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Postprint: Meta-Analysis of the Relationship Between Personality Traits and Postpartum Depression

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Abstract

Objective To explore the relationship between different personality traits and postpartum depression.

Methods A computer-based search was conducted on Web of Science, PubMed, EBSCOhost, Embase, PsycInfo (Proquest), CNKI, Wanfang, and VIP databases. Studies on the relationship between different personality traits and postpartum depression published from database inception to June 4, 2021 were retrieved. After literature quality assessment, relevant data were extracted. Stata 16.0 was used for meta-analysis. Subgroup analysis and publication bias tests were performed on the relationship between neuroticism and postpartum depression. Sensitivity analysis on the relationship between different personality traits and postpartum depression was conducted using random-effects and fixed-effects models.

Results A total of 19 studies were included in the meta-analysis. The meta-analysis results showed that the ORs for the relationship between personality traits of neuroticism, vulnerability, extraversion, openness, avoidance, and dependency with postpartum depression were 1.30 (95%CI: 1.20, 1.40), 1.39 (95%CI: 1.10, 1.76), 0.86 (95%CI: 0.77, 0.97), 0.94 (95%CI: 0.9, 0.98), 6.27 (95%CI: 2.55, 15.40), and 7.71 (95%CI: 1.62, 31.14), respectively. Subgroup analysis results indicated that different cutoff values of the Edinburgh Postnatal Depression Scale (EPDS) and different timing of postpartum depression surveys were sources of heterogeneity in the pooled results. Sensitivity analysis results showed that the pooled results for personality traits other than obsessive personality were reliable.

Conclusion Different types of personality traits have varying effects on postpartum depression, among which neuroticism and vulnerability are risk factors for postpartum depression; extraversion and openness are protective factors for

postpartum depression; postpartum depression in women with neurotic personalities may be more severe and more likely to occur after 12 weeks postpartum. Due to inconsistent research findings domestically and internationally, further investigation is needed in the future to explore the relationship between avoidant, dependent, and obsessive-compulsive personality disorders and postpartum depression.

Full Text

Preamble

A Meta-Analysis of the Relationship Between Different Personality Traits and Postpartum Depression

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Abstract

Objective: To explore the relationships between different personality traits and postpartum depression (PPD).

Methods: We systematically searched Web of Science, PubMed, EBSCOhost, Embase, PsycInfo (ProQuest), CNKI, Wanfang, and VIP databases for studies examining the relationship between personality traits and postpartum depression from inception to June 4, 2021. After literature quality assessment, relevant data were extracted. Meta-analysis was performed using Stata 16.0. Subgroup analysis and publication bias tests were conducted for the relationship between neuroticism and PPD. Sensitivity analysis of the relationships between different personality traits and PPD was performed using both random-effects and fixed-effects models.

Results: Nineteen studies were included in the meta-analysis. The pooled odds ratios (ORs) for the relationships between personality traits and PPD were: neuroticism OR = 1.30 (95% CI: 1.20, 1.40), vulnerability OR = 1.39 (95% CI: 1.10, 1.76), extraversion OR = 0.86 (95% CI: 0.77, 0.97), openness OR = 0.94 (95% CI: 0.90, 0.98), avoidant personality OR = 6.27 (95% CI: 2.55, 15.40), and dependent personality OR = 7.71 (95% CI: 1.62, 31.14). Subgroup analysis

revealed that different EPDS cutoff values and different PPD assessment timing were sources of heterogeneity. Sensitivity analysis showed that the pooled results were reliable for all personality traits except obsessive-compulsive personality.

Conclusion: Personality traits have differential effects on PPD. Neuroticism and vulnerable personality are risk factors for PPD, while extraversion and openness are protective factors. Women with neurotic personalities may experience more severe PPD and are more likely to develop PPD after 12 weeks postpartum. Due to inconsistent findings across domestic and international studies, further research is needed to explore the relationships between avoidant, dependent, and obsessive-compulsive personality disorders and PPD.

Keywords: Personality; Postpartum depression; Meta-analysis

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1. Methods

1.1 Inclusion and Exclusion Criteria

Inclusion criteria: (1) Studies using scales or diagnostic tools to measure both PPD and personality traits; (2) Articles published in Chinese or English; (3) Literature quality assessment results of medium quality or above; (4) For literature reporting on the same population, only the optimal study was included; (5) Studies providing odds ratios (OR) and 95% confidence intervals (CI), or where OR values and 95% CI could be obtained through data conversion, with adjusted OR values and 95% CI preferred.

Exclusion criteria: (1) Studies with insufficient data and no response from authors after contact; (2) Duplicate publications; (3) Reviews or meta-analyses.

1.2 Search Strategy

We searched Web of Science, PubMed, EBSCOhost, Embase, PsycInfo (ProQuest), CNKI, Wanfang, and VIP databases using subject headings. English search terms: ("perinatal depression" OR "postpartum depression" OR "postnatal depression") AND ("temperature" OR "character" OR "obsessive" OR "compulsive" OR "personality"). Chinese search terms: ("人格" OR "性格" OR "个性" OR "强迫") AND ("产后抑郁" OR "产褥期抑郁" OR "围产期抑郁" OR "产妇抑郁"). The search timeframe was from database inception to June 4, 2021.

1.3 Literature Quality Assessment Tools

The Newcastle-Ottawa Scale (NOS) was used for case-control and cohort studies, with scores of 0-4 considered low quality and 5-9 high quality. Cross-sectional studies were evaluated using the quality assessment tool recommended by the Agency for Healthcare Research and Quality (AHRQ), with scores of 0-3 considered low quality, 4-7 medium quality, and 8-11 high quality.

1.4 Literature Screening and Data Extraction Process

First, two authors independently screened titles and abstracts according to the inclusion and exclusion criteria. After cross-checking and discussion, studies with disagreements and eligible studies underwent full-text screening. Second, two authors independently reviewed full texts, extracted information, and evaluated literature quality. Third, the two authors cross-checked and discussed quality assessment results; disagreements were resolved by a third author when consensus could not be reached.

Extracted information included: author, publication year, country, PPD assessment timing, study design, age, inclusion and exclusion criteria, maternal and infant health status, measurement tools for PPD and personality, reasons for exclusion, sample size, OR values, and 95% CI.

1.5 Statistical Methods

EndNote X9 was used for literature management and duplicate removal; Stata 16.0 was used for meta-analysis. The I^2 statistic was used to reflect statistical heterogeneity of pooled effect sizes. Fixed-effects models were selected when $P > 0.1$ and $I^2 < 50\%$, while random-effects models were used when $P < 0.1$ and $I^2 \geq 50\%$. Subgroup analysis was conducted to explore sources of heterogeneity in the pooled results for the relationship between neuroticism and PPD. Sensitivity analysis was performed using both random-effects and fixed-effects models to examine the robustness of pooled results for different personality traits and PPD. Publication bias was assessed using Begg' s and Egger' s tests for traits with $ $10 studies. $P < 0.05$ was considered statistically significant.

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2. Results

2.1 Basic Characteristics and Quality Assessment Results of Included Studies

The search yielded 4,019 English articles and 692 Chinese articles. After removing 1,254 duplicates, 3,264 articles were excluded during initial screening. Following full-text review of 109 articles, 19 studies were ultimately included, covering nine personality traits: neuroticism (14 studies), extraversion (6 studies), agreeableness (5 studies), openness (4 studies), conscientiousness (4 studies), vulnerable personality (3 studies), obsessive-compulsive personality disorder (2 studies), avoidant personality disorder (2 studies), and dependent personality disorder (2 studies). All included studies were of medium quality or above (NOS ≥ 5, AHRQ ≥ 7). The literature screening flowchart is shown in [Figure 1: see original paper], and study characteristics and quality assessment results are presented in .

Note: EPQ = Eysenck Personality Questionnaire; NEO-FFI = NEO Five-

Factor Inventory; VPSQ = Vulnerable Personality Style Questionnaire; SCID = Structured Clinical Interview for DSM; SCID-II = Structured Clinical Interview for DSM-II; SIDP-IV = Structured Interview for DSM-IV Personality; SSP = Swedish Universities Scales of Personality; CPI = California Psychological Inventory; MPI = Maudsley Personality Inventory.

2.2 Meta-Analysis of the Relationship Between Personality Traits and PPD

Meta-analysis was conducted separately for nine personality traits and their relationship with PPD. Based on heterogeneity test results, random-effects models were selected for neuroticism, vulnerability, extraversion, obsessive-compulsive, and dependent personality due to substantial heterogeneity ($I^2 \geq 50\%$) [Figure 2: see original paper]. Fixed-effects models were used for openness, conscientiousness, agreeableness, avoidant personality, and dependent personality due to low heterogeneity ($I^2 < 50\%$) [Figure 3: see original paper].

Meta-analysis results indicated that neuroticism (OR = 1.30, 95% CI: 1.20, 1.40), vulnerable personality (OR = 1.39, 95% CI: 1.10, 1.76), dependent personality disorder (OR = 7.11, 95% CI: 1.62, 31.14), and avoidant personality disorder (OR = 6.27, 95% CI: 2.55, 15.40) were risk factors for PPD. Extraversion (OR = 0.86, 95% CI: 0.77, 0.97) and openness (OR = 0.94, 95% CI: 0.90, 0.98) were protective factors against PPD. No significant associations were found between PPD and agreeableness, conscientiousness, or obsessive-compulsive personality.

2.3 Subgroup Analysis

Subgroup analysis of the relationship between neuroticism and PPD was conducted by study region, measurement tools for PPD and neuroticism, EPDS cutoff values for PPD, PPD assessment timing, and study design. Since heterogeneity was low ($I^2 < 50\%$) for the pooled results of neuroticism and PPD assessed within one week postpartum, a fixed-effects model was used; random-effects models were applied to other subgroups due to high heterogeneity ($I^2 > 50\%$). Results showed that different EPDS cutoff values ($P = 0.028$) and different PPD assessment timing ($P = 0.008$) were sources of heterogeneity. Subgroup analysis results are presented in .

2.4 Sensitivity Analysis and Publication Bias

Sensitivity analysis was performed using both random-effects and fixed-effects models for the nine personality traits. Results showed that the pooled OR values and 95% CIs were similar across both models for eight personality traits, indicating robust and reliable meta-analysis results, except for obsessive-compulsive personality, which showed instability when the model was changed . Egger's test ($t = -2.49$, $P = 0.029$) and Begg' s test ($z = 0.60$, $P = 0.547$) for the relationship between neuroticism and PPD revealed evidence of publication bias.

3. Discussion

The meta-analysis demonstrated significant associations between PPD and neuroticism, extraversion, openness, vulnerability, avoidant personality, and dependent personality. The postpartum period involves changes in central neurotransmitter function related to mood and stressful life events such as employment changes, fatigue, and marital tension. According to Beck's diathesis-stress model, personality constitutes an internal diathesis for depression; individuals with poorer diathesis or higher vulnerability are more likely to trigger depression under stressful life events.

3.1 Relationship of Neuroticism, Extraversion, and Openness with PPD

Meta-analysis results identified neuroticism as a risk factor for PPD, while openness and extraversion served as protective factors. Numerous domestic and international studies have reported that women with neurotic personalities have higher PPD risk, while those with extraverted and open personalities have lower risk. Women with high neuroticism experience more distress in response to problems and negatively evaluate their social support, financial situation, and infant feeding capabilities. When facing stressful life events they cannot effectively manage, they exhibit strong or volatile emotional reactions, making them prone to negative emotions such as anxiety and depression. Unlike neurotic women who adopt avoidant coping strategies, extraverted women show lower emotional reactivity to stress and are more likely to seek social support, evaluate available resources, and express negative emotions to others, thereby alleviating PPD. Open individuals tend to respond flexibly to stress, sometimes with positive affect, and show good responsiveness to both psychotherapy and pharmacotherapy for depression. Domestic researchers have also noted that active coping styles adopted by open and extraverted mothers help mitigate PPD.

Subgroup analysis revealed that different EPDS cutoff values and PPD assessment timing were sources of heterogeneity in the pooled results for neuroticism and PPD, which differs from findings by Puyané et al. This discrepancy may be attributable to different PPD assessment timing and the inclusion of Chinese literature in our study. Our findings suggest that compared to before 12 weeks postpartum, women with neurotic personalities are more likely to develop PPD after 12 weeks postpartum, indicating the need for enhanced PPD screening beyond 12 weeks in this population. Additionally, subgroup analysis showed that neurotic women were more likely to have EPDS scores above 13 compared to above 9. A systematic review of EPDS cutoff values across countries found that women were more likely to be diagnosed with PPD when the EPDS cutoff was 12/13 compared to 9/10. Therefore, clinicians should be aware that PPD may be more severe in women with neurotic personalities.

3.2 Relationship of Vulnerability, Avoidant, Dependent, and Obsessive-Compulsive Traits with PPD

The nine-item Vulnerable Personality Style Questionnaire (VPSQ) developed by Boyce et al. measures nine personality traits related to PPD. Avoidant, dependent, and obsessive-compulsive personality disorders share similarities with the vulnerability subscale of VPSQ, which comprises items related to neuroticism, timidity, anxiety, obsession, and instability. Previous research has identified avoidant, dependent, and obsessive-compulsive personality disorders as the most common Axis II diagnoses in depressed patients. Our meta-analysis also found that vulnerable personality and avoidant, dependent, and obsessive-compulsive personality disorders are risk factors for PPD. Individuals with vulnerable personalities characterized by interpersonal anxiety and lack of confidence, as well as those with avoidant, dependent, and obsessive-compulsive personality disorders, may adopt maladaptive coping strategies when facing postpartum stress, increasing PPD vulnerability. However, while our results showed avoidant and dependent personality disorders and vulnerable personality as risk factors, the relationship between obsessive-compulsive personality and PPD was unstable. International studies have reported no association between PPD and obsessive-compulsive or avoidant personality, but a positive association with dependent personality, while domestic studies have found associations between major depression and obsessive-compulsive and avoidant personality, but not dependent personality. Given these inconsistencies, further research is needed to explore relationships between different personality disorder types and depression.

3.3 Research Prospects and Limitations

This meta-analysis elucidated relationships between different personality traits and PPD, providing a theoretical basis for clinical identification of at-risk women. Previous research indicates that personality disorders are stable and difficult to treat, while coping styles, rumination, empathy, life events, and negative automatic thoughts may mediate the relationship between maladaptive personality traits and depression. Future research should investigate these mechanisms in maternal populations to inform prevention and intervention strategies. Subgroup analysis suggests that women with neurotic personalities are more likely to develop PPD after 12 weeks postpartum, potentially with greater severity, highlighting the need for clinical attention to both timing and severity of PPD in this group.

This study included 19 studies and conducted sensitivity analysis using both models for nine personality traits. Except for unstable results for obsessive-compulsive personality, similar pooled OR values across both models indicate robust and reliable meta-analysis results. However, several limitations exist: First, substantial heterogeneity in some results may be related to different measurement tools for PPD and personality, study populations, and designs. Second, publication bias was detected in the pooled results for neuroticism and PPD, possibly due to language bias from restricting inclusion to Chinese and English

literature. Third, PPD evolves over time postpartum, but most included studies assessed PPD within one year, with wide time spans that may contribute to heterogeneity. Fourth, except for avoidant, dependent, and obsessive-compulsive personality disorders and some PPD diagnoses obtained through structured interviews, most assessments were self-report scales susceptible to social desirability bias.

4. Conclusion

Based on this meta-analysis, neuroticism and vulnerable personality are risk factors for PPD, while extraversion and openness are protective factors. The relationships between avoidant, dependent, and obsessive-compulsive personality traits and PPD require further investigation. Future PPD risk screening and research should consider the influence of different personality traits on PPD severity. Identification of neuroticism, vulnerability, avoidant, and dependent personality traits can facilitate early diagnosis and treatment of PPD.

5. Author Contributions

Yuan Dehui, Dong Yuanyuan, and Wang Minghuan conducted literature screening, data extraction, and quality assessment. Yuan Dehui performed data analysis and manuscript writing. Li Yuhong supervised manuscript writing, was responsible for quality control and review, and takes overall responsibility for the article.

6. Conflict of Interest

The authors declare no conflict of interest.

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