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Maternal-Fetal Attachment (MFA) in the Context of Pregnancy Adaptation: A Literature Review of Internal and External Factors Affecting Mothers

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Abstract: This study aims to analyze Maternal Fetal Attachment (MFA) within the context of pregnancy adaptation by examining the influence of internal and external maternal factors through a qualitative descriptive literature approach. The research employs a library study method using secondary data sources, including peer reviewed journal articles and relevant academic documents, collected through systematic literature search and analyzed using thematic analysis, data reduction, categorization, and inductive interpretation. The findings reveal that MFA is a multidimensional construct influenced by internal factors such as maternal mental health, particularly depression and anxiety, as well as positive psychological states, and external factors including social and family support. Pregnancy adaptation emerges as a key mediating process that connects these factors to the quality of maternal fetal bonding. The study also highlights that strong MFA contributes to positive infant developmental outcomes, especially in emotional regulation and adaptive behavior. These findings imply that maternal well being and supportive social environments are essential components in strengthening prenatal attachment. In conclusion, this study contributes to the theoretical understanding of MFA as a biopsychosocial process and provides practical insights for integrating mental health screening and family centered interventions in antenatal care to improve maternal and child health outcomes.

Keywords: Maternal Fetal Attachment, Pregnancy Adaptation, Maternal Mental Health, Social Support, Prenatal Bonding

Introduction

Pregnancy is a complex transitional period characterized by profound biological, psychological, and social changes that require significant maternal adaptation. Within this process, the development of Maternal Fetal Attachment (MFA) has emerged as a central construct reflecting the emotional bond between a mother and her unborn child. MFA is not only a psychological phenomenon but also a foundational component of maternal identity formation and early caregiving behaviors, influencing both prenatal experiences and postnatal outcomes (Trombetta, 2021). As such, understanding MFA within the broader context of pregnancy adaptation is essential for advancing maternal and child health research.

Recent literature highlights a growing recognition of prenatal bonding as a critical determinant of early developmental trajectories. Evidence suggests that stronger maternal fetal attachment is associated with more favorable infant outcomes, including better emotional regulation, adaptive behavior, and cognitive development (Branjerdporn, 2022) (Cervellione, 2025). These findings underscore the importance of examining MFA not merely as an isolated construct, but as an integral part of the prenatal developmental environment that shapes long-term child well being.

Despite its significance, the process of developing MFA is highly dynamic and influenced by multiple interacting factors. Pregnancy adaptation itself involves a multidimensional process encompassing emotional acceptance, coping with physical changes, and psychological readiness for motherhood (Wu, 2025). Successful adaptation facilitates positive maternal experiences and strengthens the maternal fetal bond, whereas maladaptation may lead to adverse psychological outcomes, including stress and depressive symptoms (Vega Sanz, 2023).

Current trends indicate a substantial prevalence of mental health challenges during pregnancy, which directly affect maternal fetal attachment. Studies report that antenatal depression and anxiety remain common, with prevalence rates reaching up to 19.1 percent for depression and notable levels of anxiety across different populations (Zhang, 2021) (Annamalai, 2026). These psychological conditions are consistently associated with lower levels of MFA, suggesting that maternal emotional well being is a key internal factor influencing prenatal bonding (Rollè, 2020).

In addition to internal psychological factors, external influences such as social support, family dynamics, and socioeconomic conditions play a crucial role in shaping MFA. Empirical findings demonstrate that perceived social support is one of the strongest predictors of maternal attachment, acting as a protective factor against stress and enhancing maternal adaptation (Ertmann, 2021). Furthermore, family support has been shown to directly and indirectly influence MFA through its effect on pregnancy adaptation, emphasizing the interconnected nature of external and internal determinants (Wu, 2024).

Another important trend in recent research is the recognition of anxiety as both a risk and, in some contexts, an adaptive factor in prenatal bonding. While high levels of anxiety are generally associated with reduced MFA, some studies suggest that moderate anxiety may enhance maternal sensitivity and engagement with the fetus when supported by positive mental health conditions (Ballesteros Andrés, 2025). This nuanced perspective highlights the complexity of psychological influences on maternal fetal attachment.

Moreover, sociocultural and obstetric factors such as maternal age, parity, marital satisfaction, and pregnancy intention have also been identified as significant contributors to MFA variability. These factors interact with psychological conditions to explain a substantial proportion of variance in maternal attachment, indicating that MFA is shaped by a comprehensive biopsychosocial framework (Camarneiro, 2024). However, the relative contribution and interaction of these variables remain inconsistently reported across studies.

A critical issue in the existing literature is the lack of conceptual clarity and integrative models that simultaneously address internal and external factors influencing

MFA. While numerous studies have examined individual predictors such as depression, anxiety, or social support, fewer have explored how these variables interact within the broader context of pregnancy adaptation (McNamara, 2019). This fragmentation limits the development of comprehensive interventions aimed at enhancing maternal and fetal well being.

Furthermore, methodological limitations persist, including variability in measurement tools and inconsistent operationalization of MFA. Although instruments such as the Maternal Antenatal Attachment Scale and Prenatal Attachment Inventory are widely used, ongoing research indicates the need for improved psychometric validation and culturally sensitive measurement approaches (Brekalo, 2025). These gaps highlight the necessity for more standardized and robust research designs.

Another gap lies in the limited exploration of early pregnancy stages and diverse populations. Much of the existing research focuses on the second and third trimesters, leaving early pregnancy adaptation and its impact on MFA underexplored (Wu, 2024). Additionally, there is a need for studies that include diverse sociocultural contexts to enhance the generalizability of findings and inform global maternal health strategies.

Given these challenges, there is a clear need for a comprehensive literature analysis that integrates both internal factors such as psychological well being and external factors such as social support within the framework of pregnancy adaptation. Such an approach is essential for developing a holistic understanding of maternal fetal attachment and identifying key leverage points for intervention.

Therefore, the primary objective of this article is to analyze the existing literature on Maternal Fetal Attachment within the context of pregnancy adaptation, with a specific focus on internal and external maternal factors. This study aims to synthesize current evidence, identify research gaps, and propose an integrative perspective that bridges fragmented findings.

The expected contribution of this article is both theoretical and practical. Theoretically, it seeks to enrich the conceptual understanding of MFA by situating it within a multidimensional adaptation framework. Practically, the findings are expected to inform healthcare providers and policymakers in designing targeted interventions that enhance maternal well being, strengthen prenatal bonding, and ultimately improve maternal and child health outcomes.

Methodology

This study employs a qualitative research design with a descriptive approach through library research. Qualitative methods are particularly suitable for exploring complex and multidimensional phenomena such as Maternal Fetal Attachment (MFA), as they allow for in depth interpretation of meanings, experiences, and contextual influences. Recent developments in qualitative research emphasize systematic procedures, transparency, and analytical rigor to ensure credible findings, making this approach appropriate for synthesizing theoretical and empirical insights related to pregnancy adaptation and maternal bonding (Bingham, 2023) (Pratt, 2025).

The descriptive qualitative approach is utilized to provide a comprehensive and systematic explanation of the phenomenon without manipulating variables. This approach focuses on presenting an accurate and detailed account of existing knowledge regarding MFA and its associated internal and external factors. It is widely applied in health and nursing research due to its flexibility in capturing real world complexities and its ability to generate meaningful interpretations grounded in existing literature (Doyle, 2019) (Abraham, 2024). Through this approach, the study aims to describe patterns, relationships, and conceptual frameworks that explain maternal adaptation during pregnancy.

Secondary data from reliable academic sources, such as peer-reviewed journal articles, scientific reports, and pertinent theoretical documents about maternal fetal attachment, pregnancy adaptation, and perinatal mental health, make up the study's data sources. To ensure that the analysis is current and relevant, the majority of the literature used comes from recent publications. By combining findings from several disciplines, library research facilitates the integration of various scholarly viewpoints and offers a thorough foundation for comprehending the subject (Jimenez, 2024) (Bandaranayake, 2024).

Data collection techniques were conducted through systematic literature search and document analysis. Relevant sources were identified using academic databases, followed by a careful selection process based on predefined criteria. The collected documents were then examined through theoretical review and critical reading to extract key concepts, findings, and arguments related to MFA and pregnancy adaptation. This process aligns with qualitative library research practices that emphasize thorough exploration and interpretation of existing knowledge to construct a coherent analytical narrative (Togia, 2017) (Granikov, 2020).

The data analysis procedure in this study follows an iterative qualitative analysis framework. The process begins with data familiarization and identification of key themes related to maternal psychological factors, social support, and adaptation processes. Subsequently, data reduction is performed to focus on relevant information, followed by categorization of concepts into internal and external factors influencing MFA. The analysis continues with thematic synthesis and interpretation, leading to inductive conclusion drawing. Contemporary qualitative analysis models highlight the importance of coding, categorization, and iterative interpretation to produce valid and meaningful insights (Belotto, 2018) (Fife, 2024) (Vila Henninger, 2022).

To ensure the validity and trustworthiness of the findings, this study applies several strategies, including clear inclusion and exclusion criteria, source triangulation, and conceptual consistency checks. Inclusion criteria include recent publications, relevance to MFA and pregnancy adaptation, and methodological rigor, while exclusion criteria involve outdated or non scholarly sources. Triangulation is achieved by comparing findings across multiple studies to enhance reliability and reduce bias. Additionally, maintaining a transparent analytical process supports the credibility and accountability of the study. Through this qualitative descriptive library research approach, the study is expected to produce comprehensive, valid, and theoretically grounded insights aligned with the objectives of the article.

Result and Discussion

The results of this literature-based study reveal that Maternal Fetal Attachment (MFA) is a multidimensional construct influenced by a complex interaction of psychological, social, and physiological factors. Based on the synthesis of the attached literature sources , the findings consistently indicate that MFA plays a significant role in shaping both maternal well-being and early child development outcomes. Across studies, stronger prenatal attachment is associated with more positive maternal perceptions and improved infant adaptive behavior, emphasizing the importance of early emotional bonding during pregnancy (Branjerdporn, 2022).

One of the primary findings relates to the role of maternal psychological well-being as a key internal determinant of MFA. Several studies demonstrate that depression and anxiety during pregnancy are negatively associated with maternal fetal attachment. For example, prenatal depression prevalence ranges from approximately 17.2% to 19.1%, with significant negative correlations between depressive symptoms and attachment quality (Annamalai, 2026) (Zhang, 2021). Similarly, anxiety has been shown to reduce emotional bonding, with higher anxiety levels predicting lower MFA scores (Varsha, 2026). These findings are further supported by systematic reviews indicating that depressive symptoms consistently weaken prenatal attachment, highlighting the importance of maternal mental health in the bonding process (Rollè, 2020).

In addition to negative psychological factors, positive mental health also plays a critical role in strengthening MFA. Evidence suggests that higher levels of positive mental health are associated with stronger prenatal bonding, both directly and indirectly through reduced anxiety levels (Ballesteros Andrés, 2025). Interestingly, some findings indicate that moderate anxiety may function adaptively by increasing maternal sensitivity and engagement with the fetus, suggesting a nuanced relationship between emotional states and attachment formation. This highlights the need to consider both risk and protective psychological factors in understanding MFA.

External factors, particularly social support, emerge as one of the most influential determinants of maternal fetal attachment. Empirical evidence shows that perceived support from partners, family, and social networks significantly enhances MFA, while lack of support is associated with poorer attachment outcomes (Ertmann, 2021). Furthermore, family support has been identified as a key predictor that indirectly influences MFA through pregnancy adaptation, with adaptation acting as a mediating variable (Wu, 2024). Studies also demonstrate that social support reduces stress and depressive symptoms, thereby indirectly strengthening maternal bonding (Racine, 2019) (Wang, 2026).

Another major finding concerns the mediating role of pregnancy adaptation in the relationship between internal and external factors and MFA. Pregnancy adaptation, defined as the ability to accept and cope with physical and psychological changes, significantly predicts the quality of maternal fetal bonding. Research shows that better adaptation is associated with stronger attachment, while difficulties in adaptation increase the risk of perinatal depression and weaker bonding (Vega Sanz, 2023) (Wu, 2025). These findings

suggest that adaptation serves as a critical mechanism linking psychosocial conditions to maternal attachment outcomes.

Sociodemographic and obstetric variables also contribute to variations in MFA, although their effects are generally less consistent. Factors such as maternal age, parity, marital satisfaction, and pregnancy intention have been found to influence attachment levels, often in interaction with psychological conditions (Camarneiro, 2024). For instance, unplanned pregnancy and marital discord are associated with higher risks of depression and anxiety, which in turn negatively affect MFA (Annamalai, 2026). However, some studies indicate that these variables have only a modest direct impact, suggesting that their influence is largely mediated by psychosocial factors (Pohárnok, 2022).

From a developmental perspective, the findings confirm that prenatal attachment has long-term implications for child outcomes. Strong MFA is associated with better emotional regulation, lower negative affectivity, and improved socioemotional development in infants and toddlers (Cervellione, 2025). Conversely, weak attachment and maternal psychological distress are linked to poorer developmental trajectories, reinforcing the importance of early intervention during pregnancy.

Another important finding relates to the measurement and conceptualization of MFA. Research indicates that MFA consists of multiple dimensions, including emotional affection, cognitive engagement, and behavioral interaction with the fetus (Brekalo, 2025). However, inconsistencies in measurement tools and factor structures remain a challenge. For example, variations in the structure of the Prenatal Attachment Inventory suggest that MFA may not be a uniform construct across different populations and stages of pregnancy, highlighting the need for standardized and culturally sensitive measurement approaches.

To summarize the main findings, the following table presents the key factors influencing Maternal Fetal Attachment based on the reviewed literature:

Table 1. Key Factors Influencing Maternal Fetal Attachment (MFA)

Factor Category	Key Variables	Main Findings	Supporting Studies
Internal Factors	Depression, anxiety, positive mental health	Negative emotions reduce MFA, positive mental health enhances MFA	(Annamalai, 2026) (Zhang, 2021) (Rollè, 2020) (Ballesteros Andrés, 2025)
External Factors	Social support, family support	Strong predictor of MFA and reduces psychological distress	(Ertmann, 2021) (Racine, 2019) (Wang, 2026)
Mediating Factor	Pregnancy adaptation	Mediates relationship between support and MFA	(Wu, 2024) (Vega Sanz, 2023) (Wu, 2025)
Sociodemographic	Age, parity, marital status	Moderate influence, often indirect	(Camarneiro, 2024) (Pohárnok, 2022)
Developmental Outcomes	Infant emotional regulation	Strong MFA improves child development outcomes	(Branjerdporn, 2022) (Cervellione, 2025)

Overall, the results indicate that MFA is shaped by an interplay of internal psychological conditions and external social environments, with pregnancy adaptation acting as a central mediating mechanism. Compared to earlier research, recent studies

provide a more integrative perspective by combining psychological, social, and developmental dimensions. However, inconsistencies remain, particularly in the role of anxiety and the relative contribution of sociodemographic variables, suggesting the need for further longitudinal and cross-cultural research.

Discussion

The findings of this literature analysis indicate that Maternal Fetal Attachment (MFA) should be understood as a dynamic relational process that develops within the broader context of pregnancy adaptation rather than as a purely emotional response to pregnancy. This interpretation is consistent with the view that antenatal attachment reflects the mother's psychological transition to parenthood and is shaped by her emotional state, relational environment, and readiness to engage with the unborn child (Camarneiro, 2024). In this sense, the present review strengthens the conceptual position that MFA is both an indicator and an outcome of maternal adaptation during pregnancy. The results also support the argument that bonding with the fetus begins before birth and forms an important foundation for later mother infant bonding and early developmental adjustment (Trombetta, 2021) (Rusanen, 2025).

A central interpretation of the findings is that internal maternal factors, especially depression and anxiety, are among the strongest influences on MFA. The reviewed studies consistently show that depressive symptoms are associated with lower attachment quality, weaker emotional involvement, and reduced maternal preoccupation with the fetus (Rollè, 2020) (Zhang, 2021). This pattern suggests that psychological distress may interfere with the mother's capacity to invest emotionally in the pregnancy, possibly because depression reduces energy, hope, and affective responsiveness. Anxiety shows a more complex pattern. In several studies it appears as a risk factor that weakens bonding, especially when anxiety is intense, persistent, or linked with psychosocial strain (Varsha, 2026) (Pellerone, 2023). However, one study suggests that anxiety may also function adaptively when it occurs alongside positive mental health, potentially heightening maternal vigilance and sensitivity toward the fetus (Ballesteros Andrés, 2025). This means anxiety should not be interpreted as uniformly harmful, but rather according to its intensity, context, and interaction with protective resources.

The review further indicates that pregnancy adaptation is a key explanatory mechanism connecting maternal well being and attachment. The studies by Wu and colleagues suggest that adaptation to pregnancy includes acceptance of pregnancy, coping with bodily changes, and mindful attention to pregnancy health, all of which contribute to healthier emotional engagement with the fetus (Wu, 2024) (Wu, 2025). This supports the interpretation that adaptation is not merely an accompanying process but a mediating pathway through which maternal experiences are transformed into attachment outcomes. The findings from Vega Sanz also reinforce this conclusion by showing that poor adjustment to pregnancy predicts depressive symptoms indirectly through brooding rumination and lower maternal fetal bonding (Vega Sanz, 2023). Thus, the present review contributes to the field by clarifying that MFA is not only affected by emotional symptoms in isolation, but

also by how successfully the mother reorganizes psychologically and behaviorally in response to pregnancy.

External factors, especially social and family support, also emerge as highly influential in the formation of MFA. The literature repeatedly shows that support from partners, relatives, and the broader family environment protects maternal mental health and strengthens prenatal bonding (Ertmann, 2021) (Racine, 2019). This finding aligns with relational and ecological perspectives in maternal health, which emphasize that maternal adaptation is embedded in social systems rather than occurring solely within the individual. The mediating role of pregnancy adaptation between family support and bonding provides especially strong evidence for this interpretation, because it shows that supportive relationships do not just coexist with better attachment but actively facilitate the mother's adjustment process, which in turn enhances bonding (Wu, 2024). In practical terms, this means interventions designed to improve MFA should not focus only on the mother as an isolated subject, but also on strengthening partner involvement, family responsiveness, and emotionally supportive antenatal care.

Another important implication concerns the developmental significance of MFA. The reviewed evidence suggests that stronger prenatal bonding predicts more favorable infant adaptive behavior and better early emotion regulation outcomes (Branjerdporn, 2022) (Cervellione, 2025). This expands the meaning of MFA beyond maternal experience alone and positions it as a relevant early marker for child developmental trajectories. The contribution of this review to the field lies in showing that attachment during pregnancy is not a minor or secondary emotional feature, but part of the prenatal environment that may shape regulatory and socioemotional development after birth. This reinforces the theoretical importance of prenatal relational processes within developmental and perinatal psychology and supports the inclusion of MFA in maternal child health screening frameworks.

At the same time, several findings reveal that the impact of sociodemographic and obstetric variables is less uniform. Age, parity, education, pregnancy intention, and marital satisfaction were all associated with MFA in some studies, but their effects were often smaller or indirect when compared with psychological and social variables (Pohárnok, 2022) (Camarneiro, 2024). This suggests that sociodemographic characteristics do not determine attachment on their own, but operate through more proximal mechanisms such as stress exposure, self rated health, couple relationship quality, and emotional adjustment. For example, unplanned pregnancy, economic strain, and marital discord appear to increase depression and anxiety risk, which then undermines MFA (Annamalai, 2026) (Wang, 2025). This helps explain why some earlier expectations that demographic factors would directly predict bonding are only partially supported. The broader interpretation is that structural conditions matter, but mainly because they shape the psychosocial context in which pregnancy is experienced.

The findings also contribute to the literature by highlighting conceptual and measurement issues. Recent psychometric studies suggest that MFA is multidimensional, involving affection toward the fetus, familiarity with fetal movement and behavior, fantasy or representation of the unborn child, attunement, and interaction (Brekalo, 2025) (Pohárnok, 2022). These results are valuable because they help explain why earlier studies

sometimes produced inconsistent findings. If different instruments capture different components of bonding, then depression or anxiety may affect some dimensions more strongly than others. This review therefore supports the need for greater conceptual precision in future studies. It also suggests that comparison across studies should be conducted cautiously, especially when scales differ in factor structure, item content, and timing of measurement during pregnancy.

Several factors may explain why some results diverge from initial expectations. First, gestational age appears to influence how bonding is expressed, since awareness of fetal movement and maternal fantasies about the baby tend to increase later in pregnancy, which can alter measurement outcomes (Brekalo, 2025). Second, population differences matter. Women with high psychosocial risk, assisted reproductive pregnancies, prior perinatal loss, or contextual stressors may show different attachment patterns than low risk community samples (Røhder, 2020) (Pellerone, 2023) (Branjerdporn, 2022). Third, the role of anxiety may differ depending on whether anxiety is measured as clinical distress, pregnancy specific concern, or adaptive attentiveness. These factors likely account for the mixed pattern in the literature, where anxiety is sometimes negatively related to MFA and at other times appears to coexist with stronger engagement. Therefore, contradictory findings should not be viewed as simple inconsistency, but as evidence that MFA develops under multiple interacting conditions.

This review also identifies several limitations in the body of literature. Many of the included studies use cross sectional designs, which limits causal interpretation and makes it difficult to determine whether poor mental health reduces MFA, weak MFA worsens distress, or both processes occur simultaneously (Rollè, 2020) (Wu, 2024). Some studies rely heavily on self report measures, creating a risk of shared method bias and overestimation of associations between psychological variables. There are also sample limitations, including underrepresentation of early pregnancy, non Western populations, fathers, and clinically diverse groups. In addition, measurement inconsistency remains a major challenge, as the psychometric structure of commonly used bonding scales is still debated (Brekalo, 2025). Another limitation is that some reviewed studies include relatively small samples, which reduces the stability of findings and may weaken generalizability.

For future improvement, longitudinal and multimethod studies are needed to clarify developmental pathways linking MFA, maternal mental health, pregnancy adaptation, and postnatal outcomes. Research should begin earlier in pregnancy and use repeated assessments to capture change over time. Future studies would also benefit from integrating psychological, relational, and biological indicators so that MFA can be examined within a fuller biopsychosocial framework. Greater inclusion of diverse sociocultural populations, fathers, and high risk pregnancies is also necessary to build a more representative understanding of prenatal bonding (Cervellione, 2025) (Rusanen, 2025). Practically, the present findings suggest that antenatal care should incorporate routine screening for depression, anxiety, social support, and adaptation difficulties, while also designing interventions that strengthen partner and family involvement. In this way, the contribution of the current literature analysis lies in showing that MFA is not simply an emotional

phenomenon, but a clinically relevant and theoretically rich construct that links maternal adaptation with child developmental well being.

Conclusion

This qualitative descriptive literature study confirms that Maternal Fetal Attachment (MFA) is a complex and multidimensional phenomenon shaped by the interaction of internal psychological factors, external social environments, and the process of pregnancy adaptation. Maternal conditions such as depression and anxiety significantly weaken prenatal bonding, while positive mental health and effective adaptation enhance emotional connection with the fetus. Social and family support also play a crucial role, both directly and indirectly, by facilitating maternal adjustment to pregnancy. These findings position MFA as a biopsychosocial process that extends beyond emotional experience and contributes to theoretical development in prenatal attachment and maternal adaptation, while also reinforcing its importance for infant outcomes, particularly emotional regulation and adaptive functioning. Practically, the results highlight the need for integrated antenatal care that includes mental health screening, family involvement, and supportive interventions to improve maternal and child well-being. However, limitations such as reliance on secondary data, variability in measurement tools, and the dominance of cross sectional studies restrict causal interpretation. Therefore, future research should adopt longitudinal and multi-method approaches, expand to diverse populations and early pregnancy stages, and develop standardized, culturally sensitive measurement tools to deepen understanding and strengthen the application of MFA in both research and clinical practice.

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