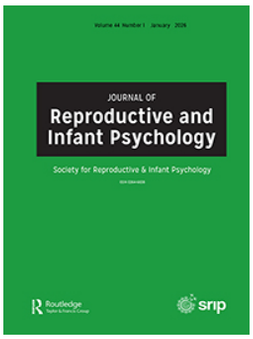

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The role of maternal prenatal attachment and postnatal stress on mother–infant bonding at 6 months

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ABSTRACT

Aims: Maternal attachment mental state is critical in stress regulation and caregiving behaviours. However, most existing research relies on cross-sectional designs and self-reported attachment measures, which capture distinct but complementary aspects of attachment relative to interview measures. This longitudinal study examines the associations between maternal attachment mental states during pregnancy, postpartum stress and mother–infant bonding at 6-months postpartum.

Methods: The study followed 98 White expectant mothers in Italy, assessing attachment mental states during the third trimester of pregnancy ($M = 35.20$ gestational weeks, $SD = 2.20$; Time 1, T1) using the Adult Attachment Interview (AAI). At 2-months postpartum (T2), maternal stress was measured via the Perceived Stress Scale, and at 6-months postpartum (T3), mother–infant bonding was evaluated using the Maternal Postnatal Attachment Scale. Of the initial sample, 91 mothers continued to T2, and 90 to T3. Mediation analyses examined whether postpartum stress mediated the relationship between maternal attachment coherence of mind and bonding.

Results: Mothers with lower coherence of mind during pregnancy—which is considered the single best indicator of attachment security in the AAI—reported higher postpartum stress at T2, which, in turn, was associated with lower-quality mother–infant bonding at T3.

Conclusion: Postpartum stress mediates the relationship between maternal attachment mental states and bonding quality. These findings suggest that addressing attachment-related vulnerabilities and stress during the perinatal period may help support positive mother–infant relationships and developmental outcomes, although future research is needed to directly evaluate the effectiveness of specific interventions.

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Introduction

The transition to motherhood is a critical event in a woman's life, characterised by profound physical, psychological and social changes within a relatively short period (Saxbe et al., 2018). While these changes often bring joy and fulfilment, they can also pose significant challenges and induce stress (Rallis et al., 2014). Mother–infant bonding, defined as the unique and enduring emotional connection between a mother and her child, begins during pregnancy, intensifies during the first postpartum year and continues to evolve throughout the child's life (de Cock et al., 2016; Nakić Radoš et al., 2024). High-quality bonding has been associated with greater maternal sensitivity and engagement during interactions with the infant (e.g. Maas et al., 2014) and with more positive socio-emotional outcomes for children (e.g. de Cock et al., 2016; Le Bas et al., 2020).

However, not all mothers develop optimal bonding with their infants (Diaz-Ogallar et al., 2024; O'Dea et al., 2023). A key factor influencing mother–infant bonding is the mother's attachment state of mind (Nakić Radoš et al., 2024), which reflects how she organises and interprets attachment-related memories (George et al., 1985). These mental states, rooted in early interactions with attachment figures, shape caregiving behaviours and are associated with the quality of mother–infant interactions (George & Solomon, 1999).

The Adult Attachment Interview (AAI) is widely regarded as the gold standard for assessing adult attachment mental states (George et al., 1985). By analysing the coherence and narrative structure of individuals' responses, the AAI categorises attachment states of mind as autonomous, dismissing, preoccupied or unresolved with respect to loss or trauma (Main et al., 2002). Autonomous individuals describe their childhood experiences in a coherent and balanced manner, demonstrating an appreciation for the value of attachment relationships. In contrast, dismissing individuals minimise the significance of attachment, often idealising or struggling to recall childhood experiences. Preoccupied individuals exhibit excessive focus on unresolved conflicts or angry with caregivers, leading to incoherent narratives. Finally, unresolved individuals demonstrate lapses in the monitoring of reasoning, discourse, and behavior surrounding loss and abuse, reflecting unprocessed emotional experiences (Main et al., 2002; Verhage et al., 2016).

Despite the centrality of attachment mental states to caregiving (George & Solomon, 1999), few studies have used the AAI to examine the influence of prenatal maternal attachment mental states on postnatal mother–infant bonding. Existing research has primarily relied on self-report measures of attachment, suggesting that expectant mothers with secure attachment styles are more likely to report stronger foetal bonding, better mental health, and greater reliance on social support (e.g. Berlin et al., 2011; Chrzan-Detkós & Lockiewicz, 2015; Mikulincer & Florian, 1999; Nordahl et al., 2020; Vagos et al., 2023). In contrast, avoidant mothers tend to exhibit weaker bonding and poorer mental health, while anxious mothers tend to show a gradual increase in bonding but rely heavily on emotion-focused coping and report worsening mental health over time (Mikulincer & Florian, 1999). Moreover, maternal psychopathology, including depression and anxiety, has been shown to mediate the relationship between insecure attachment styles and bonding difficulties (e.g. Bianciardi et al., 2023; Handelzalts et al., 2021; Nonnenmacher et al., 2016; Vanwalleghem et al., 2023).

Within the framework of attachment theory, internal working models shape individuals' perceptions of and responses to stress (Bowlby, 1969/1982; George & Solomon, 1999). In this vein, mothers with insecure attachment mental states are more likely to experience elevated relational distress and to rely on less effective coping strategies (e.g. Mikulincer & Shaver, 2019), which can, in turn, negatively impact the quality of mother–infant bonding (O'Dea et al., 2023).

Although research has examined the links between maternal attachment, stress, and bonding, few studies have directly explored the role of a mother's AAI mental states during pregnancy. For instance, both Galbally et al. (2023) and Sechi et al. (2021) found a significant association between insecure attachment mental states and elevated postpartum stress. In a further recent study, Nordahl et al. (2020) added a piece to this relationship by investigating the associations between maternal attachment style during pregnancy and postnatal maternal bonding, with a focus on the potential mediating role of stress. Findings showed that higher levels of attachment avoidance and anxiety were associated with increased stress, which in turn contributed to diminished mother–infant bonding quality.

However, it remains to be seen whether these findings are confirmed through the use of the AAI, since Nordahl et al. (2020)'s study relied on self-reported attachment styles. Notably, AAI classifications and self-reported attachment styles show only modest overlap (Roisman et al., 2007), indicating that they assess complementary but distinct aspects of attachment. Specifically, the AAI focuses on internal working models and unconscious or implicit attachment-related processes, while self-reported measures reflect explicit attachment styles and conscious beliefs about relationships (for a detailed discussion, see Roisman et al., 2007).

The present study addressed these gaps by investigating the relationship between mothers' attachment mental states during the third trimester and mother–infant bonding at 6-months post-birth. Additionally, it examined the mediating role of perceived stress, assessed when the infant was 2 months old, in this relationship. By utilising the AAI, this study aims at overcoming the limitations of prior research that relied on self-reported attachment styles, providing deeper insights into the implicit processes underlying maternal bonding. Based on the literature reviewed above, it was hypothesised that higher maternal attachment coherence of mind during pregnancy would be associated with stronger mother–infant bonding at 6-months postpartum, both directly and indirectly through lower levels of postnatal stress.

Method

Participants and procedure

The present article is based on a longitudinal research project examining the associations between prenatal stress, attachment, and autonomic and immune system functioning in mother–child dyads. Ethical approval was obtained from the Independent Ethics Committee of the University Hospital of Cagliari (protocol code ATTACCAMENTO2019, 22 July 2020), and the Health, Psychology and Social Care Research Ethics and Governance Committee, Manchester Metropolitan University (ref n. 25,823, 18 January 2021).

Table 1. Sociodemographic characteristics of participating mothers.

Variables	3rd trimester ($N = 98$)	2 months of the baby ($N = 91$, retention rate 92.86%)	6 months of the baby ($N = 90$, retention rate 91.84%)
	M (SD)	*M (SD)*	*M (SD)*
Mothers' gestational weeks	35.20 (2.20)	/	/
Mothers' age (in years)	36.40 (4.60)	36.58 (4.46)	36.66 (4.48)
	N (%)	*N (%)*	*N (%)*
Parenting other children?			
No	71 (72.45)	66 (72.53)	66 (73.33)
Yes	27 (27.55)	25 (27.47)	24 (26.67)
Ethnicity (White)	98 (100.00)	91 (100.00)	90 (100.00)
Partnership status			
Married	45 (45.92)	46 (50.54)	45 (50.00)
Living with the partner but not married	51 (52.04)	45 (49.46)	45 (50.00)
Separated/divorced	2 (2.04)	/	/
Education			
Less than high school	25 (25.51)	23 (25.28)	22 (24.45)
High school	17 (17.35)	14 (15.38)	14 (15.55)
Bachelor's degree or higher	56 (57.14)	54 (59.34)	54 (60.00)
Working status			
Employed	82 (83.67)	79 (86.81)	78 (86.66)
Unemployed	14 (14.29)	10 (10.99)	10 (11.11)
Student	2 (2.04)	2 (2.20)	2 (2.23)
Ever suffered from anxiety, depression or other affective disorders			
Yes	36 (36.73)	/	/
No	55 (56.12)	/	/
Prefer not to disclose	7 (7.14)		

Notes. Percentages may not equal 100 due to rounding.

Expectant mothers were recruited in person through paediatric clinics in Cagliari (Italy), where they were undergoing genetic screening during the first trimester. A total of 217 expectant mothers took part. In the present study, only expectant mothers who completed the AAI during the third trimester of pregnancy (Time 1, T1) were included. The AAI was administered online via the Zoom platform. Mothers completed a series of questionnaires through an internet-based programme at 2-months postpartum (Time 2, T2) and 6-months postpartum (Time 3, T3). The final sample included 98 White expectant mothers from Italy ($M = 35.20$ gestational weeks, $SD = 2.20$), of whom 91 participated at 2-months postpartum and 90 at 6-months postpartum. These mothers did not differ from the larger sample in terms of sociodemographic characteristics. Table 1 shows the complete mothers' sociodemographic characteristics and retention rates across time points.

Measures

Mothers' sociodemographics during the third trimester (T1)

Each mother was asked to report their gender, age, ethnicity, partnership status, education level, employment status, gestational age, parenting other children, and whether they had ever experienced anxiety, depression or other affective disorders (even without a formal diagnosis).

Mothers' attachment mental state during the third trimester (T1)

Each mother was administered the Adult Attachment Interview (AAI; George et al., 1985; Main et al., 2002) online via the Zoom platform, a semi-structured, 20-question protocol designed to assess the interviewee's current state of mind regarding past child-parent attachment experiences. Each interview was transcribed verbatim, with all identifying information removed to ensure confidentiality. In addition to coding transcripts for the three-way (i.e. Secure-Autonomous, Insecure-Dismissing and Insecure-Preoccupied) and the four-way (i.e. Secure-Autonomous, Insecure-Dismissing, Insecure-Preoccupied, Unresolved with respect to loss and/or abuse/Cannot classify) attachment patterns based on Main et al'.s (2002) criteria, the coherence of mind scale was analysed for the purposes of this study. Coherence of mind is considered the single best indicator of attachment security in the AAI (e.g. Carone et al., 2024; Main et al., 2002; Waters et al., 2018).

The coherence of mind scale is a 9-point rating scale (1 = *striking absence of coherence of mind*; 3 = *only slight coherence of mind*; 5 = *moderate coherence of mind*; 7 = *marked coherence of mind*; 9 = *strong coherence of mind*), with secure individuals typically receiving a score of 5 or higher (Main et al., 2002). One certified coder coded all transcripts. Subsequently, 25% ($n = 25$) of the transcripts were coded by a second certified coder, resulting in interrater reliability of $\kappa = .92$ and .88 ($p < .001$) for the three-way and four-way classifications, respectively. Disagreements were solved through consensus meeting.

Maternal stress at infant's 2 months (T2)

Mothers were administered the Perceived Stress Scale-10 (PSS; Cohen & Williamson, 1983) through an online platform to assess their stress over the last month. The PSS comprises 10 items, each rated on a 5-point Likert scale from 0 (*never*) to 4 (*very often*), with greater scores indicating greater stress. In the present study, Cronbach's alpha was .88.

Mother–infant bonding at 6 months (T3)

The Maternal Postnatal Attachment Scale (MPAS; Condon & Corkindale, 1998) was administered to assess the strength of the mother's bonding to her 6-month-old infant. The MPAS consists of 19 items, rated on a 5-point Likert scale from 1 (*low*) to 5 (*high*), with higher scores indicating greater maternal bonding. In the present study, Cronbach's alpha was .77.

Data analysis

All analyses were conducted using the R software (R Core Team, 2022) and effects significant at $p < .05$ were interpreted. Mothers who completed the AAI and at least the T2 or T3 assessments were retained in the study. In this case, missing data were treated with the multiple imputation method (using the standard fully conditional specification) (Huque et al., 2018). Means and standard deviations for maternal attachment coherence of mind, stress, bonding, and frequencies for attachment patterns were provided for descriptive reasons. Similarly, bivariate associations between continuous variables were presented.

Preliminarily, differences in the study variables based on categorical sociodemographics (i.e. educational attainment [recoded as 'high school or less', 'at least bachelor's

degree'], parenting other children [no, yes], anxiety or depression problems [yes, no]) were tested using several analyses of variance (ANOVAs). Working status and partnership status were not included in the analysis, as many participants were employed and married or in a romantic relationship. Significant sociodemographic variables were controlled for in the mediation analysis.

To test the study hypothesis, one mediational model was run computing 95% confidence intervals (CIs) with bootstrap percentiles and 5,000 resamples as recommended by Hayes (2017). A post hoc Monte Carlo power simulation was computed to obtain the statistical power of the results for the indirect effects using the shiny and MASS add-on R packages (Schoemann et al., 2017).

Results

Preliminary and descriptive analyses

Regarding missing data, five mothers did not complete the T2 stress measure and four did not complete the T3 bonding measure. Given that Little's MCAR test [χ^2 (2) = 2.47, p = .482] suggested that the data were missing completely at random, multiple imputation using the standard fully conditional specification (FCS-Standard) method was applied to handle the missing values (Huque et al., 2018).

ANOVAs showed that nulliparous mothers at T1 reported higher levels of stress at T2, F (1, 89) = 3.97, p = .049, but did not differ from mothers with previous children in their T1 AAI coherence of mind, F(1, 89) = 0.05, p = .829, or T3 bonding, F(1, 89) = 0.59, p = .445. Similarly, mothers with lower educational attainment at T1 reported higher bonding at T3, F(1, 89) = 8.29, p = .005, but did not differ from those with at least a bachelor's degree in T1 AAI coherence of mind, F(1, 89) = 0.97, p = .327, or in T2 stress, F(1, 89) = 3.61, p = .061. In addition, mothers who reported a history of anxiety, depression or other affective disorders at T1 showed lower AAI coherence of mind, F(1, 89) = 6.84, p = .010, and lower bonding at T3, F(1, 89) = 4.27, p = .042, but did not significantly differ in their T2 stress levels, F(1, 89) = 3.04, p = .084, compared to mothers without such a history.

Considering the AAI three-way distribution (Table 2), most mothers (n = 55, 61.11%) showed a secure-autonomous attachment state of mind, with the remaining showing an insecure-dismissing (n = 20, 22.22%) or an insecure-preoccupied (n = 15, 16.67%) attachment state of mind. When unresolved/cannot classify states of mind were also considered (Table 2),

Table 2. Adult attachment Interview (AAI) patterns distribution (3-ways) and (4-ways) (N = 91).

AAI pattern	N	%
3-way AAI patterns distribution		
Secure-autonomous (F)	55	61.1 1
Insecure-dismissing (Ds)	20	22.2 2
Insecure-preoccupied (E)	15	16.67
4-way AAI patterns distribution		
Secure-autonomous (F)	54	59.34
Insecure-dismissing (Ds)	19	20.88
Insecure-preoccupied (E)	7	7.69
Unresolved with respect to loss and/or abuse/Cannot classify (U/CC)	11	12.09

Note. The total number of AAIs does not include the seven mothers who dropped from T1 to T2. In the 3-way AAI patterns distribution, the sample was 90 since one mother was classified as CC.

Table 3. Means, standard deviations and bivariate associations for T1 maternal attachment coherence of mind, T2 stress and T3 bonding ($N = 91$).

Variables	1.	2.	3.	*M*	*SD*
T1 AAI coherence of mind	—			5.22	1.94
T2 Maternal stress	−.23*	—		13.67	6.20
T3 Mother–infant bonding	.26*	−.47***	—	81.10	6.92

Note. T1 = Time 1 (third trimester). T2 = Time 2 (infant's 2 months). T3 = Time 3 (infants' 6 months). The total number of mothers does not include the seven mothers who dropped from T1 to T2. *$p < .05$.***$p < .001$.

Table 4. Longitudinal associations between prenatal AAI coherence of mind and mother–infant bonding at 6-months postpartum: the mediating role of maternal stress at 2 months ($N = 91$).

				95% C.I. (a)			
Type	Effect	Estimate	SE	Lower	Upper	β	*p*
Direct	T1 AAI coherence of mind ⇒ T3 mother–infant bonding	0.54	0.32	−0.09	1.17	0.15	.094
Indirect	T1 AAI coherence of mind ⇒ T2 maternal stress ⇒ T3 mother–infant bonding	0.34	0.16	0.06	0.71	0.10	.038
Component	T1 AAI coherence of mind ⇒ T2 maternal stress	−0.76	0.33	−1.38	−0.18	−0.24	.020
	T2 maternal stress ⇒ T3 mother–infant bonding	−0.45	0.10	−0.66	−0.21	−0.41	< .001
Total	T1 AAI coherence of mind ⇒ T3 mother–infant bonding	0.87	0.35	0.24	1.50	0.24	.012

Note. The total number of mothers does not include the seven mothers who dropped from T1 to T2. AAI = Adult Attachment Interview. The mediation analysis was controlled for mothers' psychological problems (estimate = 2.64, SE = 1.40 [−0.15, 5.43], β = .19 $p = .063$), parenting other children (estimate = −2.10, SE = 1.51 [−5.10, 0.90], β = −.13 $p = .168$), and education (estimate = −4.92, SE = 1.37 [−7.64, −2.21], β = −.35 $p < .001$).

most mothers ($n = 54$, 59.34%) were still classified as secure-autonomous, 19 (20.88%) as insecure-dismissing, 7 (7.69%) as insecure-preoccupied and 11 (12.09%) as unresolved/cannot classify.

Looking at bivariate associations (Table 3), mothers showing greater coherence of mind during the third trimester reported lower stress at the infant's 2 months, $r = -.24$, $p = .024$, and greater bonding when their infant was aged 6 months, $r = .26$, $p = .013$. Also, lower stress was associated with higher levels of mother–infant bonding, $r = -.47$, $p < .001$.

The role of T1 mothers' prenatal attachment mental state on T3 mother–infant bonding through T2 maternal stress

The mediation analysis, conducted using the bootstrap percentile method with 5,000 resamples, indicated that the indirect effect was significant, while controlling for maternal educational attainment, parenting other children, and history of anxiety or depression. Specifically, mothers with lower coherence of mind during the third trimester reported lower bonding quality with their infant at 6 months, mediated by increased stress levels at 2-months postpartum. In contrast, the direct effect of maternal coherence of mind on bonding was not significant. The overall model accounted for 25% of the variance. Full statistical details are presented in Table 4. A Monte Carlo power analysis for indirect effects demonstrated a moderate power of 59% (based on 95% confidence intervals; Schoemann et al., 2017).

Discussion

This study explored the longitudinal associations between maternal attachment mental states in the third trimester of pregnancy (operationalised into the AAI coherence of mind) and mother–infant bonding at 6-months postpartum, highlighting the role of stress assessed at 2-months postpartum. Unlike previous research relying on self-reported attachment styles (Nordahl et al., 2020), this study offers an in-depth analysis of how a mother's internal working models of attachment shape her responses to stress and the relationship with her infant postnatally.

Mothers who showed lower coherence of mind were more stressed at 2 months after childbirth. These higher stress levels led, in turn, to less bonding with their baby at 6 months. Interestingly, AAI coherence of mind did not relate directly to mother–infant bonding. The absence of a direct effect of maternal attachment coherence of mind on mother–infant bonding at 6-months postpartum may be explained by the mediating role of postpartum stress, which appears to absorb most of the variance in this relationship. Specifically, while coherence of mind reflects a stable, internalised representation of past attachment experiences, bonding is a dynamic, context-sensitive process shaped by ongoing emotional and behavioural interactions. In this context, it is reasonable that stress functions as a more proximal determinant of bonding quality, directly affecting a mother's emotional availability and responsiveness. Thus, maternal attachment may exert its influence on bonding primarily by modulating the mother's susceptibility to stress, rather than through a direct pathway.

Additionally, the temporal gap between the assessment of attachment coherence of mind during pregnancy and bonding at 6-months postpartum introduces opportunities for intervening psychological and environmental factors – such as cumulative stress exposure or changes in support networks – to mediate or attenuate the impact of early attachment representations. These findings underscore the importance of conceptualising attachment coherence as a distal predictor whose effects on bonding are contingent upon intervening contextual variables, particularly stress.

Relatedly, the central role of stress in mediating the relationship between maternal attachment mental states and bonding echoes prior research (e.g. Galbally et al., 2023; Sechi et al., 2021), which linked non-autonomous attachment states to elevated postpartum stress. It also suggests that these processes carry downstream effects on the quality of mother–infant relationships. In this vein, mothers with insecure attachment mental states are more sensitive to threats of caregiving competence, which in turn heighten stress and compromise bonding (George & Solomon, 1999). As such, insecure mothers are likely to find challenges that are related to parenting particularly overwhelming, increasing stress and reducing the ability to engage in sensitive and responsive caregiving. As a result, the stress undermines the development of a strong emotional bond with the infant.

A closer examination of attachment classifications offers additional insight into these findings. Mothers with lower coherence of mind were likely classified as preoccupied, dismissing and/or unresolved regarding experiences of loss or abuse. Attachment research suggests that preoccupied individuals typically harbour negative self-views and exhibit hyper-vigilance towards potential signs of loss or abandonment (George et al., 1985; Main et al., 2002). They also tend to perceive others as reluctant to form

close relationships with them. In response, preoccupied individuals often seek excessive and enmeshed levels of closeness (George et al., 1985; Main et al., 2022).

While preoccupied mothers may find the experience of union with their child during pregnancy beneficial, it is plausible that, during the third trimester – when their AAI pattern was assessed – these mothers experienced pregnancy as a period of impending separation and an interruption of their exclusive bond with the child. Such perceptions may have been further exacerbated in cases where preoccupied mothers also exhibited unresolved mental states related to loss. Consequently, these factors may have left them ill-prepared to manage postnatal stress, potentially undermining their ability to form a closer bond with their child. Conversely, dismissing individuals often rely on independence as a defence and exhibit a distrust of others, which can impede their ability to seek support or emotional comfort (George et al., 1985; Main et al., 2022). This state of mind may have heightened their vulnerability to stress during the postnatal period, adversely impacting the quality of mother–infant bonding.

The present study has several limitations that warrant consideration. First, the sample was drawn primarily from middle-class, well-educated mothers in exclusively Western cultural contexts. Therefore, the findings cannot be generalised to more socioeconomically or culturally diverse populations. Cross-cultural research is needed to examine how cultural norms and practices shape the interplay between attachment, stress and bonding (Kohlhoff et al., 2024; Ojeleye et al., 2024). Second, the study focused exclusively on maternal attachment mental states and stress, without considering other contextual factors that may be associated with bonding, such as coparenting dynamics or infant characteristics (Takács et al., 2020; Tolja et al., 2020). Relatedly, the study measured general perceived stress rather than postpartum-specific stress, which may capture somewhat different aspects of maternal adjustment. Future research should consider including both general and postpartum-specific stress measures to provide a more nuanced understanding of these processes, as well as should adopt a more holistic approach by incorporating these variables into models of mother–infant bonding.

Another limitation concerns the modality of AAI administration. All interviews were conducted online via Zoom rather than in-person. Although remote administration allowed us to collect data efficiently from a relatively large sample of mothers, evidence regarding the reliability and equivalence of virtual versus in-person AAIs is limited (for a study administering the AAI online, see Carone et al., 2023). To date, there are no published reliability estimates directly comparing these modalities. Therefore, the use of virtual AAIs should be interpreted with caution, and future research is needed to establish whether scores obtained online are comparable to those derived from traditional face-to-face interviews. Finally, while the study provides evidence for a mediational pathway, relying on self-reported stress and bonding measures may introduce subjective biases. Combining self-reported measures with observational or physiological assessments of bonding and stress could provide a more comprehensive understanding of these processes.

Notwithstanding these limitations, the study offers several methodological and theoretical strengths. In this respect, the use of the AAI to assess maternal attachment mental states represents an important advance over self-report measures of attachment, which are vulnerable to social desirability biases and may not reflect unconscious processes (Roisman et al., 2007). Moreover, the longitudinal design allowed temporal ordering of the

variables and thereby strengthened the evidence for temporal-causal relationships between attachment mental states, stress and bonding in the perinatal period. Building on the current findings, future research should explore the role of fathers' attachment mental states and stress in shaping parent-infant bonding (Nakić Radoš et al., 2024). Understanding the contributions of both parents to bonding processes could provide a more comprehensive view of family dynamics during the postpartum period. Additionally, examining how infant temperament interacts with maternal attachment and stress could yield valuable insights into dyadic processes influencing bonding (Takács et al., 2020).

Longitudinal studies with larger and more diverse samples are needed to confirm the generalisability of these findings across various populations and cultural contexts. Future research should explore whether interventions targeting maternal stress and attachment representations during pregnancy can positively influence bonding and child developmental outcomes. Additionally, incorporating physiological stress measures, such as cortisol levels, alongside psychological assessments, could provide a more comprehensive understanding of the mechanisms linking attachment, stress and bonding (Galbally et al., 2011; Scatliffe et al., 2019; Strathearn et al., 2009). These multimethod approaches could potentially help inform the development of evidence-based practices aimed at optimising maternal and child well-being.

Conclusion

This study has shown that during pregnancy, maternal attachment mental states predict mother–infant bonding at 6-months postpartum exclusively through the mediating role of perceived stress. These findings emphasise the need to address both attachment-related vulnerabilities and stress during the perinatal period as a strategy for ensuring positive mother–infant relationships. Attachment-focused and stress-reduction interventions embedded in perinatal care may be a means by which clinicians support mothers in developing secure and nurturant bonds with their infants, laying the foundations for positive developmental trajectories.

In this vein, several attachment-focused interventions during pregnancy aim to enhance maternal reflective functioning, emotional attunement and caregiving sensitivity, while also reducing prenatal distress and negative expectations about motherhood (e.g. Sabancı Baransel & Uçar, 2023; Salehi et al., 2019). These programmes often target mothers' internal representations of themselves and their baby to promote secure caregiving. Our findings extend this work by showing that maternal attachment coherence of mind influences bonding indirectly via postpartum stress. This suggests that interventions could be strengthened by incorporating stress-regulation strategies, particularly for mothers with insecure attachment states identified through narrative-based assessments like the AAI.

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