

# Duration of Breastfeeding in Late Preterm Infant Factors

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# Duration of Breastfeeding in Late Preterm Infants: Maternal and Infant Factors

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## Abstract

**Background:** More than 550,000 late preterm infants are born each year in Indonesia. These infants, born between 34<sup>0/7</sup>–36<sup>6/7</sup> weeks, have more complications than term infants. Breastfeeding is considered the most optimal nutrition for newborn infants. Two groups of factors are important for successful breastfeeding: infant and maternal factors. The infant factors can be evaluated using the Infant Breastfeeding Assessment Tool and the maternal aspects with the Breastfeeding Self-Efficacy Scale–Short Form.

**Aim:** To determine whether the Infant Breastfeeding Assessment Tool or the Breastfeeding Self-Efficacy Scale–Short Form was more predictive of successful breastfeeding among late preterm infants.

**Methods:** This study was conducted in the Academic Teaching Hospital in Surabaya, Indonesia in March–July 2017. Mothers who delivered their infant between a gestational age of 34<sup>0/7</sup> and 36<sup>6/7</sup> weeks were included.

**Results:** Fifty-four single born participant mother–infant pairs were included. The mean total Breastfeeding Self-Efficacy Scale–Short Form score was 57.8 (SD = 8.9). The mean Infant Breastfeeding Assessment Tool score was 8.3 (SD = 1.8). There was a significant correlation between the total Breastfeeding Self-Efficacy Scale–Short Form score and the Infant Breastfeeding Assessment Tool score ( $p = .020$ ,  $r = 0.316$ ). The Breastfeeding Self-Efficacy Scale–Short Form was significantly higher in the participant (mothers) of the infants breastfed  $\geq 4$  months, compared to  $< 4$  months, 61.59 (SD = 5.78) versus 51.78 (SD = 11.64;  $p = .001$ ). No correlation was found between the duration of breastfeeding and Infant Breastfeeding Assessment Tool score ( $p = .087$ ).

**Conclusion:** Maternal factors were more important for successful breastfeeding in these late preterm infants than infant factors in our sample.

## Keywords

breastfeeding, breastfeeding assessment, late preterm infant

## Background

The yearly live birth rate in Indonesia is 138/1000 among women aged 25–29 years old (Indonesia Ministry of Health, 2017). More than 550,000 infants are born late preterm, between gestational age 34<sup>0/7</sup> and 36<sup>6/7</sup> weeks. These late preterm infants contribute to 75% of low birth weight infants. It is assumed by many pediatricians that late preterm infants develop in an equal manner to full-term infants. Late preterm infants have more complications compared to term infants, both around delivery and in later life. Complications seen in the perinatal period include asphyxia, infections, and hypoglycemia (Karnati et al., 2020). They may also demonstrate a higher incidence of delayed psychomotor development and behavioral and emotional problems (Kerstjens et al., 2012). Growth also is lower in these infants compared to term infants (Karnati et al., 2020). It is still unclear if these problems among late preterm infants are caused by the same factors

responsible for the premature delivery, or if these problems are caused by complications in the peri- and postnatal period, for

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example asphyxia and hypoglycemia (Coletti et al., 2015; Kamati et al., 2020; Stewart & Barfield, 2019).

A factor that might contribute to the outcome is nutrition, both in the first days and first months of life. Late preterm infants have more problems with achieving adequate oral intake. They have more difficulties in the coordination of latching, sucking, and swallowing. Their ability to suck might be less than that of term infants. The composition of nutrition also may be important. The requirements for compounds like protein, minerals, and calories will be higher compared with term infants, given the higher weight gain needed in these infants. Few researchers have done studies regarding optimal nutrition needed for late preterm infants (da Silva & Guedes, 2015; Wang et al., 2019; Wu et al., 2018).

Breastfeeding is the most optimal nutrition for all newborn infants, containing immunoglobulins and growth factors that are important. It is vital therefore that late preterm infants receive human milk, not only directly after birth, but also in the months thereafter. Successful initiation and continuation of breastfeeding are dependent upon many factors that can be classified as either infant or maternal. Infant factors include the ability to suck and swallow. Instruments to evaluate breastfeeding activity have been developed, including the Infant Breastfeeding Assessment Tool (IBFAT; Altuntas et al., 2014), LATCH (Diercks et al., 2020), Preterm Infant Breastfeeding Behavior Scale (PIBBS; Lober et al., 2020), Mother Baby Assessment (MBA; Altuntas et al., 2014), and Systematic Assessment of the Infant at the Breast (SAIB; Sartorio et al., 2017). Out of those instruments, we concluded that the IBFAT was more suitable for our hospital setting. The IBFAT assesses and evaluates breastfeeding behavior in infants for several days after birth. This tool also can be used to identify infants who have problems in the process of breastfeeding by assessing readiness for feeding, rooting, latching, and sucking (Altuntas et al., 2014; Boies & Vaucher, 2016; Ingram et al., 2015). The maternal factors regarding a mother's self-efficacy related to breastfeeding can be scored with the Breastfeeding Self-Efficacy Scale–Short Form (BSES-SF; Ip et al., 2016). It is presently unknown which of these factors, the infant or the maternal, are more predictive for successful breastfeeding in the late preterm infant. Knowing which is most important might help in designing methods to support the mother and her infant to achieve successful breastfeeding in this high-risk population. In our study, we aimed to determine whether either the IBFAT or the BSES-SF was more predictive of successful breastfeeding in late preterm infants.

## Methods

### Design

The design was a prospective longitudinal observational single cohort study with a comparison of two groups based on breastfeeding duration. This study had ethical clearance (No. 205/Panke.KKE/III/2017).

### Key Messages

- It is not known if maternal or infant factors are more influential in successful breastfeeding of late preterm infants.
- We found a correlation between maternal and infant factors that may influence breastfeeding.
- A higher maternal Breastfeeding Self-Efficacy Scale–Short Form score was related to a higher incidence of successful breastfeeding, while elements of infant factors were not related.
- As maternal self-confidence was related to successful breastfeeding in late preterm infants, providing maternal breastfeeding support is important.

### Setting

Our study was conducted in the Academic Teaching Hospital, in Surabaya, Indonesia. In Indonesia, the prevalence of exclusive breastfeeding in the first 6 months is only 37.3% (National Institute of Health Research and Development [NIHRD], 2018). This hospital is a referral hospital center for the eastern region of Indonesia, especially in east Java. Our hospital covers both urban and rural areas. Most mothers were of Javanese, Madurese, and Chinese origin. The mothers came to our hospital mostly due to complications in pregnancy (e.g., obesity, pre-eclampsia, and diabetes).

### Sample

The target population of this study was mothers who had delivered their late preterm infants in our hospital. Inclusion criteria for the mother were: the mother had to be stable and in a ready to breastfeed condition. Inclusion criteria for the infants were: they had to be healthy, without complications after birth and without multiple congenital abnormalities. Mothers with a multiple pregnancy or contraindication for breastfeeding (e.g., HIV or chemotherapy) were excluded. All mothers who delivered their infant between a gestational age of 34<sup>0/7</sup> and 36<sup>6/7</sup> weeks were included as long as they gave consent and fulfilled the inclusion criteria. Eight infants were not included for further analysis about the relationship between the duration of breastfeeding and BSES-SF and IBFAT because the duration of breastfeeding was not known. According to the aim of the study, we calculated the sample size needed to find a difference in the BSES-SF score between the mothers breastfeeding or not at 4 months. We used the BSES-SF score because we hypothesized that maternal factors might be more important than infant factors. We determined the sample size by using the Z-test ( $\alpha = 0.05$  and power 80%,  $\beta = 1-0.8$ ; Indrayan & Malhotra, 2018). We calculated that each group should contain at least 13 mother/infant pairs. Fifty-four mother-infant pairs were included.

### Measurement

IBFAT (see Supplemental materials) was used to describe the behavior of the infant regarding breastfeeding. It consists of four items that represent the major components of infant breastfeeding behavior: 1) readiness to feed, 2) rooting, 3) fixing or latching on, and 4) sucking. IBFAT scores from two observers were combined and we calculated the mean score. We then classified these scores into three groups: strong and effective suckling (score 10–12), suckling quite effectively (score 7–9), and no effective suckling (score 0–6).

We used the BSES-SF (see Supplemental materials) to measure the efficacy of the participants to breastfeed their infants (14 questions). The BSES-SF instrument consists of two sub scores: the technique and interpersonal dimensions. The technique dimension includes questions 1–9, while the interpersonal dimension includes questions 10–14. The maximum BSES-SF score is 70. We used the Indonesian translation of the BSES-SF questionnaire as was used in a previous study by Handayani et al. (2013). They reported that the BSES-SF questionnaire as translated into Indonesian was validated with Pearson's correlation ( $r \geq 0.5$ ) and the reliability of this questionnaire was 0.77 tested by Cronbach's alpha (Handayani et al., 2013). A pediatrician accompanied the participants when filling out the questionnaire and answered any questions.

### Data Collection

Our study was conducted between March–July 2017. Before enrollment into the study, information was given to the mother. Written consent from at least one of the parents including the fathers or other relatives, for instance the grandmothers, was obtained from all participants. Participants' confidentiality was maintained, and the data were kept secure in the Clinical Research Unit of our hospital. Mothers and infants roomed together. Participants received daily lactation support from pediatricians and nurses with specialized training in lactation. Participants were also encouraged to perform Kangaroo Mother Care.

The IBFAT and the BSES-SF were both recorded in the first week of life, on the same day, by two observers: a pediatrician and a nurse with specialized lactation knowledge. The nurses had undertaken the breastfeeding counseling training course provided by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) after a 40 hr module program (World Health Organization, 2016). The duration of breastfeeding information was recorded when the participant visited the doctor/hospital for her infant's health examinations or for immunizations. We scheduled the participants to visit with their infant in the outpatient clinic once a month and recorded the continuation and potential difficulties in breastfeeding. If the participants did not come to the appointment, the authors tried to call her by phone. In the data collection and analysis process,

identity and other information about participants' privacy were disguised.

### Data Analysis

Raw demographic data were categorized for analysis. The maternal and infant demographic data were described. Checking the distribution of the data was done using the Kolmogorov-Smirnov test.

Correlation between IBFAT and BSES-SF was made using Spearman's correlation coefficient. Correlation between duration of breastfeeding and IBFAT or BSES-SF score was determined using a Spearman's correlation coefficient and comparison between IBFAT or BSES-SF with duration of breastfeeding (< and  $\geq$  4 months) using a *t*-test. We divided the participant infants into two groups, those who breastfed for more than or equal to 4 months and those who breastfed less than 4 months. We used software IBM SPSS (Version 24.0).

### Results

The mean age of the participants was 32.16 ( $SD = 7.63$ ) years (Table 1). Over half of the participants had a previous history of breastfeeding. Most of the participants were referred to our hospital because of pregnancy complications (Table 1). The mean gestational age of the participant infants was 35.1 ( $SD = 0.9$ ) weeks and the mean birthweight was 2113g ( $SD = 53.2$ ).

### Correlation Between IBFAT and BSES-SF Scores

The mean total BSES-SF score was 56.9 ( $SD = 9.3$ ). The sub-score based on technique was 37.4 ( $SD = 6.6$ ), and the score based on interpersonal items was 20.4 ( $SD = 3.1$ ). The participant's characteristics of age, occupation, primigravida or multigravida, education level, disease during pregnancy, and mode of delivery were analyzed in relation to the BSES-SF score. No significant correlation was found between mean BSES-SF and any of the participants' characteristics.

The mean IBFAT score was 8.3 ( $SD = 1.8$ ). There was a strong correlation between the IBFAT results of the two observers ( $p = .001$ ,  $r = 0.710$ ). Seventeen (31.5%) of the participants' infants were rated as powerful and effective sucking, 28 (51.9%) participant infants were rated as effective suckling, and no effective suckling was found in nine (16.7%). The IBFAT score was not related to any of the infant characteristics.

There was a significant correlation between the total BSES-SF score and the IBFAT score ( $p = .020$ ,  $r = 0.316$ ). Both sub scales of the BSES-SF, technique and interpersonal dimensions, were related to the IBFAT score. The three subscales of the IBFAT, readiness of breastfeeding ( $p = .002$ ,  $r = 0.417$ ), rooting ( $p = .011$ ,  $r = 0.343$ ) and sucking ( $p = .004$ ,  $r = 0.384$ ) were also related to the BSES-SF score.



**Table 1.** Maternal ( $n = 54$ ) and Infant ( $n = 54$ ) Characteristics.

Characteristics	$n$ (%)
<b>Maternal</b>	
Age (years)	
< 35	38 (70.4)
≥ 35	16 (29.6)
Education	
Elementary	8 (14.8)
Junior	6 (11.1)
Senior	25 (46.3)
Vocational	5 (9.3)
Bachelors	10 (18.5)
Work	
Employed	22 (40.7)
Unemployed	32 (59.3)
Pregnancy	
1st	18 (33.3)
2nd	22 (40.7)
3rd	9 (16.7)
4th	4 (7.5)
≥ 5th	1 (1.8)
Mothers' pregnancy attitude	
Desired	51 (94.4)
Undesired	3 (5.6)
Diseases during pregnancy	
Yes	24 (44.4)
Preeclampsia	19 (79.2)
Diabetes	4 (16.7)
Obesity	1 (4.1)
No	30 (55.6)
Mode of delivery	
Vaginal	18 (32.3)
Caesarean	36 (67.7)
Previous history of BF	
Yes	32 (59.3)
No	22 (40.7)
Provided BF duration	
Yes	46 (79.3)
EBF	32 (69.5)
Non EBF	14 (30.5)
No	8 (20.7)
<b>Infant</b>	
Biological Sex	
Male	33 (59.7)
Female	21 (40.3)

Note. BF = breastfeeding; EBF = exclusive breastfeeding.

### Duration of Breastfeeding

The sample for calculating this variable was 46 infants. The mean duration of breastfeeding was 5.27 months ( $SD =$

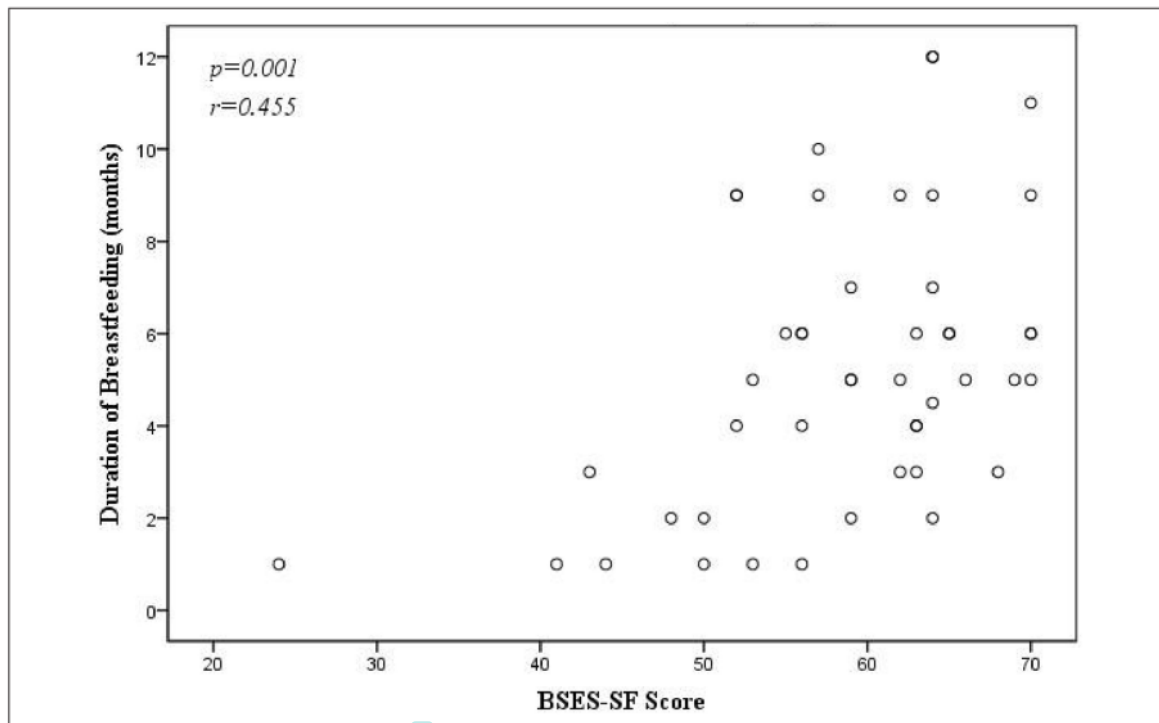
3.05). Thirty-two (69.6%) infants breastfed for more than or equal to 4 months, and 14 (30.4%) less than 4 months. There was no difference in duration of breastfeeding between participants who had breastfed previously and those who had not ( $p = .153$ ). The mean BSES-SF was significantly higher among infants who breastfed for more than or equal to 4 months, compared to less than 4 months ( $M = 61.59$ ;  $SD = 5.78$  vs.  $M = 51.78$ ;  $SD = 11.64$ ;  $p = .001$ ). There was a modest but significant correlation ( $p = .001$ ,  $r = 0.455$ ) between the BSES-SF and the duration of breastfeeding (Figure 1). No correlation ( $p = .087$ ) was found between the duration of breastfeeding and IBFAT score (Figure 2).

### Discussion

Late preterm infants constitute a special group of newborns. Although they are more developed than infants born before 34 weeks, they are still not as developed as term infants. The risk for developmental problems is higher compared to term infants (Ballantyne et al., 2016). Optimal nutrition might help to prevent or reduce the incidence of developmental deficits. In a study regarding nutritional policies, breastfeeding was advised as the most optimal feeding for the late preterm infant (Muelbert et al., 2019). There is a lack of well-executed studies, however, that evaluate the optimal composition of nutrition, such as the amount of protein late preterm infants require. Nevertheless, given the well-known advantages of breastfeeding, it is advisable to breastfeed these infants. We chose to compare infants who received breastfeeding for more or less than 4 months.

There are risk factors in late preterm infants that might inhibit successful breastfeeding. These infants might not be able to maintain latch on the breast and might have problems with swallowing. Mothers might feel insecure due to the preterm delivery. Optimal support and counseling of these mothers, therefore, is important. We used the BSES-SF to assess the capacity of the participant mothers to breastfeed late preterm infants. We observed rather high scores in the participant mothers, indicating that most participant mothers were confident about their ability to breastfeed their child. Our scores were comparable to another study conducted in Indonesia (Awaliyah et al., 2019).

The BSES-SF has been used with term infants to predict which mothers will succeed in breastfeeding their infants. It is also used to evaluate the influence of interventions to increase the chance that mothers are successful in breastfeeding their infants. In a recent study, Gerhardsson et al. (2018) evaluated the correlation between the self-efficacy of mothers of late preterm infants and the frequency of breastfeeding at term age and 3 months. They found a higher BSES-SF among participants who breastfed their infant at both time points compared with participants who discontinued breastfeeding (Gerhardsson et al., 2018). Henshaw et al. (2015) found that a high BSES-SF at 2 days after delivery

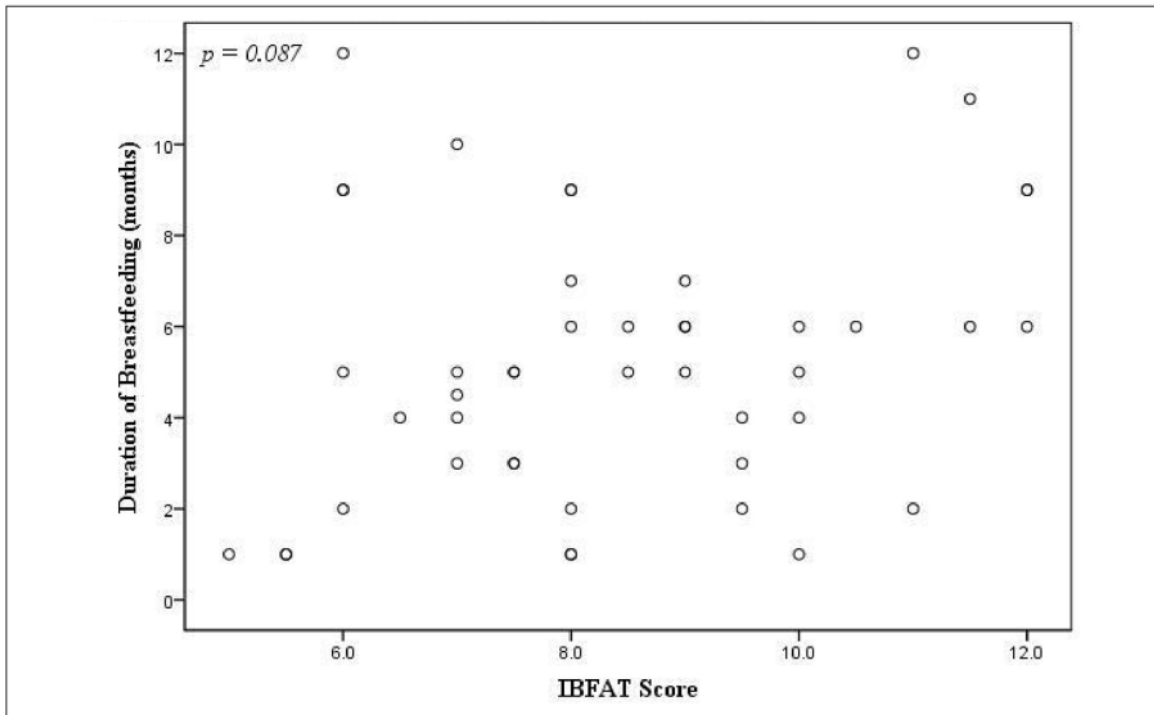


**Figure 1.** Correlation Between BSES-SF Score and the Duration of Breastfeeding.

predicted a higher incidence of breastfeeding at 6 months, as well as less depressive symptoms in the mother. Lau et al. (2018) recently conducted a review of studies evaluating the correlation between duration of breastfeeding and the BSES-SF after birth. In most, but not all reviewed studies, a positive correlation was found between duration of breastfeeding and BSES-SF. All studies were done with healthy, term infants. Maleki-Saghooni et al. (2020) found that the social support of the mother is significantly related to the BSES-SF, so the more social support the mother receives, the higher the BSES-SF and the longer the duration of breastfeeding. Brockway et al. (2017) conducted a systematic review on interventions in full-term infants looking at whether improvements in breastfeeding self-efficacy improved the duration of breastfeeding. Participants in the intervention groups were more likely to continue breastfeeding at 1 month and 2 months. The efficacy of the participants was measured with the BSES-SF. For each point increase in the BSES-SF, the odds of exclusively breastfeeding increased by 10% in the intervention group (Brockway et al., 2017). Gerhardsson et al. (2018) found a correlation between the gestational age of the late preterm infants and the continuation of breastfeeding at term age and 3 months. We did not observe this correlation, which might be due to our smaller sample size. In the Gerhardsson et al. (2018) study a

correlation was found between satisfaction with the breastfeeding support and the incidence of breastfeeding at term age and 3 months. Based on their results and the studies with full term infants (Fan et al., 2019), we speculated that interventions aimed at improving the self-confidence of late preterm mothers, might result in an increased rate of successful breastfeeding.

The IBFAT is a measure of the infant's ability to ingest sufficient amounts of the mother's milk via breastfeeding. Altuntas et al. (2014) and Sartorio et al. (2017) showed that IBFAT is an adequate method to evaluate infant behavior during feeding. Both researchers found an adequate correlation between the IBFAT and two other scores: the LATCH (Altuntas et al., 2014) and the Mother Baby Assessment (Sartorio et al., 2017). Furman and Minich (2006) showed that the IBFAT correlated in preterm infants with objective feeding measures (milk intake volume, time of sucking) but did not differentiate between infants with adequate versus inadequate milk intake. Lau et al. (2018) measured both the BSES-SF and the IBFAT in 48 healthy full-term infants. There was a correlation between both the BSES-SF and the IBFAT with exclusive breastfeeding at two months, but the correlation was much stronger for the BSES-SF than for the IBFAT, odds ratio 7.78 versus 2.38. This is in line with our study, where we did not find a correlation between duration of breastfeeding with IBFAT, while there was a correlation with the



**Figure 2.** Correlation Between IBFAT Score and the Duration of Breastfeeding.

BSES-SF. Although no correlation was found between the duration of breastfeeding and the IBFAT score, it may have been limited by our small sample size, as breastfeeding readiness on the part of the infant and infant feeding skills will influence feeding effectiveness and has been shown to contribute to breastfeeding duration among preterm infants.

Continuation of breastfeeding until 6 months after discharge from hospital might be a topic for further research. If the mother had successfully breastfed until 4 months but less than 6 months, it is important to understand her reasons for stopping breastfeeding at that time. Reassessment is also important to find the difficulties faced by the mother so that early intervention can be implemented.

### Limitations

Most of our participant mothers were admitted to the hospital due to complications in their pregnancies. This is, however, the group of mothers who deliver a late preterm infant, the focus of our study. Second, the number of participants included in the study was limited. We could not exclude the fact that we might have found a weaker relationship between the IBFAT score and the duration of breastfeeding within a larger sample of mother–infant pairs. Finally, due to local conditions, not all participants came monthly to the

outpatient clinic, and with those participants who did not, we obtained information by telephone.

### Conclusion

We found that maternal factors as measured by the BSES-SF were more important for successful breastfeeding in late preterm infants than infant factors measured by the IBFAT. We speculate that supporting mothers in the postnatal period who have a low BSES-SF score might increase their self-efficacy and self-esteem, thereby increasing the duration of breastfeeding.

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### Declaration of Conflicting Interests

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**Supplemental Material**

Supplemental material for this article is available online.

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