Attachment Style Modifies the Effect of Spousal Support on Postpartum Depression in Women

ABSTRACT

Objective: This study aims to examine the impact of spousal support on postpartum depression in women with different attachment styles and assessing if attachment style influences this effect.

Methods: From March to May 2022, 96 couples with late-stage pregnant women were randomly selected from tertiary maternity hospitals in Shandong and Guangdong provinces for a prepartum survey. Psychological assessments were conducted using the Adult Attachment Scale, Dyadic Coping Inventory, and the Patient Health Questionnaire-9 (PHQ-9) Depression Scale. To examine the relationship between each variable and postpartum depression, univariate and multiple logistic regression analyses were employed. Additionally, interaction analysis was used to analyze the interplay between different attachment styles and how spousal support influences women's postpartum depression.

Results: The findings revealed that even after accounting for confounding variables, prepartum spousal support was an independent predictor of postpartum depression (adjusted odds ratio (OR) = 0.82, 95% CI: 0.69-0.96, $P = .015$). Women with a secure attachment style showed a significantly lower incidence of postpartum depression compared to those with insecure attachment styles (24.2% vs. 46%, $P = .037$). In the secure attachment group, spousal support had a protective effect against postpartum depression (adjusted OR = 0.57, 95% CI: 0.36-0.91, $P = .018$), and attachment style emerged as a potential interactive factor influencing the impact of spousal support on postpartum depression (P for interaction = .029).

Conclusion: The provision of spousal support, especially to individuals with secure attachment styles, plays a preventive role in postpartum depression. This underscores the importance of considering attachment styles in interventions targeting postpartum depression prevention.

Keywords: Postpartum depression, social support, attachment styles, mental health, women's health

Introduction

Women face an elevated susceptibility to mental health challenges during the childbearing period, with depression emerging as a prevalent complication.[1,2] Surveys in China indicate that approximately one-third of pregnant women have experienced or are experiencing depression and anxiety,[3,4] and these issues can persist as postpartum depression (PPD).[5] Depression during pregnancy and postpartum is detrimental to the physical health of women and the growth and development of the fetus or infant,[6] underscoring the need for increased attention to depression during childbirth and timely intervention to prevent adverse outcomes.

Attachment, a concept introduced by Bowlby in 1969, refers to the emotional bond formed between an individual and their attachment figure,[7] such as the mother–infant attachment. Attachment patterns, formed during childhood, persist into adulthood and exert influence on marital relationships, particularly in terms of the perceived support within these

Runrun Liu[1,2] (ID)
Yingfang Wu[3] (ID)
Haoyu Li[1,2] (ID)
Zhiyan Chen[1] (ID)

[1]CAS Key Laboratory of Mental Health, Institute of Psychology, Chinese Academy of Sciences, Beijing, China
[2]Department of Psychology, University of Chinese Academy of Sciences, Beijing, China
[3]Health Care Department for Women, Guangzhou Women and Children's Medical Center, Guangzhou Medical University, Guangzhou, Guangdong, China

Corresponding author:
Zhiyan Chen
✉ chenzhiyan00@sina.com

Liu et al. Attachment Alters Spousal Support's Depression Impact

Alpha Psychiatry 2024;25(3):388-394

relationships.[8] Individuals with secure attachment typically experience more positive emotions and a higher sense of well-being compared to other attachment types.[9] Scholars posit that individuals with insecure attachment exhibit higher levels of depression[10,11] and lower marital satisfaction.[12,13]

Prior research has demonstrated that spousal support can reduce anxiety and depression in women[14] and plays a vital role in their postpartum mental health and quality of life.[15] The delivery of spousal support is influenced by the attachment patterns of the spouse. Past research indicates that social support, especially as perceived by women, affects their marital satisfaction, depression, and anxiety.[14] Nevertheless, it remains uncertain whether women's perception of this support is influenced by their personal characteristics, particularly their attachment pattern.[8] Yet, it remains unclear how the impact of spousal support on women's depression is influenced by their attachment patterns.

Hence, the objective of this study is to investigate the influence of spousal support on PPD in women with diverse attachment patterns. Through this research, we aim to better understand the potential differences in the effectiveness of spousal support across various attachment types, providing important guidance for future interventions to improve the mental health of postpartum women.

Materials and Methods

Subjects

From March to May 2022, 127 late-pregnancy women and their spouses were randomly selected from tertiary maternity and child specialty hospitals in Shandong and Guangdong provinces for a prenatal survey (T1). The inclusion criteria for our study were as follows: (1) pregnant women who were at least 28 weeks into their gestation period; (2) living with a spouse and having no significant communication problems; (3) in a marital relationship for at least 1 year; and (4) voluntary participation in the study. The exclusion criteria were as follows: (1) women with severe mental health issues or a history of psychiatric illnesses; (2) experiencing serious complications during pregnancy or acute illnesses; (3) with a history of pregnancy loss or

miscarriage; (4) with prenatal depression receiving treatment, and (5) unwilling to provide the necessary information for the study. These criteria were carefully established to ensure the precision and validity of our research findings. The participants included 89 primiparas, 94 expecting natural childbirth, 120 planning to breastfeed, 23 with a history of adverse pregnancy outcomes (such as embryonic arrest, stillbirth, postpartum hemorrhage, etc.), and 9 who had detected fetal abnormalities during pregnancy. A second survey was conducted 10 months postpartum, tracking 96 couples, and a PPD (T2) questionnaire was administered to both women and their spouses. Thus, the sample for this study consists of the 96 couples followed up both prenatally and postpartum.

The research adheres to the ethical standards of the Declaration of Helsinki and has received approval from the Institutional Review Board of the corresponding CAS Key Laboratory of Mental Health, Institute of Psychology, Chinese Academy of Sciences. Ethical approval for this study was granted under the protocol number H22021, confirming that all procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional and national research committee. In line with the requirements for informed consent, all participating individuals in the study provided their signed consent after being informed about the purpose of the research, the nature of the procedures they would undergo, and their rights as study participants.

Research Tools

Adult Attachment Scale: In the prenatal questionnaire, all female participants and their spouses completed the Adult Attachment Scale (AAS). The revised version of AAS by Wu Weili et al,[16] known for its strong reliability and validity, was utilized in this study.[16] The scale includes 3 subscales: closeness, dependence, and anxiety, each with 6 items, totaling 18 items, scored from 1 to 5. Based on the scoring conversion rules, attachment types are classified into secure, preoccupied, dismissive, and fearful. In this study, all types other than secure were classified as insecure, dividing attachment into secure and insecure. In this study, the Cronbach's a coefficient for this scale was 0.792.

Dyadic Coping Inventory: The Dyadic Coping Inventory (DCI) was used in both the prenatal and postpartum questionnaires to measure spousal support provided and perceived by women. For this study, the Chinese version of DCI developed by Xu Feng et al,[17] with good internal consistency and validity.[18] This scale features items that correspond between women and their spouses. It employs a 5-point scoring system, ranging from "rarely" to "very frequently," with scores ranging from 1 to 5. Negative support coping is scored inversely. Higher total scores reflect more effective supportive coping. In this study, the Cronbach's a coefficient for the female perceived support part was 0.891 prenatally and 0.853 postpartum. For the spousal support provided part, the coefficients were 0.836 prenatally and 0.851 postpartum.

Depression Scale: The PHQ-9 Depression Scale was used in both the prenatal and postpartum questionnaires to measure women's depression.[19] This scale is from the "Health China Action Psychological Health Promotion Action Main Indicators Interpretation and Survey Methods" issued by the National Health Commission of China, used to assess depression levels in adults. Responses are based on the 2 weeks immediately preceding the completion of the questionnaire, with each item rated from 0 (not at all) to 3 (nearly every day). The

MAIN POINTS

- *In this study, 96 couples with late-stage pregnant women were assessed across Shandong and Guangdong provinces to examine the impact of spousal support on postpartum depression, taking into account varying attachment styles.*
- *Univariate and multiple logistic regression analyses indicated that prepartum spousal support significantly predicted lower incidence of postpartum depression (adjusted odds ratio (OR) = 0.82, 95% CI: 0.69-0.96, P = .015), after adjusting for potential confounders.*
- *Women with secure attachment styles experienced notably less postpartum depression than those with insecure attachment styles (24.2% vs. 46%, P = .037), highlighting the protective role of secure attachment.*
- *For women with a secure attachment style, spousal support was found to be particularly protective against postpartum depression (adjusted OR = 0.57, 95% CI: 0.36-0.91, P = .018), and attachment style itself was identified as a potential moderator in the relationship between spousal support and postpartum depression (P for interaction = .029).*

Alpha Psychiatry 2024;25(3):388-394

Liu et al. Attachment Alters Spousal Support's Depression Impact

total score is the sum of the 9 items, ranging from 0 to 27. A score of ≥10 is considered screening positive. If the sum of the first and second items is less than 2, the questionnaire jumps to the anxiety measurement items. In this study, the Cronbach's α coefficient for this scale was 0.92 prenatally and 0.933 postpartum.

Generalized Anxiety Disorder Scale: The Generalized Anxiety Disorder 7-Item Scale was used to measure anxiety in women both prenatally and postpartum.[20] This scale is also from the "Health China Action Psychological Health Promotion Action Main Indicators Interpretation and Survey Methods" issued by the National Health Commission of China. Each item is rated on a scale from 0 (not at all) to 3 (nearly every day), resulting in a total score that is the sum of the 7 items, ranging from 0 to 21. A score of ≥10 is considered screening positive. In this study, the Cronbach's α coefficient for this scale was 0.861 prenatally and 0.837 postpartum.

Locke–Wallace Marital Adjustment Test
The Locke–Wallace Marital Adjustment Test was used to measure marital satisfaction.[21] This questionnaire, developed by Locke and Wallace in 1959, consists of 15 items. This study used its first item to measure marital satisfaction, which has good reliability. Participants rate the item on a 7-point scale, with scores ranging from 0 (very unhappy) to 35 (extremely happy). Higher scores reflect higher levels of marital satisfaction. A score above 15 is defined as happy.

Data Processing
The data analysis in this study was conducted using R version 4.2.3 (R Development Core Team, Vienna, Austria). Descriptive statistics included mean (standard deviation) for continuous variables that followed a normal distribution and median (interquartile range) for those that did not. Categorical data were presented as percentages. Different statistical methods were used to compare differences between 2 groups: Student's *t*-test for normally distributed continuous variables, Mann–Whitney *U*-test for non-normally distributed continuous variables, and Pearson chi-square test and Fisher's exact tests for categorical data. Univariate logistic regression was used to examine the relationship of each variable with PPD. Subsequently, multiple logistic regression models were analyzed, adjusting for relevant variables to assess the independent effect of each variable on PPD, considering other potential influencing factors. Interaction tests were conducted to determine whether different attachment patterns were interaction factors for the effect of spousal support on PPD. All analyses were conducted using a 2-sided $P < .05$ to determine statistical significance.
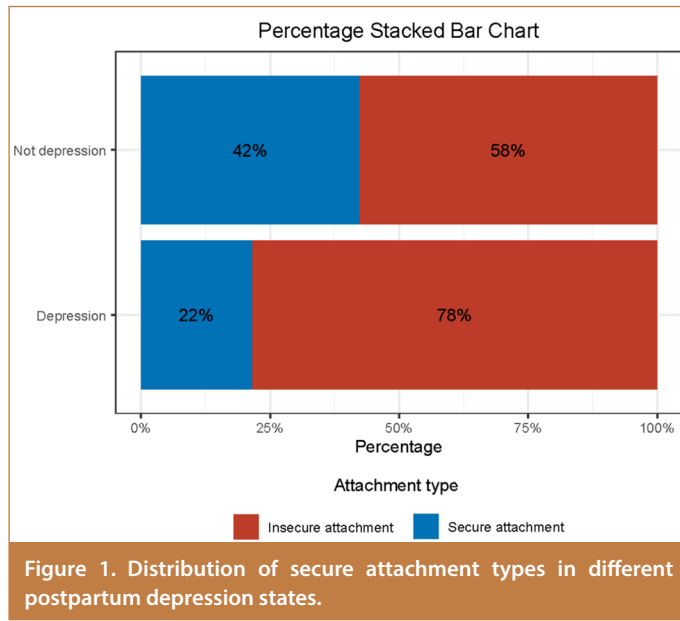
Results

Demographic and Psychological Characteristics of Women with Different Attachment Types
In this study involving 96 participants, 63 were categorized into the insecure attachment group, while 33 belonged to the secure attachment group. The average age of the women was 29.2 ± 4.1 years, with 12 cases of advanced maternal age, an average weight gain of 13.7 ± 6.94 kg, and an average height of 163.57 ± 5.55 cm. As shown in Table 1, although there were no significant differences between the 2 groups in terms of age, educational level, employment status, income, prenatal depression, and anxiety (all $P > .05$), significant

Table 1. Demographic and Psychological Characteristics of Women with Different Attachment Types

	Total Population (n = 96)	Insecure Attachment (n = 63)	Secure Attachment (n = 33)	P
Age, mean (SD)	29.2 (4.1)	28.6 (4.3)	30.2 (3.4)	.076
Educational level, n (%)				.349
Below high school	70 (72.9)	44 (69.8)	26 (78.8)	
Above high school	26 (27.1)	19 (30.2)	7 (21.2)	
Employment status, n (%)				.765
Unemployed	82 (85.4)	53 (84.1)	29 (87.9)	
Employed	14 (14.6)	10 (15.9)	4 (12.1)	
Income, n (%)				.165
Below expenditure	29 (30.2)	22 (34.9)	7 (21.2)	
Equal or above expenditure	67 (69.8)	41 (65.1)	26 (78.8)	
Prenatal depression, n (%)				.504
No	85 (88.5)	57 (90.5)	28 (84.8)	
Yes	11 (11.5)	6 (9.5)	5 (15.2)	
Prenatal anxiety, n (%)				.661
No	90 (93.8)	58 (92.1)	32 (97)	
Yes	6 (6.2)	5 (7.9)	1 (3)	
Prenatal perceived support by women, median (IQR)	44.5 (37.0, 48.2)	41.0 (35.5, 46.5)	49.0 (46.0, 53.0)	<.001
Prenatal marital satisfaction, n (%)				1
Unhappy	9 (9.4)	6 (9.5)	3 (9.1)	
Happy	87 (90.6)	57 (90.5)	30 (90.9)	
Prenatal spousal support, median (IQR)	43.0 (37.0, 46.0)	39.0 (34.0, 45.5)	46.0 (44.0, 49.0)	<.001
Postpartum depression, n (%)				.037
No	59 (61.5)	34 (54)	25 (75.8)	
Yes	37 (38.5)	29 (46)	8 (24.2)	

IQR, interquartile range; SD, standard deviation

Liu et al. Attachment Alters Spousal Support's Depression Impact

Alpha Psychiatry 2024;25(3):388-394

Figure 1. Distribution of secure attachment types in different postpartum depression states.

differences were observed in prenatal perceived support, spousal support provided, and PPD. Participants in the insecure attachment group reported lower scores in prenatal perceived support (average score 40.4 vs. 48.1) and spousal support provided (average score 39.0 vs. 45.8), and a higher incidence of PPD (46% vs. 24.2%), with these differences being statistically significant ($P < .001$, $P < .001$, $P = .037$). Furthermore, among individuals experiencing PPD, the proportion

of those with insecure attachment was 78%, which was significantly higher than the 58% observed in the non-depressed group ($P < .05$) (Figure 1). These results suggest that secure attachment is closely related to prenatal perceived support and spousal support and may play a significant role in reducing the risk of PPD.

Risk Factors for Postpartum Depression

In the univariate and multiple logistic regression conducted for PPD, prenatal spousal support and educational level were identified as significant protective factors for PPD (Table 2). Through the application of the Likelihood Ratio Test, we determined the statistical significance of each univariate logistic regression model. The results revealed significant associations for several predictors: prenatal depression ($P = .0001$), attachment type ($P = .03382$), prenatal anxiety ($P = .0196$), prenatal perceived support by women ($P = 7.94 \times 10^{-7}$), prenatal marital satisfaction ($P = 1.86 \times 10^{-7}$)), educational level ($P = .0218$), and prenatal spousal support ($P = 7.83 \times 10^{-9}$)). In contrast, age ($P = .505$), employment status ($P = .8133$), and income ($P = .0829$) did not show a significant impact on PPD in this analysis. The final adjusted logistic regression model demonstrated a statistically significant overall fit ($P = 2.78 \times 10^{-10}$). This comprehensive approach effectively addresses the reviewer's concerns by providing a detailed overview of the statistical significance of each factor in relation to PPD, highlighting the nuanced and multifaceted nature of its predictors.

The final model, adjusted for other variables, showed that prenatal spousal support had a significant protective effect against PPD (adjusted odds ratio (OR) = 0.82, 95% Confidence Interval (CI): 0.69-0.96, $P = .015$), and educational level above high school was

Table 2. Univariate and Multiple Logistic Regression of Postpartum Depression

	Crude OR (95% CI)	Crude P	Adj. OR (95% CI)	Adj. P
Prenatal spousal support	0.8 (0.73-0.88)	<.001	0.82 (0.69-0.96)	.015
Age	1.04 (0.93-1.15)	.506	1.1 (0.93-1.31)	.269
Income				
Below expenditure	Reference		Reference	
Equal or above expenditure	0.46 (0.19-1.11)	.084	0.3 (0.07-1.4)	.127
Employment status				
Unemployed	Reference		Reference	
Employed	0.87 (0.27-2.82)	.814	0.49 (0.07-3.32)	.464
Educational level				
Below high school	Reference		Reference	
Above high school	0.38 (0.14-1.05)	.063	0.14 (0.02-0.9)	.039
Attachment type				
Insecure attachment	Reference		Reference	
Secure attachment	0.38 (0.15-0.96)	.04	0.51 (0.08-3.49)	.495
Prenatal depression				
No				
Yes	21.48 (2.62-176.36)	.004	21.15 (0.97-459.28)	.052
Prenatal anxiety				
No	Reference		Reference	
Yes	9.06 (1.01-80.98)	.049	0.96 (0.04-22.51)	.978
Prenatal perceived support by women	0.86 (0.8-0.92)	<.001	0.98 (0.86-1.12)	.778
Prenatal marital stisfaction				
Unhappy	Reference		Reference	
Happy	0.06 (0.01-0.52)	.011	0.13 (0.01-2.92)	.201

OR, odds ratio; CI, confidence interval.

Alpha Psychiatry 2024;25(3):388-394

Liu et al. Attachment Alters Spousal Support's Depression Impact

significantly associated with a protective effect of PPD compared to below high school (adjusted OR = 0.14, 95% CI: 0.02-0.9, P = .039). While factors like age, income, employment status, attachment type, prenatal depression, and anxiety displayed correlations with PPD in the univariate analysis, it is noteworthy that these associations did not attain statistical significance in the multiple logistic regression. These results highlight the importance of spousal support and educational background in preventing PPD.

The Impact of Spousal Support on Postpartum Depression Across Different Attachment Patterns

Further analysis was conducted to determine whether attachment type influences the relationship between prenatal spousal support and PPD. The logistic regression adjusted model demonstrated a statistically significant overall fit (Log-Likelihood Ratio [LLR] $P = 7.36 \times 10^{-12}$). Data in Table 3 indicate that in the insecure attachment group (n = 63), for every unit increase in prenatal spousal support, the odds of experiencing PPD decreases by 18% (unadjusted OR = 0.82, 95% CI: 0.74-0.91, P < .001), indicating that increased prenatal spousal support is associated with a lower risk of PPD. This association remained significant after adjustment for income, educational level, prenatal depression, and prenatal marital satisfaction (adjusted OR = 0.85, 95% CI: 0.75-0.98, P = .021), suggesting that prenatal spousal support may act as a protective factor against PPD. Within the secure attachment group (n = 33), prenatal spousal support exhibited an even more pronounced negative correlation with PPD: with each additional unit increase in the secure attachment score, the risk of PPD decreased by 43% (adjusted OR = 0.57, 95% CI: 0.36-0.91, P = .018). Additionally, the interaction between attachment type and prenatal spousal support in preventing PPD was statistically significant (P for interaction = .029). These results suggest that spousal support under secure attachment offers more significant protective effects against PPD, and attachment type may be an important factor influencing the effectiveness of prenatal spousal support in preventing PPD.

Discussion

Postpartum depression not only impacts the mental health of mothers but also exerts long-term effects on infant development and the overall family's well-being. Therefore, identifying and understanding the factors influencing PPD, particularly at controllable social and psychological levels, is crucial for developing effective prevention and intervention strategies. Our study results reveal the importance of spousal support in alleviating symptoms of PPD, especially among women with secure attachment types. These findings are significant for understanding the complex nature of PPD and how to provide more effective support and interventions.

Our study identified a substantial role of spousal support in the prevention of PPD. Our data indicate that spousal support remains an independent predictor of PPD, even after considering potential influencing factors such as age, income, employment status, attachment

type, prenatal depression, and anxiety. This result highlights the importance of spousal support in reducing the risk of PPD, underscoring its potential as a key intervention point. In multiple logistic regression, spousal support showed a significant protective effect against PPD. This finding is consistent with prior literature, which has likewise emphasized the significance of partner support in mitigating the risk of PPD.[22,23] These studies emphasize the crucial role of emotional support, communication, and joint coping strategies between partners in maintaining mental health. Notably, while partner support is important for all women, its impact may vary among individuals. For instance, attachment type might influence how individuals perceive and utilize partner support. However, our study results indicate that, even with these variables' influence, spousal support remains a strong independent predictor of PPD. These findings carry substantial implications for clinical practice and public health strategies. They suggest that enhancing support between spouses should be a particular focus in preparing and implementing interventions aimed at preventing PPD. This might include providing training to strengthen marital relationships, educating couples on effective communication, and how to jointly cope with challenges during pregnancy and postpartum. Interestingly, we also found that education plays a protective role in preventing PPD. This suggests that the level of education may be associated with the risk of PPD, with women of higher educational levels potentially being more effective in utilizing resources and strategies to cope with postpartum stress, thereby reducing the risk of PPD. Education might provide better cognitive and psychological preparation, helping women adapt to new life challenges postpartum, especially in terms of mental health.[24] Therefore, we suggest that future research and interventions should consider the potential role of education more in preventing PPD.

Additionally, we explored the relationship between attachment types and PPD and how attachment types influence the protective effect of spousal support on PPD. Our data show that women with secure attachment types exhibit a lower risk of PPD, and this protective effect seems more pronounced when women with secure attachment traits receive more spousal support. In our study, women in the secure attachment group experienced a notably lower prevalence of PPD compared to those in the insecure attachment group. This finding is consistent with existing literature, suggesting that individuals with secure attachment types generally handle stress and emotional distress better.[25] Individuals with secure attachment often have more positive self-concepts and trust in others, which may help them maintain better mental states when facing postpartum challenges. Furthermore, our data unveil an interaction between attachment styles and spousal support. In women with secure attachment types, spousal support showed a more significant protective effect against PPD. This might be because individuals with secure attachment are better able to perceive and utilize partner support, thereby more effectively alleviating postpartum psychological stress. This resonates with the findings of McLeod et al,[26] who found that individuals

Table 3. Attachment Type as a Modifier in the Relationship Between Prenatal Spousal Support and Postpartum Depression

	n. event_%	Crude OR (95% CI)	Crude P	Adj OR* (95% CI)	Adj P*	P for interaction
Insecure attachment (n = 63)	29 (46)	0.82 (0.74-0.91)	<.001	0.85 (0.75-0.98)	.021	.029
Secure attachment (n = 33)	8 (24.2)	0.51 (0.31-0.84)	.008	0.57 (0.36-0.91)	.018	

OR, odds ratio.
*Adjusted for income, educational level, prenatal depression, and prenatal marital satisfaction.

Liu et al. Attachment Alters Spousal Support's Depression Impact

Alpha Psychiatry 2024;25(3):388-394

with secure attachments are more likely to seek and utilize support. These findings hold significance for comprehending the psychological intricacies of PPD. They suggest that improving the quality and quantity of spousal support is important for all women, but particularly crucial for those with secure attachment types. Therefore, in designing interventions for preventing PPD, considering attachment types and strategies to enhance spousal support may be more effective.

This study possesses several limitations. First, the sample size is relatively small and limited to tertiary maternity and child specialty hospitals in Shandong and Guangdong, which may limit the generalizability and extrapolation of our findings. Subsequent research should encompass a wider geographic scope and a more heterogeneous population to augment the representativeness of the outcomes. Second, as an observational study, our results may be subject to the influence of unmeasured variables, potentially leading to bias. For instance, we did not account for additional psychosocial factors that could potentially influence PPD, including family environment, socioeconomic status, or individual coping strategies. Additionally, although we conducted a 10-month follow-up, this time frame may not be sufficient to fully understand the long-term trends and dynamics of PPD. Future research could consider longer-term follow-ups to more comprehensively assess the long-term impact of spousal support and attachment types on PPD. Moreover, our study primarily relied on self-reported scales to assess depression symptoms, attachment types, and spousal support, which may be subject to subjective bias. Future research could consider using more objective measurement methods, such as clinical assessments or physiological indicators, to enhance the reliability of the results. Last, given that cultural factors might exert an influence on the manifestation of attachment styles, spousal support, and their consequences on PPD, subsequent research should investigate the role of these variables in diverse cultural settings.

Our study emphasizes the significant role of prenatal spousal support in preventing PPD, particularly among women with secure attachment types. Our results show that spousal support is an independent predictor of PPD, with its impact remaining significant even after controlling for factors such as age, income, employment status, attachment type, prenatal depression, and anxiety. Additionally, we found that attachment type is an important interaction factor in how spousal support influences PPD, with women with secure attachment types showing a more pronounced protective effect when receiving spousal support. These findings offer valuable insights for clinical practice, highlighting the imperative to prioritize the enhancement of both the quality and quantity of spousal support in the design and execution of interventions aimed at averting PPD. Moreover, considering the influence of attachment types, personalized intervention measures may be more effective.

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