

Family function fully mediates the relationship between social support and perinatal depression in rural Southwest China

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Abstract

Background: Perinatal 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 explore inter-relationships between social support and perinatal depression considering the influence of family function in rural areas of Southwest China.

Methods: This is a cross-sectional study. The following instruments were used: the Edinburgh Postpartum Depression Scale, the APGAR Family Care Index Scale, and the Social Support Rate Scale. A structural equation modelling was used to test the hypothesis relationships among the variables.

Results: A total of 490 rural antenatal (N=249) and postpartum(N=241) women (age: 28.17± 5.12) participated. We found that the prevalence of depression symptoms 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 perinatal depression. Family members interventions are critical to reduce depression among antenatal and postpartum women.

1. Background

The prevalence of perinatal depression in China has been estimated at 16.3% in a recent meta-analysis, with trends suggesting an increasing prevalence over the last decade and in less developed regions (Nisar et al.2020)[1]. The perinatal period is an important time of family transition for women and is associated with an increase in the onset of new or recurrent mental disorders. Depression and anxiety are the most common mental disorders experienced during the perinatal period[2, 3]. Perinatal depression is of concern not only because of the suffering and distress it causes for women but also because of the risk of adverse effects on the developing foetus and child[4, 5].

Perinatal depression usually has its onset during the third trimester of pregnancy or in the postpartum, affecting one in seven women[6, 7]. The prevalence of antenatal depression ranges from 5.2% to 17.8% worldwide[8]. This can be partly explained by the negative effects of psychosocial changes as well as various hormonal factors [9-11]. Women with antenatal depression appear to be at considerably higher risk of several negative outcomes: self-harm or suicide; failure to seek prenatal care; and, poor diet[12, 13]. In turn, this may lead to adverse pregnancy outcomes(such as complications during pregnancy, premature birth, dysplasia of the foetus, low birth weight of the baby etc.)[14, 15]. Furthermore, a study has shown that women were more vulnerable to psychiatric illness after birth [16]. The prevalence of postpartum depression is 14.8% in China and there is a rising trend thereof [1]. Additionally, postpartum

depression also predicts shorter breastfeeding time [17] and may also be a risk factor for children with a low social capacity [18]. Existing literature shows that factors associated with pregnancy and postpartum depression mainly include socio-demographic characteristics (e.g. ,age, marital status, education, income, complications of pregnancy etc.) [15, 19-21], social support [22], and family function[23].

Social support is defined as instrumental, informational, and emotional support provided by a social network including family, friends, and neighbourhoods, which can safeguard psychological well-being through buffering the effects of traumatic life events[24]. It can be characterised by the provider of support, including support from a spouse, relatives, or friends, with each thought to have independent protective effects against depression [25]. Social support as a protective and modifiable factor has been well investigated in relation to antenatal or postpartum depression[26]. Some studies have also shown that low-levels social support were risk factors for perinatal depression[27, 28]. With adequate support, family ties will strengthen as has been shown in Tarkka and Lepistö's studies which regard social support as an important resource to improve family functioning [29, 30].

Family functioning 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[31]. Compared to healthy families, families with family dysfunction are expressed as having lower cohesion, lower warmth, and expressiveness but also higher conflict, rigidity, and affectionless control [23]. Previous studies have shown that depression is negatively correlated with family functioning [32, 33]. A study undertaken in China demonstrated that stronger family support can help improve the mental health of pregnant women. [34]. In addition, Wang Y et al. (2019) proposed a model that family function moderated the indirect relationship between social support and depression among the elderly[35].

The availability of mental health resources in rural areas of China is low[36]. Studies have shown that living in rural areas of China is very significantly associated with perinatal depression[37]. Despite previous studies which 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. We do so here in order to understand the interrelationships and potential mechanisms of social support, family function, and perinatal depression. We examined the influence of social support and family function on perinatal depression in rural areas of southwest China in this study. Based on the above description, we hypothesis a single mediator model as 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 hypothesis that family function would be negatively associated with depression (Hypothesis 3). Furthermore, we suggested that the relationship between social support and depression would be mediated by the family function (Hypothesis 4). The study aims to assess the prevalence of perinatal depression in rural China and to identify the key factors including social support and family function which contribute to the prevention and control of perinatal depression.

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[38, 39]. 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 in 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 Considerations

The study protocol was approved by the Institutional Review Board of Sichuan University (Project identification code: H171260). The study was explained by the trained investigators to participants and informed written consent was obtained within ten minutes of consideration before 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, perinatal status, 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 [40]. 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 [41, 42]. In this research, Cronbach's α of the scale was 0.825.

2.3.3. Family function

Family function was measured by the APGAR, developed by Smilkstein[43], 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 a higher level of satisfaction with family function. It was generally believed that scores 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[44, 45]. In this research, Cronbach's α of the scale was 0.874.

2.3.4. Depression

Depression was measured by the EPDS (Edinburgh Postnatal Depression Scale). The EPDS, designed by Cox, et al.[46], 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 [47]. 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 a Chinese version by Pen et al in 1994[48], 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 analysed 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 the family function as an independent variable. Fourth, a structural equation model (SEM) was employed to further test the hypothesis relationships among social support, family function, and perinatal depression.

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 cut-offs: 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 [49].

3. Results

3.1 Participants and Socio-demographic characteristics

Of the 500 participants invited to take part, 498 agreed and returned questionnaires with 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 postpartum 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 of less than \$750 (41.2%), and received medical insurance (98.0%). Most had no complications of pregnancy (81.2%).

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

Socio-Demographic Characteristics	N(I)
Age, mean ± SD	28.17±5.12
Perinatal status	
Postpartum 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%)

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 a 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 symptoms. The mean score of depression among antenatal and postpartum women were 5.78 ± 3.30 and 4.80 ± 3.57 , respectively, 10.4% (26) of antenatal women and 10.4% (25) of postpartum women had significant depression symptoms. And the ANOVA showed that social support and family function were significantly correlated with depression symptoms.

Table 2. Description of social support, family function and depression scores with and without depression symptoms (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: ** $p < 0.05$.

3.3. Binary logistic regression analyses of depression

Table 3 shows the results of the binary logistic regression analyses testing the relationship between social support, family function, and depression. The results of model 1 suggested that there was no socio-demographic factor in addition to social support was significantly correlated with depression (AOR=0.933, $p=0.012$). The results of model 2 suggested that there was no socio-demographic factor in addition to family function was significantly correlated with depression (AOR=0.720, $p<0.001$). According to the collinearity diagnosis, the VIF of each regression coefficient was no more than 2, the model fitted well. And after controlling for the influence of family function, a previously significant relationship between social support and depression became non-significant, suggesting a full or perfect mediation relationship existed.

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)
Perinatal status (ref: Antenatal women)						
Postpartum 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, ** $p < 0.05$.

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 Hypothesis 2. The 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.

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

4. Discussion

This study aimed to investigate the depression status and to clarify the inter-relationships between social support and depression considering the influence of family function among perinatal women in rural areas of Southwest China. To our knowledge, this is the first study to report the fully mediating role of family function between social support and perinatal depression. The findings of this study give important implications of development and implementation of intervention to ameliorate perinatal depression for mother's health and to promote the future wellbeing of their children and family in rural areas.

The prevalence of antenatal depression symptoms in our study is 10.4%, which is close to a meta-analysis of 21 studies (10.7%) [50]. And the prevalence of postpartum depression symptoms in our study is also 10.4%, which was lower than 19.9% in a prospective cohort study in China (Xie, 2009) [42]. However, the prevalence of depression is not comparable in these studies due to different definitions of depression and the inclusion/exclusion criteria of the study cohorts. Our samples were obtained from women within 6 months postpartum, while Xie's were obtained from women within one month postpartum. Women during the first month postpartum are required to engage in certain practices to

promote the health of the maternal/new-born dyad for the Chinese tradition of “doing the month”, mainly including promoting maternal rest, reducing domestic duties, and restricting activities at home [51]. To coerce a person into a certain behaviour, even if it is apparently for their good, is classified as negative and ineffective support[52]. Due to the physical and social activities limitation, with frustration for breastfeeding and lack of sleep cannot be relieved effectively, the women would be stressed which leads to mood alterations[53]. After the first month postpartum, with social activities resumed, they may accommodate and accept the new situation gradually[54].

The mean family function (APGAR) score was 8.80 ± 1.89 , and only 1.4% of women reported severe family dysfunction in our study. The possible reason may be that in traditional rural China, pregnancy is regarded as a great familial contribution, and family members will acknowledge the women’s family status and strive to develop better family function[55]. The model revealed that perinatal women with lower family function were more likely to experience depression symptoms, which is consistent with previous studies[33, 56]. There are two possible explanations. One is that the couple relationship which plays an important role in family function will be affected in the perinatal period by more emerging work-family and economic conflicts[57] and fewer opportunities for shared intimacy, which leads women stuck in worse moods [58]. The other possible explanation is that women in dysfunctional families communicate their emotions and thoughts ineffectively with other family members, thus leading to the development of depression[59].

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[60]. 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[61]. Our model revealed that better social support predicted better family function which is consistent with Jiang’s study[62]. There are two possible reasons. One reason may be that social support improves an individual’s physical health(e.g., increases healthy activities and protective behaviours and promoting a healthier lifestyle) and ability to manage their stress and cope effectively; accordingly, the individual functions better within the family[63]. The other reason may be that the family members provide the most solid support in one's social network[64], partly owing to Chinese culture-specific norms of reciprocal filial piety[65], therefore, good social support means good family function in Chinese societies.

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 social support had a direct effect on depression[27, 66], but this research further found the effect was indirect. Our model reveals that the higher social support among perinatal women was less likely to experience depression symptoms which is consistent with previous studies, but interestingly, the association was fully mediated by family function. The family function is the key factor. This can be explained by the vulnerability-stress model, when perinatal women facing the stressor, the low social support leads to family dysfunction which increases environmental vulnerability and triggers the onset of depression [67]. Compared to

western women, Chinese women seem to be more family-oriented and thus are more likely to be affected by family relationships[68].

The findings of this study highlight the importance of family function in decreasing perinatal depression in rural areas and have important implications for public health practices. Healthcare professionals should pay more attention to evaluating family function constantly across the perinatal period and take a partner-inclusive intervention to lower the risk of perinatal depression[69]. 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 [70]. For the dysfunctional family, the health professionals should focus on intervening in family members in addition to perinatal 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[71]. 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 experimental 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 of perinatal women. In addition, EPDS is a screening tool rather than a diagnostic tool, which can only provide information on symptoms of depression. Finally, although our study concerned people in the community, which could reduce selection bias, the data was 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 perinatal depression. Family members' interventions are critical to reducing perinatal depression.

Abbreviations

SEM: Structural equation modeling

EPDS: Edinburgh Postnatal 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 analysed during the current study available from the corresponding author on reasonable request.

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

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Figures

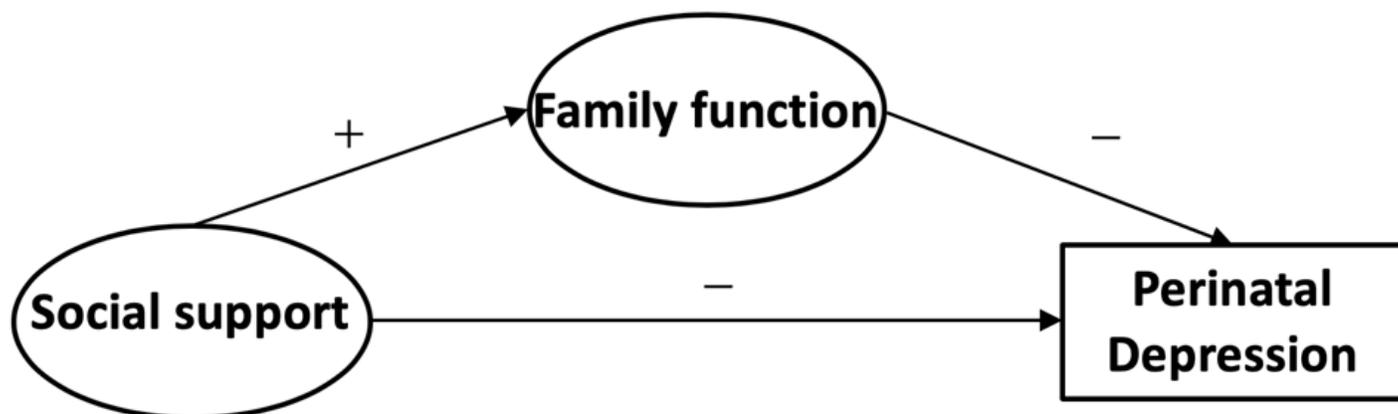


Figure 1

The theoretical model and hypothesis.

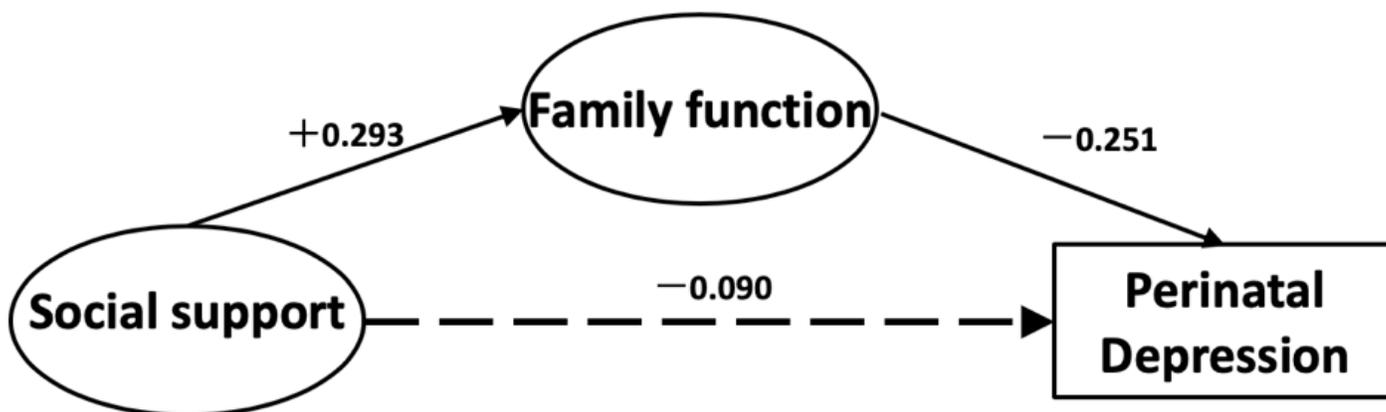


Figure 2

The final model and standardized model paths.

Supplementary Files

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- [STROBEchecklistBMJOpencrosssectionalstudies.doc](#)
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