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Original research article

Early maternal-infant bonding and its related factors

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Abstract
Introduction: Early maternal-infant bonding and maternal breastfeeding self-efficacy are key factors influencing maternal and neonatal health outcomes. The aim of this study was to assess the level of early bonding among mothers in the postpartum period and to examine its associated factors.
Methods: A cross-sectional quantitative study was conducted. The sample consisted of 303 women (age: 32.9 ± 5.10) at 3–4 days postpartum. Data were collected using a questionnaire that included the Mother-to-Infant Bonding Scale (MIBS) (Cronbach's alpha = 0.805) and the Breastfeeding Self-Efficacy Scale – Short Form (BSES-SF) (Cronbach's alpha = 0.946). Descriptive and inferential statistics were used for data analysis (Mann–Whitney *U* test, Kruskal–Wallis test, Spearman's correlation coefficient).
Results: The mean MIBS score was 2.13 ± 2.56. The mean BSES-SF score was 47.02 ± 14.7. A statistically significant association was found between MIBS and mode of delivery ($p = 0.052$) and support for skin-to-skin contact after birth ($p = 0.036$). Correlation analysis confirmed a negative correlation between MIBS and BSES-SF ($p < 0.001$).
Conclusion: The findings highlight the importance of early identification of mothers with lower levels of bonding in the early postpartum period, enabling the implementation of targeted interventions. Support for skin-to-skin contact and strengthening breastfeeding self-efficacy represent effective strategies to promote the development of maternal-infant bonding and, subsequently, secure attachment.

Keywords: Attachment; Bonding; Breastfeeding; Infant; Mother; Self-efficacy

Introduction

Early maternal-infant bonding, as well as maternal breastfeeding self-efficacy, are key factors influencing maternal and neonatal health outcomes, which is of significant importance from a public health perspective. The development of positive emotional bonds between a mother and her infant represents one of the most fundamental bases for building a healthy relationship and serves as a foundation for the child's later development (Mihelic et al., 2017).

Concepts such as maternal-infant bonding and attachment are closely related; however, they describe different aspects of the same phenomenon (Ettenberger et al., 2021). Maternal-infant bonding is defined as the emotions and feelings of a mother toward her infant (Kinsey et al., 2014). In contrast to attachment, bonding is unidirectional – from the mother to the infant – and begins to develop during pregnancy (prenatal bonding), continuing to evolve after birth (postnatal bonding) and into early childhood (Tichelman et al., 2019). Attachment is used in a broader developmental and psychological context and refers to a relatively stable relational system of the child toward the caregiver, which is formed during the first year of life based on repeated interactions (Vandesande et al., 2019). Secure attachment represents the foundation for further psychosocial development of the child and is essential for the development of a positive self-concept and self-esteem later in life (Călin et al., 2022). Children with this type of attachment are more likely to seek support, experience lower levels of anxiety, cope better with stress, regulate emotions more effectively, and exhibit fewer difficulties in interpersonal relationships (Bureau et al., 2017; Delgado et al., 2022).

Research indicates that breastfeeding plays a significant role in the development of secure attachment between mother and infant (Linde et al., 2020; Padmasree et al., 2017), and represents one of the most intimate forms of interaction. Successful breastfeeding should be a global public health priority. In addition to the well-established benefits of breast milk as the optimal source of nutrition for newborns, breastfeeding also provides proven health benefits for both infants and their mothers. It facilitates not only physical closeness but also regular and sensitive interactions, provides intensive skin-to-skin contact, more frequent maternal touch, longer time spent together, deepening of the relationship, emotional caregiving, and direct sensory feedback. Breastfeeding can be considered a means through which mothers come to better understand their infants. Women gradually learn to recognize early signals by which the infant expresses their needs and are able to

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respond to them sensitively. This approach fosters maternal empathy toward the infant, thereby strengthening their mutual bond (Mazúchová et al., 2022). Self-efficacy is considered one of the key determinants of breastfeeding success, as it can predict whether a mother chooses to breastfeed, how much effort she invests, whether she persists, and how she copes with breastfeeding difficulties (Piro and Ahmed, 2020).

The aim of the study was to assess the level of early maternal-infant bonding in the postpartum period and to examine its associated factors.

The study focused on the following specific objectives:
1. To determine the level of early maternal-infant bonding in the postpartum period.
2. To identify differences in bonding levels, based on sociodemographic and obstetric characteristics of women.
3. To examine the association between bonding levels and support for skin-to-skin contact after birth.
4. To assess the relationship between bonding levels and maternal breastfeeding self-efficacy.

Materials and methods

A cross-sectional study was conducted from March 2024 to January 2025. At the beginning of the data collection, a pilot study was carried out with four respondents. Based on the feedback obtained, some items were subsequently revised for clarity.

The sampling was purposive, which limits the interpretation and generalization of the results to the studied sample. Respondents who met the following predefined inclusion criteria were included: being 3–4 days postpartum, willingness to participate in the research, and providing informed consent.

The study sample consisted of 303 respondents with a mean age of 32.9 (±5.10). A total of 72.9% of respondents had a university education, 25.1% had secondary education, 0.3% had vocational education, and 1.7% had primary education.

Regarding marital status, 70.3% of respondents were married, 28.4% were single with a partner, 1.0% were divorced or widowed, and one respondent (0.3%) was single without a partner.

Primiparous women accounted for 51.2% of respondents, secundiparous for 35.6%, tertiparous for 7.9%, and multiparous women (four or more births) for 5.3%.

A spontaneous vaginal delivery was reported by 72.2% of respondents, operative vaginal delivery by 5.0%, and cesarean section by 22.8%.

A total of 64.7% of respondents delivered at term, 29.0% post-term, and 6.3% preterm.

The baseline characteristics of the study sample are presented in Table 1.

A questionnaire was used as the research instrument. The first part consisted of self-developed items focusing on demographic, pregnancy-related, and obstetric characteristics. The second part included the Mother-to-Infant Bonding Scale (MIBS) (Taylor et al., 2005), which consists of eight items reflecting positive and negative maternal emotions toward the infant, rated on a 4-point Likert scale. The selection of this instrument was based on its brevity, good psychometric properties, and frequent use in international research on early maternal-infant bonding, allowing for comparability of results. Although the scale has not yet been validated in the Slovak sociocultural context, its internal consistency in our sample reached a good level (Cronbach's α = 0.805).

Table 1. Basic characteristics of the study sample

Studied variables	*N*	%
Education		
High school	76	25.1
University	221	72.9
Marital status		
Single without partner	1	0.3
Single with partner	86	28.4
Married	213	70.3
Divorced/widow	3	1.0
Parity		
Primiparous	155	51.2
Multiparous	148	48.8
Type of delivery		
Spontaneous vaginal delivery	219	72.2
Operative vaginal delivery	15	5.0
Cesarean section	69	22.8
Due date		
Preterm	19	6.3
At term	196	64.7
Post-term	88	29.0

Items 1, 4, and 6 reflect positive emotions, while items 2, 3, 5, 7, and 8 reflect negative emotions and were reverse-coded. The total score of the scale ranges from 0 to 24, with lower scores indicating a higher level of bonding.

The final part consisted of the Breastfeeding Self-Efficacy Scale – Short Form (BSES-SF) (Dennis, 2003). The BSES-SF includes 14 items aimed at assessing maternal self-efficacy and the mother's ability to breastfeed. Responses were rated on a 5-point Likert scale. The total score ranges from 14 to 70, with higher scores indicating higher levels of maternal breastfeeding self-efficacy. The questionnaire has been validated in Slovakia (Mazúchová et al., 2024). The Cronbach's alpha coefficient was 0.946.

Data collection was conducted in both paper-based and electronic forms. A total of 333 questionnaires were distributed, with a response rate of 90.99% (n = 303).

Descriptive and inferential statistical methods were used for data analysis. Statistical processing was performed using the Jamovi statistical software. Prior to testing for statistical significance, the Shapiro–Wilk test was conducted on the variable representing the total MIBS score, with a significance level of p = 0.001. Non-parametric tests were used to assess statistical significance, including the Kruskal–Wallis test, Mann–Whitney U test, and Spearman's correlation coefficient.

Results

The results presented below summarize the findings of descriptive and inferential statistical analyses focusing on the level of early maternal-infant bonding and its associated factors in the postpartum period.

Table 2 presents the descriptive statistics of the Mother-to-Infant Bonding Scale (MIBS), which assesses the level of maternal-infant bonding. Lower scores indicate a higher level of bonding. The mean MIBS score was 2.13 ± 2.56 (Table 2).

A higher level of bonding (lower scores) was observed among women with secondary education (2.11 ± 2.90), followed by women with university education (with a nearly identical score of 2.13 ± 2.90), while the lowest level of bonding was found among women with lower education (primary and vocational) (3.83 ± 2.04). Based on the Kruskal–Wallis test,

Table 2. MIBS score

MIBS	
Mean	2.13
Median	1
Mode	0
Standard deviation	2.59
Minimum	0
Maximum	15

no statistically significant differences in bonding levels were found between groups according to education (p = 0.177).

A higher level of bonding was observed among primiparous women (2.04 ± 2.53) compared to multiparous women (2.28 ± 2.69). Based on the Mann–Whitney *U* test, no statistically significant differences in bonding levels were found between groups according to parity (p = 0.380).

A higher level of bonding was found among women who had an operative vaginal delivery (vacuum extraction or forceps delivery) (1.88 ± 2.68), followed by women who had a spontaneous or induced vaginal delivery (2.00 ± 2.55), while the lowest level of bonding was observed among women who delivered by cesarean section under spinal or general anesthesia (2.75 ± 2.72). Based on the Kruskal–Wallis test, a borderline statistically significant difference in bonding levels was found between groups according to mode of delivery (p = 0.052). Post hoc pairwise comparisons indicated that a statistically significant difference was observed only between women who had a vaginal delivery and those who delivered by cesarean section.

A higher level of bonding was observed among women who received support for skin-to-skin contact (SSC) for a shorter duration (less than 45 minutes) (1.53 ± 2.60), as well as among women who received SSC according to recommended guidelines (2.21 ± 2.51). The lowest level of bonding was found among women who reported not having SSC after birth (2.63 ± 2.84). Based on the Kruskal–Wallis test, statistically significant differences in bonding levels were found between groups according to SSC support (p = 0.036). Post hoc pairwise comparisons indicated that a statistically significant difference was observed only between women who did not receive SSC and those who received SSC for a shorter duration.

A higher level of bonding was observed among women who reported breastfeeding (2.11 ± 2.56) compared to those who did not breastfeed (2.81 ± 3.21). Based on the Mann–Whitney *U* test, no statistically significant differences in bonding levels were found between groups according to breastfeeding status (p = 0.400).

A higher level of bonding was observed among women who were satisfied with partner support (2.11 ± 2.55) compared to those who were not satisfied (5.20 ± 7.26). Based on the Mann–Whitney *U* test, no statistically significant differences in bonding levels were found between groups according to satisfaction with partner support (p = 0.810).

A higher level of bonding was observed among women who were satisfied with healthcare professionals' support (2.11 ± 2.55) compared to those who were not satisfied (4.67 ± 4.23). Based on the Mann–Whitney *U* test, no statistically significant differences in bonding levels were found between groups according to satisfaction with healthcare support (p = 0.120).

A higher level of bonding was observed among women who were satisfied with the support provided by neonatal care staff (2.12 ± 2.58) compared to those who were not satisfied (2.86 ± 3.13). Based on the Mann–Whitney *U* test, no statistically significant differences in bonding levels were found between groups according to satisfaction with neonatal staff support (p = 0.464) – Table 3.

Table 3. Statistically significant correlations between the investigated variables and the MIBS scale

Studied variables	MIBS			
	N	%	d ± SD	*p*
Education				
Lower	6	2.0	3.83 ± 2.04	0.177**
High school	76	25.1	2.11 ± 2.90	
University	221	72.9	2.13 ± 2.51	
Parity				
Primiparous	155	51.2	2.04 ± 2.53	0.380*
Multiparous	148	48.8	2.28 ± 2.69	
Type of delivery				
Spontaneous vaginal delivery	219	72.2	2.00 ± 2.55	0.052**
Operative vaginal delivery	15	5.0	1.88 ± 2.68	
SC spinal/general	69	22.8	2.75 ± 2.72	
Bonding support				
Yes	186	61.4	2.21 ± 2.51	0.036**
Yes, but <than 45 min.	60	19.8	1.53 ± 2.60	
No	57	18.8	2.63 ± 2.84	
Breastfeeding				
Fully/partially breastfeed	282	93.1	2.11 ± 2.56	0.400*
I don't breastfeed	21	6.9	2.81 ± 3.21	
Satisfied with partner support				
Agree	298	98.3	2.11 ± 2.46	0.810*
Disagree	5	1.7	5.20 ± 7.26	
Satisfied with support from healthcare professionals				
Agree	289	95.4	2.12 ± 2.58	0.464*
Disagree	14	4.6	2.86 ± 3.13	

Note: SC – *sectio caesarea*, *N* – number of respondents; d – mean score; SD – standard deviation; *p* – level of significance; * Mann–Whitney *U* test, ** Kruskal–Wallis test

Table 4 presents descriptive statistics for the *Breastfeeding Self-Efficacy Scale – Short Form (BSES-SF)*, which assesses maternal breastfeeding self-efficacy. Higher scores indicate higher levels of breastfeeding self-efficacy, with scores ≤50 considered at risk. The mean BSES-SF score was 47.02 ± 14.7. A total of 46.03% of women had scores ≤50 (Table 4).

Table 4. BSES-SF score

BSES-SF	
Mean	47.02
Median	48.00
Mode	58
Standard deviation	14.7
Minimum	14
Maximum	70
Score ≤50	49 (46.03%)

A statistically significant relationship was found between the MIBS and BSES-SF variables ($p < 0.001$). The Spearman correlation coefficient ($r = -0.244$) indicates a negative correlation; higher MIBS scores (indicating lower levels of bonding) were associated with lower BSES-SF scores (indicating lower maternal breastfeeding self-efficacy). Although statistically significant, the relationship was weak, suggesting that breastfeeding self-efficacy is one of several factors influencing bonding rather than a dominant determinant (Table 5).

Table 5. Association between MIBS and BSES-SF scores

Scales	*r* *	df	*p*
MIBS – BSES-SF	–0.244	301	<0.001

Note: * Spearman correlation analysis

Discussion

The development of the relationship between the mother and the newborn is the most important process in the postpartum period. Assessing maternal-infant bonding plays a key role in the quality of care. The total MIBS score is traditionally used as a clinical indicator. It is essential to evaluate bonding from the earliest stages, to identify any disturbances in emotional bonding as early as possible (Winston and Chicot, 2016), and to provide mothers with appropriate support when needed.

The MIBS, which allows mothers to express their feelings toward their infants, can be a useful tool for assessing maternal-infant bonding. In our study, the overall mean MIBS score was low (M = 2.13 ± 2.59), indicating a favorable level of postnatal bonding. Our findings are comparable with the study by Bienfait and Nur (2011), where the mean MIBS score was above 2.00, and are more favorable compared to the study by Gulturk et al. (2018), where the mean MIBS score was 2.53 ± 0.08. From a clinical perspective, it is important to focus on individual cases of mothers with higher MIBS scores, as they may be at risk of impaired early bonding, which is not always apparent through routine clinical observation. These findings support the use of screening tools such as the MIBS as a complement to clinical assessment.

No statistically significant differences were found between bonding levels and maternal education. Similar findings were reported by Daglar et al. (2018); however, other studies (Lehnig et al., 2019; Mazúchová et al., 2021) have demonstrated significant associations. A systematic review indicated that higher education was associated with better bonding quality; however, approximately half of the reviewed studies reported a negative association (Tichelman et al., 2019).

In our study, parity was not confirmed as a significant factor associated with bonding. Similarly, no association was found in a Slovak study (Mazúchová et al., 2021), although other studies (Mazúchová et al., 2025; Yoshida et al., 2020) have reported significant findings. Our results suggest that demographic characteristics alone may not be decisive factors in the quality of early bonding.

A borderline statistically significant difference ($p = 0.052$) in bonding levels was found in relation to mode of delivery. Significant differences were observed between women who had vaginal delivery and those who delivered by cesarean section, which is consistent with findings from other studies (Yoshida et al., 2020). However, these differences were relatively small, and their clinical relevance should be interpreted with caution. Clinically, this highlights the need for increased support of early interactions in women following operative delivery, particularly in situations where contact between the mother and infant may be delayed.

The early postpartum period is considered crucial for the development of bonding, and support for immediate skin-to-skin contact is regarded as an important contributing factor. One of the most important findings of our study was the association between support for skin-to-skin contact and bonding levels, which has also been demonstrated in other studies (Mazúchová et al., 2021; Potgieter and Adams, 2019). This finding supports theoretical assumptions regarding the importance of early sensory and emotional interactions. Although differences in scores were not substantial, they are clinically relevant, as this represents a simple and non-invasive intervention. In practice, this underscores the need to systematically ensure skin-to-skin contact whenever the health condition of the mother and infant allows.

Breastfeeding strengthens the unique bond between mother and infant, thereby enhancing maternal bonding (Kaynak et al., 2025). However, the relationship between breastfeeding and bonding was not statistically significant, suggesting that the mere presence of breastfeeding does not automatically imply a higher-quality relationship. A systematic review showed that breastfeeding is associated with increased parental sensitivity and secure attachment; however, findings vary due to differences in methodologies and measurement approaches (Peñacoba and Catala, 2019). It has also been shown that adaptation to breastfeeding, the development of self-efficacy, and the ability to emotionally interact with the infant significantly influence maternal bonding shortly after birth (Kim, 2019).

Support for women – whether from partners, healthcare professionals, or the broader environment – is an important factor that positively influences not only maternal mental well-being but also bonding. The quality of the partner relationship and partner support may serve as protective factors for mothers (Konrádyová et al., 2022). The association between bonding levels and satisfaction with partner support was not statistically significant ($p = 0.810$), although it has been confirmed in other studies (Matthies et al., 2020; Mazúchová et al., 2021).

No statistically significant differences were found between bonding levels and support from healthcare professionals, although a study by Mazúchová et al. (2025) identified health-

care support as significant. It is important to involve partners in the development of the relationship with the infant and in supporting mothers in childcare, as this significantly contributes to maternal well-being and healthy bonding. Nurses and midwives are well positioned to support the developing mother–infant relationship through targeted interventions, education, and support during both prenatal and postnatal periods.

The lack of a significant association between bonding and satisfaction with support suggests that subjective perceptions of support may not directly reflect the quality of early emotional experiences. Nevertheless, these factors remain important for overall maternal well-being, which may indirectly influence bonding. Therefore, in clinical practice, providing support to mothers should remain an integral part of care.

Self-efficacy, rooted in a mother's belief in her ability to breastfeed successfully, is fundamental to successful breastfeeding. Evidence shows that breastfeeding self-efficacy, as measured by the BSES-SF, is associated with initiation, duration, effectiveness, and exclusivity of breastfeeding (Brani et al., 2024; Economou et al., 2021). The mean BSES-SF score in our study was 47.02 ± 14.7. Our findings are comparable to those of Amini et al. (2019), where the mean score was 50.80 ± 8.91, but lower than those reported in a Slovak study by Mazúchová et al. (2024), where the mean score was 55.02 ± 9.396. The results indicate a relatively high proportion of women with risk scores (46.03%). This highlights the need for systematic assessment of breastfeeding self-efficacy in clinical practice to enable early identification of mothers requiring individualized support. Healthcare professionals working with pregnant and postpartum women should actively integrate strategies to enhance breastfeeding self-efficacy, thereby increasing maternal confidence and persistence when facing difficulties (Mazúchová et al., 2022). Strengthening self-efficacy through education, support, and positive feedback may thus represent an effective intervention – not only for successful breastfeeding but also for promoting early maternal-infant bonding.

Correlation analysis confirmed a negative correlation between MIBS and BSES-SF ($p < 0.001$). Given that the correlation was weak, it suggests that lower breastfeeding self-efficacy may represent one of several risk factors for less favorable bonding. The clinical relevance of this association lies more in identifying at-risk groups than in strong predictive power. A correlation between MIBS and BSES-SF was also reported in a study by Altiparmak et al. (2021). These findings suggest that interventions aimed at increasing self-efficacy may support not only breastfeeding but also bonding, which is crucial for healthy child development.

The findings of this study should be interpreted in light of several limitations. One limitation is the purposive sampling, which restricts the generalizability of the findings to the studied sample. Another limitation is the unequal distribution of groups, which may have affected the accuracy of the results. Additionally, the MIBS has not been validated in the Slovak sociocultural context, which may influence its validity. There is considerable scope for further research to confirm the psychometric properties of the Slovak version of the MIBS, as well as to explore additional factors influencing early bonding, such as infant health status, infant temperament, maternal health, maternal psychiatric conditions, postpartum anxiety and depression, preterm birth, and maternal history of childhood maltreatment. Despite these limitations, we believe that the findings provide valuable insights and may serve as a basis for further research in this field.

Conclusion

The findings highlight the need for systematic identification of mothers with lower levels of maternal-infant bonding in the early postpartum period. Identification of risk factors enables targeted interventions for women who may be at risk of impaired postnatal bonding. The results also support the use of the MIBS as an appropriate screening tool in the early postpartum period.

In clinical practice, healthcare professionals can significantly influence the quality of early interactions by supporting immediate skin-to-skin contact after birth and by strengthening maternal breastfeeding self-efficacy. The implementation of these measures may contribute not only to enhancing maternal-infant bonding but also to the favorable development of secure attachment in later stages.

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Ethical aspects and conflict of interest
The authors have no conflict of interest to declare.

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