

BMJ Open Marital adjustment and depressive symptoms among Chinese perinatal women: a prospective, longitudinal cross-lagged study

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ABSTRACT

Objectives The objective was to assess the prevalence of perinatal depressive symptoms and determine the trajectories of marital adjustment and depressive symptoms and their reciprocal relationships among Chinese perinatal women.

Design This was a prospective, longitudinal cross-lagged study.

Setting The study was conducted at the outpatient department of the largest women's and children's hospital in China, which is located in Chengdu, Sichuan Province.

Participants Four hundred and sixty-three mothers were conveniently sampled.

Main outcome measures The Dyadic Adjustment Scale and the Chinese version of the Edinburgh Postnatal Depression Scale were used to evaluate marital adjustment and depressive symptoms, respectively, at three time points: the first trimester of pregnancy (T1), the third trimester of pregnancy (T2) and 6 weeks after childbirth (T3). Descriptive statistics were used to assess the prevalence of perinatal depressive symptoms, and repeated-measures analysis of variance (ANOVA) was used to determine the trajectories of marital adjustment and depressive symptoms among the participants. A cross-lagged model was used to explore the reciprocal relationship between marital adjustment and depressive symptoms.

Results The prevalence of perinatal depressive symptoms among our participants ranged from 21.2% to 24.0%. Repeated-measures ANOVA showed that during the perinatal period there was a significant tendency towards worse marital adjustment ($F=33.031$, $p=0.000$) and a slight but not significant reduction in depressive symptoms ($F=1.883$, $p=0.153$) among the participants. The cross-lagged model showed that maternal marital adjustment at T1 significantly and negatively predicted depressive symptoms at T2 ($\beta=-0.165$, $p<0.001$), and that depressive symptoms at T2 significantly and negatively predicted marital adjustment at T3 ($\beta=-0.135$, $p<0.001$). However, the predictive effects of depressive symptoms at T1 on marital adjustment at T2 and that of marital adjustment at T2 on depressive symptoms at T3 were not significant.

Conclusion The prevalence of perinatal depressive symptoms ranged from 21.2% to 24.0% among the participants. During the perinatal period, the marital adjustment of women tended to be worse; however, there

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This is one of the few studies to assess the prevalence of perinatal depressive symptoms in China.
- ⇒ This was a prospective, longitudinal cross-lagged study that explored the longitudinal reciprocal relationship between marital adjustment and depressive symptoms.
- ⇒ The study was conducted at the largest women's and children's hospital in China and therefore pregnant women from all over the country were recruited.
- ⇒ Validated screening tools were used to assess depressive symptoms and marital adjustment.
- ⇒ There were some participants lost to follow-up and we only included participants who completed the entire study for statistical analysis, and although the follow-up rate was acceptable the final results of the study may still be affected.

was no significant change in depressive symptoms. This study showed that better marital adjustment at T1 was a protective factor against maternal depressive symptoms at T2, and a higher level of depressive symptoms at T2 was a risk factor for worse marital adjustment at T3.

INTRODUCTION

Universal marriage is the norm among Chinese people, and for the majority of Chinese adults marriage is the core relationship, affecting the satisfaction and happiness of couples.¹ Marital adjustment is a multidimensional concept that refers to perceived satisfaction based on several independent but related subsystems in the marital relationship, including satisfaction, consensus, cohesion and emotional expression.^{2 3} Marital adjustment plays a key role in the physical and mental health of individuals.⁴ Several studies have demonstrated that high levels of marital adjustment are associated with better quality of life,⁵ health conditions and psychological outcomes.⁶ On the other hand, poor marital adjustment has been found to be

significantly correlated with poor sleep quality, anxiety tendency and increased suicidal ideation, and odds of mortality.^{7 8}

Childbearing within marriage is the social norm in China, with a high of 12.86 million births in 2020. Although there is an increasing number of births taking place outside marriage in some countries,⁹ most childbearing in China still occurs within marriage, with a total marital fertility rate of 2.12.¹⁰ However, the perinatal period can be challenging for women, during which the transformation of their social roles, coupled with a series of physiological changes and various stressors, as well as other factors including psychological factors, makes them more likely to experience depression.^{11 12} It has been reported that the incidence of depression in women reaches its first peak during the reproductive age,¹³ with a prevalence rate ranging from 7% to 25% among Chinese perinatal women.¹⁴ Moreover, perinatal depression often goes unrecognised and may be underestimated.¹⁵ Perinatal depression can lead to multiple and significant adverse effects and is associated with an increased risk of maternal pre-eclampsia as well as pregnancy and labour complications.¹⁶ For infants and newborns, the effects may include fetal growth retardation, more medical check-ups, prematurity and increased antibiotic use^{17–19}; furthermore, prolonged maternal depression has been found to be associated with a vulnerability to addiction, cognitive delays and adolescent behaviour problems in the offspring.^{19 20} Evidence from animal models also suggests that sustained maternal mood disorders have programmed effects on offsprings' physical health, such as growth and immune function.^{21 22}

It has been reported that depressive symptoms among perinatal women affected and were affected by their marital relationships.^{23 24} Clarifying the relationships between marital adjustment and depressive symptoms in the perinatal period is important for screening and implementing prevention and treatment programmes that can address both conditions. Gawlik *et al*²⁵ and Savarimuthu *et al*²⁶ found that marital adjustment is negatively correlated with postpartum depressive symptoms among fathers and mothers. Pietromonaco *et al*'s²⁷ results showed that depressive symptoms were an independent risk factor for poor marital adjustment, and higher levels of depressive symptoms were related to worse marital relationship during the perinatal period.²⁸ Thus far, the available evidence does not provide a consistent picture regarding the nature of the relationship between marital adjustment and depressive symptoms. Therefore, we conducted a prospective, longitudinal cross-lagged study among Chinese perinatal women aiming to determine the prevalence of perinatal depressive symptoms and the trajectories of marital adjustment and depressive symptoms during the perinatal period and to explore their longitudinal associations.

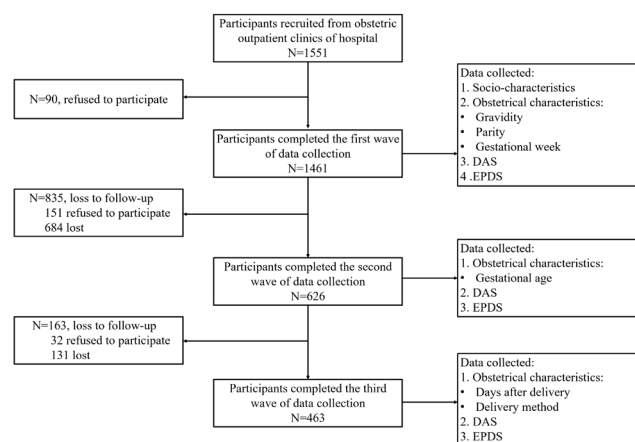


Figure 1 Flow chart of the study participants during the study period. DAS, Dyadic Adjustment Scale; EPDS, Edinburgh Postnatal Depression Scale.

METHODS

Design and subjects

This was a prospective, cross-lagged longitudinal study with data collection repeated in three waves conducted at the outpatient department of the largest women's and children's hospital in China, located in Chengdu, Sichuan Province. Many women from Sichuan and other provinces of Western China come to this hospital to give birth, with annual deliveries at this hospital accounting for approximately 10% of the total annual deliveries in Chengdu. Convenience sampling was adopted to enrol pregnant women who registered to give birth at this hospital. The inclusion criteria were as follows: (1) aged ≥ 18 years old, (2) able to complete the study independently and (3) volunteered to participate in the research. The exclusion criteria were as follows: (1) stillbirth or fetal deformities, (2) severe systemic diseases and (3) a personal or family history of psychiatric problems.

A total of 1551 pregnant women were invited to participate in the study, of whom 1461 agreed to participate and 90 refused. Ultimately, 463 women completed the three waves of data collection for the entire study (as shown in figure 1), with a follow-up rate of 31.69%, similar to that of previous prospective studies.^{29 30}

Measurement

Demographic information

A self-compiled form was used to collect participants' sociodemographic information in the first wave of data collection, including age, nationality, education level, marital status, residential address and average monthly household income. Obstetric data were collected at different stages. Gravidity and parity were evaluated in the first wave of data collection. Gestational week was assessed in both the first and second waves of data collection. Days after delivery and delivery method were evaluated in the third wave of data collection, as shown in figure 1.

Marital adjustment

The Dyadic Adjustment Scale (DAS), developed by Spanier in 1979,³¹ was used to assess participants' self-reported marital adjustment. The scale is not only suitable for measuring marital adjustment between legally married couples but also between unmarried couples.³¹ The DAS comprises 32 items and 4 subscales: affectional expression, dyadic consensus, dyadic cohesion and dyadic satisfaction. The total score ranges from 0 to 151, and the recommended cut-off point is a score of ≥ 107 , with a higher score indicating a higher level of marital adjustment.³² The DAS has been validated in Chinese pregnant women³³ and mothers,³⁴ with a satisfactory Cronbach's α coefficient ranging from 0.90 to 0.98. In this study, the Cronbach's α coefficient was 0.913.

Depressive symptoms

The Chinese version of the Edinburgh Postnatal Depression Scale (EPDS), developed by Cox *et al*,³⁵ translated by Lee *et al*³⁶ and revised by Wang *et al*,³⁷ was used to evaluate participants' self-reported depressive symptoms. This scale has been widely used to screen for depressive symptoms among the Chinese perinatal population. There are 10 items in the EPDS, with each item scored from 0 to 3. The total score for the EPDS ranges from 0 to 30, with a higher score indicating worse depressive symptoms.³⁸ The recommended cut-off score for the EPDS is 9.5, with 78.6% sensitivity, 83.4% specificity and an area under the curve of 0.845.³⁹ The reliability and validity of the EPDS have been demonstrated in the Chinese population with a Cronbach's α coefficient of 0.78 and a test-retest reliability coefficient of 0.90.³⁴ In the current study, the Cronbach's α coefficient was 0.831.

Data collection

Data were collected in three waves, by uniformly trained researchers in an on-site manner, using self-assessment questionnaires. The first wave of data collection was carried out at the obstetric outpatient clinic of the hospital in the first trimester of pregnancy (T1), when the women came to register for antenatal care visits. The second wave of data collection was conducted at the obstetric outpatient clinic of the hospital in the third trimester of pregnancy (T2: after 28 weeks of gestation according to the Chinese standards of pregnancy staging) during routine antenatal follow-up. The third wave of data collection took place in the postnatal review outpatient clinic of the hospital, approximately 6 weeks after childbirth (T3) when the women returned for routine postnatal check-up. Uniform instructions were provided after distributing the questionnaires and necessary explanations were offered in case of doubt. All participants completed the questionnaires independently and the questionnaires were immediately returned to the researchers. It took approximately 15 min for each participant to complete the entire questionnaire.

Ethical consideration

For confidentiality, participants' names were replaced by numbers. Informed consent was obtained from the participants prior to data collection. All participants were aware of the purposes and procedures of the study, and they had the right to withdraw at any time without any negative consequences.

Statistical analysis

Data were analysed using SPSS V.26.0 and M-plus V.7.3 software. Descriptive statistics, including mean with SD and proportions with percentages in parentheses, were used to summarise the characteristics of the participants and their DAS and EPDS scores. Repeated-measures analyses of variance (ANOVAs) were used to determine the trajectories of marital adjustment and depressive symptoms among the participants. Pearson correlations were used to examine cross-sectional and longitudinal associations between marital adjustment and depressive symptoms. After this, we performed a cross-lagged model (CLM) (using the M-plus software) to determine the longitudinal associations between marital adjustment and depressive symptoms. In the CLM, sociodemographic and obstetric variables were included as covariates. All tests were two-sided, and a p value of less than 0.05 was considered statistically significant.

Patient and public involvement statement

No patients and/or public were involved in this study.

RESULTS

Sociodemographic information

Among the 463 participating women included in the final analysis, 448 (96.2%) were of Han nationality. The average age of the participants was 31.6 ± 4.02 years (range 23–44). Majority of the women had college education or above (91.4%) and lived in cities (90.5%). Most of these women (90.44%) were in their first marriage, with a family income of more than ¥5000 per month (86.9%). The mean gestational weeks of the women who completed the wave 1 and wave 2 surveys were 13.44 ± 2.24 and 34.38 ± 2.02 weeks, respectively. More than two-thirds of the women were currently pregnant with their first child (69.3%), and more than half of them delivered by caesarean section (57%). Detailed sociodemographic and obstetric characteristics of the participants are summarised in [table 1](#).

Prevalence of depressive symptoms among the participants during the perinatal period

The prevalence rates of depressive symptoms (an EPDS index score ≥ 9.5) among the perinatal women in our study were 24.0% in the first trimester, 21.2% in the third trimester and 21.8% in the postpartum period. The χ^2 test showed that there was no significant difference in the prevalence of depressive symptoms at the three time points ($\chi^2=1.154$, $p=0.561$).

Table 1 Sociodemographic characteristics and obstetric characteristics of the participants (N=463)

Sociodemographic characteristics		n (%)/ mean±SD
Age		31.6±4.02
Nationality	Han	448 (96.2)
	Others	15 (3.2)
Education level	Primary	1 (0.2)
	Secondary	39 (8.4)
	College	423 (91.4)
Marital status	First marriage	447 (96.5)
	Remarriage	15 (3.2)
	Unmarried	1 (0.2)
	Divorced	0
	Widowed	0
Residential address	City	419 (90.5)
	Township	25 (5.4)
	Countryside	19 (4.1)
Average monthly income per person in the household (¥)	≤1000	4 (0.8)
	1001–3000	11 (2.4)
	3001–5000	46 (9.9)
	5001–8000	149 (32.2)
	8001–10 000	110 (23.8)
	>10000	143 (30.9)
Obstetric characteristics		
Gravidity		2.09±1.34
Parity (including current pregnancy)	First child	321 (69.3)
	Second child	136 (29.4)
	Third child and above	6 (1.3)
Gestational week (T1)		13.44±2.24
Gestational week (T2)		34.38±2.02
Days after delivery		50.14±12.08
Delivery method	Vaginal delivery	198 (42.8)
	Assisted delivery	1 (0.2)
	Caesarean delivery	264 (57.0)

T1, first trimester of pregnancy; T2, third trimester of pregnancy.

Trajectories of depressive symptoms and marital adjustment among the participants during the perinatal period

The average DAS scores of our participants from T1 to T3 were 120.96±14.71, 118.58±15.28 and 115.91±17.62, respectively. The average EPDS scores from T1 to T3 were 7.44±3.38, 7.18±3.48 and 7.10±4.16, respectively. The error diagram and repeated-measures ANOVA showed that during the perinatal period our participants showed a significant tendency towards worse marital adjustment

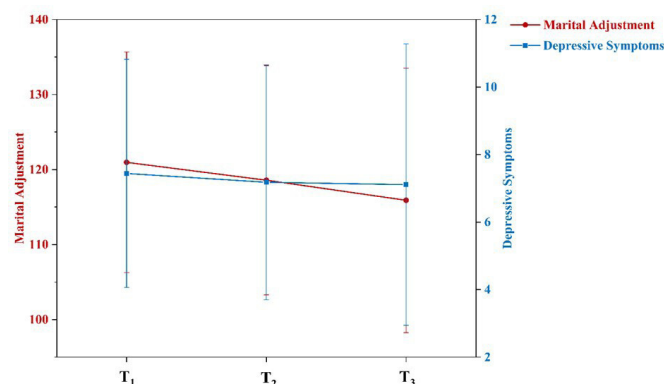


Figure 2 Trajectories of marital adjustment and depressive symptoms from T1 to T3. T1, first trimester of pregnancy; T2, third trimester of pregnancy; T3, 6 weeks after childbirth.

($F=33.031$, $p=0.000$) and a slight but not significant reduction in depressive symptoms ($F=1.883$, $p=0.153$), as shown in [figure 2](#) and [table 2](#).

Longitudinal relationships between marital adjustment and depressive symptoms

As summarised in [table 3](#), both cross-sectional ($r=-0.328$ to $r=-0.407$, $p<0.01$) and longitudinal ($r=-0.027$ to $r=-0.307$, $p<0.01$) associations were observed between marital adjustment and depressive symptoms and so it was worthwhile to proceed with the proposed CLM.⁴⁰

[Figure 3](#) displays the complete CLM, which demonstrated good fit to the data ($\chi^2/df=4.896$, comparative fit index (CFI)=0.982, root-mean-square error of approximation (RMSEA)=0.093, SRMR=0.008). As shown in [figure 3](#), marital adjustment at T1 significantly and negatively predicted depressive symptoms at T2 ($\beta=-0.165$, $p<0.001$), and depressive symptoms at T2 significantly and negatively predicted marital adjustment at T3 ($\beta=-0.135$, $p<0.001$). Pregnant women with poorer marital adjustment in the first trimester of pregnancy were more likely to report depressive symptoms in the third trimester of pregnancy. Moreover, women with depression in the third trimester of pregnancy were prone to having worse marital adjustment after childbirth. However, the predictive effects of depressive symptoms at T1 on marital adjustment at T2 and that of marital adjustment at T2 on depressive symptoms at T3 were not significant.

DISCUSSION

The prevalence rates of perinatal depressive symptoms among the participants in our study were 24.0% in the first trimester, 21.2% in the third trimester and 21.8% in the postpartum period, which were roughly the same as those reported in previous studies.^{41 42} However, the prevalence rates in this study were higher than of Bowen *et al*'s⁴³ study among Canadian women, at 8.1%–14.1%, and lower than that reported by Gremigni *et al*⁴⁴ among Italian women, at 55.7%. This may be due to the different cut-offs used for the EPDS. Bowen *et al*⁴³ used a cut-off of 12 and Gremigni *et al*⁴⁴ used a cut-off of 9, while we used

Table 2 Repeated-measures ANOVA of the EPDS and DAS scores of the participants (N=463) at three time points

Variable	Source	Type 3 sum of squares	df	Mean square	F	P value
DAS	Time	5928.645	2	2964.323	33.031	0.000
	Error (time)	82 923.735	924	89.744		
EPDS	Time	28.419	2	14.209	1.883	0.153
	Error (time)	6973.653	924	7.547		

ANOVA, analysis of variance; DAS, Dyadic Adjustment Scale; EPDS, Chinese version of Edinburgh Postnatal Depression Scale.

a cut-off point of 9.5. Different racial and cultural backgrounds may have also contributed to this inconsistency. It has been confirmed that pregnant women of different ethnic groups have different levels of depression.⁴⁵ Our results showed no significant change in the prevalence or level of depressive symptoms among perinatal women and this was consistent with some previous studies,^{46 47} although different from others. For example, Bowen *et al*⁴³ found a declining trend in the prevalence of depressive symptoms among Canadian women during pregnancy. Martinez *et al*⁴⁸ found a significantly increasing trend of depressive symptoms among women in the USA, while Lau *et al*³⁰ found a subtle decreasing-increasing trend among Chinese women. The inconsistent pattern of depressive symptoms may be due to differences in cultural backgrounds.⁴⁵ In the Chinese cultural context, pregnancy and childbirth are happy family events, and pregnant women may receive higher levels of family and social support during this period, which allows them to maintain stable levels of depressive symptoms even when faced with various crises.⁴⁹

It has been confirmed that marital adjustment is not a fixed but an ongoing process that changes over time as a result of experienced life events.⁵⁰ Our findings showed that maternal marital adjustment worsened during the perinatal period and this confirmed the results of Figueiredo and Conde.⁵¹ On the one hand, the transition to parenthood is one of the most demanding and stressful transitions in life.⁵² This shift brings feelings of chaos, increases stress in the lives of the parents and triggers marital conflict,²⁴ all of which potentially undermine the marital adjustment of perinatal women. On the other

hand, the shift in the partner's attention to tasks related to childcare,⁵³ a decrease in positive spousal interactions⁵⁴ and the experience of a life crisis due to reduced sexual function during pregnancy⁵⁵ may also contribute to this reduction. According to the findings of our research, a higher level of marital adjustment at T1 was a protective factor against depressive symptoms at T2. A higher level of marital adjustment at T1 predicted milder depressive symptoms at T2, which was similar to the findings of Ruiz-Marin *et al*'s study.⁸ There are several possible reasons for this result. First, pregnant women with better marital adjustment may have better access to diagnosis and care due to spousal encouragement.⁵⁶ It has been demonstrated that access to healthcare and healthcare utilisation are associated with marital status.⁵⁷ Second, marital satisfaction enhances an individual's psychological health, well-being and experiences of happiness⁵⁸; therefore, women with better marital adjustment are less likely to experience depression. Interestingly, the predictive effect of marital adjustment at T2 on depressive symptoms at T3 was not significant in our participants, which was supported by Yim *et al*'s results.⁵⁹ We assume that in the third trimester marital adjustment may have a strong effect on depressive symptoms. With the birth of a newborn, the impact of marital adjustment on the mother's depressive symptoms might gradually diminish due to birth-related distress and disrupted sleep, as well as a high level of childcare stress, the changing roles and responsibilities of the couple, and a lack of parenting experience.^{24 60}

We also found that depressive symptoms at T2 negatively predicted marital adjustment at T3, and the same

Table 3 Bivariate correlations of marital adjustment with depressive symptoms (N=463)

Variables	1	2	3	4	5	6
1. Marital adjustment at T1	–					
2. Marital adjustment at T2	0.715*	–				
3. Marital adjustment at T3	0.608*	0.648*	–			
4. Depressive symptoms at T1	–0.328*	–0.266*	–0.027*	–		
5. Depressive symptoms at T2	–0.305*	–0.401*	–0.307*	0.525*	–	
6. Depressive symptoms at T3	–0.166*	–0.230*	–0.377*	0.364*	0.479*	–

*P< 0.01.

T1, first trimester of pregnancy; T2, third trimester of pregnancy; T3, 6 weeks after childbirth.

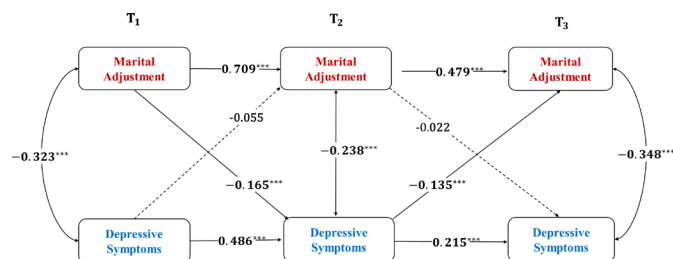


Figure 3 Cross-lagged model between marital adjustment and depressive symptoms. The two-way arrow in the chart indicates the result of the correlation analysis, with the data of correlation coefficient (r); the one-way arrow indicates the result of the path analysis, with the data of standardised regression coefficient (β). The demographic and obstetric characteristics of the participants were included as covariates in this model but are not depicted for clarity. *** $P < 0.001$. T1, first trimester of pregnancy; T2, third trimester of pregnancy; T3, 6 weeks after childbirth.

result was obtained by Pietromonaco *et al.*²⁷ They also found that a higher level of depressive symptoms was a risk factor for poor marital adjustment. This may be explained by the moderating effect of social support on depression and marital adjustment.⁶¹ Social support is positively correlated with marital adjustment.⁶¹ Individuals with depression perceive their partners as less understanding and supportive and subjectively overestimate their partners' negative behaviours.^{62 63} These negative bias perceptions may cause them to feel less social support and therefore experience worse marital adjustment. However, from T1 to T2, this effect was not significant. Perhaps the effect of depressive symptoms on marital adjustment in the third trimester was weakened by other factors, such as feelings of chaos, increased marital conflict and decreased positive spousal interactions associated with preparation for transition to parenthood.²⁴

Our findings showed that both depressive symptoms and marital adjustment can serve as causes and consequences, but they depend on time. In the third trimester, pregnant women were more likely to show depressive symptoms due to impaired marital adjustment. In the postpartum period, mothers who experienced a higher level of depressive symptoms were more likely to experience poor marital adjustment. In other words, there was a dynamic and time-dependent relationship between marital adjustment and depressive symptoms, suggesting that we should maintain a dynamic and developmental perspective on the relationship between them.

There are also several limitations to our study. First, our data collection was based on participants' self-reports and was therefore subject to some degree of reporting bias. Second, as a new hospital campus opened during the progress of the study, many pregnant women visited the new campus for prenatal and postnatal check-ups. Due to manpower constraints, we were unable to track the women who moved to the new hospital campus for follow-up check-ups, resulting in a high number of women being lost to follow-up. In the statistical analysis,

we only included participants who completed the entire study, and although the follow-up rate was acceptable the final study results may still be affected. Third, both fathers and mothers are core members of marital relationships and contribute to the relationship and its quality. Our lack of focus on paternal marital adjustment limits our ability to better understand the whole picture of the perinatal marital relationship. Last, despite the implementation of a prospective longitudinal study, it is difficult to draw definite causal conclusions from an observational study; therefore, randomised controlled trials with a large sample size based on the results of our study are needed.

CONCLUSION

The prevalence of perinatal depressive symptoms was 21.2%–24.0% among the participants in our study. During the perinatal period, the marital adjustment of women tends to worsen, but there is no significant change in depressive symptoms. This study showed that better marital adjustment in the first trimester is a protective factor against maternal depressive symptoms in the third trimester, and a higher level of depressive symptoms in the third trimester is a risk factor for poor marital adjustment in the postpartum period. However, the effects of depressive symptoms in the first trimester on marital adjustment in the third trimester and those of marital adjustment in the third trimester on depressive symptoms in the postpartum period are not significant.

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Competing interests None declared.

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Patient consent for publication Not required.

Ethics approval Ethical approval that complied with the Declaration of Helsinki was obtained from the Ethics Committee of West China Second University Hospital of Sichuan University (registration number 2019 (002)).

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data supporting our findings are presented in the manuscript; the data sets used and/or analysed during the current study are available from the corresponding author upon reasonable request.

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