

# Bonding and Infants' Development and Quality of Life: A Study Among Mothers with Severe Mental Illnesses in Remission

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## ABSTRACT

**Background:** Maternal mental health has specific implications for bonding and infants' mental health. However, most of the evidence comes from mothers who are either symptomatic or did not have adequate mental health support. In this context, our objective was to explore if symptom status in mothers and bonding share any significant association with the infants' development and quality of life (QOL), in case of mothers with severe mental illnesses in remission.

**Methods:** The study included 41 mother–infant dyads from the outpatient perinatal psychiatry services and the mother–baby unit of the current study center. Symptom status, self-reported bonding, mother–infant interactions, and infants' development and QOL were assessed with Clinical Global Impressions, Postpartum Bonding Questionnaire, Pediatric Infant-Parent Exam, Developmental Assessment Scales for Indian Infants, and Pediatric Quality of Life Scale, respectively.

**Results:** Most mothers had a complete recovery or minimal symptoms. Nine (22%) infants had a significant developmental delay. Atypical play-based interactions were

observed in nine (22%) mothers. Self-reported bonding and bonding as evinced over play-based interactions did not significantly correlate with the QOL or development of the infants. Mothers who have recovered and are functioning well reported good bonding with their infants, though objective assessment revealed specific difficulties. Symptom severity correlated with poor physical QOL in infants.

**Conclusion:** The association between mothers' bonding and infants' mental health is domain-specific and differential than linear and robust. Infants of mothers with severe mental illnesses postpartum should be routinely monitored for mother–infant bonding, development, and quality of life.

**Keywords:** Severe mental disorders, maternal mental illnesses, mother–infant interactions, bonding, infant mental health, Infant's quality of life, infant's development

**Key Message:** Literature presents a generic view that maternal mental health has negative implications for infants' mental health because of specific challenges like low levels of bonding and impaired dyadic interactions. However, most evidence is

from postpartum depression and active states of psychopathology. The current study, which includes mothers with severe mental illnesses in remission, indicates that mothers can bond well with their infants as evident through mother–infant interactions. Though, some domains of quality of life are more susceptible to bonding issues. Both subjective and objective assessments can help understand the bonding issues better.

**B**onding provides the foundation for the infant's future development and mental health, especially in the first year of life.<sup>1</sup> Bonding can be understood through the mother–infant relationship. However, this dyadic relationship can be affected by infants' characteristics, parental psychopathology, as well as familial and social factors.<sup>2</sup> Among all the factors, considerable attention has been given to maternal psychopathology as it is identified to have negative outcomes for infants' mental health.<sup>3</sup> Perinatal mental health problems are common worldwide and rates of common perinatal mental

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disorders are higher among women from low- and lower-middle-income countries.<sup>4-8</sup> However, very few studies have assessed the mother–infant interactions to understand the quality of bonding.<sup>9</sup>

In a previous study, parenting stress and psychiatric symptoms predicted significantly less optimal postnatal bonding, but only psychiatric symptoms explained the difference in bonding between mothers at risk for postpartum psychosis and healthy controls.<sup>10</sup> Existing literature seems to imply that maternal mental illnesses can directly, and indirectly affect the infant's mental health.<sup>11-13</sup> A direct mechanism could be a biological vulnerability and genetic predisposition of the infants for stress and vulnerability.<sup>14</sup> The indirect mechanisms may include reduced responsive care by the mother, less involvement by significant others because of their preoccupation with the mother's illness and personal responsibilities, poor social support, lack of systemic support for early childhood care, and lack of awareness of the developmental needs of the infants.<sup>11</sup>

Factors that influence mother–child interactions include maternal mental health, emotional states, perceived social support, motivation, and maternal self-efficacy. Infant-related variables such as the child's sex, temperament, and sensory-motor and cognitive abilities may also affect the mother's responses. Environmental factors that may have an influence include the level of participation of others in child care, how stimulating the environment is, and the socioeconomic status.<sup>15,13</sup> Nonetheless, strong bonding and attachment elicit responsive care from the mother, which in turn can attenuate the negative child outcomes.<sup>16,17</sup> Considering the impact of mother–infant bonding on a child's physical, psychological, behavioral, and developmental well-being,<sup>18-20</sup> maternal mental health programs focus on promoting mother–infant interactions, and supportive family environments for mother–infant dyads.<sup>21-22</sup>

Mother–infant interactions can be assessed by self-report measures such as the Postpartum Bonding Questionnaire<sup>23</sup> and clinician-administered interviews<sup>24</sup> and objectively through play-based behavioral observation.<sup>25</sup> Self-reported measures provide subjective experiences that can

be corroborated with objective, play-based observations in real-time. Therefore, depending on the need, either or both methods can be used to assess mother–child interactions and bonding.

In summary, current literature predominantly indicates that maternal mental health can negatively affect mother–infant interactions, with adverse outcomes for infant mental health. However, most studies included only mothers with depression and not those with other psychiatric illnesses. Most data are reported from high-income countries, and data from low and middle-income countries are lacking. In this context, the objective of this study was to explore if symptom status in mothers and bonding share any significant association with the infants' development and infants' quality of life, in case of mothers with severe mental illnesses in remission. We adopted an exploratory, cross-sectional design without a control group for this study.

## Materials and Methods

### Participants

Specific sample size was not estimated because there were no published studies on bonding and infant development in an Indian context, therefore, we considered the women reporting for the perinatal psychiatry services at the National Institute of Mental Health of Neuro Sciences (NIMHANS), Bangalore, India, as the universe, and the mother with psychiatric illnesses as the population, and those with severe psychiatric illnesses in remission as the sample. Since the data collection was stipulated for 6 months (i.e., October 1, 2016, to March 31, 2017), we decided to include all mothers reporting to the study centre during that period who met the inclusion criteria [aged 18–45 years with an International Classification of Diseases (ICD-10) diagnosis of bipolar disorder, major depressive disorder, schizophrenia, or any other psychotic disorder with an onset within the first six months postpartum, currently in remission (based on a score of  $\leq 2$  on Clinical Global Impressions), maintaining well on psychotropics, regular for perinatal psychiatric consultations, and having an infant aged less than one year]. Mothers with a comorbid intellectual disability, receiving therapy for a bonding disorder,

or having an infant with sensory-motor impairments were excluded. Thus, it was a purposive sampling method. Accordingly, we included 41 mother–infant dyads from the outpatient (perinatal psychiatry) and inpatient (mother–baby unit) services of the study center.

## Tools

### For the Severity of Psychiatric Illness and Functioning in Mothers

*Clinical Global Impressions (CGI)*<sup>26</sup>: The CGI is a seven-point rating scale used to assess the status of psychopathology and change in global functioning from the initiation of treatment. High scores indicate high severity of pathology. CGI reference is as follows: 1 (normal, not at all ill), 2 (borderline ill), 3 (mildly ill), 4 (moderately ill), 5 (markedly ill), 6 (severely ill), and 7 (extremely ill). The remission criterion was a CGI score of  $\leq 2$ , as followed in other studies.<sup>27-28</sup>

### For Bonding and Mother–Infant Interactions

*Postpartum Bonding Questionnaire (PBQ)*<sup>23</sup>: This was used to assess the mothers' emotional involvement with their infants during the postpartum period. It is a self-rated questionnaire with 25 items, each with six points ranging from “always” (0) to “never” (5). Higher scores indicate that the parent has negative affection toward the infant and feels a greater psychological burden regarding parenting. PBQ has been translated into Hindi and Kannada and is regularly used in the clinic and mother–baby ward as a part of routine assessment.<sup>29</sup>

*Pediatric Infant–Parent Exam (PIPE)*<sup>25</sup>: This observational measure focuses on the reciprocal nature of dyadic interactions between parents and their infants in the context of play. The play-based interactions are understood through three stages: initiation, maintenance, and termination of the game. A standard coding system for each of the three stages reveals the mother's approach and the infant's responsiveness. Scores of the three stages are summed up to understand the overall involvement of the mother as adaptive (score of 3–4), marginally adaptive (score of 5–9), or problematic interaction (score of 10–18). Maladaptive interactions are identified from disengaged or intrusive stimulation from the mother to which

the infant responds with flat or negative affect or by looking away. Further, clinicians can judge the play-based interaction as typical, somewhat typical, or atypical. Thus, both the mother's overall involvement and the quality of the play-based interactions can help identify bonding issues.

### For Infants' Quality of Life and Development

**Pediatric Quality of Life Scale (PedsQL)**<sup>30</sup>: This measures children's health-related quality of life across different age groups. We used the scale for infants aged 1–12 months. It contains items on physical functioning, physical symptoms, emotional functioning, social functioning, and cognitive functioning. Each item is rated on a 5-point scale, where a low score indicates a good quality of life.

**Developmental Assessment Scale for Indian Infants (DASII)**<sup>31</sup>: This test is based on the Bayley Scales of Infant Development standardized on Indian infants. It is a clinician-assessed measure. It can be used to assess infants' motor and mental development from 0 to 28 months approximately and yields developmental quotients in motor and cognitive domains. The higher the quotients are, the better the child's development. The categorization of developmental delay based on the test quotients are as follows: <20 = profound, 20–34 = severe, 35–49 = moderate, 50–69 = mild, and 70–79 = borderline.

### Procedures

The study was carried out at the outpatient perinatal psychiatry services and the mother–baby unit of NIMHANS, Bangalore, after obtaining due approval from the sub-ethics committee of the Department of Clinical Psychology, NIMHANS. Written informed consent was obtained from all mothers before including them in the study. Each mother was individually interviewed to collect the sociodemographic and clinical data, followed by the administration of the CGI scale to rate the remission status of the psychiatric illness and functional recovery. The measures were administered individually in the following order: PBQ, PedsQL, and DASII. These assessments were immediately followed by video recordings of the mother–infant

interactions through unstructured play. Standard guidelines given for the PIPE were followed to record and score the play-based interactions.<sup>25</sup> Accordingly, the play was carried out in a designated room that has a provision to set the camera and ensure the privacy of the mother–infant dyads. Materials like floor mats and toys were provided to facilitate the play. The maximum duration of the play was 10 minutes, and the mothers had to initiate, continue, and end the play the way they usually do at home.

### Statistical Analysis

IBM Statistical Package for Social Sciences (version 22.0) was used to analyze the data. Descriptive statistics such as frequencies and percentages, means, and standard deviations were employed for the sociodemographic and clinical details. Pearson's *r* was done to assess the correlation between maternal psychopathology, mother–infant interactions, and infants' quality of life and development.

### Results

Seventy-five mother–infant dyads were qualified for the study, but only 41 mothers consented.

### Sociodemographic and Clinical Profiles of Mothers

The mean age of the mothers was 27.58 years (range: 19–39; SD = 5.17), while the mean age of the infants was 5.78 months (range: 1.12–11.13; SD = 2.75). Twenty-two infants were male and 19 were female. Most mothers (*n* = 31; 75.6%) had studied up to class 12th, and the remaining had studied up to the primary. Thirty-eight (92.7%) were homemakers, and three

were employed. Most mothers were from the below-poverty line category (*n* = 25; 61%), Hindu religion (*n* = 29; 70.7%), and urban areas (*n* = 21; 51.2%). There was almost equal representation between nuclear families (*n* = 21; 51.2%) and joint family (*n* = 20; 48.8%). As noted in the clinical record sheets, 20 (48.8%) had psychosis (schizophrenia, psychosis not otherwise specified, or acute and transient psychosis) and 21 (51.2%) had a mood disorder (bipolar affective disorder, major depressive episode, or recurrent depressive disorder). Ten (24.3%) had a history of medically terminated pregnancies or a miscarriage. Eighteen (43.9%) had a planned pregnancy. As documented in the case records, the majority reported a positive attitude toward pregnancy (97.5%), a positive bonding with the infant (90.2%), and no history of causing any harm to the infants (82.9%). Seven mothers (17.1%) reported harming or having thoughts of harming their infants during the acute phase of their illnesses. Extended family members served as primary caregivers in all cases in this study.

### Infants' Quality of Life and Development

PedsQL scores revealed that no infant had a low quality of life related to physical functioning. Two had low quality of life associated with psychological functioning. DASII scores indicated that nine (22%) infants had a significant delay in motor development and 12 (29.3%) in mental development. The composite scores, that is an average of the motor and mental quotients, indicated that nine (22%) infants had significant developmental delays, that is, DQ < 70.

TABLE 1.

### Mother–Infant Interactions on Self-Report Measure of Postnatal Bonding Questionnaire.

Domains		<i>n</i>	%
Attitude toward the infant	Positive	32	78
	Negative	9	22
Anger and Rejection	None	41	100
Confidence and Anxiety	Confident	40	97.6
	Anxious	1	2.4
Aggression to baby	Low	32	78
	High	9	22

## Functional Recovery and Mother–Infant Interactions

Regarding symptom severity, 15 (36.6%) mothers were in the normal category and 26 (63.4%) were in the borderline category. Regarding global functioning, 18 (43.9%) were very much improved, 15 (36.6%) were much improved, and eight (19.5%) were minimally improved. The mother–infant interactions, as assessed subjectively with the PBQ, revealed that

most mothers reported positive attitude toward their infants ( $n = 32$ ; 78%) and were confident of their ability to bond ( $n = 40$ ; 97.5%). No mother reported anger or rejection toward their infants, though nine (22%) mothers reported displaying aggression toward their infants occasionally (**Table 1**).

**Table 2** shows the results of the mother–infant interactions as observed on the PIPE. Sixteen (39%) mothers had difficulty initiating play with the infants,

three (7.3%) were disengaged, four (9.8%) had an intrusive engagement, while two (4.9%) had inappropriate and bizarre engagement. Eleven (26.8%) mothers had difficulty in keeping the play going, 14 (34.1%) were disengaged during the play, seven (17.1%) faced the infant's protest during the play, and three (7.3%) had intrusive stimulation. Eleven (26.8%) mothers ended the play unevenly and 11 (26.8%) ended abruptly. Twenty-four (58.5%) mothers had maladaptive over-involvement. In the majority of the cases (63.4%), the overall play was observed to be somewhat typical.

Both symptom recovery and global functioning had a significantly positive correlation with play-based interaction difficulties, that is, keeping the game and overall involvement (for both,  $p < 0.05$ ). It indicates that the higher the CGI scores, the higher the difficulty in play-based interactions and the overall involvement (**Table 3**).

PBQ or PIPE scores did not significantly correlate with the infant's quality of life or development measures (**Table 4**). However, the CGI scores significantly correlated with the infant's physical quality of life ( $p = 0.04$ ). That is, the more severe the symptoms of maternal mental illness, the lower the quality of life of the infants in the physical domain. A separate analysis indicated that none of the socio-demographic variables had a significant correlation with infants' development or quality of life; therefore, they were not controlled for while examining the correlation between PBQ, PIPE, and CGI scores.

## Discussion

Systematic reviews indicate that in the context of maternal mental health

**TABLE 2.**

### Mother–Infant Interactions as Observed Objectively on Paediatric Infant Parent Exam.

Domains		<i>n</i>	%
Starting the game	Easy engagement	16	39
	Infant difficult to engage	16	39
	Parent disengaged	3	7.3
	Intrusive engagement	4	9.8
	Inappropriate and bizarre engagement	2	4.9
Keeping the game	Easy playfulness	6	14.6
	Infant have difficulty to keep going	11	26.8
	Parent disengaged	14	34.1
	Infant protest	7	17.1
	Intrusive stimulation	3	7.3
Stopping the game	Gradual cool down	10	24.4
	Uneven ending	11	26.8
	Abrupt ending	11	26.8
	Infant protest	5	12.2
	Intrusiveness	3	7.3
	Unable to stop the game	1	2.4
Over involvement	Adaptive	17	41.5
	Maladaptive	24	58.5
	Problematic interaction	0	0
Judgement of exam (of parent–child interaction)	Very typical	6	14.6
	Somewhat typical	26	63.4
	Atypical	9	22

**TABLE 3.**

### Correlation Between Mother's Illness, Bonding, and Mother–Infant Interaction.

		Postpartum Bonding Questionnaire Domains					Paediatric Infant Parent Exam Domains				
		F1	F2	F3	F4	Total	SG	KG	STG	OI	JOE
CGI SI	<i>r</i>	−0.04	−0.22	−0.01	−0.28	−0.23	0.24	0.33*	0.05	0.31*	0.26
	<i>p</i>	0.80	0.16	0.98	0.07	0.16	0.13	0.03	0.78	0.05	0.10
CGI GF	<i>r</i>	0.02	−0.04	0.05	−0.00	−0.06	0.25	0.33*	−0.04	0.32*	0.21
	<i>p</i>	0.89	0.82	0.76	0.98	0.71	0.11	0.03	0.81	0.04	0.09

\**p* values are significant

CGI SI, Clinical Global Impression: Symptom Improvement; CGI GF, Clinical Global Impression: Global Improvement; F1, General Positive/Negative factors toward infants; F2, Confidence and Anxiety; F3, Anger and Rejection; F4, Aggression toward infants; SG, Paediatric infant parent exam: Starting the game; KG, Paediatric infant parent exam: Keeping the game; STG, Paediatric infant parent exam: Stopping the game; OI, Paediatric infant parent exam: Overall impression; JOE, Paediatric infant parent exam: Judgment of Exam.



TABLE 4.

### Correlation Between Mother–Infant Interaction, Maternal Psychopathology, and Infant’s Mental Health.

		DASII		PedsQL	
		Motor DQ	Mental DQ	Physical	Psychological
PBQ_Total	r	0.04	0.05	-0.11	0.03
	p	0.81	0.77	0.49	0.87
PIPE_JOE	r	-0.11	-0.15	-0.05	0.10
	p	0.50	0.34	0.76	0.52
CGI-SI	r	-0.22	-0.18	0.32*	-0.02
	p	0.16	0.26	0.04	0.89
CGI-GI	r	-0.05	0.00	0.27	0.11
	p	0.76	0.98	0.09	0.48

\*p value is significant.

PBQ Total, Postpartum Bonding Questionnaire: Total Score; PIPE JOE, Pediatric infant parent exam: Judgment of Exam; CGI SI, Clinical Global Impression: Symptom Improvement; CGI GF, Clinical Global Impression: Global Improvement; DASII Motor DQ, Developmental Assessment Scale for Indian Infants: Motor Developmental Quotient; DASII Mental DQ, Developmental Assessment Scale for Indian Infants: Mental Developmental Quotient; PedsQL Physical, Pediatric Quality of Life Inventory: Physical functioning; PedsQL Psychological, Pediatric Quality of Life Inventory: Psychological functioning.

several perspectives: (1) most mothers were functioning better as indicated by the CGI scores and hence, they might be appraising their interactions with the infants positively; (2) sometimes it is difficult to discern from the self-report measures whether the mothers’ interactions with the infants is accounted by mothers’ interpersonal dispositions or the mother’s understanding of how much autonomy or care the infant needs;<sup>36</sup> (3) mothers taking a lead while playing and interacting with the child and reporting the same as healthy engagement could be a cultural phenomenon; and (4) lastly, mothers may become conscious and hesitant when asked to play with their infants, and it would affect objective ratings.<sup>37</sup> Unlike some previous studies,<sup>1</sup> this study did not find a significant association between mother–infant interactions and the infants’ motor abilities. Rather, a significant association was noted between mothers’ symptom status and infants’ physical quality of life.

The mother–infant interactions, as observed through play-based interactions, revealed that problematic interactions between the mothers and infants were mainly in the form of intrusion and cessation of play midway. However, the atypical interaction patterns did not significantly correlate with infants’ development or quality of life. It is important to note that extended family members served as primary caregivers in all cases in this study, as is common in many low and middle-income countries where the family members take care of the infants until the mother is ready to take over.<sup>38</sup> Besides, play-based interactions alone may not be a robust indicator of infants’ quality of life. Lastly, all the mothers were maintaining well on medication, as indicated by the CGI scores, and they had an adequate sense of bonding with the child, which may or may not translate into play-based activities. In fact, better symptom recovery was associated with better quality of life in physical domains. These findings support the need for supportive interventions for mothers in interacting and bonding with infants during the perinatal period.<sup>9,17,18,39</sup>

However, this study has some limitations, including a small sample size and the absence of a control group. Several factors can influence mother–child interactions and bonding, including the mothers’

issues, infants are at risk for early developmental lags and compromised quality of life.<sup>13,32–34</sup> In the present sample, 22% of infants had a motor delay, 29.3% had a cognitive delay, and 22% had a delay in both domains. Earlier studies have also noted high rates of developmental delay in infants admitted with mothers in the mother–baby unit.<sup>35</sup> However, the current findings do not imply a causal link between the mothers’ mental health during the perinatal period and infants’ developmental outcomes, as obstetric complications and other biological risk factors were not examined.

## Symptom Recovery and Infant Mental Health

Improvement in symptoms and global functioning positively correlated with play-based interactions and quality of life – physical domain. It indicated mothers could interact better with their children when their symptoms had improved and they were functioning well. However, similar results were not obtained for the self-rated measure of bonding and symptom improvement. This finding may have specific implications: one, there could be a discrepancy between subjective reports and objective measurement of bonding because mothers may give more socially desirable answers as they gain better insight about bonding and dyadic interactions; two, PBQ is a reliable measure but has

a “moderate” risk of bias for reporting the bonding and hence, measurement bias cannot be ruled out.<sup>22</sup> However, the current findings also suggest that mothers feel more confident in their ability to bond with their infants and do not report a negative attitude, anger, rejection, anxiety, or aggression toward the infants as they recover from mental illness. Hence, in the perinatal period, improving psychiatric symptoms and parenting stress in the mothers could positively affect bonding.<sup>10</sup>

## Mother–Child Interactions and Infant’s Mental Health

On the self-report assessment, most mothers reported adequate bonding with their infants, while having difficulties interacting with them. However, observations of parent–child play behaviors on the PIPE revealed that more than one-third of the mothers had difficulty initiating and maintaining play with the infants. Disengagement and intrusive engagement were noted in a few, while inappropriate and bizarre engagement was rarely noted. Instead, more than half of the mothers were over-involved. For example, the mothers took the lead than following the child and decided what the child should play. Intrusive engagement was characterized by mothers starting the game before the infant looks and making statements that are outside the context of the game. These findings could be understood from

emotional states, perceived social support, motivation, and self-efficacy. Infant-related variables such as a child's temperament may also affect the mother's responses. Environmental factors such as home environment and stimulation and care provided by other family members can also influence mother-child interactions. However, we did not document these variables. The study group is predominantly from the middle and low socio-economic status, generalizability of these findings to other groups will have its limitation. Also, mother-infant dyads and other caregivers coming to the institute receive various forms of psychosocial support and therapies for bonding on a routine basis, and the effects of the same were not controlled for. Despite these limitations, the current study provides preliminary evidence for supporting mother-infant interactions and bonding to enhance the quality of life of infants, at least in specific domains. As the entire attention of the family and professionals would be on mothers' psychiatric illnesses, there is a high chance that the evaluation of the infants' development can be neglected. Hence, at-risk infants should get screened for early intervention. Mothers with postpartum psychiatric illness should be provided adequate opportunities to interact with their children, in order to develop confidence in taking care of the child independently. Future studies can determine the required sample size based on the current study. Besides, future studies can examine the stability of bonding patterns over an extended period of time and controlling variables such as practical support available for mother to bond with the infant, birth order of the infant, number of children in the family, and infants' sex and temperament. Further investigations are needed to understand factors associated with a high proportion of developmental delays in the study group, especially from the perspectives of psychosocial adversities, obstetric complications, and the maternal mental health status during pregnancy and postpartum.

## Conclusion

In conclusion, psychiatric symptom status is negatively associated with mother-infant interactions and infant mental health. Mothers may report better bonding with infants as the symptom status and functional capabilities improve. However, play-based observations may reveal some

atypical interactions. Though mother-infant interactions are important for the infants' emotional functioning, and the mothers' symptom status, and functional capacities were significantly associated with the infant's mental health, especially the physical quality of life. For comprehensive evaluations of mother-infant interactions, both self-report measures and clinical observations should be utilized.

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