

# Relations of maternal psychopathologies, social-obstetrical factors and mother-infant bonding at 2-month postpartum: a sample of Turkish mothers

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**Background:** The mental health of the mother influences early mother-infant relationship. This study aimed to explore the relations between maternal psychopathologies, particularly postpartum depression, social-obstetrical factors and mother-infant bonding.

**Methods:** One hundred and eighty-nine mother-infant pairs who participated in the longitudinal study entitled "Mother-Infant Care Study" were evaluated at the second month postpartum. The Brief Symptom Inventory (BSI) had been applied to all mothers in the first 3 days postpartum. At the second month postpartum, mothers were assessed with the Edinburgh Postpartum Depression Scale (EPDS), Postpartum Bonding Questionnaire (PBQ), and Mother-Infant Bonding Scale (MIBS).

**Results:** The mean maternal age was 25.1 ( $\pm 5.2$ ) years. The EPDS scores were higher in the mothers who had been supported lifelong by a psychologist due to psychological problems, had a birth interval of  $\leq 2$  years, and had smoking habits at the second month postpartum. Mothers with a female infant had higher PBQ score than those with a male infant. The EPDS score was correlated positively with the PBQ and MIBS scores. There were positive correlations between the EPDS scores and all subscales of PBQ and MIBS scores. Some subscales and indexes of the BSI were correlated with the PBQ, MIBS and EPDS scores.

**Conclusion:** Identifying postpartum depression and other psychopathologies in mothers is critical for prevention of mother-infant bonding impairment in the early postpartum period.

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**Key words:** maternal psychopathologies; mother-infant bonding; postpartum depression; risk factors

## Introduction

Mother-infant bonding has attracted the attention of clinicians for several decades.<sup>[1,2]</sup> The methods for the assessment of mother-infant bonding in the postnatal period vary from video-observation<sup>[3]</sup> to clinical report.<sup>[4-6]</sup> In recent years, some instruments have been developed to evaluate mother-infant bonding such as postpartum bonding questionnaire (PBQ)<sup>[7]</sup> and Mother-Infant Bonding scale (MIBS).<sup>[8]</sup> These instruments could demonstrate significant stability over the first three months postpartum. Previous studies<sup>[9-14]</sup> confirmed their validity by application in different societies in assessing mother-infant bonding in a short time.

The mental health of a mother affects the early mother-infant relationship and interaction experiences. Several studies<sup>[7,8,12,15,16]</sup> have addressed the relationship between depressive symptoms and bonding. Not only postpartum depression but also postnatal mood disorders affect the mother-infant relationship. In the present study, we aimed to: 1) collect preliminary data on the psychometric properties of the PBQ and MIBS in Turkish mothers; 2) explore the relations of maternal psychosocial factors, psychopathologies, particularly PPD, and mother-infant bonding; and 3) identify the psycho-sociodemographic factors affecting postpartum bonding and maternal depression.

## Methods

### Study design and participants

This study is part of a longitudinal study of Mother-Infant Care Study. The recruitment of participants and data collection were reported elsewhere.<sup>[17,18]</sup> Each participant completed an information form, including

sociodemographic data such as age, education level, family income, and natal/postnatal characteristics. Moreover, the Brief Symptom Inventory (BSI) was applied to the mothers in the first 3 days postpartum before discharge from the hospital. One hundred and eighty-nine mother-infant couples were evaluated in the Social Pediatrics Unit of Hacettepe University İhsan Doğramacı Children's Hospital for follow-up in the second month postpartum. Maternal depressive symptomatology was assessed with the Turkish version of the Edinburgh Postnatal Depression Scale (EPDS).<sup>[19]</sup> The Turkish versions of the PBQ and MIBS were used to evaluate the mother-infant bonding status.<sup>[20]</sup>

Maternal hemoglobin (Hb) levels <11 g/dL at delivery and gestational age <37 weeks were taken as cut-off values for comparisons. A nuclear family structure was defined as a wife and a husband who were living with their children in the same household, whereas an extended family structure was defined if another adult (mother-in-law, father-in-law, etc.) was living with the married couple in the same household.

This study was approved by the Ethical Committee of the Faculty of Medicine, Hacettepe University (HEK 07/97-10). Written informed consent was obtained from the mothers.

## Assessments

### **Brief symptom inventory (BSI)**

The BSI is a 53-item instrument consisting of self-reported symptoms drawn from the Symptom Checklist-90-R (SCL-90-R) and it assesses current psychological symptomatology.<sup>[21]</sup> Each item describes a symptom, such as "feeling no interest in things", and is scored from not at all (0) to extremely (4). It results in three global indexes of distress: global severity index (number and severity of symptoms), positive symptom distress index (intensity of symptom), and positive symptom total index (number of symptoms endorsed in a pathological direction without regard to intensity). The BSI was standardized for the Turkish population previously.<sup>[22]</sup>

### **Postpartum bonding questionnaire (PBQ)**

The PBQ is a 25-item scale reflecting a mother's feelings or attitudes towards her baby.<sup>[7]</sup> Responses to each item are given on a 6-point Likert scale, with the scale points labelled "always", "very often", "quite often", "sometimes", "rarely", and "never". A high score indicates worse postpartum bonding.<sup>[7,9,20]</sup>

### **Mother-to-infant bonding scale (MIBS)**

This short questionnaire was dependent on previous research on mentally ill postpartum women with impaired bonding towards one of their infants.<sup>[8,23]</sup> The MIBS consists of 8 items of emotional response such as "loving"

or "disappointed", which are rated on a 4-point Likert scale ranging from "very much" (score=0) to "not at all" (score=3). Five items describe negative emotional responses and are reversely scored from 0 to 24. A high score indicates worse mother-to-infant bonding and each takes only a few minutes to complete.<sup>[8,20]</sup> Taylor et al<sup>[8]</sup> reported good internal reliability (Cronbach alpha of 0.71) and a positive correlation with the EPDS ( $r=0.31$ ,  $P<0.01$ ).

### **Edinburgh postnatal depression scale (EPDS)**

The EPDS is a validated, self-rating 10-item questionnaire developed to screen postnatal depression.<sup>[19,23]</sup> This scale measures the individual's psychological well-being over the previous seven days. Each item is scored on a 4-point scale (from 0 to 3), and the total score ranges from a minimum of 0 to a maximum of 30.

## Statistical analysis

Data were analyzed using the statistical package for social sciences (SPSS) (SPSS Inc, Chicago, IL, USA). Descriptive statistics were presented in median and 25<sup>th</sup>-75<sup>th</sup> percentiles, and range values of scores for all instruments. The normality of data distribution was checked using the Kolmogorov-Smirnov test. Because the distributions of PBQ and MIBS scores were skewed, the Mann-Whitney *U* test was used for comparison. Independent sample *t* test was applied to the EPDS scores with normal distributions. The relations between the BSI, PBQ, MIBS, and EPDS scores were examined using Spearman's rank-order correlation coefficient. The statistical significance level was set to  $P<0.05$ .

## Results

### **Descriptive statistics**

The maternal age (mean±SD) was 25.1±5.2 years. Of mothers, 20% were younger than 21 years of age, 70% had been educated less than 9 years and only 8.5% were employed. Monthly income was ≤250 USD in 17.6% of the participants. With respect to family structure, 57% of the participants were from nuclear families. Approximately 6% of mothers reported witnessing violence by her husband. About 72% of the pregnancies were planned and 43.2% of the mothers were primigravida. Anemia (Hb <11 g/dL) was present in 39% of the mothers. Overall, 18% of the mothers smoked during pregnancy. Of the infants, 6.4% had a birth weight <2500 g, and 10.2% were born at <37 weeks. Breast-milk was given to 74% of the babies within the first two hours; 81% of babies were fed with breast-milk only, 17.5% were fed with partial breast-milk (+ formula), and 1.5% were fed with formula only at the second month postpartum. Overall, 16.9% of the mothers had an EPDS score of more than 12.

**Correlations among BSI, PBQ, MIBS, and EPDS**

The PBQ score was significantly correlated with the interpersonal sensitivity, depression and hostility subscales of the BSI ( $r_s=0.232$ ,  $P=0.001$ ;  $r_s=0.225$ ,  $P=0.002$ ;  $r_s=0.174$ ,  $P=0.017$ , respectively), and global severity index and positive symptom total index of the BSI ( $r_s=0.188$ ,  $P=0.012$ ;  $r_s=0.191$ ,  $P=0.011$ , respectively). The MIBS score was correlated with the somatisation, depression, anxiety subscales of the BSI ( $r_s=0.145$ ,  $P=0.047$ ;  $r_s=0.150$ ,  $P=0.041$ ;  $r_s=0.185$ ,  $P=0.011$ , respectively) and positive symptom total index of the BSI ( $r_s=0.163$ ,  $P=0.030$ ). The EPDS score was positively correlated with six subscales of the BSI ( $r_s=0.172$ ,  $P=0.018$  for the somatisation;  $r_s=0.357$ ,  $P<0.001$  for the interpersonal sensitivity;  $r_s=0.262$ ,  $P<0.001$  for the depression;  $r_s=0.283$ ,  $P<0.001$  for the anxiety;  $r_s=0.311$ ,  $P<0.001$  for the hostility;  $r_s=0.216$ ,  $P=0.003$  for the phobic subscales) and two indexes of

the BSI ( $r_s=0.246$ ,  $P=0.001$  for global severity index;  $r_s=0.249$ ,  $P=0.001$  for positive symptom total index). There was a positive correlation between the MIBS and the PBQ scores ( $r_s=0.438$ ,  $P<0.001$ ). Significant correlations were also found between the MIBS and EPDS scores ( $r_s=0.377$ ,  $P<0.001$ ) and between the PBQ and EPDS scores ( $r_s=0.449$ ,  $P<0.001$ ).

**Associated factors of PBQ, MIBS and EPDS**

Maternal age, education, family income, employment status, domestic violence, marital adjustment, planned pregnancy, birth interval, maternal health problems and nausea during pregnancy, parity, gestational age, birth weight, and type of delivery did not affect the total scores of the PBQ and MIBS. Nonetheless, mothers with a female offspring had higher total scores of the PBQ than those with a male offspring (10.5 vs. 9.0,  $P=0.047$ ) (Table).

**Table.** Total scores of the Postpartum Bonding Questionnaire (PBQ), Mother-Infant Bonding Scale (MIBS) and Edinburgh Postpartum Depression Scale (EPDS) according to the maternal and child characteristics, median (25-75 percentiles)

| Variables  | <i>n</i> | Total score of PBQ           | Total score of MIBS | Total score of EPDS          |
|--|----------|------------------------------|---------------------|------------------------------|
| Overall  | 189      | 10.0 (5.0-17.0)              | 1.0 (0.0-3.0)       | 7.0 (4.0-11.0)               |
| Age, y   |          |                              |                     |                              |
| ≤20  | 39       | 9.5 (5.8-17.0)               | 1.0 (0.0-3.0)       | 7.5 (4.0-11.0)               |
| >20  | 150      | 10.0 (5.0-16.5)              | 2.0 (0.0-3.0)       | 7.0 (4.0-11.0)               |
| Education, y   |          |                              |                     |                              |
| ≤8   | 130      | 10.0 (5.0-16.3)              | 1.0 (0.0-3.0)       | 8.0 (4.0-11.0)               |
| >8   | 59       | 10.0 (5.0-17.0)              | 1.0 (0.0-3.0)       | 7.0 (3.0-11.0)               |
| Working status   |          |                              |                     |                              |
| Employed   | 16       | 7.0 (2.0-18.8)               | 2.0 (1.0-3.0)       | 6.0 (3.0-8.8)                |
| Housewife  | 173      | 10.0 (5.0-16.5)              | 1.0 (1.0-3.0)       | 8.0 (4.0-11.0)               |
| Family income monthly, USD <sup>§</sup>                    |          |                              |                     |                              |
| ≤250   | 33       | 9.0 (3.0-17.5)               | 2.0 (0.0-3.0)       | 7.0 (3.5-12.0)               |
| >250   | 155      | 10.0 (5.0-16.0)              | 1.0 (0.0-3.0)       | 7.0 (4.0-11.0)               |
| Family structure   |          |                              |                     |                              |
| Nuclear  | 108      | 9.5 (4.3-16.8)               | 1.0 (0.0-3.0)       | 7.0 (3.0-10.8)               |
| Extended   | 81       | 10.0 (5.0-17.0)              | 2.0 (0.5-4.0)       | 8.0 (4.0-12.0)               |
| Planned pregnancy <sup>§</sup>                             |          |                              |                     |                              |
| Yes  | 135      | 10.0 (5.0-17.0)              | 1.0 (0.0-3.0)       | 7.0 (4.0-11.0)               |
| No   | 53       | 9.0 (5.0-16.5)               | 1.0 (0.0-3.0)       | 8.0 (3.0-12.0)               |
| Lifelong support for psychological problem by psychologist |          |                              |                     |                              |
| Present  | 23       | 9.0 (6.0-16.0)               | 1.0 (0.0-4.0)       | 9.0 (5.0-15.0) <sup>†</sup>  |
| Absent   | 166      | 10.0 (4.8-17.0)              | 1.0 (0.0-3.0)       | 7.0 (3.0-11.0)               |
| Parity   |          |                              |                     |                              |
| 1  | 97       | 10.0 (5.5-17.0)              | 1.0 (0.0-3.0)       | 8.0 (4.0-11.0)               |
| >1   | 92       | 9.0 (4.0-14.0)               | 1.5 (0.0-3.0)       | 7.0 (3.0-11.0)               |
| Birth interval, y <sup>‡</sup>                             |          |                              |                     |                              |
| ≤2   | 10       | 12.5 (8.3-20.3)              | 1.5 (0.8-4.0)       | 11.5 (9.0-16.0) <sup>†</sup> |
| >2   | 79       | 8.0 (4.0-13.0)               | 1.0 (0.0-3.0)       | 6.0 (3.0-10.0)               |
| Maternal health problem during pregnancy                   |          |                              |                     |                              |
| Yes  | 50       | 9.0 (3.8-17.3)               | 1.0 (0.0-3.0)       | 7.0 (4.0-11.0)               |
| No   | 139      | 10.0 (5.0-16.0)              | 1.0 (0.0-3.0)       | 7.0 (3.0-12.0)               |
| Smoking during pregnancy <sup>§</sup>                      |          |                              |                     |                              |
| Yes  | 34       | 11.5 (7.8-17.0)              | 2.0 (1.0-3.0)       | 8.0 (4.8-13.5)               |
| No   | 154      | 9.0 (4.0-17.0)               | 1.0 (0.0-3.0)       | 7.0 (3.0-11.0)               |
| Nausea during pregnancy                                    |          |                              |                     |                              |
| Yes  | 136      | 9.0 (5.0-16.0)               | 1.0 (0.0-3.0)       | 7.0 (4.0-11.0)               |
| No   | 53       | 11.0 (5.0-17.0)              | 1.0 (0.0-3.0)       | 7.0 (3.0-12.0)               |
| Domestic violence  |          |                              |                     |                              |
| Present  | 11       | 8.0 (5.0-16.0)               | 1.0 (0.0-3.0)       | 11.0 (3.0-15.0)              |
| Absent   | 178      | 10.0 (5.0-17.0)              | 1.0 (0.0-3.0)       | 7.0 (4.0-11.0)               |
| Marital adjustment   |          |                              |                     |                              |
| Yes  | 176      | 10.0 (5.0-16.0)              | 1.0 (0.0-3.0)       | 7.0 (4.0-11.0)               |
| No   | 13       | 13.0 (7.5-21.5)              | 2.0 (1.0-7.0)       | 10.0 (3.5-15.0)              |
| Postpartum hemoglobin, g/dL                                |          |                              |                     |                              |
| <11  | 74       | 9.0 (4.0-15.3)               | 2.0 (0.8-4.0)       | 8.0 (4.0-12.0)               |
| ≥11  | 115      | 10.0 (5.0-17.0)              | 1.0 (0.0-3.0)       | 7.0 (3.0-11.0)               |
| Smoking at 2 months <sup>§</sup>                           |          |                              |                     |                              |
| Yes  | 34       | 9.5 (5.8-16.3)               | 2.0 (1.0-4.3)       | 9.0 (5.0-15.0) <sup>†</sup>  |
| No   | 154      | 10.0 (5.0-17.0) <sup>*</sup> | 1.0 (0.0-3.0)       | 7.0 (3.0-11.0)               |
| Gender   |          |                              |                     |                              |
| Female   | 102      | 10.5 (5.0-18.0)              | 1.0 (0.0-4.0)       | 8.0 (4.0-12.0)               |
| Male   | 87       | 9.0 (5.0-13.0)               | 1.0 (0.0-3.0)       | 7.0 (3.0-10.0)               |
| Gestational age and birth weight <sup>§</sup>              |          |                              |                     |                              |
| ≤37 wk or <2.5kg   | 22       | 10.5 (5.3-17.3)              | 1.0 (0.0-3.0)       | 5.5 (3.0-10.3)               |
| >37 wk or ≥2.5kg   | 163      | 10.0 (5.0-16.0)              | 1.0 (0.0-3.0)       | 7.0 (4.0-11.0)               |
| Delivery type  |          |                              |                     |                              |
| Vaginal  | 96       | 10.0 (6.0-17.0)              | 1.0 (0.0-3.0)       | 7.0 (3.0-12.0)               |
| Caesarean  | 93       | 10.0 (4.5-15.5)              | 2.0 (0.0-4.0)       | 8.0 (8.0-11.0)               |
| Breastfeeding at 2 months                                  |          |                              |                     |                              |
| Exclusively  | 153      | 10.0 (5.0-17.0)              | 1.0 (0.0-3.0)       | 7.0 (4.0-11.0)               |
| Partially  | 36       | 9.5 (2.5-16.0)               | 2.5 (0.5-3.5)       | 7.0 (3.5-11.0)               |

\*:  $P<0.05$ ; †:  $P<0.01$ ; ‡: Only cases with parity >1 were included ( $n=89$ ); §: with missing data.

Maternal age, education, family income, employment status, domestic violence, marital adjustment, planned pregnancy, maternal health problems and nausea during pregnancy, parity, infant gender, and gestational age did not influence the scores of the EPDS. However, the EPDS total score of the mothers who had psychological lifelong support due to a psychological problem was significantly higher than that of those who did not (median: 9.0 vs. 7.0,  $P=0.04$ ). Similarly, the EPDS total score of the mothers with a birth interval between the current and previous pregnancy of  $\leq 2$  years was considerably different from that of mothers with a birth interval of  $> 2$  years (median: 11.5 vs. 6.0,  $P=0.002$ ). The EPDS total score of the mothers who were smoking at the second month postpartum was significantly higher than that of the mothers who were not smoking (median: 9.0 vs. 7.0,  $P=0.01$ ).

## Discussion

In this study, we found a relationship between bonding and maternal psychopathologies, especially postpartum depression (PPD). The scores of the PBQ and MIBS were influenced by the maternal emotional status in the early neonatal period and the second month postpartum. Similarly, it was reported that women with impaired attachment were characterized by high levels of depression and anxiety, low levels of social support outside the partner relationship and high levels of control, domination and criticism within the partner relationship.<sup>[24]</sup> Multiparous and highly educated women were found to have lower feelings of bonding with their infants.<sup>[14,15]</sup> In the present study, however, the median scores of PBQ, MIBS and EPDS were not changed with respect to some social determinants such as maternal age, education level, occupation, family structure (nuclear or extended), marital adjustment, and planned pregnancy. This might be due to differences in cultures, norms and social support systems.

PPD is considered as a major health problem in women from different cultures. PPD may significantly affect the health of both mother and her baby. A meta-analysis of 59 studies showed a PPD prevalence of 13%,<sup>[25]</sup> and that of 19.2% within the first year postpartum.<sup>[26]</sup> Similar to our study, previous reports showed that PPD varied from 14% to 42% in the Turkish population.<sup>[27-29]</sup> The prevalence of PPD varied widely in the studies because of different instruments and criteria were used. In the perinatal period, early diagnosis and treatment of mothers who are susceptible to PPD will minimize any negative effects on the relationship between the mother and her baby. A meta-

analysis found 13 predictors of PPD including prenatal depression, self esteem, child care stress, prenatal anxiety, life stress, social support, marital relationship, history of previous depression, infant temperament, maternity blues, marital status, socioeconomic status, and unplanned/unwanted pregnancy.<sup>[30]</sup> The history of depression in the mother is considered as a significant risk factor for the development of PPD.<sup>[25,27]</sup> In our study we found that the mother who received the lifelong support from a psychologist because of psychological problems might be a risk factor for PPD.

In the present study, the mother who was a smoker had higher depression scores at the second month postpartum. Hence, depression was an independent risk factor for smoking during pregnancy<sup>[30,31]</sup> as well as postpartum relapse.<sup>[32,33]</sup> We suggest that pregnant or lactating women who report smoking habits are candidates for PPD screening.

The relation between postnatal mental illness and maternal bonding impairment remains unclear. In 91 Portuguese women who were assessed 3 months before and after childbirth by means of the State-Trait Anxiety Inventory, EPDS and MIBS, researchers found that before childbirth, maternal depression indicated a worse emotional involvement with the infant, while after childbirth, maternal anxiety indicated a worse emotional involvement with the infant.<sup>[34]</sup> This study showed that BSI was useful in defining various maternal psychopathologies during the early postpartum period. A correlation between the PBQ and the BSI indicated that some maternal psychopathologies other than depression might also affect negatively the mother-infant bonding.

A longitudinal study<sup>[16]</sup> revealed that maternal psychopathology was measured with the SCL-90-R at the second and 6th weeks and 4th and 14th months, and that the effect of maternal depression symptoms on the mother-infant bonding was pronounced at the 6th week ( $r=0.41$  for depression subscale and  $r=0.49$  for the global severity index of BSI). It was shown that the bonding was most sensitive to maternal depressive symptoms during this period.

Figueiredo et al<sup>[34]</sup> investigated some factors influencing mothers' initial emotional involvement with their newborns. They found a poor emotional involvement with newborns when mothers were unemployed, unmarried, educated less than 9 years, and even they had obstetrical/psychological problems like depression, had a female infant, had neonatal problems or had been admitted to the intensive care unit. No significant differences in the mother-infant emotional involvement were observed in events related to childbirth such as type of delivery, pain and partner

support; the events could not be used to predict mother's bonding results. In the present study, only infant gender was related with the PBQ score. This finding may be associated with the perception in Turkish culture that a male offspring is preferred. It could be argued that the mother-infant bonding might be positively affected by early experiences with the newborn (such as skin-to-skin contact, touching, holding, and breastfeeding after delivery). Almost all infants in the present study were exclusively or partially breastfed; therefore, we could not analyze the status of non-breastfed infants. Additionally, mother-infant bonding may be adversely affected by excessive crying, feeding difficulties, etc., during infancy. Yalçın et al<sup>[18]</sup> found that the mothers of infants with colic had a significantly higher frequency of impaired bonding than the control group at 1.5-2 month postpartum when the PBQ assessed the mother-infant bonding.

We found moderate correlations between the PBQ and MIBS scales. The two scales were easy to use in the pediatric clinic as a reliable screening instrument in detecting disorders in the early emotional bond between a mother and her newborn infant. In addition, a significant positive correlation was found between EPDS and mother-infant bonding impairment.

The present study has some limitations. First, all instruments utilized were based on mother's reports. Second, we did not make a clinical interview regarding either mother-infant bonding or postpartum maternal mood and psychopathologies. Third, because the study consisted of low-educated mothers, predominance of an extended family structure and lower household income, the pressure of social desirability may affect the mother.

In conclusion, we recommend that comprehensive assessment of antenatal and postpartum psychosocial risks be integrated into medical and obstetric care. Mother-infant bonding and later interaction are associated with maternal psychopathologies, especially PPD. Clinicians should be alert to mothers who are smoking, with a shorter birth interval and psychological problems prior to the pregnancy as a possible risk of PPD. Assessment and/or management of maternal psychopathologies and bonding impairment might prevent earlier and later disturbances in child behavior, development and attachment in adulthood. In addition, mothers with a female baby should be monitored more closely for mother-child bonding.

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**Competing interest:** None declared.

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