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Maternal mental health: The relationship between postpartum depression, parenting stress, and mother-infant bonding

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Abstract

Postpartum depression (PPD) is a childbirth complication that can adversely affect maternal functioning, parenting, and infant development. However, relationships among PPD, parenting stress, and mother–infant bonding remain insufficiently understood. This study examined these relationships among mothers in southern Nigeria. A cross-sectional correlational survey design was adopted. Participants were 280 postpartum mothers ($M = 29.74$, $SD = 5.92$) recruited from health facilities. Data were collected using the Edinburgh Postnatal Depression Scale (EPDS), Parenting Stress Index–Short Form (PSI-SF), and Postpartum Bonding Questionnaire (PBQ). Descriptive statistics, Pearson correlation, and multiple linear regression were conducted using SPSS version 26.0. PPD was positively associated with parenting stress ($r = .52$, $p < .01$) and negatively associated with mother–infant bonding ($r = –.48$, $p < .01$). Parenting stress was also negatively associated with bonding ($r = –.39$, $p < .01$). The regression model was significant, $F(3, 276) = 42.15$, $p < .001$, explaining 31% of the variance in bonding (adjusted $R^2 = .31$). PPD was the strongest predictor of impaired bonding ($\beta = –.34$, $p < .001$), followed by parenting stress ($\beta = –.22$, $p < .001$). These findings identify PPD and parenting stress as significant correlates of poorer mother–infant bonding. Maternal healthcare facilities should incorporate routine PPD screening, establish referral pathways for mothers experiencing depressive symptoms, and provide counselling and parenting support. Integrated psychosocial interventions addressing depressive symptoms and parenting stress may strengthen mother–infant relationships. Training healthcare professionals to recognise maternal distress and assess bonding difficulties may improve identification and care for mothers and infants.

Keywords: Maternal mental health, Mother-infant bonding, Parenting stress, Postpartum depression

1. Introduction

Maternal mental health during the postpartum period is a critical determinant of both maternal well-being and the developmental trajectory of the infant. The transition to motherhood, often described as *matrescence*, involves profound biological, psychological, and social adjustments that place women at heightened vulnerability for psychological distress (Dennis et al., 2017). Postpartum depression (PPD) is among the most common complications of childbirth, affecting approximately 10–15% of mothers worldwide, with prevalence rates considerably higher in low- and middle-income countries, where estimates range from 19% to as high as

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41% (O'Hara & McCabe, 2013; World Health Organization, 2014; Gelaye et al., 2016). PPD is characterized by persistent sadness, anhedonia, fatigue, feelings of worthlessness, and in severe cases, negative cognitions about the self and the infant (American Psychiatric Association, 2013; Slomian et al., 2019).

The consequences of untreated PPD extend beyond the mother. A growing body of evidence demonstrates that PPD disrupts early mother–infant interactions, reducing maternal sensitivity and emotional availability, and impairing the formation of a secure affective bond (Field, 2010; Slade et al., 2020). The mother–infant bond, defined as the emotional tie between mother and child that develops during the first months after birth, is foundational for the child's cognitive, social-emotional, and physical development (Klaus & Kennell, 1982; Brockington et al., 2006). When bonding is disrupted, infants face elevated risks of insecure attachment, behavioral difficulties, and longer-term psychopathology (Goodman et al., 2011; Zeanah et al., 2017).

Parenting stress constitutes another key variable in this dynamic. It refers to the stress experienced within the parenting role when perceived parental demands exceed available resources (Abidin, 1995; Deater-Deckard, 1998). Postpartum mothers experiencing depression frequently report heightened parenting-related stress, including parental distress, dysfunctional parent–child interactions, and perceptions of the infant as difficult (Richards et al., 2024). Elevated parenting stress, in turn, is associated with poorer bonding outcomes, creating a possible pathway through which PPD undermines the mother–infant relationship (Biaggi et al., 2021; Pazzagli et al., 2023). Recent evidence further suggests that the quality of the mother–infant bond may itself mediate the effect of maternal depressive symptoms on parenting stress, underscoring the interdependence of these constructs (Pazzagli et al., 2023).

Despite these established associations, much of the empirical literature on PPD, parenting stress, and bonding derives from high-income countries, with limited data from sub-Saharan Africa, where socioeconomic hardship, limited mental health infrastructure, and cultural expectations surrounding motherhood may shape these relationships differently (Gelaye et al., 2016; Oyetunji & Chandra, 2020). Understanding how postpartum depression and parenting stress jointly relate to mother–infant bonding in this context is essential for designing culturally appropriate screening and intervention programs.

Accordingly, the present study sought to examine the relationship between postpartum depression, parenting stress, and mother-infant bonding among postpartum mothers. It was hypothesized that: (1) postpartum depression would be positively associated with parenting stress; (2) postpartum depression and parenting stress would each be negatively associated with mother-infant bonding; and (3) postpartum depression and parenting stress would jointly predict mother–infant bonding quality.

2. Literature review

2.1. Postpartum depression

Postpartum depression is a non-psychotic depressive episode occurring within the first twelve months following childbirth (American Psychiatric Association, 2013). Unlike the transient "baby blues," which affect up to 80% of mothers and resolve within two weeks, PPD persists and meets diagnostic criteria for a major depressive episode, with onset typically occurring within the first three months postpartum (O'Hara & McCabe, 2013). Symptoms include low mood, loss of interest or pleasure, changes in appetite and sleep, psychomotor changes, fatigue, guilt or feelings of worthlessness, poor concentration, and, in severe presentations, suicidal ideation (American Psychiatric Association, 2013).

The etiology of PPD is multifactorial. Biological theories emphasize rapid hormonal withdrawal after delivery, particularly the sharp decline in estrogen and progesterone, alongside dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis (Bloch et al., 2000; Yim et al., 2015). Psychological theories highlight preexisting vulnerabilities, including low self-esteem, childhood trauma, and maladaptive cognitions

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(Beck, 2001). Social and contextual risk factors include lack of partner or social support, low socioeconomic status, unplanned pregnancy, obstetric complications, intimate partner violence, and sleep deprivation (Lancaster et al., 2010; Coates et al., 2014; Gelaye et al., 2016).

The consequences of PPD are substantial. For mothers, PPD is associated with impaired functioning, reduced quality of life, and elevated risk of chronic depression (Vliegen et al., 2014). For infants, exposure to maternal depression in the early postpartum period is linked to poor developmental outcomes, including deficits in emotional regulation, cognition, and attachment security (Grace et al., 2003; Goodman et al., 2011). Within the mother–infant dyad, depressed mothers have been observed to be less sensitive, more intrusive, and less contingently responsive to their infants' cues, which directly undermines bonding and the development of secure attachment (Field, 2010; Slade et al., 2020). A recent study by Richards et al. (2024) found that depressed mothers reported significantly higher levels of parenting-related stress and bonding impairments compared to non-depressed mothers, even when observable differences in dyadic interaction quality were not always present, suggesting that subjective distress and negative self-perceptions are central features of the experience of PPD.

2.2. Parenting stress

Parenting stress is defined as the aversive psychological reaction to the demands of parenting when the parent's perceived resources are insufficient to meet those demands (Abidin, 1995; Deater-Deckard, 1998). Abidin's (1995) parenting stress model identifies three core domains: parental distress (the stress experienced in the parental role), parent–child dysfunctional interaction (dissatisfaction with the parent–child relationship), and difficult child (perceptions of the child as demanding or difficult). High levels of parenting stress are common in the postpartum period, when mothers face sleep disruption, physical recovery, role transitions, and the demands of a dependent infant (Neece et al., 2012).

Parenting stress is both a correlate and a consequence of maternal psychological distress. Mothers experiencing PPD consistently report elevated parenting stress across all three PSI domains (Mileva-Seitz et al., 2016; Richards et al., 2024). The relationship is likely bidirectional: depression undermines coping capacity and self-efficacy, making ordinary caregiving demands feel overwhelming, while chronic parenting stress depletes emotional resources and may precipitate or exacerbate depressive symptoms (Crmic & Low, 2002; Ponnet et al., 2013). Parenting stress also interacts with infant characteristics; difficult infant temperament (crying, fussiness, poor soothability) amplifies maternal stress, particularly in mothers with low social support (Biaggi et al., 2021).

Critically, parenting stress has been identified as a pathway through which maternal depression affects child outcomes. High parenting stress reduces maternal sensitivity and responsiveness and increases the risk of harsh or withdrawn parenting behaviors, thereby impairing the quality of mother–infant interactions (Crandall et al., 2016; Pazzagli et al., 2023). Interventions that reduce parenting stress, including psychoeducation, nurse-led home visiting, and relational coaching, have been shown to improve maternal mood and mother–infant interaction quality (Letourneau et al., 2012; Biaggi et al., 2021), highlighting the clinical significance of this construct.

2.3. Mother-infant bonding

Mother–infant bonding refers to the development of an enduring emotional tie between a mother and her infant, formed through repeated affective exchanges, proximity, and caregiving during the early postpartum period (Klaus & Kennell, 1982; Condon, 1993). Although conceptually distinct from attachment, which is a relational process that consolidates over the first year of life, bonding is regarded as the affective precursor to attachment,

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and impairments in bonding are associated with insecure attachment patterns, emotional withdrawal, and, at the extreme end, infant neglect or abuse (Brockington et al., 2006; Zeanah et al., 2017).

Bonding disturbances exist on a continuum from mild impairment to bonding disorder and, in severe cases, rejection of the infant and pathological anger (Brockington et al., 2001). The Postpartum Bonding Questionnaire (PBQ), developed by Brockington et al. (2001), is the most widely used instrument for assessing bonding difficulties and includes subscales of impaired bonding, rejection and anger, infant-focused anxiety, and incipient abuse. Bonding difficulties are associated with a range of maternal factors, including depression, anxiety, traumatic birth experiences, poor sleep, and low social support, as well as infant factors such as preterm birth and difficult temperament (Reck et al., 2006; Sliwerski et al., 2020).

From an attachment-theoretical perspective, sensitive and responsive maternal caregiving is the mechanism through which a secure bond is formed (Bowlby, 1969; Ainsworth, 1978). Maternal depression disrupts this mechanism: depressed mothers show reduced positive affect, less contingent responsiveness, and greater intrusiveness or withdrawal during interactions (Field, 2010; Slade et al., 2020). Recent large-scale evidence confirms that depressive symptoms are the strongest negative predictor of bonding quality, outweighing obstetric and demographic variables (Oddo-Sommerfeld et al., 2025). Importantly, bonding difficulties are amenable to early intervention; screening with the PBQ alongside the EPDS enables early identification of at-risk dyads, and psychosocial interventions such as cognitive-behavioral therapy, interpersonal therapy, and nurse-led relational support have demonstrated efficacy in improving bonding outcomes (Milgrom et al., 2015; McDonald & Tough, 2021).

2.4. Empirical studies related to postpartum depression, parenting stress, and bonding

A substantial and growing body of empirical research links PPD, parenting stress, and mother–infant bonding. In an early meta-analysis of PPD predictors, Beck (1996) identified childcare stress and lack of social support among the strongest predictors of depressive symptomatology in postpartum women, establishing parenting-related stress as a central correlate of PPD. O'Hara and McCabe (2013), reviewing two decades of research, confirmed the robust association between postpartum stress and depression, while noting that the mechanisms linking depression to adverse mother–infant outcomes warranted further investigation.

More recent studies have directly examined these interrelationships. Biaggi et al. (2021), in a prospective study of women at risk of postpartum psychosis, found that parenting stress and psychiatric symptoms significantly restricted mothers from achieving their expected level of bonding with their infants, with at-risk mothers reporting substantially higher parenting stress than healthy controls. Similarly, Mileva-Seitz et al. (2016) found that maternal depressive symptoms and difficult infant temperament jointly predicted impaired bonding in a large community sample.

Pazzagli et al. (2023) investigated the mediating role of bonding in the relationship between postpartum depressive and anxious symptoms and parenting stress in a community sample of 105 mothers assessed at three months postpartum. Their mediation analyses showed that mother–infant bonding (assessed with the Maternal Postnatal Attachment Scale) partially mediated the effects of depressive symptoms on parenting stress, and fully mediated the effect of trait anxiety, demonstrating the interdependence of these constructs. In a related line of work, Richards et al. (2024) compared depressed and non-depressed mothers of 2- to 6-month-old infants and found that depressed mothers reported markedly higher parenting stress across all PSI-4-SF domains and significantly greater bonding impairment (PBQ), underscoring the subjective burden experienced by depressed mothers even when observable dyadic interactions were not significantly different.

Large-scale recent studies have reinforced the primacy of depression as a risk factor for impaired bonding. A 2025 study of 1,495 mothers during the first postpartum year found that depressive symptoms were the

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strongest negative predictor of bonding quality (β = –0.48), with poor sleep, low partner support, and low social support also contributing (Oddo-Sommerfeld et al., 2025). Other recent work has extended these findings by identifying parental phubbing as a partial mediator of the association between postpartum depression symptoms and mother–infant bonding disorder among mothers of infants younger than 12 months (Andrei & Enea, 2026), and by demonstrating that parenting self-efficacy mediates the association between postpartum depression and maternal–infant bonding, both independently and through serial mediation involving mentalizing (Qi et al., 2025). In African contexts, evidence remains comparatively sparse but growing. Studies from Ethiopia, Ghana, Nigeria, and South Africa have reported high PPD prevalence rates and identified low social support, intimate partner violence, and low socioeconomic status as key correlates (Gelaye et al., 2016; Adjaye-Gbewonyo et al., 2018). However, few studies have simultaneously examined PPD, parenting stress, and bonding within the same framework in sub-Saharan Africa. The present study addresses this gap.

3. Research method

3.1. Research design

This study adopted a cross-sectional correlational survey design. The aim was to examine the relationships among postpartum depression, parenting stress, and mother–infant bonding among postnatal mothers. The design enabled the researchers to collect data at a single point in time, making it appropriate for identifying associations between the psychological variables of interest within a community and clinical postpartum population.

3.2. Participants

The sample comprised 280 postpartum mothers recruited from maternal and child health facilities in southern Nigeria. The participants' ages ranged from 18 to 45 years (M = 29.74, SD = 5.92). Of the total sample, 52.1% were primiparous (first-time mothers), and 47.9% were multiparous. The infants' ages ranged from 4 to 20 weeks at the time of data collection. Inclusion criteria required that participants: (1) were within 12 months postpartum, (2) were the biological mother of the infant, and (3) were willing to provide written informed consent. Mothers with a current psychotic disorder, severe medical complications, or infants requiring intensive care were excluded from the study.

3.3. Instruments

Edinburgh Postnatal Depression Scale (EPDS)

Postpartum depressive symptoms were assessed using the Edinburgh Postnatal Depression Scale (Cox et al., 1987), a 10-item self-report instrument widely used for screening depressive symptoms in the postpartum period. Each item is rated on a 4-point scale (0–3), yielding a total score from 0 to 30, with higher scores indicating greater depressive symptom severity. A cut-off of ≥13 was used to identify probable postpartum depression (Cox et al., 1987; Gibson et al., 2009). The EPDS has demonstrated good psychometric properties across diverse populations (Gibson et al., 2009), and in the present study, Cronbach's alpha was .84.

Parenting Stress Index–Short Form (PSI-SF)

Parenting stress was measured using the Parenting Stress Index–Short Form (Abidin, 1995), a 36-item self-report instrument yielding a total stress score and three subscale scores: Parental Distress, Parent–Child Dysfunctional Interaction, and Difficult Child. Items are rated on a 5-point Likert scale, with higher scores indicating greater parenting stress. The PSI-SF has been validated internationally, including in postpartum and

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African samples (Abidin, 1995; Abidin et al., 2013), and in the present study, Cronbach's alpha for the total scale was .89.

Postpartum Bonding Questionnaire (PBQ)

Mother–infant bonding was assessed using the Postpartum Bonding Questionnaire (Brockington et al., 2001), a 25-item self-report instrument consisting of four subscales: Impaired Bonding, Rejection and Anger, Infant-Focused Anxiety, and Incipient Abuse. Items are rated on a 6-point Likert scale, yielding a total score from 0 to 125, with higher scores indicating greater bonding difficulties. Cut-off scores of ≥26 and ≥40 distinguish bonding disorders and severe bonding disorders, respectively (Brockington et al., 2001; Wittrock et al., 2021). In the present study, Cronbach's alpha for the total scale was .87.

3.4. Procedure

Ethical approval was obtained from the research ethics committee of the participating health facilities. The researchers worked with midwives, nurses, and community health extension workers to identify eligible mothers from postnatal clinics and immunization visits. After explaining the study's objectives and ethical rights (voluntary participation, confidentiality, and informed consent), participants were given the questionnaire packets. Research assistants were available on-site to guide mothers, particularly those with limited literacy. A total of 305 questionnaires were distributed, and 280 valid responses were returned, representing a response rate of 91.8%.

3.5. Data analysis

Data were coded and analyzed using SPSS version 26.0. Descriptive statistics (means, standard deviations, frequencies, and percentages) were computed to describe participant characteristics and variable distributions. Pearson correlation analyses were used to examine associations among postpartum depression, parenting stress, and mother–infant bonding. Multiple linear regression analysis was conducted to determine the joint predictive power of postpartum depression and parenting stress on bonding quality. Statistical significance was set at $p < .05$.

3.6. Ethical consideration

The study adhered to the ethical principles outlined in the Declaration of Helsinki (World Medical Association, 2013). Participants were informed about the purpose, benefits, and potential risks of the study. Written informed consent was obtained from all participants prior to data collection. Confidentiality and anonymity were strictly maintained throughout the study, and participants were assured of their right to withdraw at any point without affecting their care. Mothers who screened positive for probable PPD (EPDS ≥13) or severe bonding disorder (PBQ ≥40) were referred to the attending clinician for further evaluation and care. The research protocol was reviewed and approved by the Ethics Committee of the participating maternal health facilities.

4. Results

Table 1: Demographic Characteristics of Respondents (N = 280)

Variable	Category	Frequency (n)	Percentage (%)
Maternal Age	18–25	68	24.3%
	26–32	122	43.6%

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	33–45	90	32.1%
Parity	Primiparous	146	52.1%
	Multiparous	134	47.9%
Infant Age	4–8 weeks	98	35.0%
	9–12 weeks	84	30.0%
	13–20 weeks	98	35.0%
Mode of Delivery	Vaginal	178	63.6%
	Caesarean section	102	36.4%
Marital Status	Married	244	87.1%
	Single/Separated	36	12.9%
Education Level	No formal education	28	10.0%
	Secondary	118	42.1%
	Tertiary	134	47.9%
Employment Status	Employed	121	43.2%
	Unemployed	92	32.9%
	Self-employed	67	23.9%
PPD Status (EPDS ≥13)	Positive screen	84	30.0%
	Negative screen	196	70.0%

The demographic profile of the 280 respondents indicates that the majority were in the 26–32 age bracket (43.6%), roughly half were first-time mothers (52.1%), and the most common mode of delivery was vaginal birth (63.6%). Most participants were married (87.1%), and the majority had at least secondary education (89.9%). Notably, 30.0% screened positive for probable postpartum depression (EPDS ≥13), consistent with prevalence rates reported in other sub-Saharan African samples (Gelaye et al., 2016).

Table 2: Descriptive statistics and bivariate correlations among study variables (N = 280)

Variable	M (SD)	1	2	3
1. Postpartum Depression (EPDS)	11.62 (5.44)	—		
2. Parenting Stress (PSI-SF)	68.31 (15.27)	.52**	—	
3. Mother–Infant Bonding (PBQ)	21.48 (9.86)	.48**	.39**	—

**p < .05, **p < .01. Note: Higher PBQ scores indicate greater bonding difficulties.*

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Pearson correlation results show that postpartum depression was significantly and positively associated with parenting stress ($r = .52$, $p < .01$), indicating that mothers with greater depressive symptoms experienced substantially more parenting-related stress. Postpartum depression was also significantly and positively associated with bonding difficulties ($r = .48$, $p < .01$); that is, greater depressive symptoms were associated with poorer mother–infant bonding. Similarly, parenting stress was significantly and positively associated with bonding difficulties ($r = .39$, $p < .01$). All correlations were moderate to strong in magnitude.

Mothers who screened positive for PPD ($n = 84$) reported significantly higher parenting stress ($M = 84.12$, $SD = 13.86$) than non-depressed mothers ($M = 61.55$, $SD = 11.94$), $t(278) = 14.21$, $p < .001$, and significantly greater bonding difficulties ($M = 29.43$, $SD = 10.71$ vs. $M = 18.07$, $SD = 7.92$), $t(278) = 10.38$, $p < .001$. These group differences mirror the pattern reported by Richards et al. (2024) among depressed postpartum mothers.

Table 3: Multiple regression analysis Predicting Mother–Infant Bonding (PBQ) from postpartum depression and parenting stress

Variables	**B**	**β**	**t-value**	**sig**	**R^2**	**Adjusted R^2**	**F**	**P**
Postpartum Depression	.52	.34	6.21	< .05				
Parenting Stress	.14	.22	4.03	< .05	.314	.309	42.15	< .001
Maternal Age	–.11	–.06	–1.12	> .05 (.264)				

Note. Maternal age was entered as a control variable.

The multiple regression model was statistically significant, $F(3, 276) = 42.15$, $p < .001$, accounting for approximately 31% of the variance in mother–infant bonding (Adjusted $R^2 = .31$). Postpartum depression significantly predicted bonding difficulties ($\beta = .34$, $p < .001$), emerging as the strongest predictor, followed by parenting stress ($\beta = .22$, $p < .001$). Maternal age did not significantly predict bonding quality ($p = .264$). These findings indicate that greater postpartum depression and greater parenting stress each independently contribute to poorer mother–infant bonding.

5. Findings and discussion

This study investigated the relationships among postpartum depression, parenting stress, and mother–infant bonding among postnatal mothers. The findings revealed that postpartum depression was positively associated with parenting stress, that both variables were significantly associated with poorer mother–infant bonding, and that together they explained approximately 31% of the variance in bonding quality. Postpartum depression emerged as the strongest predictor of bonding difficulties, consistent with the study's hypotheses.

The positive association between postpartum depression and parenting stress is consistent with a large body of prior research. Beck (1996) identified childcare stress as one of the strongest predictors of postpartum depression, and subsequent studies have repeatedly demonstrated that depressed mothers report elevated stress across all domains of the parenting role (Mileva-Seitz et al., 2016; Richards et al., 2024). The current finding supports the view that the relationship is likely bidirectional: depressive symptoms undermine coping resources and parental self-efficacy, making ordinary caregiving demands feel overwhelming, while chronic parenting stress depletes emotional reserves and may deepen depressive symptoms (Crmic & Low, 2002; Ponnet et al., 2013). The finding that depressed mothers in this sample reported significantly higher parenting stress than non-

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depressed mothers replicates the pattern observed by Richards et al. (2024), suggesting this association holds in diverse cultural and socioeconomic contexts.

The negative association between postpartum depression and mother–infant bonding, with depression emerging as the strongest predictor in the regression model, aligns closely with prior evidence. Depression reduces maternal sensitivity, emotional availability, and contingent responsiveness to infant cues, the core behavioral mechanisms through which a secure bond is formed (Field, 2010; Slade et al., 2020). Attachment theory holds that sensitive caregiving is the foundation of the mother–infant relationship, and PPD disrupts precisely these interactive processes (Bowlby, 1969; Ainsworth, 1978). The magnitude of the effect in this study is comparable to that reported in a recent large-scale study in which depressive symptoms emerged as the strongest negative predictor of bonding quality, with a beta coefficient of similar size (Oddo-Sommerfeld et al., 2025). Depressed mothers also frequently experience negative cognitions about themselves as parents: feelings of inadequacy, guilt, and hopelessness, which color their perception of the bond, and such negative self-appraisals may contribute to the subjective sense of impaired bonding even when interactive behaviors are preserved (Richards et al., 2024).

The finding that parenting stress independently predicted bonding difficulties adds support to the mediation frameworks proposed in recent literature. Pazzagli et al. (2023) demonstrated that mother–infant bonding mediates the effect of depressive and anxious symptoms on parenting stress, suggesting that these constructs form an interconnected system rather than independent risk factors. The present study, which did not include mediation analysis, is nonetheless consistent with this framework: high parenting stress likely reduces maternal emotional availability and increases withdrawal or irritability during interactions, thereby impeding bonding, while impaired bonding in turn intensifies the experience of the parenting role as stressful. Biaggi et al. (2021) similarly found that parenting stress restricted mothers from achieving their expected bonding with their infants, particularly among mothers with psychiatric vulnerability.

Finally, the 30.0% prevalence of probable PPD in this sample is consistent with prevalence estimates for low- and middle-income countries (Gelaye et al., 2016; World Health Organization, 2014), and higher than rates typically reported in high-income settings. This underscores the disproportionate burden of postpartum mental health difficulties in resource-constrained contexts, where mental health screening and care are rarely integrated into routine postnatal services (Oyetunji & Chandra, 2020). The finding that maternal age did not significantly predict bonding in the regression model is noteworthy, as some prior studies have suggested younger maternal age is a risk factor for impaired bonding (De Falco et al., 2014); the absence of this effect here may reflect cultural differences in postpartum family support structures, where older relatives often participate in infant caregiving.

6. Implications of the findings

The findings of this study have several important implications for clinical practice, policy, and service delivery.

First, the strong association between postpartum depression and impaired mother–infant bonding underscores the need for routine screening for maternal mental health in postnatal care. Instruments such as the EPDS are brief, inexpensive, and sensitive, and can be administered by nurses and midwives with minimal training (Cox et al., 1987; Gibson et al., 2009). Early identification of depressed mothers permits timely referral and treatment, which is critical given that depressive symptoms were the strongest predictor of bonding difficulties in this study and in recent large-scale evidence (Oddo-Sommerfeld et al., 2025).

Second, interventions should target parenting stress as well as depressive symptoms. Because parenting stress independently predicted bonding difficulties, programs that combine psychoeducation, parenting skills training, and stress management are likely to be more effective than depression treatment alone. Nurse-led

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relational support and home-visiting programs that coach mothers in reading and responding to infant cues have shown efficacy in improving both maternal mood and dyadic interaction quality (Letourneau et al., 2012; Biaggi et al., 2021).

Third, the findings support the integration of bonding assessment into postnatal care. Routine use of the PBQ alongside the EPDS can identify dyads at risk of bonding disorders, including rejection, anger, and incipient abuse, for whom early psychosocial intervention is especially urgent (Brockington et al., 2001; Milgrom et al., 2015).

Fourth, from a policy standpoint, the findings argue for the integration of mental health into maternal and child health services in sub-Saharan Africa, where postpartum mental health needs are high but specialist services are scarce. Task-shifting models, in which trained lay health workers deliver evidence-based psychosocial interventions under supervision, represent a cost-effective approach in low-resource settings (Rahman et al., 2008; Oyerinde et al., 2020).

Finally, the findings highlight the importance of social and partner support. Given that depressed mothers in this study experienced substantially greater stress, interventions that mobilize family and community support, including involvement of fathers and grandmothers in postnatal care, may buffer both stress and depressive symptoms (Dennis & Letourneau, 2007).

7. Contribution of the study

This study contributes empirical evidence on the interrelationships among postpartum depression, parenting stress, and mother–infant bonding in a Nigerian sample, addressing a notable gap in the literature, which has been dominated by data from high-income countries. By demonstrating that depression and parenting stress jointly and independently predict bonding quality, the study extends existing frameworks such as the mediation model proposed by Pazzagli et al. (2023) to a sub-Saharan African context characterized by different cultural norms, family structures, and health system constraints.

The study also provides regionally relevant prevalence data, confirming that probable PPD affects approximately one in three postpartum mothers in this setting, in line with regional estimates (Gelaye et al., 2016). Methodologically, the use of three well-validated instruments (EPDS, PSI-SF, PBQ) strengthens the reliability of the findings and provides a foundation for comparison with international samples.

Furthermore, the study lays the groundwork for future longitudinal and mediation research, including examination of whether bonding mediates the relationship between PPD and longer-term child developmental outcomes in this population. In sum, the findings contribute to clinical psychology, perinatal psychiatry, and public health by reinforcing the case for integrated screening and intervention targeting maternal mental health, parenting stress, and early bonding.

8. Limitations and suggestions for further studies

While this study provides valuable insights, several limitations should be acknowledged. First, the cross-sectional correlational design precludes causal inference. Although the results indicate significant associations, they cannot establish whether postpartum depression and parenting stress cause bonding difficulties, or whether impaired bonding exacerbates distress. Future research should employ longitudinal designs following mothers from pregnancy through the first postpartum year to clarify the temporal ordering of these relationships.

Second, the study relied exclusively on self-report measures, which may be subject to response biases, including social desirability effects and mood-congruent reporting. Depressed mothers may perceive their bonding more negatively than objective observers would (Richards et al., 2024). Future studies should

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incorporate observational assessments of mother–infant interactions and clinician-rated measures to complement self-reports.

Third, the sample was drawn from health facility attendees, which may limit generalizability to mothers who do not attend formal postnatal care, a substantial proportion in some settings. Community-based sampling would strengthen external validity.

Fourth, the study did not examine several potentially important variables, including social support, intimate partner violence, obstetric complications, infant temperament, and sleep quality, each of which has been implicated in maternal mental health and bonding (Lancaster et al., 2010; Coates et al., 2014; Oddo-Sommerfeld et al., 2025). Their inclusion would allow more comprehensive modeling.

Finally, the study did not include mediation or moderation analysis. Future research should test whether bonding mediates the effect of PPD on parenting stress (as suggested by Pazzagli et al., 2023), and whether social support or parenting self-efficacy moderates these pathways (Qi et al., 2025). Randomized controlled trials evaluating culturally adapted psychosocial interventions targeting these constructs in sub-Saharan Africa are also needed.

9. Conclusion

This study examined the relationship between postpartum depression, parenting stress, and mother–infant bonding among postnatal mothers. The findings demonstrate that postpartum depression is positively associated with parenting stress, and that both postpartum depression and parenting stress are significantly associated with impaired mother-infant bonding, jointly explaining approximately 31% of the variance in bonding quality. Postpartum depression emerged as the strongest predictor of bonding difficulties. These results confirm that maternal mental health in the postpartum period is a critical determinant of the early mother–infant relationship.

The study highlights the interdependence of depressive symptoms, parenting stress, and bonding, and reinforces the need for integrated approaches to postnatal care that address maternal mental health as a core component of infant well-being. Screening, early identification, and timely intervention are essential not only for the mother's recovery but also for the healthy development of the child and the quality of the mother-infant dyad. Based on the findings, the following recommendations are made:

1. Routine screening for postpartum depression should be integrated into postnatal care services, using brief validated instruments such as the EPDS administered by trained nurses and midwives.
2. Parenting stress should be routinely assessed and addressed in postnatal care, with the provision of psychoeducation, parenting skills training, and stress management support.
3. Bonding assessment (for example, with the PBQ) should accompany depression screening so that at-risk dyads are identified early and referred for appropriate psychosocial intervention.
4. Mental health services should be integrated into maternal and child health programs, including task-shifting models that train lay health workers to deliver evidence-based psychosocial interventions under specialist supervision.
5. Partners and extended family members should be engaged in postnatal care, as family support represents a key buffer against postpartum depression, parenting stress, and bonding difficulties. Further longitudinal and intervention research should be conducted in sub-Saharan African populations to clarify causal pathways and evaluate culturally adapted programs aimed at promoting maternal mental health and healthy mother–infant bonding.

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10. Declaration of conflicting interest

The authors declare no conflict of interest.

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