Family function fully mediates the relationship between social support and depression among antenatal and postpartum women in rural Southwest China

Yilin Huang  
Sichuan University West China School of Public Health

Yan Liu  
Sichuan University West China School of Public Health

Yu Wang  
Sichuan University West China Hospital

Danping Liu (✉ liudanping03@163.com)  
West China School of Public Health and West China Fourth Hospital

Research article

Keywords: social support, family function, antenatal depression, postpartum depression, rural China

DOI: https://doi.org/10.21203/rs.3.rs-48519/v2

License: © This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License
Abstract

Background: Antenatal and postpartum depression is the most common complication of gestation and childbearing affecting women and their families, and good social support and family function are considered the protective and modifiable factors. This study aimed to investigate the depression status and to clarify the interrelationships between social support and depression considering the influence of family function among antenatal and postpartum women in rural areas of Southwest China.

Methods: This is a cross-sectional study. Data were collected from a total of 490 rural antenatal (N=249) and postpartum (N=241) women (age: 28.17± 5.12). A structural equation modeling (SEM) was used to test the hypothesized relationships among the variables. The following instruments were used: the Edinburgh Postpartum Depression Scale (EPDS), the APGAR Family Care Index Scale, and the Social Support Rate Scale (SSRS).

Results: We found that the prevalence of depression was 10.4%. Path analysis showed that family function had a direct negative correlation with depression ($\beta =-0.251$, 95%CI: -0.382 to -0.118). Social support had a direct positive correlation with family function ($\beta =0.293$, 95%CI: 0.147 to 0.434) and had an indirect negative correlation with depression ($\beta =-0.074$, 95%CI: -0.139 to -0.032), family function fully mediated the relationship between social support and depression.

Conclusions: Findings of this study highlight that family function should be considered as the key target for interventions aiming to lower the prevalence of antenatal and postpartum depression. Family members interventions are critical to reduce depression among antenatal and postpartum women.

1. Background

Perinatal period is special for women as a major family transition, easily leading to the onset and recurrence of mental illness, and depression and anxiety are the most common [1, 2]. Perinatal depression is of concern not only because of the suffering and distress it cause for women, also because of the risk of adverse effects on the developing fetus and child[3]. The prevalence of perinatal depression in China is 16.3% reported in a meta analysis conducted by Anum Nisar in 2020, and an increasing trend was seen over the last decade and in underdeveloped regions[4].

The prevalence of antenatal depression ranges from 5.2% to 17.8% worldwide[5], which can be partly explained by the negative effects of fluctuations in gonadotropin levels during pregnancy on neurotransmitter levels and functional differences in the hypothalamus-pituitary-adrenal axis [6]. Women with antenatal depression appear to be at considerably higher risk for self-harm or suicide, failure to seek prenatal care, poor diet[7, 8], which may lead to the adverse pregnancy outcomes (like complications during pregnancy, premature birth, dysplasia of the fetus, low birth weight of the baby)[9, 10]. Moreover, a study had shown that women were more vulnerable to psychiatric illness after birth[11]. The prevalence of postpartum depression is 14.8% in China and there is a rising trend[4]. As well, postpartum depression also predicts shorter breastfeeding time [12] and may be a risk factor for children with low social
capacity [13]. Existing literature shows that factors associated with pregnancy and postpartum depression mainly include sociodemographic characteristics (e.g., age, marital status, education, income, complications of pregnancy) [14-17], social support [18], and family function [19].

Social support is defined as instrumental, informational and emotional support provided by a social network including family, friends and neighborhoods, which could protect psychological well-being through buffering the effects of traumatic life events [20]. It can be characterized by the provider of support, including support from a spouse, relatives or friends, each thought to have independent protective effects against depression [21]. Social support as a protective and modifiable factor has been well investigated in relation to antenatal or postpartum depression [22]. Some studies have also proved that low-level social support were risk factors for antenatal and postpartum depression [23, 24]. And then, family ties will strengthen, same as the Tarkka's and Lepistö S's studies that social support has been considered an important resource to improve family functioning [25, 26].

Family function can be defined as the degree to which a family performs as a unit to manage conditions, activities, external stimuli or events that cause stress [27]. Compared to healthy families, families with family dysfunction are expressed as lower cohesion, lower warmth, and expressiveness and higher conflict, rigidity, and affectionless control [19]. Previous studies had shown that depression is negatively correlated with family functioning [28, 29]. Improvement of family function may contribute to better prognosis of depression [30]. In addition, Wang Y et al (2019) proposed a model that family function moderated the indirect relationship between social support and depression in the elderly [31].

The availability of mental health resources in rural areas of China is low [32]. Studies have shown that living in rural areas of China strongly significantly associated with antenatal and postpartum depression [33]. Despite previous studies have demonstrated the relationship between family function and depression as well as social support and depression, few studies have included these three variables in one study to understand the interrelationships and potential mechanisms of social support, family function and depression among antenatal and postpartum women. We examined the influence of social support and family function on the antenatal and postpartum depression in rural areas of southwest China in this study. Based on the above description, we hypothesized a single mediator model shown in Figure 1. Specifically, social support would be positively associated with family function (hypothesis 1) and negatively associated with depression (hypothesis 2). We also hypothesized that the family function would be negatively associated with depression (hypothesis 3). In addition, we suggested that the relationship between social support and depression would be mediated by the family function (hypothesis 4). The study objects to assess the prevalence of antenatal and postpartum depression in rural China and identify the key factors including social support and family function which contribute to the prevention and control of depression in antenatal and postpartum women.

2. Methods

2.1. Participants and Procedure
This cross-sectional study was conducted among pregnant and postpartum women in rural areas of Sichuan Province, Southwest China, from December, 2017 to May, 2018. The optimal time to conduct the first screen for postpartum depression is within 6 months postpartum[34, 35]. So, the target population in this study was the women who were at pregnancy or within 6 months postpartum.

A multi-stage stratified random sampling was used to acquire the sample. In the first stage, we randomly chose a city in Sichuan province. In the second stage, we randomly selected a rural district in the city. In the third stage, 10 townships were randomly selected from the rural district. In the fourth stage, we randomly selected 50 maternal women from the database of maternal women established by each township hospital. Trained investigators invited the selected participants to take part a face to face interview in their home and the questionnaires were completed by the investigators. We used the quantifiable scales, trained investigators, two-person data entry and logical verification to ensure the quality of the research.

2.2. Ethical Consideration

The study protocol was approved by the Institutional Review Board of Sichuan University (Project identification code: H171260). The study was explained to participants and informed written consent was obtained prior to data collection.

2.3. Measures

Participants’ socio-demographic characteristics, social support, family function and depression information were collected from questionnaires.

2.3.1. Socio-demographic Characteristics

Socio-demographic Characteristics included age, type of maternal women, marital status, education level, employment status, individual annual income, medical insurance status and complications of pregnancy.

2.3.2. Social support

Social support was assessed through the Social Support Rating Scale, which was developed by Xiao S.Y et al [36]. The SSRS was specifically designed for use in a Chinese context and consists of ten items of three domains in total: objective support, subjective support and social support utilization. Responses were provided as a 4-point Likert scale, the overall score of all items ranges from 12 to 66 with higher scores reflecting stronger social support. The total score has been divided into three levels: low (12-22), moderate (23-44), and high (45-66). The SSRS has been widely applied in China with excellent validity and reliability [37, 38]. In this research, Cronbach's $\alpha$ of the scale was 0.825.

2.3.3. Family function
Family function was measured by the APGAR, developed by Smilkstein, et al.[39], which was used to evaluate an individual's satisfaction with family function. This scale was a 3-point scale ranging from 0 (hardly ever) to 2 (almost always), composing of five items: adaptation, partnership, growth, affection and resolve. The total score ranged from 0 to 10 with higher scores denoting higher level of satisfaction with family function. It was generally believed that score 0-3 indicated severe family dysfunction, 4-6 indicated moderate family dysfunction, and 7-10 indicated good family function. The Chinese version of APGAR has been widely applied in China with excellent validity and reliability[40, 41]. In this research, Cronbach's α of the scale was 0.874.

2.3.4. Depression

Depression was measured by EPDS (Edinburgh Postnatal Depression Scale). The EPDS, designed by Cox, et al.[42], was originally developed to assist primary care health professionals to detect mothers suffering from postpartum depression and was also proved to be suitable for the detection of antenatal depression in 2003 [43]. The EPDS is a 10-item self-reported questionnaire on depressive symptoms. Each item is scored on a 4-point scale (from 0 to 3), so that the total score ranges from 0 to 30, with higher scores representing more depressive symptoms. The EPDS was translated into Chinese version by Pen et al in 1994[44], who recommended that the cut-off score for the Chinese was 9.5, and the score of 9.5 or higher indicates significant depressive symptoms. In this research, Cronbach's α of the scale was 0.776.

2.4. Statistical analyses

The data were entered using the Epidata3.1 database and were analyzed using the SPSS version 20.0 (SPSS Inc., Chicago, IL, USA) and Analysis of Moment Structures (AMOS) version 24.0 (IBM, New York, NY, USA). First, we calculated descriptive statistics (frequencies, percentages, means, and standard deviations) to examine the socio-demographic characteristics of the sample. Second, we undertook a descriptive analysis of study variables (means and standard deviations). Third, binary logistic regression models were used to test the relationship between social support, family function and depression. In model 1, we used depression as the dependent variable and social support, socio-demographic variables as independent variables. In model 2, we further added family function as an independent variable. Fourth, a structural equation model (SEM) was employed to further test the hypothesized relationships among social support, family function and depression of antenatal and postpartum women.

The SEM used bootstrap maximum likelihood estimation and the results, with a p-value of < 0.05, were considered statistically significant. To examine the model fit, we employed several indicators with their cutoffs: adjusted goodness of fit index (AGFI), a goodness of fit index(GFI), the comparative fit index (CFI), normed fit index (NFI), incremental (IFI), and Tucker-Lewis index (TLI) of 0.90 or above; a root mean squared error of approximation (RMSEA) less than or equal to 0.08, indicated an acceptable model fit [45].

3. Results
3.1 Participants and Socio-demographic characteristics

498 participants out of a total of 500 participants in these townships returned questionnaires (a response rate of 99.6%). Questionnaires were checked after the interviews for completeness. Eight records met exclusion criteria (Incomplete data collection: n=2; postpartum period>6 months n=6). Overall, 490 questionnaires were valid.

Socio-demographic characteristics of the 490 samples are shown in Table 1. The proportion of antenatal women and postnatal women were 50.8% and 49.2%, respectively. The mean age was 28.17±5.12, ranged from 19 to 43 years old. Most were married (96.7%), educated high or vocational school or less (73.7%). The majority of the women were currently unemployed (57.3%), had an individual annual income less than $750 (41.2%) and received medical insurance (98.0%). Most had no complications of pregnancy (81.2%).

3.2 Descriptive analysis of study variable

Table 2 shows scores of social support, family function and depression. The mean score of social support was 40.79 ± 5.95, 0.2% (1), 71.6% (351) and 28.2% (138) of participants had low, moderate and high social support, respectively. The mean score of family function was 8.80 ± 1.89, 85.5% (419) of participants had good family function, 13.1% (64) and 1.4% (7) of participants experienced moderate and severe family dysfunction, respectively. The mean score of depression was 5.30±3.46, 10.4% (51) of women had significant depression. The mean score of depression among antenatal women and postnatal women were 5.78±3.30 and 4.80±3.57, respectively, 10.4% (26) of antenatal women and 10.4% (25) of postnatal women had significant depression, respectively. And the ANOVA showed that social support and family function were significantly correlated with depression.

3.4 Test of study model

Figure 2 shows path analysis testing results of the fitness of the hypothetical model in Figure 1. The final model had an adequate fit: GFI = 0.960, AGFI = 0.928, NFI = 0.934, IFI = 0.951, TLI = 0.928, RMSEA = 0.075.
The estimates for direct, indirect and total effects with bias-corrected 95% CI are shown in Table 4. In these analyses, effect coefficients were substantially significant if the 95% CI does not include 0. The results showed that social support had a significant positive correlation with family function ($\beta = 0.293$, 95%CI: 0.147 to 0.434), thus supporting Hypothesis 1. However, the direct impact of social support on depression proved to be statistically non-significant ($\beta = -0.090$, 95%CI: -0.213 to 0.043), leading us to reject Hypotheses 2. Family function had a direct negative correlation with depression ($\beta = -0.251$, 95%CI: -0.382 to -0.118), thus supporting Hypothesis 3. In addition, social support had an indirect negative correlation with depression ($\beta = -0.074$, 95%CI: -0.139 to -0.032), thus supporting Hypothesis 4.

Regarding the path between social support and depression, total effect and indirect effect are statistically significant but the direct effect is statistically non-significant. Based on the above, family function fully mediates the relationship between social support and depression.

4. Discussion

This study aimed to investigate the depression status and to clarify the interrelationships between social support and depression considering the influence of family function among antenatal and postpartum women in rural areas of Southwest China. To the best of our knowledge, this is the first study reporting the fully mediating role of family function between social support and depression in antenatal and postpartum women. Findings of this study have important implications for the development and implementation of intervention strategies and measures to ameliorate maternal depression as well as the promotion of mother's health and the future wellbeing of their children and family in rural areas.

The antenatal depression prevalence in our study is 10.4%, which is close to a meta-analysis of 21 studies (10.7%) [46]. And the prevalence rate of postpartum depression in our study is also 10.4%, lower than that of a prospective cohort study in China (19.9%) conducted by Xie R.-H et.al [38]. Different sample characteristics may be the reason. Postpartum women in our study were within 6 months, while Xie R.-H's were within one month. Women during the first month postpartum are required to engage in specific practices to promote the health of the maternal/newborn dyad for the Chinese tradition of “doing the month” which mainly including the promotion of maternal rest, discouraging domestic duties and activity outside the home [47]. Due to the physical and social activity limitation, combined with the frustration for breastfeeding and the lack of sleep cannot be relieved effectively, the women would be stressful which lead to mood alterations [48]. After the first month, with social activities resumed, they may accommodate and accept to the new situation gradually [49].

The mean family function (APGAR) score was 8.80±1.89, and only 1.4% women reported severe family dysfunction in our study. The possible reason may be that in traditional rural China, women’s pregnancy is regarded as a great familial contribution, and then family members will acknowledge the women's family status and strive to develop better family functions [50]. The model revealed that antenatal and postpartum women with lower family function were more likely to experience depression symptoms, which is consistent with previous studies [29, 51]. There are two possible explanations. One possible
explanation is that the couple relationship which plays an important role in family function, was affected after the birth of a child by the increased conflict[52] and less opportunities for shared intimacy, thus leading to the women's worse mood[53]. Another possible explanation is that women in dysfunctional families are less able to communicate their emotions and thoughts effectively with other family members, thus leading to the development of depression[54].

The results revealed that the mean score of social support among antenatal and postpartum women was 40.79±5.95, which is lower than another study(43.34±7.06) in China that surveyed women before pregnancy[55].The possible reason may be that the women after pregnancy would decrease physical exercise and leisure activities due to the concerns of maternal/child health, and thus receive less social support[56]. Our model revealed that better social support predicted better family function which is consistent with Jiang H’s study[57]. There are two possible reasons. One reason may be that social support can improve physical health by increasing healthy activities, protective behaviors and promoting a healthier lifestyle, the individual and family functions get better accordingly [58]. Another reason may be that in China the family members normally provide the most solid support in one's social network, good social support usually means good family function[59].

The most significant finding of this study was that the relationship between social support and depression was fully mediated by family function. Previous studies identified that the social support had direct effect on depression[23, 60], but this research further found the effect was indirect. Our model reveals that the higher social support among antenatal and postpartum women were less likely to experience depression symptoms which is consistent with previous studies, but interestingly, the association was fully mediated by family function. Family function is the key factor. This can be explained by the vulnerability-stress model, when antenatal or postpartum women facing the stressor, the low social support leads to family dysfunction which increases environmental vulnerability and triggers the onset of depression [61]. Compared to western women, Chinese women seem to be more family-oriented and thus are more likely to be affected by family relationships[62].

Findings of this study highlight the importance of family function in decreasing depression of rural antenatal and postpartum women and have important implications for public health practices. Healthcare professionals should pay more attention to evaluate family function constantly across the perinatal period and take partner-inclusive intervention to lower risk of antenatal and postpartum depression[63]. Combining assessments like APGAR, especially applying the simple Resolve item—“Are you satisfied with the way you and your family share time together?”, can help professionals quickly assess family function [64]. For the dysfunctional family, the health professionals should focus on intervening in family members in addition to antenatal and postpartum women, such as requiring family members to participate in prenatal health and baby care education, providing different types of health education programs for different family members and setting up consulting platforms of perinatal nursing for families[65]. They are beneficial for minimizing the harmful effects of family dysfunction.
Limitations of this study need to be recognized. Firstly, we cannot make claims about causality among the three variables because of the cross-sectional design. Future longitudinal or experiment studies should be conducted to provide causal inference. Secondly, some factors such as life stress, personal history of depression and family history of depression have not been taken into consideration, which may also influence the depression level among antenatal and postpartum women. In addition, the EPDS is a screening tool rather than a diagnostic tool, which can only provide information on symptoms of depression. Finally, although our study concerned with people in the community, which could reduce selection bias, the data were obtained in rural areas of southwest China, so we should be careful to generalize the findings.

5. Conclusions

The study investigates the interplay between social support and depression considering the influence of family function. The results suggested that family function played a fully mediating role in the association between social support and depression. Findings of this study highlight that family function should be considered as the key target for interventions aiming to lower the prevalence of antenatal and postpartum depression. Family members interventions are critical to reduce depression among antenatal and postpartum women.

Abbreviations

SEM: Structural equation modeling
EPDS: Edinburgh Postpartum Depression Scale
APGAR: APGAR Family Care Index Scale
SSRS: Social Support Rate Scale.

Declarations

Ethics approval and consent to participate: The study protocol was approved by the Institutional Review Board of Sichuan University (Project identification code: H171260). The study was explained to participants and informed written consent was obtained prior to data collection.

Consent to publication: Not applicable

Availability of data and materials: The datasets used and/or analyzed during the current study available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

Funding: None Declared.
Authors' contributions: Conceptualization, Y.H., Y.L. D.L; Methodology, Y.H., Y.L., D.L; Investigation, Y.L., D.L; Software, Y.H., Y.L.; Formal analysis, Y.H., Y.L.; Resources: D.L. Writing—original draft preparation, Y.H., Y.L.; Writing—review and editing, Y.H., Y.L., W.Y, D.L.. All authors read and approved the final manuscript

Acknowledgements: The authors wish to acknowledge the help of all investigators who participated in our investigation, and are also thankful to all women participated in this project.

References

1. Alipour Z, Lamyian M, Hajizadeh E. Anxiety and fear of childbirth as predictors of postnatal depression in nulliparous women. Women Birth. 2012;25(3):e37-43.
2. Smith MV, Shao L, Howell H, Lin H, Yonkers KA. Perinatal depression and birth outcomes in a Healthy Start project. Matern Child Health J. 2011;15(3):401-9.
3. Goodman JH. Perinatal depression and infant mental health. Archives of Psychiatric Nursing. 2019;33(3):217-24.
4. Nisar A, Yin J, Waqas A, Bai X, Wang D, Rahman A, et al. Prevalence of perinatal depression and its determinants in Mainland China: A systematic review and meta-analysis. Journal of Affective Disorders. 2020;277:1022-37.
5. Farias DR, Pinto Tde J, Teofilo MM, Vilela AA, Vaz Jdos S, Nardi AE, et al. Prevalence of psychiatric disorders in the first trimester of pregnancy and factors associated with current suicide risk. Psychiatry Res. 2013;210(3):962-8.
6. Piccinelli M, Wilkinson G. Gender differences in depression. Critical review. Br J Psychiatry. 2000;177:486-92.
7. Lindahl V, Pearson JL, Colpe L. Prevalence of suicidality during pregnancy and the postpartum. Arch Womens Ment Health. 2005;8(2):77-87.
8. Evans J, Heron J, Francomb H, Oke S, Golding J. Cohort study of depressed mood during pregnancy and after childbirth. BMJ (Clinical research ed). 2001;323(7307):257-60.
9. 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):1012-24.
10. Hanko C, Bittner A, Junge-Hoffmeister J, Mogwitz S, Nitzsche K, Weidner K. Course of mental health and mother-infant bonding in hospitalized women with threatened preterm birth. Arch Gynecol Obstet. 2020;301(1):119-28.
11. Kendell RE, Wainwright S, Hailey A, Shannon B. The influence of childbirth on psychiatric morbidity. Psychol Med. 1976;6(2):297-302.
12. Dias CC, Figueiredo B. Breastfeeding and depression: a systematic review of the literature. J Affect Disord. 2015;171:142-54.
13. Luoma I, Tamminen T, Kaukonen P, Laippala P, Puura K, Salmelin R, et al. Longitudinal study of maternal depressive symptoms and child well-being. J Am Acad Child Adolesc Psychiatry. 2001;40(12):1367-74.

14. Maeda Y, Ogawa K, Morisaki N, Tachibana Y, Horikawa R, Sago H. Association between perinatal anemia and postpartum depression: A prospective cohort study of Japanese women. Int J Gynaecol Obstet. 2020;148(1):48-52.

15. Hanko C, Bittner A, Junge-Hoffmeister J, Mogwitz S, Nitzsche K, Weidner K. Course of mental health and mother-infant bonding in hospitalized women with threatened preterm birth. Arch Gynecol Obstet. 2019.

16. Vesga-Lopez O, Blanco C, Keyes K, Olfson M, Grant BF, Hasin DS. Psychiatric disorders in pregnant and postpartum women in the United States. Arch Gen Psychiatry. 2008;65(7):805-15.

17. Jesse DE, Walcott-McQuigg J, Mariella A, Swanson MS. Risks and Protective Factors Associated With Symptoms of Depression in Low-Income African American and Caucasian Women During Pregnancy. Journal of Midwifery & Women's Health. 2005;50(5):405-10.

18. Martini J, Petzoldt J, Einsle F, Beesdo-Baum K, Hofler M, Wittchen HU. Risk factors and course patterns of anxiety and depressive disorders during pregnancy and after delivery: a prospective-longitudinal study. J Affect Disord. 2015;175:385-95.

19. Feldman R. Maternal versus child risk and the development of parent-child and family relationships in five high-risk populations. Dev Psychopathol. 2007;19(2):293-312.

20. Cohen S. Social relationships and health. Am Psychol. 2004;59(8):676-84.

21. Gariépy G, Honkaniemi H, Quesnel-Vallée A. Social support and protection from depression: systematic review of current findings in Western countries. British Journal of Psychiatry. 2016;209(4):284-93.

22. Li Y, Long Z, Cao D, Cao F. Social support and depression across the perinatal period: A longitudinal study. J Clin Nurs. 2017;26(17-18):2776-83.

23. Robertson E, Grace S, Wallington T, Stewart DE. Antenatal risk factors for postpartum depression: a synthesis of recent literature. Gen Hosp Psychiatry. 2004;26(4):289-95.

24. Morikawa M, Okada T, Ando M, Aleksic B, Kunimoto S, Nakamura Y, et al. Relationship between social support during pregnancy and postpartum depressive state: a prospective cohort study. Sci Rep. 2015;5:10520.

25. Tarkka M-T, Paavilainen E, Lehti K, Åstedt-Kurki P. In-hospital social support for families of heart patients. Journal of Clinical Nursing. 2003;12(5):736-43.

26. Lepistö S, Ellonen N, Helminen M, Paavilainen E. The family health, functioning, social support and child maltreatment risk of families expecting a baby. J Clin Nurs. 2017;26(15-16):2439-51.

27. Cao X, Jiang X, Li X, Hui Lo M-CJ, Li R. Family functioning and its predictors among disaster bereaved individuals in China: eighteen months after the Wenchuan Earthquake. PLoS One. 2013;8(4):e60738-e.
28. 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.

29. Lu C, Yuan L, Lin W, Zhou Y, Pan S. Depression and resilience mediates the effect of family function on quality of life of the elderly. Arch Gerontol Geriatr. 2017;71:34-42.

30. Chen H, Ma Z, Song J. [Family function and its relationship with clinical prognosis in patients with major depressive disorder]. Zhong Nan Da Xue Xue Bao Yi Xue Ban. 2017;42(7):843-7.

31. Yan W, Sen L, Jinfeng Z, editors. The Relationship between Institutional Social Support and Depression in the Elderly Institutions: The Role of Self-Training Perception and Family Function [in Chinese]. The 22nd National Conference on Psychology; 2019; Hangzhou, Zhejiang, China.

32. Patel V, Xiao S, Chen H, Hanna F, Jotheeswaran AT, Luo D, et al. The magnitude of and health system responses to the mental health treatment gap in adults in India and China. Lancet. 2016;388(10063):3074-84.

33. Chen J, Cross WM, Plummer V, Lam L, Sun M, Qin C, et al. The risk factors of antenatal depression: A cross-sectional survey. Journal of Clinical Nursing. 2019;28(19-20):3599-609.

34. Wang L, Wu T, Anderson JL, Florence JE. Prevalence and risk factors of maternal depression during the first three years of child rearing. J Womens Health (Larchmt). 2011;20(5):711-8.

35. Boyd RC, Le HN, Somberg R. Review of screening instruments for postpartum depression. Arch Womens Ment Health. 2005;8(3):141-53.

36. ShuiYuan X. The effect of social support on physical and psychological health. [in Chinese]. Chin Psychiatry. 1994:98-100.

37. Cheng Y, Liu C, Mao C, Qian J, Liu K, Ke G. Social support plays a role in depression in Parkinson's disease: A cross-section study in a Chinese cohort. Parkinsonism & Related Disorders. 2008;14(1):43-5.

38. Xie R-H, He G, Koszycki D, Walker M, Wen SW. Prenatal Social Support, Postnatal Social Support, and Postpartum Depression. Annals of Epidemiology. 2009;19(9):637-43.

39. Smilkstein G. The family APGAR: a proposal for a family function test and its use by physicians. J Fam Pract. 1978;6(6):1231-9.

40. Hai S, Wang H, Cao L, Liu P, Zhou J, Yang Y, et al. Association between sarcopenia with lifestyle and family function among community-dwelling Chinese aged 60 years and older. BMC geriatrics. 2017;17(1):187.

41. Li C, Lu H, Qin W, Li X, Yu J, Fang F. Resilience and Its Predictors Among Chinese Liver Cancer Patients Undergoing Transarterial Chemoembolization. Cancer nursing. 2019;42(5):E1-e9.

42. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. Br J Psychiatry. 1987;150:782-6.

43. Buist A. Perinatal mental health: a guide to the Edinburgh Postnatal Depression Scale. Archives of Women's Mental Health. 2004;7(1):96-.
44. Wang Y, Guo X, Lau Y, Chan KS, Yin L, Chen J. Psychometric evaluation of the Mainland Chinese version of the Edinburgh Postnatal Depression Scale. Int J Nurs Stud. 2009;46(6):813-23.

45. Steiger JH. Structural Model Evaluation and Modification: An Interval Estimation Approach. Multivariate behavioral research. 1990;25(2):173-80.

46. Bennett HA, Einarson A, Taddio A, Koren G, Einarson TR. Prevalence of depression during pregnancy: systematic review. Obstet Gynecol. 2004;103(4):698-709.

47. Callister LC. Doing the month: Chinese postpartum practices. MCN Am J Matern Child Nurs. 2006;31(6):390.

48. Tsai S-S, Wang H-H. Role changes in primiparous women during ‘doing the month’ period. Midwifery. 2019;74:6-13.

49. Prevalence and Risk Factors of Maternal Depression During the First Three Years of Child Rearing. Journal of Women's Health. 2011;20(5):711-8.

50. Liu YQ, Petrini M, Maloni JA. “Doing the month”: Postpartum practices in Chinese women. Nursing & Health Sciences. 2015;17(1):5-14.

51. Wang J, Mansfield AK, Zhao X, Keitner G. Family functioning in depressed and non-clinical control families. Int J Soc Psychiatry. 2013;59(6):561-9.

52. Shapiro AF, Gottman JM. Effects on Marriage of a Psycho-Communicative-Educational Intervention With Couples Undergoing the Transition to Parenthood, Evaluation at 1-Year Post Intervention. Journal of Family Communication. 2005;5(1):1-24.

53. Fisher JR, Wynter KH, Rowe HJ. Innovative psycho-educational program to prevent common postpartum mental disorders in primiparous women: a before and after controlled study. BMC Public Health. 2010;10:432.

54. Wang Y, Tian L, Guo L, Huebner ES. Family dysfunction and Adolescents' anxiety and depression: A multiple mediation model. Journal of Applied Developmental Psychology. 2020;66:101090.

55. Xu J, Chen P, Ma X. The relationship among preconception depression, anxiety, and social support of the reproductive-aged women in China. Archives of Women's Mental Health. 2018;21(4):429-36.

56. Nascimento SL, Surita FG, Godoy AC, Kasawara KT, Morais SS. Physical Activity Patterns and Factors Related to Exercise during Pregnancy: A Cross Sectional Study. PLoS One. 2015;10(6):e0128953.

57. Jiang H, Wang L, Zhang Q, Liu DX, Ding J, Lei Z, et al. Family functioning, marital satisfaction and social support in hemodialysis patients and their spouses. Stress Health. 2015;31(2):166-74.

58. Shamali M, Konradsen H, Stas L, Østergaard B. Dyadic effects of perceived social support on family health and family functioning in patients with heart failure and their nearest relatives: Using the Actor-Partner Interdependence Mediation Model. PLoS One. 2019;14(6):e0217970.

59. Li T, Guo N, Jiang H, Eldadah M, Zhuang W. Social support and second trimester depression. Midwifery. 2019;69:158-62.
60. Racine N, Zumwalt K, McDonald S, Tough S, Madigan S. Perinatal depression: The role of maternal adverse childhood experiences and social support. J Affect Disord. 2020;263:576-81.

61. Bernazzani O, Marks MN, Bifulco A, Siddle K, Asten P, Conroy S. Assessing psychosocial risk in pregnant/postpartum women using the Contextual Assessment of Maternity Experience (CAME)—recent life adversity, social support and maternal feelings. Soc Psychiatry Psychiatr Epidemiol. 2005;40(6):497-508.

62. Hu Y, Wang Y, Wen S, Guo X, Xu L, Chen B, et al. Association between social and family support and antenatal depression: a hospital-based study in Chengdu, China. BMC pregnancy and childbirth. 2019;19(1):420-.

63. Alves S, Martins A, Fonseca A, Canavarro MC, Pereira M. Preventing and Treating Women's Postpartum Depression: A Qualitative Systematic Review on Partner-Inclusive Interventions. Journal of Child and Family Studies. 2018;27(1):1-25.

64. Takenaka H, Ban N. The most important question in family approach: the potential of the resolve item of the family APGAR in family medicine. Asia Pacific family medicine. 2016;15:3-.

65. Tang X, Lu Z, Hu D, Zhong X. Influencing factors for prenatal Stress, anxiety and depression in early pregnancy among women in Chongqing, China. Journal of Affective Disorders. 2019;253:292-302.

Tables

Table 1. Socio-demographic characteristics of the sample (n = 490).
### Socio-Demographic Characteristics

| Characteristics                      | N(%)       |
|--------------------------------------|------------|
| Age, mean ± SD                       | 28.17±5.12 |
| Type of maternal women               |            |
| Antenatal women                      | 249(50.8%) |
| Postnatal women                      | 241(49.2%) |
| Marital status                       |            |
| Married                              | 474(96.7%) |
| Unmarried/ Divorced/ Widowed         | 16(3.3%)   |
| Education level                      |            |
| Elementary and below                 | 31(6.3%)   |
| Middle school                        | 141(28.8%) |
| High or vocational school            | 189(38.6%) |
| College and above                    | 129(26.3%) |
| Employment status                    |            |
| Employment                           | 209(42.7%) |
| Unemployed                           | 281(57.3%) |
| Individual annual income, (RMB)     |            |
| <5,000                               | 202(41.2%) |
| 5,000~9,999                          | 68(13.9%)  |
| 10,000~29,999                        | 122(24.9%) |
| 30,000~49,999                        | 73(14.9%)  |
| ≥50,000                              | 25(5.1%)   |
| Medical insurance                    |            |
| No                                   | 10(2.0%)   |
| Yes                                  | 480(98.0%) |
| Complications of pregnancy           |            |
| No                                   | 398(81.2%) |
| Yes                                  | 92(18.8%)  |

| Table 2. Description of social support, family function and depression scores with and without depression (n=490). |

| Contents             | Range | Total Mean (SD) | Depression (EPDS<9.5, n=439) Mean (SD) | Non-depression (EPDS≥9.5, n=51) Mean (SD) | p-Value |
|----------------------|-------|-----------------|------------------------------------------|--------------------------------------------|---------|
| Social support       | 12—66 | 40.79(5.95)     | 38.76(5.40)                              | 41.03(5.97)                                | 0.009** |
| Objective support    | 1—22  | 9.8 (2.21)      | 9.06(2.10)                               | 9.89(2.20)                                 |         |
| Subjective support   | 8—32  | 22.89 (3.98)    | 22.29(4.25)                              | 22.96(3.94)                                |         |
| Support utilization  | 3—12  | 8.10(1.70)      | 7.41(1.64)                               | 8.18(1.69)                                 |         |
| Family function      | 0—10  | 8.80(1.89)      | 7.37(2.50)                               | 8.97(1.74)                                 | <0.001**|
| Adaptation           | 0—2   | 1.77(0.45)      | 1.43(0.57)                               | 1.81(0.42)                                 |         |
| Partnership          | 0—2   | 1.74(0.48)      | 1.43(0.57)                               | 1.77(0.46)                                 |         |
| Growth               | 0—2   | 1.74(0.48)      | 1.43(0.64)                               | 1.77(0.44)                                 |         |
| Affection            | 0—2   | 1.73(0.49)      | 1.51(0.54)                               | 1.76(0.48)                                 |         |
| Resolve              | 0—2   | 1.82(0.41)      | 1.57(0.61)                               | 1.85(0.37)                                 |         |
| Depression           | 0—30  | 5.30(3.46)      | 11.76(3.18)                              | 4.55(2.61)                                 |         |
| Antenatal            | 0—30  | 5.78(3.30)      | 12.38(3.89)                              | 5.00(2.18)                                 |         |
| Postpartum           | 0—30  | 4.80(3.57)      | 11.12(2.11)                              | 4.07(2.92)                                 |         |

Notes: ** p < 0.05.
**Table 3.** Binary logistic regression of factors associated with the depression.

| Factors                          | Model 1                     |       | Model 2                     |       |
|----------------------------------|-----------------------------|-------|-----------------------------|-------|
|                                  | AOR | p-Value | 95%CI for AOR | AOR | p-Value | 95%CI for AOR |
| Social support                   | 0.933 | 0.012** | (0.884,0.985) | 0.945 | 0.060 | (0.892,1.002) |
| Family function                  | 0.720 | <0.001** | (0.628,0.824) |       |       |               |
| Age                              | 0.985 | 0.669 | (0.919,1.056) | 0.992 | 0.830 | (0.924,1.066) |
| Type of maternal women (ref: Antenatal women) |       |       |               |       |       |               |
| Postnatal women                  | 0.902 | 0.744 | (0.484,1.680) | 1.130 | 0.713 | (0.589,2.171) |
| Marital status (ref: Married)    |       |       |               |       |       |               |
| Unmarried/Divorced/Widowed       | 0.607 | 0.573 | (0.069,4.785) | 0.617 | 0.659 | (0.072,5.257) |
| Education level (ref: Elementary and below) |       |       |               |       |       |               |
| Middle school                    | 2.435 | 0.415 | (0.287,20.662) | 2.797 | 0.357 | (0.314,24.940) |
| High or vocational school        | 4.017 | 0.199 | (0.482,33.489) | 4.790 | 0.158 | (0.544,42.186) |
| College and above                | 3.837 | 0.220 | (0.447,32.909) | 4.871 | 0.159 | (0.537,44.192) |
| Employment status (ref: Employment) |       |       |               |       |       |               |
| Unemployed                       | 1.200 | 0.580 | (0.629,2.292) | 1.343 | 0.388 | (0.688,2.624) |
| Individual annual income (ref: ≤750, $) |       |       |               |       |       |               |
| 750~1499                         | 0.690 | 0.483 | (0.244,1.947) | 0.720 | 0.548 | (0.247,2.099) |
| 1500~4499                        | 1.320 | 0.458 | (0.634,2.745) | 1.591 | 0.232 | (0.743,3.406) |
| 4500~7499                        | 0.967 | 0.944 | (0.373,2.505) | 0.997 | 0.995 | (0.373,2.661) |
| ≥7500                            | 0.324 | 0.298 | (0.039,2.708) | 0.342 | 0.361 | (0.034,3.418) |
| Medical insurance (ref: NO)      |       |       |               |       |       |               |
| Yes                              | 144344517.3 | 0.999 | (0.000) | 98701368.48 | 0.999 | 0.000 |
| Complications of pregnancy (ref: No) |       |       |               |       |       |               |
| Yes                              | 1.484 | 0.273 | (0.733,3.007) | 1.300 | 0.482 | (0.626,2.701) |

Notes: AOR means adjusted odds ratio, ** p < 0.05.

**Table 4.** Direct, indirect and total effects and 95% confidence intervals for the final model.
| Model pathways                  | Estimated effect | 95%CI       |
|--------------------------------|------------------|-------------|
| **Total effects**              |                  |             |
| Depression <-- Social support  | -0.164           | -0.274 to 0.028 |
| Family function <-- Social support | 0.293          | 0.147 to 0.434 |
| Depression <-- Family function | -0.251           | -0.382 to -0.118 |
| **Direct effects**             |                  |             |
| Depression <-- Social support  | -0.090           | -0.213 to 0.043 |
| Family function <-- Social support | 0.293          | 0.147 to 0.434 |
| Depression <-- Family function | -0.251           | -0.382 to -0.118 |
| **Indirect effects**           |                  |             |
| Depression <-- Social support  | -0.074           | -0.139 to -0.032 |