A Cross Sectional Study On The Relationship Of Maternal Bonding And Infant Temperament: Recommendations For Enhancing Maternal-Infant Bonding

Alvina Dewi Maharani[1)], Rufidah Maulina✉[1)], Siti Nurhidayati[1)], Nurul Jannatul Wahidah[1)], Grhasta Dian Perestoika[2)]

[1] Midwifery Study Program, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Central Java, Indonesia 57126
[2] Master of Applied Occupational Health and Safety Study Program, Department of Health Services and Information, Vocational School, Universitas Gadjah Mada (UGM), DI Yogyakarta, Indonesia 55281
✉Email: maulinarufidah@staff.uns.ac.id

ABSTRACT

***Background**: The temperament of a baby plays an important role in the quality of the mother's interaction. The close relationship between maternal bonding and infant temperament affects the quality of their interactions. Given the impact of maternal bonding relates to infant temperament. This study aimed to investigate the relationship between maternal bonding and infant temperament in the Colomadu II Health Center area.* ***Methods**: This cross-sectional study involved 102 mothers with babies aged 6 to 11 months in the Colomadu II Health Center area. Accidental sampling technique was used. The instruments were the Infant Characteristics Questionnaire (ICQ) and the Mother Infant Bonding Scale-Indonesia (MIBS-I). Statistical analysis used the Spearman rank correlation test.* ***Results**: The study found that 75.5% of babies had a mild temperament. The average MIBS-I score for mothers was 1.49 (range: 0-9, SD: 2.038). The Spearman test showed a significant relationship between maternal bonding and infant temperament (p=0.001). Conclusion: This study found a significant relationship between maternal bonding and infant temperament in the working area of Colomadu II Health Center. These findings can be applied to primary care health promotion programs by incorporating maternal-infant bonding assessments into routine child health visits and providing counseling or educational sessions to support mothers in developing positive bonding practices and managing infant temperament challenges.*

***Keywords**: Bonding, Mother-infant bonding, Temperament of baby*

INTRODUCTION

The mother-baby bond is crucial for the child's psychological development and begins to form during pregnancy, developing through reciprocal interactions such as eye contact, facial expressions, and the baby's cries (Hill & Flanagan, 2020; Davies et al., 2021; Fallon et al., 2021). The quality of this bond is reflected in the mother's feelings of love, closeness, and responsiveness, which are demonstrated through behaviors such as carrying, soothing, and attending to the baby's signals. A strong bond supports the mother's confidence, the baby's healthy attachment, and the child's long-term psychosocial development. Conversely, disrupted bonding can hinder child development and increase the risk of behavioral problems. Factors such as maternal education, planned pregnancies, number of children, and psychosocial support contribute to positive bonding (Darvishvand et al., 2018; Mazúchová et al.,2021).

Baby temperament, influenced by neurohormonal factors, genetics, environmental experiences, and brain and physiological maturity, affects the quality of interaction between mother and baby (Jones & Sloan, 2018; Aktar & Pérez-Edgar, 2020). Baby reactivity is evident through cognitive, motor, and emotional responses to stimuli, while self-regulation relates to the baby's ability to manage their reactions. This reactivity develops alongside neurophysiological and cognitive maturation into adulthood. Difficult temperament is considered a phase of normal development due to the immature brain and the baby's inability to adapt to the environment. The mother-infant bond itself is a physiological and psychological

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need that provides a sense of safety and comfort (Davies et al., 2021).

In Indonesia, maternal and child health remains a national priority, but the emotional and psychological dimensions of postpartum care, such as mother-infant bonding, often receive less attention. Early parenting challenges such as maternal stress, bonding disorders, and infant behavioral difficulties are frequently reported (Astuti, Rachmawati, and Rahma, 2017; (Minayati *et al.*, 2023); Nurwany et al., 2023; (Oktafia *et al.*, 2023); Sari, Muhani, and Dewi, 2023). Meanwhile, previous studies have shown a prevalence of common mental disorders of 12.6% in pregnant women and 10.1% in postpartum women in Indonesia (Ariasih et al., 2024), indicating an urgent need for research in the field of maternal psychology.

Davies et al. (2021) found that maternal anxiety mediates the relationship between mother-infant bonding and infant temperament. Another study by Takács et al. (2020) shows that although the first week postpartum can temporarily affect the baby's temperament, the baby's temperament in the following weeks or months plays a crucial role in shaping the long-term mother-child relationship. These studies emphasize that maternal psychiatric symptoms and infant temperament can influence early bonding.

However, routine screening for maternal mental health, bond quality, and infant temperament has not yet become common practice in public health services. In Central Java, including Colomadu II, although there are maternal and child health programs, there is still minimal data and evidence-based guidelines related to support for bonding and temperamental regulation of infants postpartum.

Because research in this field is still limited, this study aims to examine the relationship between maternal bonding and infant temperament in the working area of Puskesmas Colomadu II.

METHODS

This study is a quantitative study with a cross sectional research design. The population used in the study were all mothers who had babies aged 6-11 months in the Colomadu II Health Center Working Area. The sample used in this study amounted to 102 mothers who had babies aged 6-11 months in the Colomadu II Health Center working area with accidental sampling technique. The technique of accidental sampling can adequately represent a population when used on a homogeneous group, because the similarity of characteristics among population members reduces data variation, so the information collected from the sample tends to reflect the general condition of the entire population (Jager, Putnick and Bornstein, 2017).

The instrument used to measure infant temperament is the Infant Characteristics Questionnaire (ICQ) which was translated and developed in Indonesian by (Oktafia *et al.*, 2023) which was developed and has been used in Indonesia with 20 question items scored on a 7-point scale, with a value of 1 describing optimal temperament traits and 7 describing difficult temperament with a score range of 20 - 140. Scores less than equal to 60.25 are categorized as infants with easy temperament and scores greater than 60.25 are categorized as infants with difficult temperament. This instrument has been tested for validity and reliability with a Cronbach's Alpha value of 0.89 so that this instrument shows reliable and valid results as a data collection instrument.

The instrument used to measure mother-infant bonding is the Mother Infant Bonding Scale-Indonesian (MIBS-I) questionnaire which has been validated and used in Indonesia by (Wiguna and Ismail, 2019). This questionnaire contains 10 Likert-type statements where 0 = “not at all” and 3 = “very true, most of the time”. In statement points that have positive affections, namely item numbers 6, 8 and 10, the values 0 - 3 are changed (0 = “very true, most of the time” so that 3 = “not at all”). The statement items used are only 8 items, namely numbers 3 - 10 with a score range of 0 -24. The higher the score obtained, the less bonding the mother has with her baby. This instrument has been tested for validity and reliability with a Cronbach's Alpha value of 0.535. This result showed that the Cronbach’s alpha is acceptable with caution, particularly given that the number of items is limited and the construct under investigation may be multidimensional. As noted by (Panayides, 2013) and (Taber, 2018), alpha values below the conventional threshold can still be defensible in exploratory research when

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supported by conceptual clarity and supplementary analyses.

The data analysis used consisted of univariate analysis (infant temperament, mother's education, mother's occupation, birth weight, infant birth (prematurity), type of delivery, planning for pregnancy and history of postpartum blues, mother and infant bonding, mother's age and infant's age) and bivariat analysis using the spearman-rank test. This research has obtained ethical permission from Dr. Moewardi Surakarta Hospital with Number 2.225/XI/HREC/2023.

RESULTS

Based on table 1, it can be seen that most of the ages of mothers who have babies aged 6-11 months in the Colomadu II Health Center Working Area are 20-35 years with a total of 86 mothers (84.3%). Then most of the respondents had the latest high school education is 51 mothers (50%) and most of the respondents did not have a job with a total of 67 mothers (65.7%). Most respondents in this study had planned their pregnancy with a total of 64 mothers (62.7%). The majority of respondents had a history of SC (Sectio Caesarea) delivery is 58 mothers (56.9%)

Variable	Frequency (f)	Mean	Min	Maks	SD
Mother Infant Bonding	102	1,49	0	9	2,038
Baby's age	102	8,12	6	11	1,511

and most respondents did not experience postpartum blues with a total of 93 mothers. Table 1 below also shows that the majority of respondents' babies were born full term or not premature with a total of 96 babies (94.1%) and had normal birth weight is 91 babies (89.2%).

Table 1. Frequency Distribution of Respondents' Characteristics in Colomadu II Health Center Working Area

Variabel	Frequency (f)	Percent (%)
Mother's Age		
<20 years	1	1,0
20-35 years	86	84,3
>35 years	15	14,7
Education		
Junior high school	6	5,9
Senior high school	51	50,0
Collage	45	44,1
Employment status		
Employed	35	34,3
Not employed	67	65,7
Planning of Pregnancy		
Planned	64	62,7
Unplanned	38	37,3
Type of Labor		
Normal Vaginal Delivery	44	43,1
Caesarean Section	58	56,9
History of Postpartum Blues		
Yes	9	8,8
No	93	91,2
Baby Birth		
Premature	6	5,9
Not Premature	96	94,1
Birth Weight		
Low birth weight	11	10,8
Normal weight	91	89,2

Table 2. Frequency Distribution of Respondents Based on Mother and Baby Bonding, Mother's Age and Baby's Age in Colomadu II Health Center Working Area

Based on table 2, it can be concluded that the average maternal MIBS score is 1.49 with a minimum score of 0 and a maximum score of 9 and the average age of the baby is 8 months with a minimum age of 6 months and a maximum age of 11 months.

Tabel 3. The Relationship between Maternal and Infant Bonding with Infant Temperament in the Colomadu II Health Center Working Area

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Infant Temperament	Frequency (f)	Presentation (%)	Correlation Coefficient	p-value
Easy	77	75,5	0,406	0,001
Difficult	25	24,5		
Infant Temperament	Frequency (f)	Presentation (%)	Correlation Coefficient	p-value
Easy	77	75,5	0,406	0,001
Difficult	25	24,5		

Based on table 3, the results of statistical tests using the spearman-rank test show p-values of 0.001 <0.05 so that there is a significant relationship between mother-infant bonding and infant temperament in the Colomadu II Health Center Working Area. The correlation coefficient value in this study is 0.406, indicating a moderate positive relationship between the baby's temperament and the quality of the mother-baby bond, which suggests that the more positive the baby's temperament, the stronger the emotional bond that is formed. However, the strength of this relationship is moderate, so other factors may also play a role in shaping the quality of the bond (Akoglu, 2018).

DISCUSSION

The age characteristics of respondents in this study mostly ranged from 20-35 years old which is a healthy and productive age. Women in this age group are generally more physically and psychologically prepared for pregnancy and childrearing. This is in line with research conducted by (Rinata and Andayani, 2018) which states that mothers in this age range are better equipped to provide care and maintain well-being during the postpartum period.

The results of this study also show that most mothers were unemployed, which may allow mothers to have more time to stay at home, attend to their infants, and engage in caregiving activities.

This is in line with research by (Oktafia *et al.*, 2023) which states that non-working mothers tend to be more available to provide stimulation and monitor infant development. However, while increased time at home can support bonding, it is important to consider that unemployment may also be associated with financial or emotional stress, social disconnectedness (Wickramaratne *et al.*, 2022), particularly if social support is limited.

Education level was also considered in this study, with most mothers having completed senior high school. Educational attainment is an important psychosocial factor, as higher education levels are associated with improved health literacy and parenting confidence, which can positively influence the quality of maternal-infant bonding (Tukamushabe *et al.*, 2024).

The study further found that most mothers had planned pregnancies. Planned and accepted pregnancy are generally linked with greater maternal readiness and positive emotional engagement (Shreffler *et al.*, 2021); (McNamara *et al.*, 2022), which facilitates early bonding and maybe associated with more favorable infant temperament outcomes. Providing developmentally appropriate stimulation during pregnancy may enhance emotional connections and reduce the likelihood of difficult infant behavior.

In this study, it was also found that the majority of mothers who were respondents in the Colomadu II Health Center Working Area had a history of Caesarean Section (CS) delivery. The experience of childbirth in mothers can affect the mother's interaction with her baby because if the mother experiences difficulties in her labor, it will become a trauma to the mother (Oktafia *et al.*, 2023). Mothers who have a history of section caesarean (SC) delivery do not necessarily have a bad delivery history.

In this study, it was found that most mothers did not experience a history of postpartum blues. In addition In this study, there was a significant relationship between the history of postpartum blues and the bonding of mother and baby as well as with the baby's temperament. This is in line with the research of (Oyetunji and Chandra, 2020) which states that there is a relationship between postpartum blues and mother infant bonding. This is also in line with the research of (Oktafia *et al.*, 2023) which states that there is a relationship between postpartum maternal anxiety and infant temperament.

In terms of infant characteristics, most babies were born full term and with

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normal birth weights. These conditions promote opportunities for joint mother-infant care, which can improve maternal confidence and foster a secure bond. (Arnita, Tahlil and Amalia, 2020). Babies aged 6-11 months in the Colomadu II Health Center Working Area are mostly normal weight and not premature so there are no challenges for mothers and babies to build bonding with each other. This is not in line with research conducted by (Arnita, Tahlil and Amalia, 2020) which states that babies born prematurely make the family become disturbed and will affect the bond of affection towards their babies to be disturbed. The age of the baby 6-11 months was chosen to be used because at that age is the optimal time to investigate the impact of postpartum blues which may affect the mother's temperament and interaction with her baby (Stewart and Vigod, 2019).

The mean maternal MIBS score was 1.49 suggesting that most mothers did not have difficulties forming bonds with their infants. The average MIBS score in this study is lower than the average MIBS score of previous research conducted in Sweden, which scored 2 (Mörelius, Elander and Saghamre, 2021). Although this is relatively low compared to the maximum MIBS score from questions 3 - 10 which is 24. In this study, the lowest MIBS score obtained by the mother was 0 and the highest was 9. The higher the MIBS score, the more challenges the mother experiences to form the mother's bonding with her baby (Mörelius, Elander and Saghamre, 2021). In addition, the results of this study also showed that most respondents had easy temperament babies with 77 babies (75.5%) and 25 babies (24.5%) had difficult temperament. In this study, the majority of respondents who had babies with easy temperament were mothers aged 20-35 years, not working, the last level of education was college, the pregnancy was planned, type of labor is Caesarean Section (SC) delivery and did not have a history of postpartum blues.

The study found a statistically significant relationship between maternal-infant bonding and infant temperament (p=0.001). The significance value can be interpreted as having a correlation or relationship between the two variables if the significance value is <0.05. Then the correlation coefficient value in this study is 0.406 and is classified as moderate strength, as evidenced by the correlation coefficient value being in the interval 0.40-0.70 (Sumardiyono, Probandari and Widyaningsih, 2021). The moderate strength indicate that some variables may have influence to maternal bonding and infant temperament, such as maternal mental health, social support, parenting self-efficacy, and breastfeeding difficulties (Henshaw *et al.*, 2015). The correlation coefficient of this study shows a positive direction which means that there is a directly proportional relationship between one variable and another. This study shows that the higher the MIBS score obtained, the more difficult the baby's temperament. So this shows that mothers who lack bonding with their babies will affect their babies' temperament.

In this study it was found that the easier it is for mothers to bond with their babies, the baby will have an easier temperament compared to mothers who have difficulty bonding with their babies. The results of this study are in line with research conducted by (Abuhammad, AlAzzam and AbuFarha, 2021) which shows that baby temperament is a predictor of mother's attachment to her baby.

The majority of Indonesian society, especially those from Javanese culture, hold a life philosophy that emphasizes acceptance and submission to God's will or nrimo (acceptance) (Kuswaya and Ma'mun, 2020). Therefore, the emergence of negative feelings from a mother towards her baby—although this can happen naturally—is often considered taboo and unworthy of being felt. This can hinder mothers from expressing their difficulties, which can ultimately affect the emotional quality of the mother-baby bond (Wiguna and Ismail, 2019). Research by (Minayati *et al.*, 2023) also shows that psychosocial factors, including family support, play an important role in shaping the bond between mothers and babies in Indonesia.

While nrimo can provide emotional resilience, it may also discourage mothers from expressing distress or seeking help, as negative emotions are often seen as a sign of spiritual weakness or moral failure(Pratiwi, Padmawati and Willems, 2025). To address this, policies should involve traditional birth attendants, community leaders, or family members—who hold influential roles in the community—as trusted intermediaries to identify and support mothers experiencing

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emotional challenges (Cipta *et al.*, 2024). Culturally adapted mental health screening tools and family-centered bonding interventions should be implemented in primary care settings, such as Puskesmas, to reduce stigma and enhance maternal-infant attachment (Turk Dudukcu and Tas Arslan, 2022); (Minayati *et al.*, 2023)

Moreover, midwives and other healthcare workers can be trained to use screening tools such as the MIBS-I and ICQ during immunization visits or monthly child development monitoring. In addition, health promotion efforts should include maternal education sessions focused on early bonding practices, emotional regulation, and interpreting infant cues, especially for mothers identified as having difficulty bonding. These actions can strengthen the foundation of early mother-infant interactions, improve infant developmental outcomes, and support maternal well-being in community settings which also consider the local context.

This study provides valuable insight into the relationship between maternal-infant bonding and infant temperament within the Indonesian primary care context, a topic that remains underexplored in local literature. One of the strengths of this study is its focus on a community-based sample using validated instruments adapted for Indonesian populations, such as the Infant Characteristics Questionnaire (ICQ) and the Mother-Infant Bonding Scale-Indonesian (MIBS-I). The use of the MIBS-I enhances cultural relevance, while the inclusion of diverse maternal factors such as education level, employment status, postpartum blues, and pregnancy planning adds depth to the analysis. Furthermore, the use of the Spearman rank correlation enabled the identification of significant associations despite non-parametric data distribution.

However, this study also has several limitations. First, the cross-sectional design limits the ability to infer causal relationships between maternal bonding and infant temperament. Second, the Cronbach's alpha value for the MIBS-I in this study was relatively low (α = 0.535), indicating moderate internal consistency. Although values below 0.70 are often considered suboptimal, this alpha may still be acceptable for exploratory research involving brief scales and multifaceted constructs, as discussed by (Taber, 2018) and (Panayides, 2013).Nonetheless, this limitation suggests that future studies should consider re-evaluating or refining the MIBS-I for improved reliability. Lastly, the use of accidental sampling may limit the generalizability of findings beyond the study setting, and unmeasured confounding variables such as maternal mental health status or social support levels could have influenced the outcomes

CONCLUSIONS

This research supports the importance of routine evaluations of the mother-baby bond as part of primary healthcare services in the working area of Puskesmas Colomadu II. By strengthening the emotional bond between mother and baby through integrated screening and education in maternal and child health services, the quality of the parent-child relationship can be improved from an early stage.

As a follow-up step, it is recommended that further research be conducted more in-depth by examining other factors that may influence the bond and development of the baby, such as maternal mental health, self-efficacy, parenting stress, breastfeeding difficulties, and social support. This further research will help strengthen the evidence base and improve intervention strategies in primary health care services.

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