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Cross-Cultural Neuroendocrine Perspectives on Postpartum Depression: Social Support, Resilience, and Cultural Contexts

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Abstract. Postpartum depression (PPD) remains an unresolved issue in public health, continuing to exert a significant psychological impact on pregnant women worldwide. PPD is not only associated with neuroendocrine regulation but is also substantially influenced by sociocultural factors. Furthermore, increasing evidence suggests that cultural backgrounds may contribute to PPD development, emerging as a new avenue for understanding maternal mental health issues. This study employed a social network approach and key factor analysis to systematically integrate sociocultural variables and comprehensively examine the interactions among humanistic, social, and neuroendocrine pathways. Findings reveal that family caregiving and shared responsibilities in collectivist cultures typically provide sustained, predictable, low-stress environments that promote HPA axis regulation. Conversely, individualistic cultures emphasise the individual's perception of societal support, where the protective effect of social support depends more on the perceived quality of social relationships. Consequently, the probability of developing PPD is higher in such contexts. Finally, based on the above analysis, this study proposes a culturally responsive assessment framework to translate the model into a practical tool. Through the design of a questionnaire survey, we seek to provide information for PPD prevention and the identification of intervention strategies.

Keywords: Postpartum depression, Cultural neuroscience, Social support, HPA axis

1. Introduction

Postpartum depression (PPD) is a common mood disorder that affects nearly 17% of women after delivery, with significant consequences for maternal health [1]. Unlike transient postpartum depression, PPD is a serious psychiatric disorder that can have long-term effects not only on the mother but also on the child's development, including cognitive, emotional, and behavioral outcomes [2]. Previous explanatory models have emphasized the dramatic changes in estrogen and progesterone levels during labor and have portrayed postpartum depression primarily as a disorder caused by hormonal fluctuations. However, these biological perspectives are insufficient to provide insight into the significant cultural differences observed in the prevalence and clinical presentation of postpartum depression [3]. This limitation has encouraged a shift in scholarly focus, integrating sociocultural factors within current etiological frameworks [4].

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Among various psychosocial influences, social support emerges as a key protective factor against PPD, while its lack consistently predicts a higher risk of the disorder. Concurrently, scientific evidence from the neuroscience field link sPPD to dysregulated neuroendocrine pathways, including increased HPA axis activity, an anomalousinflammatory response, and a disrupted oxytocin function, all of which have a significant, though different, impact on pathophysiology [1,5]. To unify these social and biological insights, this study adopts a cultural neuroscience lens to explore how culturally embedded social contexts interact with neuroendocrine mechanisms to exacerbate or alleviate perinatal depressive symptoms.

Guided by this integrative approach, I develop a theoretical model examining how cultural values and practices modulate the effects of social support on stress and resilience neurobiology during the perinatal period. By systematically synthesizing empirical literature across disciplines, this review aims to advance culturally informed explanations of PPD etiology and contribute to designing more effective, culturally grounded interventions for women worldwide.

2. Neuroendocrine mechanisms of PPD

Emerging evidence suggests that postpartum depression (PPD) involves more than fluctuations in estrogen and progesterone—it is primarily driven by a profound dysregulation of the body's stress response system [2]. A core component of this dysregulation involves impaired functioning of the hypothalamic-pituitary-adrenal (HPA) axis—a central system in managing physiological stress. Despite the common progression of increased HPA activity that follows delivery, this pattern is oftenrupted in women who later develop PPD [3]. Research has shown that these individuals tend to sustain HPA axis abnormalities well into the postpartum period, often exhibiting persistently higher cortisol levels—a primary hormonal marker of this pathway—as measured in both plasma and saliva relative to non-depressed postpartum controls. This sustained hypercortisolemia is additionally associated with diurnal changes in cortisol rhythm and may lead to neurological changes in the hippocampus, which would promote the development of PPD symptoms [2].

In contrast, oxytocin is increasingly recognized for its influence on parturition, breastfeeding, and the expression of maternal caregiving behaviors. Therefore, systemic dysfunction of oxytocin can significantly impact the mother's psychological and physiological health. Research indicates that lower perinatal maternal plasma oxytocin levels, influenced by specific genetic polymorphisms, elevate PPD risk [4]. Within the HPA axis, oxytocin inversely modulates its activity, reducing communication and promoting maternal-infant bonding. As a result, the deficiency of oxytocin directly diminishes the capacity to buffer stress and decreases the mother's behavioral motivation [5].

Finally, recent studies indicate that immune inflammation also plays a significant role in depression. While postpartum women naturally experience a mild inflammatory state after childbirth, PPD patients often exhibit elevated levels of pro-inflammatory cytokines such as IL-6, TNF-α, and CRP. These cytokines can cross the blood-brain barrier, further disrupting neurotransmitter metabolism and intensifying depressive symptoms.

3. Social support as a neuroendocrine modulator

Postpartum social support directly impacts women's mental health. This social support is not abstract but can directly influence measurable neuroendocrine changes, thereby regulating the mechanisms above. First, social support is closely linked to the HPA axis [6]. A meta-study showed that higher perceived social support was associated with lower basal cortisol levels and faster

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cortisol stress responses [7]. Additionally, a perinatal study found that mothers receiving greater family and partner support postpartum typically exhibited lower cortisol levels and reduced incidence of psychological disorders and severe PPD [8]. Medical research demonstrates that positive social interactions and increased physical contact, such as hugging and soothing, can enhance oxytocin production in pregnant women [9]. As a result, social support can enhance the mother's resilience to depression and anxiety, this will in turn have a positive effect on their mental health [8-9]. Finally, social support is linked to inflammation. Significant feelings of social isolation and psychological loneliness can elevate inflammatory factor levels in the body [8]. Conversely, elevated inflammatory factors may also increase patients' sense of social isolation. While the current impact of inflammatory factors on pregnant women is limited, numerous studies have demonstrated a strong association between this response and the downregulation of inflammatory factors.

4. The impact of cultural moderation on the perinatal period

Contemporary society is a richly diverse cultural system, with different nations exhibiting varied social cultures such as collectivism and individualism. The perceptions of people are inevitably affected by their culture, which directly affects their understanding and behavior during the perinatal period and their perception of support [10].

For instance, in East Asian countries like China and South Korea, Latin American cultures, and African societies, well-established “postpartum care” traditions exist—such as China's “sitting the month.” These customs typically view women as exceptionally vulnerable after childbirth, requiring an extended recovery period. Other family members—such as the mother or mother-in-law—provide comprehensive care [9,11]. This care encompasses all aspects of daily life, including cooking, cleaning, infant care, and emotional support [12]. This social support is primarily considered a family's responsibility and obligation in these cultures. New mothers typically accept and rely on this assistance, which is often perceived as an important indicator of family health. This cultural climate following childbirth undoubtedly offers mothers a significant emotional support [12,13].

Another prevalent model is individualistic culture, typically found in North America and Western Europe. The nuclear family—spouses and children—is considered more independent in these regions. Consequently, postpartum support is expected primarily from the spouse [11]. If spousal support is unavailable for objective reasons, it is more likely to be sourced from friends or paid postpartum caregivers and cleaning services. Individualistic cultures typically advocate for safeguarding and preserving the autonomy and personal space of new mothers [14]. However, this model also implies smaller, more independent social support networks. The mother's perspective emphasises her ability to establish and maintain relationships [15]. When core spousal support is insufficient, mothers are more likely to feel socially isolated and marginalized, increasing their susceptibility to anxiety, depression, and ultimately PPD.

Despite significant methodological challenges due to the absence of uniform cultural measurement standards, some researchers have identified associations between cultural differences and PPD incidence rates [13,14]. For instance, scholars have noted lower PPD rates in East Asian societies compared to Western countries, attributing this to the collective nature of East Asian cultures that enables mothers to receive better care [10]. Consequently, cultural factors play an important, non-determinative role across cultures.

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5. Building an integrated model

Based on the above analysis, it attempts to establish an integrated cultural neuroscience model by considering multiple perspectives and synthesising cultural, social, neural, and psychological dimensions. Given the two distinct cultures discussed in this paper, this model can be divided into Path A for collectivist cultures and Path B for individualist cultures.

First, within the collectivist cultural context, highly institutionalized family support significantly reduces the practical burdens and role pressures mothers face. To prevent the development of anxiety and depression in this context, high-frequency positive social interactions, which are sometimes accompanied by physical contact, can increase the release of oxytocin in pregnant women. Adequate levels of oxytocin inhibit the excessive activation of the HPA axis, this is done by decreasing the levels of inflammation-related factors and decreasing the responses to inflammation. This series of neural network adjustments significantly reduces the mother's physiological stress levels, and the neuroendocrine system stabilizes. This ultimately lowers the risk of PPD and enhances psychological resilience.

Additionally, in individualistic cultures, social support heavily relies on individualized, voluntarily constructed networks, particularly the quality of spousal support. Thus, if this support network is robust and responsive, it can establish a positive feedback loop similar to Pathway A. However, if the network is fragile or perceived support is inadequate, the mother may experience heightened loneliness and stress. This leads to sustained HPA axis activation, elevating inflammation levels. Concurrently, cortisol levels surge significantly, causing more frequent depressive and anxious moods, thereby increasing PPD risk.

In summary, the integrated model proposed in this article emphasizes that culture does not directly cause PPD. Instead, it influences maternal neurocircuitry by modulating a form of social support, ultimately leading to different psychological outcomes.

6. Development of the practice assessment tool

Based on the above analysis and model construction, this study concludes that cultural factors must be critical in preventing and treating PPD. As a result, this paper propose creating a Perinatal Support andultural Alignment Questionnaire (PSCAQ) that will allow a more individualized understanding of the impact of culture onPPD [16]. This questionnaire will initially comprise four modules:

(1) Module 1: Characteristics of Social Support Networks

This section will list sources such as spouse, parents (in-laws), other relatives, friends, and paid services. Mothers will rate the frequency of support received from each source within the first month postpartum. Responses will be categorized into five levels: 1 = Never, 5 = Always. Each option will further subdivide support into three types: instrumental support (e.g., household chores, cooking, infant care), emotional support (e.g., listening to concerns, offering comfort and encouragement), and informational support (e.g., providing parenting knowledge, health advice). Finally, satisfaction with support will be integrated into a 0-100 point rating system for the current level of support, thereby capturing the mother's subjective data.

(2) Module 2: Cultural Value Orientation

This module uses 10 to 12 questions to measure a person’s natural tendencies across four cultural dimensions:

(a) Horizontal Collectivism (HC): Values equality and harmony within groups. Example: “I share my troubles with those close to me.”

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(b) Vertical Collectivism (VC): Emphasizes respecting hierarchy and sacrificing for the group. Example: “I usually obey elders' decisions even if I disagree.”

(c) Horizontal Individualism (HI): Values self-reliance and equality. Example: “I prefer to rely on myself rather than others.”

(d) Vertical Individualism (VI): Focuses on competition and standing out. Example: “Winning in competitions is important to me.”

The module looks at the mother’s inherent cultural outlook—not her ethnic or national background.

(3) Module 3: Support-Cultural Fit

This part of the assessment looks at how well the support a mother receives matches her cultural preferences. It uses realistic scenarios to ask what she would prefer.

For those with strong collectivist values:

“After giving birth, if I’m feeling down, I would rather:

(a) have my family notice and stay with me without me having to ask, or

(b) receive comfort only if I specifically request it.”

For those who are more individualistic:

“When it comes to caring for my baby, I prefer:

(a) figuring things out on my own, with help available if I ask, or

(b) getting advice from older relatives before I even ask.”

(4) Module 4: Perinatal Cultural Practices

Finally, it explores broader cultural identity by asking how much individuals follow and relate to specific traditions—like “postpartum confinement” or “La Cuarentena”—and whether they find these practices supportive or stressful.

Thus, the PSCAQ developed in this phase serves as a research tool to validate the theoretical model proposed in large-scale cross-sectional or longitudinal studies and as a direct means to investigate the impact of support-cultural fit on neuroendocrine markers and psychological outcomes. This precise assessment enables personalized interventions, thereby enhancing their effectiveness.

7. Conclusion

This study systematically constructed a theoretical framework grounded in cultural neuroscience to elucidate the complex interactions among social support, culture, neuroendocrine processes, and psychological resilience during the perinatal period. Through a literature review, the paper clarifies that social support influences PPD onset by regulating neuroendocrine mechanisms such as the HPA axis and oxytocin system.Additionally, the cultural context alters the way the support system is presented and perceived as being effective within it. As a result, it developed a comprehensive cultural neuroscience model that takes into consideration cultural, social, neurological, and psychological components. Furthermore, it proposes a detailed design for the Perinatal Social Support and Cultural Compatibility Questionnaire (PSCAQ) to overcome limitations in current measurement tools and translate theory into practice. This questionnaire aims to quantify the degree of alignment between social support and individual cultural orientation, which holds promise for predicting PPD risk more effectively than traditional support measures. Looking forward to having the opportunity to complete this experiment in the future, it could be a direction.

Therefore, future research should focus on two primary directions: First, conduct prospective longitudinal studies to empirically test the theoretical model proposed herein, particularly by collecting data using the PSCAQ and physiological indicators (e.g., cortisol, oxytocin) to validate

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the predictive validity of the cultural fit index. Second, based on PSCAQ assessment results, develop and validate culturally adaptive psychosocial intervention programs. Examples include communication skills training for families experiencing “cultural mismatch” or connecting individualistic-oriented mothers with insufficient support to peer support groups.

In conclusion, incorporating cultural elements into perinatal mental health assessment and intervention is crucial for precise PPD prevention and treatment. This study's framework and tools offer a scientific approach to achieving this.

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