Standard Deviation; GAD-7, Generalized Anxiety Disorder-7; ISI, Insomnia Severity Index; IES-R, Impact of Event Scale-Revised.

Table 2 Univariate Analysis of Anxiety, Insomnia, and Stress Disorder in Pregnant Women (n = 897)

Item	Total (%)	Anxiety			Insomnia			Post-traumatic stress disorder		
		GAD-7 Score (Mean ± SD)	Test Statistic (t/F)	P-value	ISI Score (Mean ± SD)	Test Statistic (t/F)	P-value	IES-R Score (Mean ± SD)	Test Statistic (t/F)	P-value
Pregnancy stage [name (percent, %)]	—	—	10.552 ^a	<0.001	—	4.966 ^a	0.007 ^b	—	5.275 ^a	0.005 ^b
Early pregnancy (≤12 weeks)	279 (31.1)	6.60 ± 4.51	—	—	7.36 ± 5.84	—	—	25.05 ± 19.60	—	—
Mid-pregnancy (12–28 weeks)	322 (35.9)	5.14 ± 4.07	—	—	6.11 ± 4.83	—	—	20.34 ± 17.17	—	—
Late pregnancy (≥28 weeks)	296 (33.0)	5.27 ± 4.15	—	—	7.13 ± 5.02	—	—	22.25 ± 16.49	—	—
Adverse obstetric history [name (percent, %)]	—	—	53.093 ^a	<0.001	—	31.240 ^a	<0.001	—	48.326 ^a	<0.001
None	375 (41.8)	5.10 ± 3.84	—	—	6.56 ± 4.99	—	—	20.98 ± 16.07	—	—
Once or twice	475 (53.0)	5.47 ± 4.01	—	—	6.48 ± 4.81	—	—	21.24 ± 16.64	—	—
Three times or more	47 (5.20)	11.51 ± 5.73	—	—	12.53 ± 7.82	—	—	46.11 ± 25.31	—	—
Complications of pregnancy [name (%)]	—	—	5.360 ^a	0.021 ^b	—	5.679 ^a	0.017 ^b	—	2.485 ^a	0.115
No	826 (92.1)	5.54 ± 4.19	—	—	6.71 ± 5.17	—	—	22.16 ± 17.52	—	—
Yes	71 (7.9)	6.76 ± 5.05	—	—	8.25 ± 5.95	—	—	25.63 ± 21.07	—	—

Status of Anxiety, Insomnia, and Stress Disorders in Pregnant Women

Among a total of 897 participants, 13.9% (n=125) moderate to severe anxiety (GAD-7 score $\geq$ 10), 28.4% (n=255) mild to severe insomnia (ISI $\geq$ 8), and 24.1% (n=216) moderate to severe PTSD symptoms (IES-R $\geq$ 33). A total of 897 pregnant women were assessed, yielding Generalized Anxiety Disorder-7 (GAD-7) scores of (5.64 ± 4.28), Insomnia Severity Index (ISI) scores of (6.83 ± 5.25), and Impact of Event Scale-Revised (IES-R) scores of (22.43 ± 17.84).

Univariate Analysis of Anxiety, Insomnia, and Stress Disorders in Pregnant Women

The results of the single-factor analysis showed that the influencing factors of anxiety were employment status, family income, pregnancy stage, adverse pregnancy history, and pregnancy complications ($p < 0.05$); while income, pregnancy stage, adverse pregnancy history, and pregnancy complications were the influencing factors of insomnia ($p < 0.05$); age, employment status, pregnancy stage, and adverse pregnancy history were the influencing factors of stress ($p < 0.05$). Detailed data are presented in [Tables 1](#) and [2](#).

Analysis of the Multiple Factors of Anxiety, Insomnia, and Post-Traumatic Stress Disorder in Pregnant Women

Multiple stepwise linear regression analyses were performed to identify factors associated with anxiety, insomnia, and PTSD symptoms ([Tables 1](#) and [2](#) presents the demographic and obstetric characteristics of the participants). For anxiety, significant negative associations were observed with employment status ($\beta = -0.53$, $p < 0.05$), family income ($\beta = -0.51$, $p < 0.05$), and pregnancy trimester ($\beta = -0.67$, $p < 0.05$), indicating that being employed, higher family income, and later trimester were associated with lower anxiety scores. Conversely, adverse pregnancy history ($\beta = 1.53$, $p < 0.05$) and pregnancy complications ($\beta = 1.27$, $p < 0.05$) were positively associated with anxiety, suggesting that these factors increased anxiety scores. Similarly, for insomnia, employment status ($\beta = -0.53$, $p < 0.05$) and family income ($\beta = -0.55$, $p < 0.05$) were negative predictors, while adverse pregnancy history ($\beta = 1.22$, $p < 0.05$) and pregnancy complications ($\beta = 1.42$, $p < 0.05$) were positive predictors. The strongest predictor for PTSD was adverse pregnancy history ($\beta = 5.38$, $p < 0.05$), which was associated with a substantial increase in PTSD symptoms. Additionally, older age group ($\beta = 2.03$, $p < 0.05$) was associated with higher PTSD symptoms, whereas employment status ($\beta = -2.48$, $p < 0.05$) was associated with lower symptoms. Detailed data are presented in [Tables 3–5](#).

Overall, higher family income and being employed were consistently associated with lower scores across all three mental health outcomes, while adverse pregnancy history emerged as a strong risk factor, particularly for PTSD. As illustrated in [Figure 1](#), the overlap of risk factors indicates that “Adverse pregnancy history” is a central, universal risk factor significantly associated with all three conditions (Anxiety, Insomnia, and PTSD), whereas “Pregnancy complications” serve as a shared risk factor specifically for Anxiety and Insomnia. Conversely, [Figure 2](#) visualizes the protective factors, highlighting that “Continuous employment status” acts as a universal buffer against all three conditions. “Higher

Table 3 Multi-Factor Analysis of Anxiety in Pregnant Women

Independent Variable	GAD-7				
	Unstandardized B	Standard Error	Standardized β	T Value	P-value
(constant)	4.512	0.934		4.830	0.000
Age group.	0.148	0.187	0.026	0.794	0.427
Educational Background.	0.221	0.167	0.053	1.326	0.185
Employment Status	-0.528	0.195	-0.104	-2.706	0.007
Family income	-0.510	0.166	-0.108	-3.079	0.002
Pregnancy stage	-0.666	0.174	-0.125	-3.819	0.000
Adverse pregnancy history	1.530	0.237	0.208	6.461	0.000
Pregnancy complications	1.274	0.514	0.080	2.477	0.013

Notes: $R^2 = 0.078$, $F = 11.891$, $P < 0.05$.

Abbreviation: GAD-7, Generalized Anxiety Disorder-7.

Table 4 Multivariate Analysis of Insomnia in Pregnant Women

Independent Variable	ISI				
	Unstandardized B	Standard error	Standardized β	T Value	P-value
(constant)	4.510	1.175		3.838	0.000
Age group.	0.283	0.235	0.040	1.202	0.230
Educational Background.	0.321	0.210	0.063	1.527	0.127
Employment Status.	-0.528	0.245	-0.085	-2.151	0.032
Family income	-0.550	0.208	-0.095	-2.641	0.008
Pregnancy stage	-0.129	0.219	-0.020	-0.589	0.556
Adverse pregnancy history	1.218	0.298	0.135	4.088	0.000
Pregnancy complications	1.418	0.647	0.073	2.192	0.029

Notes: $R^2 = 0.032$, $F = 5.193$, $P < 0.05$.

Abbreviation: ISI, Insomnia Severity Index.

Table 5 Multi-Factor Analysis of Stress in Pregnant Women

Independent Variable	IES-R				
	Unstandardized B	Standard error	Standardized β	T Value	P-value
(constant)	16.330	3.952		4.133	0.000
Age group.	2.032	0.790	0.085	2.571	0.010
Educational Background.	0.492	0.706	0.028	0.697	0.486
Employment Status.	-2.478	0.825	-0.117	-3.005	0.003
Family income	-1.062	0.701	-0.054	-1.516	0.130
Pregnancy stage	-1.415	0.738	-0.064	-1.918	0.055
Adverse pregnancy history	5.380	1.002	0.175	5.370	0.000
Pregnancy complications	2.766	2.176	0.042	1.272	0.204

Notes: $R^2 = 0.052$, $F = 7.967$, $P < 0.05$.

Abbreviation: IES-R, Impact of Events Scale.

family income” functions as a shared protective factor for Anxiety and Insomnia but shows no significant independent protective effect for PTSD in this model. Detailed data are presented in Figures 1 and 2.

Discussion

In the current socio-context of the biopsychosocial model, adverse emotions pose a significant threat to maternal and infant health. This study has found that pregnant women commonly experience issues such as anxiety, insomnia, and stress disorders. Among these, the detection rates of these adverse emotions are higher in pregnant women with a history of adverse pregnancy outcomes, while those with higher incomes and continuous employment exhibit relatively lower detection rates. This study intends to conduct a psychological status survey among pregnant women undergoing prenatal check-ups in obstetric clinics, aiming to provide healthcare professionals with a theoretical basis for psychological interventions in key populations, strengthen professional education and systematic management, and develop targeted intervention measures to safeguard the physical and mental health of both mothers and infants.

The observed anxiety prevalence (13.9%) presents a complex picture. This proportion is significantly higher than the anxiety rate among pregnant women in China during the COVID-19 pandemic (3.8%)¹⁵ and those in India during the same period (11.1%).³ However, it falls below rates documented in other populations during the pandemic^{12,16–18} and is significantly lower than the 33% prevalence identified by Kulshreshtha and associates³ specifically in pregnant women with adverse pregnancy histories. This suggests that while the current anxiety burden exceeds some early-pandemic figures, it remains lower than rates observed in high-stress subgroups or certain pandemic waves. Our insomnia prevalence (28.4%) exceeds the 20% reported in a large pre-pandemic Chinese cohort,¹⁹ indicating a potential worsening trend or increased vulnerability in the current context. The PTSD symptom rate (24.1%) is particularly striking, slightly

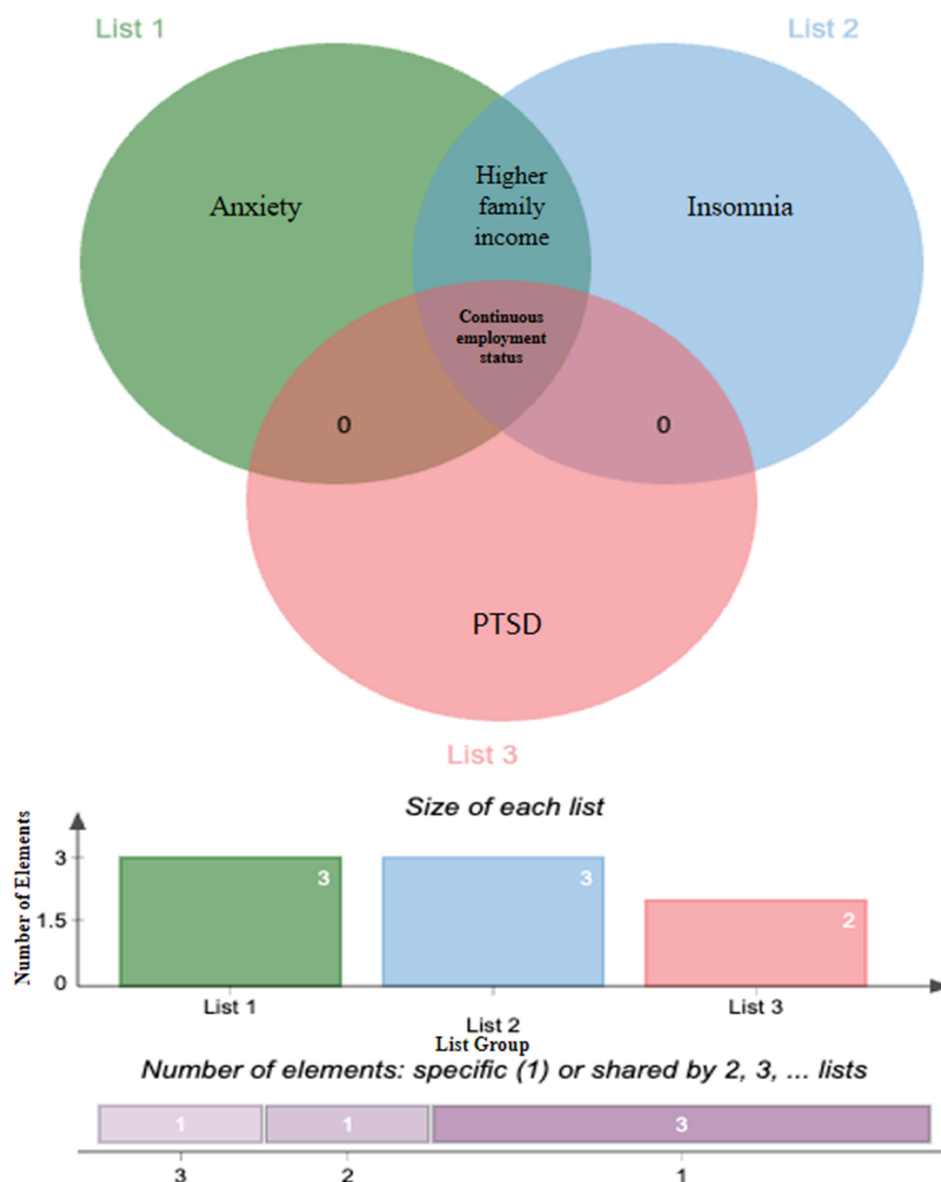


Figure 1 Venn diagram illustrating the overlapping risk factors associated with anxiety, insomnia, and PTSD in pregnant women.

exceeding the 23.7% reported.¹² This high prevalence underscores trauma-related distress as a significant, potentially under-addressed issue in perinatal care, even beyond acute global crises. Regarding socioeconomic factors, our study found that higher family income and employment were protective against psychological distress. This is consistent with the “resource buffer” hypothesis, where financial stability and social connections provided by employment mitigate the impact of stressors. Conversely, economic strain can exacerbate the psychological burden of pregnancy, particularly when combined with the medical costs associated with high-risk pregnancies.

This study found that a history of adverse pregnancy is a common risk factor for anxiety, insomnia, and post-traumatic stress disorder. Conversely, sustained employment status has a protective effect against these three adverse emotional states. Shapiro and associates indicates that women who have experienced complications such as miscarriage, stillbirth, or preterm birth are more likely to exhibit heightened anxiety symptoms during subsequent pregnancies, particularly in the first trimester.²⁰ This anxiety propensity, often unrelated to the current pregnancy, underscores the enduring psychological impact of prior adverse events.²¹ Furthermore, the prevalence of insomnia and stress disorders is notably higher among women with a history of adverse pregnancy outcomes, with studies indicating that up to 72.2% of

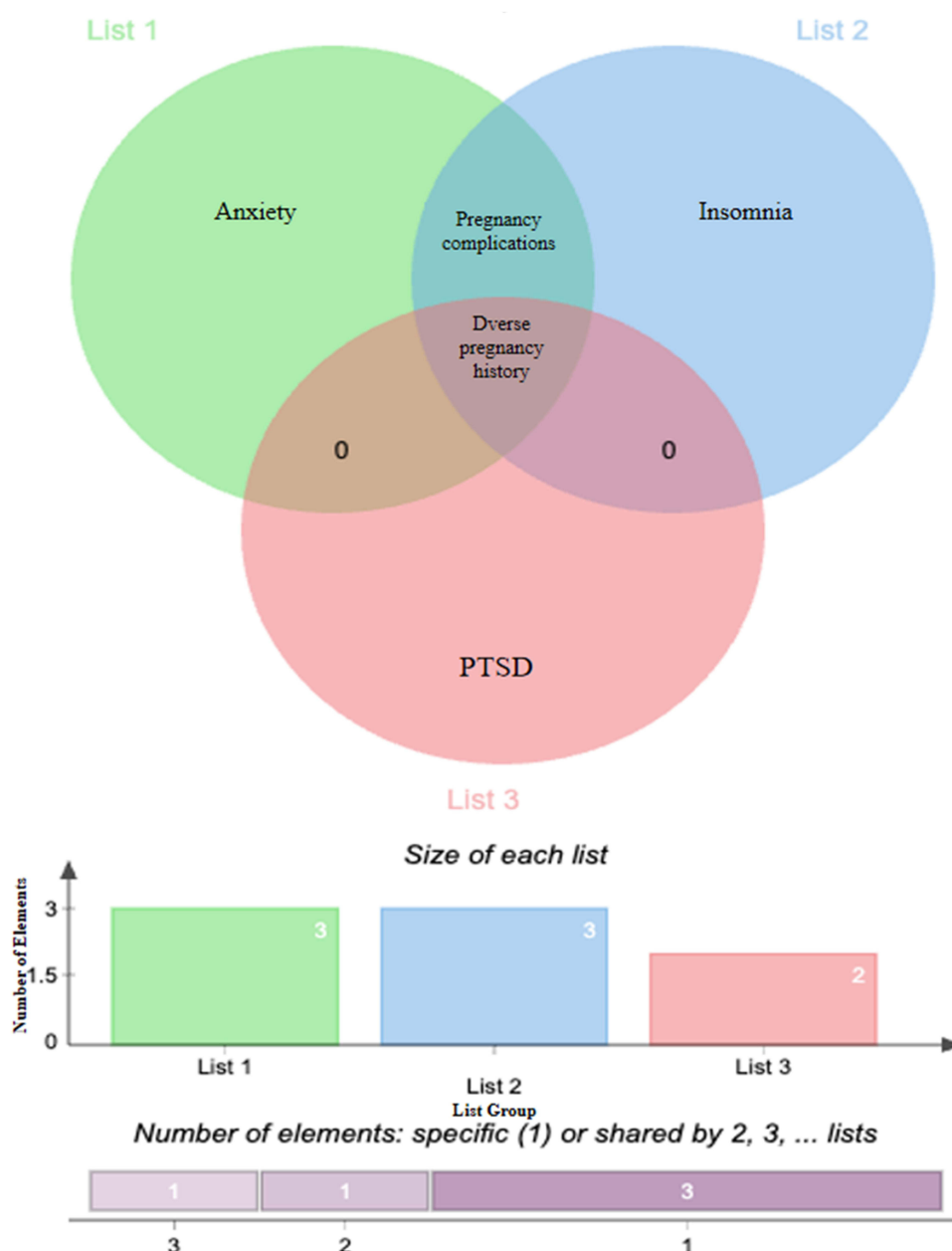


Figure 2 Venn diagram illustrating the overlapping protective factors associated with anxiety, insomnia, and PTSD in pregnant women.

pregnant women with such histories report stress-related symptoms.² These observations are highly consistent with the findings of the current research. The interplay between adverse pregnancy history and mental health is complex. Our findings align with the work of Shapiro et al,²⁰ suggesting that prior loss creates a specific “pregnancy-related anxiety” characterized by hypervigilance and fear of recurrence. Possible pathways linking adverse history to distress include both physiological and psychological mechanisms. Physiologically, women with a history of trauma often exhibit dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis and elevated cortisol levels, increasing vulnerability to stress.²¹ Psychologically, prior adverse events may shatter the maternal expectation of a “safe pregnancy,” leading to intrusive thoughts and avoidance behaviors characteristic of PTSD. Additionally, we observed that older maternal age was associated with higher PTSD symptoms. This may be attributed to the “precious child” phenomenon, where older women, often having experienced fertility challenges or prior losses, perceive the current pregnancy as having higher stakes, thereby intensifying psychological pressure.^{22,23}

Continuous work can divert the attention of pregnant women with a history of adverse pregnancy from their pregnancy, thereby alleviating their anxiety, insomnia, and traumatic stress. This may potentially be a form of Attention Bias Modification (ABM). ABM, a psychological intervention aimed at altering selective attention to specific stimuli, has been increasingly recognized for its role in mitigating negative emotional states such as anxiety and depression.²⁴ In the context of pregnancy, particularly among women with adverse pregnancy histories, ABM could play a crucial role in redirecting attention away from negative or threatening stimuli, thereby alleviating psychological distress.² Research indicates that pregnant women with adverse pregnancy histories often exhibit heightened attention to negative information, which can exacerbate anxiety and depressive symptoms.²⁵ However, continuous work engagement may act as a cognitive distraction, shifting focus away from these negative stimuli and potentially reducing their emotional impact. This aligns with the principles of ABM, which seek to modify attentional patterns to promote healthier emotional responses.²⁶ ABM interventions, whether through structured training programs or naturalistic settings like continuous work, aim to reduce this susceptibility by altering attentional biases. For instance, research has demonstrated that ABM training can reduce anxiety symptoms by encouraging individuals to disengage from threatening stimuli and focus on neutral or positive stimuli.²⁷ In the case of pregnant women, continuous work may serve a similar function by providing a structured environment that demands cognitive engagement, thereby reducing the capacity for negative attentional biases.²⁸ The application of ABM principles through continuous work also aligns with broader theories of cognitive-behavioral therapy (CBT), which emphasize the role of cognitive processes in emotional regulation. CBT interventions often include techniques designed to modify attentional biases, such as cognitive restructuring and exposure therapy, which aim to reduce the impact of negative stimuli by altering cognitive responses.²⁹ In this sense, continuous work could be seen as a naturalistic extension of these techniques, providing a real-world context in which attentional biases can be modified through sustained cognitive engagement.³⁰

The strengths of this study include the relatively large sample size (N=897) recruited from a clinical setting, which ensures a degree of representativeness of pregnant women seeking routine care. Additionally, the use of validated psychometric tools (GAD-7, ISI, IES-R) allows for comparability with international literature. However, several limitations must be noted. First, the cross-sectional design precludes definitive causal inference. This is particularly relevant to the relationship between employment and mental health, which is likely bidirectional; while employment may provide a protective structure, pre-existing mental health symptoms could also hinder the ability to maintain employment. Second, the study relied on broad classifications for “adverse pregnancy history” and “pregnancy complications.” Specific details regarding the nature and severity of these events (such as recurrent miscarriage vs late stillbirth) were not collected, restricting our ability to analyze how specific subtypes might differentially impact psychological status. Third, the reliance on self-report questionnaires may introduce recall or social desirability bias, and the lack of diagnostic interviews prevents clinical confirmation of disorders. Finally, recruitment from a single tertiary hospital in one region may limit the generalizability of our findings to rural populations or those in different socioeconomic settings.

Conclusion

In conclusion, this study confirms that psychological issues, including anxiety, insomnia, and PTSD, are prevalent among pregnant Chinese women, with an adverse pregnancy history significantly increasing risk. Our findings demonstrate a strong inverse association between sustained active work status and the prevalence of these psychological symptoms. While this suggests employment’s potential protective role, the cross-sectional design precludes causal inference. We therefore recommend future longitudinal studies and controlled trials to establish the directionality and confirm the efficacy of work status as an intervention for mitigating psychological distress in this population.

Abbreviations

PTSD, post-traumatic stress disorder; GAD-7, generalized anxiety disorder scale-7; ISI, insomnia severity index; IES-R, impact of event scale-revised; SD, standard deviation; HPA, hypothalamic-pituitary-adrenal; ABM, attention bias modification.

Data Sharing Statement

The original contributions presented in this study are included in the article and/or [Supplementary Material](#). Further inquiries can be directed to the corresponding authors.

Ethics Approval and Informed Consent

This study was conducted in accordance with the Declaration of Helsinki. The studies involving human participants were reviewed and approved by the ethics committee of the First Affiliated Hospital of Henan University of Chinese Medicine (ethics number: 2024HL-320-01). The patients/participants provided their written informed consent to participate in this study.

Consent for Publication

The manuscript is approved by all authors for publication.

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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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Disclosure

The authors declare no conflicts of interest in this work.

References

- Guillen-Burgos HF, Galvez-Florez JF, Miranda J. et al. Pregnancy and mental health outcomes during the COVID-19 pandemic in Colombia: a nationwide cross-sectional study. *J Affect Disord Rep.* **2023**;12:100488. doi:10.1016/j.jadr.2023.100488
- Zhao J, Li Y, Guo M, Zhang G, Chen P. Current Situation and Mental Health of Pregnant Women During the Prevention and Control of Novel Coronavirus Infection: a Cross-Sectional Study on the Investigation of Influencing Factors. *Int J Womens Health.* **2024**;16:193–202. doi:10.2147/IJWH.S445473
- Kulshreshtha S, Siwatch S, Aggarwal N, Rohilla M, Grover S. Mental health issues in antenatal women with prior adverse pregnancy outcomes: unmasking the mental anguish of rainbow pregnancy. *Indian J Med Res.* **2023**;158(2):190–196. doi:10.4103/ijmr.ijmr_1241_21
- Albertini JGL, Benute GRG, Brizot ML, Peres SV, Francisco RPV, Galletta MAK. Post-Traumatic Stress Disorder in Brazilian Pregnant Women at the Beginning of the Coronavirus Disease Pandemic. *Int J Environ Res Public Health.* **2024**;21(4):461. doi:10.3390/ijerph21040461
- Vignato J, Connelly CD, Bush RA, et al. Correlates of Perinatal Post-Traumatic Stress among Culturally Diverse Women with Depressive Symptomatology. *Issues Ment Health Nurs.* **2018**;39(10):840–849. doi:10.1080/01612840.2018.1488313
- Muzik M, McGinnis EW, Bocknek E, et al. PTSD SYMPTOMS ACROSS PREGNANCY AND EARLY POSTPARTUM AMONG WOMEN WITH LIFETIME PTSD DIAGNOSIS. *Depress Anxiety.* **2016**;33(7):584–591. doi:10.1002/da.22465
- Penninx BW, Pine DS, Holmes EA, Reif A. Anxiety disorders. *Lancet.* **2021**;397(10277):914–927. doi:10.1016/S0140-6736(21)00359-7
- Sharma A, Minh Duc NT, Luu Lam Thang T, et al. A Consensus-Based Checklist for Reporting of Survey Studies (CROSS). *J Gen Intern Med.* **2021**;36(10):3179–3187. doi:10.1007/s11606-021-06737-1
- Spitzer RL, Kroenke K, Williams JB, 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
- Hong Y, Lee J, Hj L, et al. Resilience and Work-Related Stress May Affect Depressive Symptoms in Nursing Professionals during the COVID-19 Pandemic Era. *Psychiatry Invest.* **2021**;18(4):357–363. doi:10.30773/pi.2021.0019
- Ben Saida I, Grira S, Toumi R, et al. North-African doctors as second victims of medical errors: a cross sectional survey. *BMC Psychiatry.* **2022**;22(1):411. doi:10.1186/s12888-022-04049-0
- Ho-Fung C, Andersson E, Hsuan-Ying H, Acharya G, Schwank S. Self-reported mental health status of pregnant women in Sweden during the COVID-19 pandemic: a cross-sectional survey. *BMC Pregnancy Childbirth.* **2022**;22(1):260. doi:10.1186/s12884-022-04553-x

13. Feinstein A, Owen J, Blair N. A hazardous profession: war, journalists, and psychopathology. *Am J Psychiatry*. 2002;159(9):1570–1575. doi:10.1176/appi.ajp.159.9.1570
14. Wu KK, Chan KS. The development of the Chinese version of Impact of Event Scale--Revised (CIES-R). *Soc Psychiatry Psychiatr Epidemiol*. 2003;38(2):94–98. doi:10.1007/s00127-003-0611-x
15. Shangguan F, Wang R, Quan X, et al. Association of Stress-Related Factors With Anxiety Among Chinese Pregnant Participants in an Online Crisis Intervention During COVID-19 Epidemic. *Front Psychol*. 2021;12:633765. doi:10.3389/fpsyg.2021.633765
16. Tauqeer F, Ceulemans M, Gerbier E, et al. Mental health of pregnant and postpartum women during the third wave of the COVID-19 pandemic: a European cross-sectional study. *BMJ Open*. 2023;13(1):e063391. doi:10.1136/bmjopen-2022-063391
17. Hinds C, Lindow SW, Abdelrahman M, Hehir MP, O'Connell MP. Assessment of antenatal anxiety, depression and obsessive-compulsive disorder in pregnant women in the COVID-19 era. *Ir J Psychol Med*. 2023;40(4):547–553. doi:10.1017/ipm.2021.57
18. Mateus V, Cruz S, Costa R, et al. Rates of depressive and anxiety symptoms in the perinatal period during the COVID-19 pandemic: comparisons between countries and with pre-pandemic data. *J Affect Disord*. 2022;316:245–253. doi:10.1016/j.jad.2022.08.017
19. Wang WJ, Hou CL, Jiang YP, et al. Prevalence and associated risk factors of insomnia among pregnant women in China. *Compr Psychiatry*. 2020;98:152168. doi:10.1016/j.comppsy.2020.152168
20. Shapiro GD, Séguin JR, Muckle G, Monnier P, Fraser WD. Previous pregnancy outcomes and subsequent pregnancy anxiety in a Quebec prospective cohort. *J Psychosom Obstet Gynaecol*. 2017;38(2):121–132. doi:10.1080/0167482X.2016.1271979
21. Ghosn F, Almansa B, Moreno-Giménez A, et al. Trajectories of stress biomarkers and anxious-depressive symptoms from pregnancy to postpartum period in women with a trauma history. *Eur J Psychotraumatol*. 2019;10(1):1601990. doi:10.1080/20008198.2019.1601990
22. Schobinger E, Stuijzand S, Horsch A. Corrigendum: acute and Post-traumatic Stress Disorder Symptoms in Mothers and Fathers Following Childbirth: a Prospective Cohort Study. *Front Psychiatry*. 2022;13:79017. doi:10.3389/fpsyg.2022.790170
23. Laifer LM, O'Hara MW, DiLillo D, Brock RL. Risk for trauma-related distress following difficult childbirth: trajectories of traumatic intrusions across 2 years postpartum. *Arch Womens Ment Health*. 2023;26(2):191–200. doi:10.1007/s00737-023-01296-2
24. Tang W, Bao C, Xu L, et al. Depressive Symptoms in Late Pregnancy Disrupt Attentional Processing of Negative-Positive Emotion: an Eye-Movement Study. *Front Psychiatry*. 2019;10:780. doi:10.3389/fpsyg.2019.00780
25. Hampson E, Phillips SD, Duff-Canning SJ, et al. Working memory in pregnant women: relation to estrogen and antepartum depression. *Horm Behav*. 2015;74:218–227. doi:10.1016/j.yhbeh.2015.07.006
26. Uzan LM, Brust M, Molenaar JM, Leistra E, Boor K, Kiefe-de Jong JC. A cross-sectional analysis of factors associated with the teachable moment concept and health behaviors during pregnancy. *BMC Pregnancy Childbirth*. 2024;24(1):147. doi:10.1186/s12884-024-06348-8
27. Lv Y, Hu R, Liang Y, Zhou Y, Lian Y, He T. Effect of daily physical activity on ambulatory blood pressure in pregnant women with chronic hypertension: a prospective cohort study protocol. *PLoS One*. 2024;19(1):e0296023. doi:10.1371/journal.pone.0296023
28. Rani V, Joshi S. Effectiveness of different behavioral interventions on gestational weight gain, post-partum weight retention and anthropometric measures in pregnancy: a randomized controlled trial. *Health Promot Perspect*. 2022;12(3):286–294. doi:10.34172/hpp.2022.37
29. Andreae G, Scott S, Nguyen G, et al. Food insecurity among pregnant women living in high-income countries: a systematic review. *Lancet*. 2022;400(Suppl 1):S17. doi:10.1016/S0140-6736(22)02227-9
30. Amir N, Kuckertz JM, Strega MV. A Pilot Study of an Adaptive, Idiographic, and Multi-Component Attention Bias Modification Program for Social Anxiety Disorder. *Cognit Ther Res*. 2016;40(5):661–671. doi:10.1007/s10608-016-9781-1

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