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Exclusive Breastfeeding, Emotionally Available Mothering at Bedtime, and Maternal  
Confidence Across the First Six Months

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## ABSTRACT

This study investigates the association between exclusive breastfeeding, maternal emotional availability, and maternal confidence in caregiving and feeding across the first 6 months of the infant's life. This longitudinal observation study was based on the data collected by Project SIESTA, funded by the National Institute of Child Health and Human Development (5R01HD052809). Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author and do not necessarily reflect the views of the NIH federal agency that funded the SIESTA study, whose data was included in the current thesis. The study consisted of a sample of 167 participants from Centre and Dauphin counties in Pennsylvania. Mothers were classified into exclusive or non-exclusive breastfeeding groups, where exclusive breastfeeding was defined as only breastfeeding for up to 3 months postpartum. Maternal emotional availability was observed at 1, 3, and 6 months through video cameras placed in the participants' homes at bedtime. Maternal confidence in caregiving and confidence in feeding was obtained by questionnaires at 1, 3, and 6 months.

Results from this study revealed that there was no difference in emotional availability during infant bedtimes among exclusive and non-exclusive breastfeeding mothers. There was, however, a significant relationship between confidence in caregiving and confidence in feeding. For both confidence measurements, mothers who non-exclusively breastfed had low levels of confidence at 1 month and improved their confidence by 6 months, while exclusive breastfeeding mothers had high confidence across the entire 6 months. These findings suggest that whereas mothers' emotional availability is not influenced by feeding method, maternal confidence is increased when mothers exclusively breastfeed for the first 3 months.

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## INTRODUCTION

### **Breastfeeding Benefits**

One of the very first decisions a mother makes with a newborn child is whether she is going to breastfeed. The American Academy of Pediatrics has recommended breastfeeding for at least 6 months due to the variety of physical, mental, and emotional benefits to the mother and child (Centers for Disease Control [CDC], 2019). Breastfeeding not only provides nutrients to the infant and protects against disease, but it also helps the mother recover faster from pregnancy (American Academy of Pediatrics, 1997). When the mother breastfeeds, she experiences a decrease in post-partum bleeding and a faster return of normal uterine size and functioning, due to the hormone oxytocin (Abedi et al., 2013). There are several behaviors related to breastfeeding that a mother can adopt to enhance this release of oxytocin and promote bonding with the infant.

During breastfeeding, the mother and infant share close skin-to-skin contact, which creates a situation similar to kangaroo care. Kangaroo care, holding the baby skin-to-skin with the parent, supports this release of oxytocin in the mother and infant, which in turn results in more sensitive, resilient, and confident parenting (Tessier, 1998). There is a downstream effect from this behavior such that the mother is more likely to exclusively breastfeed due to her increased confidence and is more successful in producing milk due to the release of oxytocin (Anderson, 1991; Wilson, 2016). This shows that the benefits of kangaroo care while breastfeeding have a positive effect on oxytocin, maternal confidence, and other key features of a healthy mother-infant relationship. Previous studies on breastfeeding and emotional bonding

have found an association between variables that contribute to bonding, such as maternal sensitivity and mother-infant interactions; however, the actual link between breastfeeding and the mother-infant emotional relationship is less well-established (Britton, Britton, & Gronwaldt, 2006; Lavelli & Poli, 2002). Therefore, it is important to study whether and how exclusive breastfeeding and maternal emotional availability are connected.

### **Emotional Availability and Breastfeeding**

The emotional bond between a mother and her infant is an innate and essential relationship necessary for the infant's survival (Bornstein, Suwalsky, & Breakstone, 2012). Studying mothers' and infants' emotional availability (EA) is one way to understand this reciprocal mother-infant emotional connection (Biringen et al., 2014). One context that may facilitate the relationship between the mother and child in infancy is breastfeeding. Breastfeeding not only provides nutrition to the child but may also help establish mother-infant emotional bonds, and thus it is necessary to understand how emotional availability and breastfeeding are related.

### **Emotional Benefits of Breastfeeding**

One of the first social interactions between an infant and mother is during feeding (Lavelli & Poli, 2002). While a baby is being fed, s/he is in close contact with the mother. The breastfeeding interaction is slightly different than the bottle-feeding interaction, because during breastfeeding the mother and child are more likely to experience eye contact and close skin-to-skin contact. These behaviors are important for the mother-infant emotional relationship because



they have the potential to enhance the mother's attunement with the infant (Tharner et al., 2012). If the mother's sensitivity to infant social cues is fostered through these behaviors and she perceives her breastfeeding efforts to be successful, there may be a positive feedback loop as she begins to initiate more positive interactions with the infant such as smiling and touching the child more often (Krol & Grossmann, 2018; Lavelli & Poli, 2002). Physical skin-to-skin contact provides further support for attunement and responsiveness, because the mother is able to feel if the baby is full or still hungry. Tharner and colleagues (2012) determined that the sensory stimulation from breastfeeding provides an advantage for breastfeeding mothers over bottle feeding mothers. Therefore, the additional features of breastfeeding such as nipple simulation and enhanced skin to skin contact and eye contact may support the emotional relationship between the mother and infant, that is not provided by bottle feeding.

Breastfeeding is also unique because it tends to elicit and require more attention from the mother to infant cues. The feeding interaction is longer when breastfeeding vs bottle feeding because it takes longer for the baby to feed from the mother than from a bottle (Lavelli & Poli, 2002). This is beneficial for bonding because it allows the infant to spend more time in close contact with the mother. The mother also typically pays more attention when the infant is breastfeeding and is less distracted than when bottle feeding. If a mother is distracted during feeding, she is less likely to engage with the child through touching and facial expressions (Bornstein, Suwalsky, & Breakstone, 2012). This may lead to the mother being less emotionally available to the infant leading to possible negative consequences for the infant.

## **Oxytocin**

There are many psychological and emotional benefits to breastfeeding, and it is important to also recognize a physiological, non-nutritive benefit to this feeding method. When a mother breastfeeds her child, oxytocin is released in both the mother and child. Oxytocin is a hormone released in the brain that not only assists in the production and release of breastmilk, but also promotes bonding (Jansen, Weerth, & Riksen-Walraven, 2008). Oxytocin has been found to induce positive social interactions and reduce negative ones (Uvnäs Moberg & Prime, 2013; Krol & Grossmann, 2018). Maternal emotional availability not only involves increased sensitivity, but also decreased hostility towards the child. This shows that the effect of oxytocin could overall strengthen the quality of the mother-infant relationship. This hormone may also have a positive emotional effect on the mother, considering that oxytocin is associated with increased maternal confidence (Cleveland Clinic, 2018). Thus, when oxytocin is released in the mother and infant, specifically during breastfeeding, emotional availability and maternal confidence may be fostered.

## **Maternal Confidence**

Although there is a significant amount of research proving the physical and emotional benefits of breastfeeding, there are multiple factors that lead to early cessation that must be addressed. The Centers for Disease Control's (2020) Breastfeeding Report Card found that in 2017, 84% of mothers began breastfeeding their child and only 58% continued for 6 months. A possible explanation for this decrease in breastfeeding rates is that the mothers may perceive their breastfeeding experience as unsuccessful. An intervention can be performed to promote the

initiation of breastfeeding and identify common challenges mothers may face. One way to increase mothers' self-confidence is to have support from hospital staff in the days following childbirth and social support from family and friends. A main predictor of breastfeeding success is having positive breastfeeding experiences, as the mother feels encouraged to keep breastfeeding (Blyth, 2008). Therefore, these interventions will likely increase the mother's confidence in her feeding ability and lead to longer and more exclusive breastfeeding.

There is a positive feedback loop when mothers have a successful breastfeeding experience and therefore are encouraged to continue breastfeeding. Bandura (1977) explained this theory of self-efficacy and expressed that there are multiple factors involved such as expectations of success and actual personal success with the task. Bandura also explained that there is a difference between general self-efficacy and one's confidence in a specific task (Blyth, 2008). This supports the importance of studying confidence in caregiving and confidence in feeding separately because a mother may generally feel confident in her parenting abilities but have self-doubt about breastfeeding. The results of studying these two aspects of self-efficacy independently will help researchers and clinicians determine the best course of action to help increase confidence in mothers and support them throughout breastfeeding.

### **Limitations of Previous Work and Contributions of the Present Study**

Previous work has measured the mother-infant relationship through a variety of ways such as maternal report, structured observation, and naturalistic observation (Peñacoba & Catala, 2019). Many studies rely on maternal report of the mother-infant relationship, while only 6 studies, to the author's knowledge, have performed an observational study on the possible

association between breastfeeding and the quality of the mother-infant relationship. These observational studies either take place in a laboratory setting or in the home, where the participants are recorded or observed by a researcher in person. The present study differs from these observational studies in several ways.

Observation of the mother and infant interacting is a way to accurately measure their relationship because it removes bias from maternal report. Two studies performed an observational study in a laboratory setting, where the participants were instructed to complete certain tasks while researchers observed their maternal sensitivity. These studies were longitudinal and found that mothers who had breastfed and for a longer duration showed more sensitivity towards the infant over time than mothers who bottle fed (Weaver, Schofield, & Papp, 2018; Tharner et al., 2012). The video coders in the Weaver, Scofield, and Papp (2018) study were blind to all other information about the participants. Project SIESTA II was also a blind study, as the video coders did not know which mothers breastfed, while coding the mother-infant interactions.

Other studies consisted of a semi-structured observational session in the home which provided a more natural environment where the mother was more likely to respond to the infant as she normally would (Else-Quest, Hyde, & Clark, 2003; Gibbs, Forste, & Lybbert, 2018; Papp, 2013). Two of these studies concluded that mothers who breastfed exhibited more sensitive parenting than mothers who never breastfed or breastfed less frequently (Gibbs, Forste, & Lybbert, 2018; Papp, 2013). The study by Else-Quest and colleagues (2003) found that mothers who breastfed right after birth had higher quality interactions between the mother and infant at 12 months. This study was also unique because although one component of the study involved observation of a structured task, sessions of free play and feeding were also observed (Else-

Quest, Hyde, & Clark, 2003). Another observational study which was similar to Project SIESTA II was by Lavelli and Poli (2002), which placed video cameras in the home to observe the mother and infant interacting during feeding time. This study was different because it measured interactions such as mutual touch and gaze during feeding, while the present study measures sensitivity, structuring, non-hostility, and non-intrusiveness surrounding bedtime (Lavelli & Poli, 2002).

This present study improves on previous work by performing a naturalistic, unstructured, observational study taking place in the home at bedtime. This study is one of the first to measure these components at bedtime, when mothers and infants are more likely to display their true behaviors. Previous studies have examined breastfeeding and the mother-infant relationship using a variety of measurement scales; however, to the author's knowledge, no studies have used maternal emotional availability to look at this relationship. It is unique to study emotional availability because it combines the common measurement of maternal sensitivity with structuring, non-intrusiveness, and non-hostility.

Along with the measurement of emotional availability, this study also considers the aspect of maternal confidence on breastfeeding. As explained in the literature review by Rocha and colleagues, many studies have used the Breastfeeding Self-Efficacy Scale to express the mother's self-efficacy in her breastfeeding ability. These longitudinal studies have concluded that there is a significant relationship between breastfeeding and maternal confidence (Rocha et al., 2018). The differences between the current research on maternal confidence and this study is that Project SIESTA II differentiates between maternal confidence in caregiving and maternal confidence in feeding by using the Mother and Baby Scale. It is important to examine these

separately, because a mother may only lack confidence in certain situations, as supported by Bandura (Teti & Gelfand, 1991).

This study from Project SIESTA II will determine the relationship between breastfeeding and emotional availability among the mother and infant. Along with the measure of emotional availability, this study will examine the association between confidence in caregiving and confidence in feeding related to exclusive breastfeeding. The purpose of this thesis paper is to form a better understanding of the longitudinal relationship between emotional availability, maternal confidence, and breastfeeding during the early transition into parenthood. It is hypothesized that:

1. Mothers who exclusively breastfeed for the first 3 months will be more emotionally available with their infants, during independent bedtime observations, compared to mothers who do not exclusively breastfeed. To be analyzed will be linkages between exclusive (or not) breastfeeding and emotional availability across the three time points.
2. Mothers who exclusively breastfeed their infant will demonstrate higher maternal confidence in caregiving for the first 6 months.
3. Exclusive breastfeeding for 3 months will be associated with higher maternal confidence in feeding by the time the infant is 6 months old.

## METHODS

### Participants

The current study surveyed 167 participants from Centre county and Dauphin county Pennsylvania and their respective surrounding areas. The mothers were recruited from local hospitals within the first couple days after giving birth. The following demographics are based on the mother's answers to a questionnaire provided at 1 month. The average age of the mothers at the beginning of the study was 29.43 (SD = 5.27, age range = 18-43), while the average age of the fathers was a little older (M = 32.10, SD = 5.87, age range = 21-49). The majority of the mothers were White ( $n = 138$ , 83.60%), with a smaller proportion of Black ( $n = 6$ , 3.60%), Asian American ( $n = 6$ , 3.60%), Latino ( $n = 9$ , 5.50%), and other races ( $n = 6$ , 3.60%). 80.80% of mothers were married and living with their partner ( $n = 135$ ), while 14.40% were single and living with their partner ( $n = 24$ ). The remaining 4.80% of mothers were living without their partner while being single ( $n = 4$ , 2.40%), married ( $n = 3$ , 1.80%), or in a relationship with their partner ( $n = 1$ , 0.60%). The majority of the moms in this study were employed ( $n = 103$ , 62.00%) and their average yearly income was \$69,503.59 (SD = \$47,604.71, income range = \$0-\$300,000). Lastly, the average of the mothers' highest level of education was calculated for the sample (M = 4.95, SD = 2.06). Education ranged on a scale from 1, attended high school but did not graduate, to 10, some type of medical degree. Refer to Table 1 for demographic information.

There were 10 participants who did not complete the study, and their demographics were compared to the participants who stayed in the study. There was no difference in mothers' ( $F(1,164) = 1.56, p = 0.21$ ) or fathers' ages ( $F(1,153) = 0.56, p = 0.46$ ) among the participants who stayed and dropped out. There was also no difference in the yearly income between the two

groups of people ( $F(1,152) = 0.14, p = 0.71$ ). The marital statuses of the participants who dropped out of the study closely resembled the marital statuses of the individuals who continued in the study ( $\chi^2(1) = 0.83, p = 0.36$ ). The demographic of race showed that there was a trend towards more of the non-completers being non-white, however this was insignificant ( $\chi^2(1) = 2.74, p = 0.10$ ). Lastly, employment status showed no significant difference between the participants who stayed or dropped out of the study. Majority of the individuals who discontinued and individuals who stayed in the study were employed, with slightly more dropouts being employed ( $\chi^2(1) = 2.91, p = 0.09$ ). Overall, there was no significant difference between those who continued participating in the study and those who left the study.

## **General Approach**

### **Bedtime Video Collection**

The participants were recorded at bedtime in order for the researchers to observe the family's bedtime routine and parent-infant interactions in a natural setting. The families were recorded for one night at 1 and 3 months. The recording system was a Bosch Divar XF digital video recorder (DHR-0800B-150A; Bosch Security Systems). This system held video data from the IR Color CCD night-vision cameras (C420BCVFIR; ARM Electronics) and microphones (CV-5104MIC; Channel Vision). A DVD player (A299-1040; Audiovox D9000) was used to observe the camera angles in the room (Kim & Teti, 2014).

Up to four video cameras and microphones were placed inside the participant's home, typically in the bedroom and other rooms that the parents indicated were used during bedtime. The participants turned on the cameras about one hour before bedtime and turned off the



recording when the baby woke up in the morning. The bedtime duration started when the parent and infant were on camera for at least two minutes. Bedtime ended when the infant fell asleep and stayed asleep, showing eyes closed and no movement, for at least 5 minutes (Philbrook & Teti, 2016). Refer to the 2014 paper by Kim and Teti for more information on the video recording process (Kim & Teti, 2014). Coding of the bedtime videos was performed in the lab by trained coders who were blind to all study hypotheses.

## **Measures**

### **Breastfeeding**

The participants were required to complete a survey at each time point of the study and one of the questions asked about the mother's feeding method. The mothers were asked at 1 and 3 months if they breastfeed and their answer options were "yes, all the time", "yes, sometimes; baby is also on formula and/or solid food", "no, never breastfed", or "my baby was breastfed but has stopped". This was then recoded so that the individuals who answered "yes, all the time" were considered exclusively breastfeeding and all other responses were not exclusively breastfeeding.

### **Maternal Emotional Availability**

Emotional availability (EA) was coded in the lab by trained researchers who watched bedtime videos of the participants at 1, 3, and 6 months. The researchers observed the family interacting during bedtime, while taking note of the mother's emotional availability in 30 second

intervals. Emotional availability was categorized into four maternal measurements of sensitivity, structuring, non-hostility, and non-intrusiveness from the Emotional Availability Scales (EAS) defined by Biringen (Biringen et al., 2014). Sensitivity was based on the emotional responsiveness of the mother and the positive behaviors she displayed towards the child. Non-intrusiveness involved the mother not overcontrolling or excessively interfering in the child's activities. This was similar to the measurement of structuring, which was how well the parent set the child up for success, while allowing them to still have autonomy. The last maternal EA measurement was non-hostility, which was the mother's ability to refrain from verbal, physical, or any form of subtle hostility towards the child (Biringen et al., 2014). These EA measurements were adjusted for bedtime such as mothers with higher EA were likely to provide a quiet calming nighttime environment and not initiate interactions with the infant as they began to fall asleep (Teti, Kim, Mayer, & Countermeine, 2010).

There were also two infant measurements for emotional availability, responsiveness and involvement; however, for the purpose of this study, EA was only measured based on the four maternal measurements. The maternal measure of sensitivity was scored on a 9-point scale while structuring, non-intrusiveness, and non-hostility were on a 5-point scale (Kim & Teti, 2014). In order to create a composite maternal emotional availability measurement, a z-score was performed to place each of these components on the same scale. Mothers with a higher score were more emotionally available than mothers with a lower score. Bo-Ram Kim and Douglas Teti (2010) provided interrater reliability as both researchers were trained and certified on the Emotional Availability Scales. Kim coded maternal EA for the bedtime segments and was blind to all other data, and Teti ensured the reliability of these scores (Teti, Kim, Mayer, and

Countermeine, 2010). Based on eight mother-infant dyads at each age point, the interrater reliability for maternal EA was 0.98 for 1 and 3 months, and 0.99 for 6 months.

### **Lack of Confidence in Caregiving and Feeding**

The survey provided to the participants also asked several questions related to the mother's lack of confidence in feeding and lack of confidence in caregiving from the Mother and Baby Scale (MABS) (Wolke, 1995). These questions were asked at the timepoints of 1, 3, and 6 months after the baby was born. There were 6 statements about confidence in feeding and the participants answered 0 = not at all vs 1, 2, 3, 4, 5 = very much/often. The statements were: I'm tense during feeds, I'm unskilled, I don't have enough milk, lack of confidence holds up my feeds, received conflicting advice, and I enjoy feeds which was reverse coded. Having a higher score meant worse confidence, and a lower score meant more confidence in feeding ability.

For confidence in caregiving there were 11 questions, with the same answer choices of 0 = not at all vs 1, 2, 3, 4, 5 = very much/often. The statements were: I'm insecure when the baby cries, I've felt clumsy, I've needed advice, it is more difficult than expected, I'm afraid of dropping baby, I worry about hurting baby, and I'm unsure. The other statements were I'm confident, I'm coping all right, I cope well, and I'm doing a good job, which were reverse coded to stay consistent with high scores meaning worse confidence. These answers were then combined into a composite score for lack of confidence in feeding and lack of confidence in caregiving. Internal reliability was performed on these composite scores and was high for lack of confidence in caregiving at 1 (0.89), 3 months (0.84), and 6 months (0.83). Internal reliability for

lack of confidence in feeding was not as high as the other confidence variable. It was acceptable for 1 month (0.69), marginal for 3 months (0.50), and low for 6 months (0.38).

### **Analyses**

The first hypothesis states that mothers who exclusively breastfeed for 3 months will be more emotionally available at 6 months than mothers who do not exclusively breastfeed. A general linear model was used to determine the relationship between the two breastfeeding groups and their emotional availability across time. The second and third hypothesis states that mothers who exclusively breastfeed will demonstrate higher confidence in caregiving and confidence in feeding compared to mothers who do not exclusively breastfeed for at least 3 months. To analyze these variables across time, a 2 (breastfeeding group) X 3 (infant age) mixed-model analysis of covariance was used to show this relationship. For all analyses, maternal education and yearly family income was statistically controlled.

## RESULTS

### Preliminary Analyses

Descriptive statistics were performed on the two breastfeeding groups, non-exclusive breastfeeding and exclusive breastfeeding up to 3 months. The percentage of mothers who exclusively breastfed was determined at 1 month and 3 months after the infant was born. At 1 month, there were more mothers exclusively breastfeeding (59.00%) than non-exclusively breastfeeding (41.00%). At 3 months, these numbers started to even out as 52.30% of mothers were exclusively breastfeeding compared to 47.70% of mothers who were non-exclusively breastfeeding.

A one-way analysis of variance (ANOVA) compared the exclusive and non-exclusive breastfeeding mothers on maternal emotional availability, lack of confidence in caregiving, and lack of confidence in feeding. These results showed that compared to mothers who did not exclusively breastfeed, mothers who exclusively breastfed for 3 months showed no difference in emotional availability at 1 ( $F(1,111) = 0.003, p = 0.96$ ) or 3 months ( $F(1,104) = 0.45, p = 0.50$ ). By the time the infant was 6 months old, there was a trend showing that mothers that exclusively breastfed were more emotionally available ( $F(1,103) = 3.28, p = 0.07$ ) compared to mothers who did not exclusively breastfeed.

The ANOVA results for lack of confidence in caregiving showed no statistical difference in confidence levels at 1 ( $F(1,162) = 2.54, p = 0.11$ ), 3 ( $F(1,153) = 1.26, p = 0.26$ ), or 6 months ( $F(1,149) = 0.02, p = 0.89$ ) between the two breastfeeding groups. However, results for lack of confidence in feeding revealed a difference in confidence levels between exclusive and non-exclusive breastfeeding mothers. Compared to mothers who did not exclusively breastfeed,

mothers who exclusively breastfed for up to 3 months demonstrated significantly higher levels of confidence at 1 month ( $F(1,158) = 8.13, p = 0.01$ ), and a trend towards being more confident in feeding at 3 months ( $F(1,150) = 3.30, p = 0.07$ ). There was no statistical difference in feeding confidence between the two groups by the time the infant was 6 months old ( $F(1,145) = 0.68, p = 0.41$ ).

An additional ANOVA was performed to compare the two breastfeeding groups in terms of the mother's education level and income. Both of these variables showed a significant difference between exclusive and non-exclusive breastfeeding mothers. Exclusive breastfeeding mothers were more likely to have a higher level of education compared to mothers who did not exclusively breastfeed ( $F(1,164) = 16.38, p < 0.001$ ). Similarly, mothers who exclusively breastfed were more likely to have a higher income ( $F(1,152) = 4.35, p = 0.04$ ). This information is important because it shows that education and income differ significantly between the two breastfeeding groups, and therefore these variables must be statistically controlled.

Correlational analyses were also performed to determine the relationship between emotional availability, lack of confidence in caregiving, and lack of confidence in feeding at each timepoint for mothers who exclusively breastfed, or not, for 3 months. The first correlation, at 1 month, showed a significant negative correlation between exclusive breastfeeding for 3 months and the mother's confidence in feeding ability at 1 month ( $r(166) = -0.22, p = 0.01$ ) (see Table 2). This indicates that mothers who exclusively breastfed had higher confidence in feeding at this timepoint. Correlations at 3 and 6 months only demonstrated a relationship between the two confidence variables. These correlations found that there was a significant positive relationship between lack of confidence in caregiving and lack of confidence in feeding at 1 ( $r(158) = 0.48, p < 0.001$ ), 3 ( $r(150) = 0.48, p < 0.001$ ), and 6 months ( $r(145) = 0.45, p < 0.001$ ),

such that mothers who had low confidence in caregiving also had low confidence in feeding (see Table 2).

## **Main Hypotheses**

### **Hypothesis 1**

The first hypothesis stated that mothers who exclusively breastfed up to 3 months would be more emotionally available to their infant by 6 months. A 2 (breastfeeding group) X 3 (infant age: 1, 3, and 6 months) mixed-model factorial analysis of covariance (ANCOVA), controlling for maternal education and yearly family income, enabled comparisons between feeding group and across infant age of mothers' emotional availability. The analysis showed that there was no significant change in emotional availability as the infant got older ( $F(2, 96) = 1.38, p = 0.26$ ). There was also no difference in bedtime emotional availability between the two breastfeeding groups, independent of infant age ( $F(1,48) = 1.03, p = 0.32$ ). Finally, the interaction between breastfeeding group and infant age was not significant, ( $F(2,96) = 0.01, p = 0.99$ ), indicating that mothers' emotional availability did not differentially change from 1 to 3 to 6 months of infant age (see Figure 1).

### **Hypothesis 2**

The second hypothesis stated that mothers who exclusively breastfed would have higher maternal confidence in caregiving for the first 6 months of the infant's life compared to mothers who did not exclusively breastfeed. The same 2 (breastfeeding group) X 3 (infant age: 1, 3, and 6

months) mixed-model factorial ANCOVA, controlling for maternal education and income, was performed to test this hypothesis. Results revealed no significant change in confidence in caregiving scores as infants got older ( $F(2,266) = 0.78, p = 0.46$ ) (see Figure 2). However, there was a main effect of breastfeeding group ( $F(1,133) = 6.79, p = 0.01$ ), showing that exclusive breastfeeding mothers reported higher confidence in caregiving (lower lack of confidence scores) compared to non-exclusive breastfeeding mothers.

In addition, there was a significant breastfeeding group by infant age interaction, ( $F(2,266) = 5.84, p = 0.003$ ), indicating that mothers' confidence in caregiving changed over time in different ways in the two breastfeeding groups (see Figure 2). Compared to non-exclusive breastfeeding mothers, exclusive breastfeeding mothers were more confident in caregiving at 1 month, and remained more confident from 1 to 6 months, showing slight increases in confidence in caregiving as their infants got older. By contrast, non-exclusive breastfeeding mothers reported less confidence in caregiving at 1 month but increased in confidence more rapidly from 1 to 3 months, then leveled off from 3 to 6 months. Stated differently, exclusive breastfeeding mothers started off more confident than non-exclusive breastfeeding mothers at 1 month, and although non-exclusive breastfeeding mothers showed improvements in caregiving confidence across time, exclusive breastfeeding mothers remained more confident across infant age, than non-exclusive breastfeeding mothers (see Figure 2).

### **Hypothesis 3**

The final hypothesis stated that exclusive breastfeeding mothers would have higher confidence in their feeding ability by 6 months, compared to mothers who did not exclusively



breastfeed. A similar ANCOVA was performed, controlling for maternal education and income. This analysis showed that as infants got older, maternal confidence in feeding, independent of breast feeding group, did not change significantly across time ( $F(2,246) = 0.13, p = 0.88$ ). However, similar to the findings for lack of confidence in caregiving, results revealed a significant main effect of breastfeeding group, ( $F(1,123) = 23.32, p < 0.001$ ), indicating that exclusive breastfeeding mothers were significantly more confident in feeding their infants than non-exclusive breastfeeding mothers. In addition, there was a significant interaction between breastfeeding group and infant age, ( $F(2,246) = 12.53, p < 0.001$ ), indicating that mothers' confidence in feeding changed differently over time between the two breastfeeding groups. Compared to non-exclusive breastfeeding mothers, exclusively breastfeeding mothers were more confident in feeding at 1 month and remained relatively more confident from 1 to 6 months. Non-exclusive breastfeeding mothers, by contrast, showed less confidence at 1 month, but increased in confidence across infant age, converging with exclusive breastfeeding mothers by 6 months (see Figure 3).

## **DISCUSSION**

The purpose of this study was to determine the associations between exclusive breastfeeding for 3 months, maternal emotional availability, lack of confidence in caregiving, and lack of confidence in feeding. This study found that mothers who exclusively breastfed were not necessarily more emotionally available compared to their non-exclusive breastfeeding counterparts. As for the maternal confidence measurements, this study showed that there was a significant relationship between breastfeeding and confidence in caregiving and feeding, both dependent and independent of infant age. Non-exclusive breastfeeding mothers showed a major increase in maternal confidence in caregiving as the infant got older, while exclusive breastfeeding mothers remained having high confidence in caregiving at all infant ages. The mothers' confidence in feeding followed the same trend as confidence in caregiving. The mothers who did not exclusively breastfeed showed the greatest improvement in feeding confidence overtime, while exclusive breastfeeding mothers demonstrated continually higher levels of confidence over the first 6 months. These findings show that breastfeeding does not have a significant impact on emotional availability; however, it does play an important role in mothers' confidence in caregiving and feeding.

### **Emotional Availability**

The findings regarding emotional availability and exclusive breastfeeding did not support the hypothesis: mothers who exclusively breastfeed for 3 months would be more emotionally available by the time the infant is 6 months old. There was no change in the mother's emotional availability as the infant got older and no difference in emotional availability between the two breastfeeding groups, either taking into consideration infant age or not. This shows that the mother's feeding method had no influence on the mother's sensitivity, structuring, non-hostility, and non-intrusiveness behaviors. This information is

encouraging for mothers who are unable or choose not to breastfeed because her emotional availability may not be affected by her decision to breastfeed.

It was interesting to compare these findings with previous studies because other research had not studied the association between emotional availability and breastfeeding in the same context as was performed in this study. Previous observational studies of parenting quality and breastfeeding took place during the day while the mother and infant participated in a structured activity (Gibbs, Forste, & Lybbert, 2018; Papp, 2013), feeding (Lavelli & Poli, 2002), or a combination of an activity, feeding, and free play (Else-Quest, Hyde, & Clark, 2003). The present study was naturalistic and was the first study to examine emotional availability during bedtime. It is possible that parent-infant interactions at bedtime differ from during the day, which would influence the results of this study.

### **Maternal Confidence**

Maternal confidence was measured by examining confidence in caregiving and confidence in feeding separately to see how breastfeeding had an impact on these different areas of parenting. The results supported the second and third hypotheses that mothers who exclusively breastfeed for 3 months will demonstrate higher confidence in caregiving and confidence in feeding by the time the infant is 6 months old.

To first examine confidence in caregiving, the study showed that there was a significant difference between the two breastfeeding groups. Mothers who did not exclusively breastfeed their infant had lower levels of caregiving confidence at 1 month and showed improved confidence by 6 months. This is understandable because it takes time for mothers to adjust to the parenting role and their confidence in themselves increases as they get more practice. However, this trend was not observed in exclusive breastfeeding mothers. Mothers who exclusively breastfed had high caregiving confidence across the entire 6 months, with a slight increase over time, showing that breastfeeding has an impact on mothers'

caregiving confidence. This may be due to the fact that breastfeeding reduced anxiety and self-doubt towards motherhood, thereby increasing mothers' confidence from the beginning.

The results from maternal confidence in feeding were very similar to the confidence in caregiving findings. Mothers who exclusively breastfed had higher levels of feeding confidence from 1 to 6 months, while non-exclusive breastfeeding mothers showed a change over time. Mothers who did not exclusively breastfeed had low levels of confidence at 1 month but became more confident as the infant got older. By the time the infants were 6 months old, the two breastfeeding groups had very similar levels of confidence. A possible explanation for this trend is that by the time the infant is 6 months old, parents start to introduce solid food into the infant's diet. By this point, both breastfeeding and non-breastfeeding mothers are starting to feed their infant in similar ways and therefore the act of breastfeeding does not have as strong of an influence on feeding confidence.

This was the first study to investigate the relationship between breastfeeding and maternal confidence in caregiving and confidence in feeding as separate measurements. The present findings extend prior work on this topic, as addressed in the systematic review by Rocha and colleagues (2018). This review assessed four studies which measured exclusive breastfeeding and maternal confidence, in terms of breastfeeding self-efficacy and not related to general caregiving or other feeding methods (Rocha et al., 2018). These studies ultimately found an association between these two variables. This was similar to the present study, further supporting the relationship between mothers' confidence and breastfeeding.

## CONCLUSION

### Implications of the Findings

The findings of this study are important for researchers, healthcare providers, and mothers who are considering the impact of breastfeeding. Breastfeeding is a behavior that is known to have many positive physical, mental, and emotional benefits to the mother and infant (Centers for Disease Control [CDC], 2019). It is then important to consider if a decision not to breastfeed might have some type of negative impact on the mother or baby. Based on this study, it is reassuring that as for maternal emotional availability, there is no difference between exclusive and non-exclusive breastfeeding mothers. This is important information because it shows that non-exclusive breastfeeding mothers are not necessarily at a disadvantage and will not necessarily have lower emotional availability towards their child, at least in the early postpartum period. Mothers must not feel pressured to breastfeed, for fear of forming a less intimate bond with their infant. Indeed, breastfeeding may not be a choice for some mothers experiencing lactation difficulties. The present study suggests that mothers who do not exclusively breastfeed can still be emotionally available to their infant.

Although breastfeeding was not associated with emotional availability, it did appear to have a significant influence on maternal confidence. It is necessary to recognize that exclusive breastfeeding mothers have higher confidence in caregiving and confidence in feeding than non-exclusive breastfeeding mothers. New mothers may be nervous to step into the new role of motherhood. The findings provided by the present study may inform healthcare providers that breastfeeding is associated with greater confidence in caregiving and feeding ones' infant. As for mothers who are unable to breastfeed or choose not to, it is still hopeful that they will have similar levels of confidence to breastfeeding mothers by 6 months, as the present study indicates; it just may take them more time to gain that confidence. Exclusive breastfeeding may be an important practice to adopt for mothers who are feeling self-doubt regarding their parenting confidence.

### **Strengths, Limitations, and Next Steps**

There are several strengths and weaknesses to this study that must be addressed. One of the strengths is the method of direct observation of emotional availability. This study performed an observational study at bedtime, in the natural setting of the participants' homes and was observed through video cameras. Researchers coded maternal emotional availability based on these recordings, which provided a more accurate measurement of emotional availability than maternal report. This study was also longitudinal as it assessed the mother and infant over a 6-month period of time. Another strength was that mothers' education and yearly family income was statistically controlled for in order to see the true relationship between breastfeeding, emotional availability, and maternal confidence. Previous studies have found that income and parental education may have an influence on breastfeeding and infant development (Gibbs, Forste, & Lybbert, 2018). By controlling for income and education, the present study ruled out any influence those sociodemographic variables might have had on the quality of mothering and maternal levels of confidence.

This study also had several limitations. The first is that the study defined exclusive breastfeeding as breastfeeding for up to 3 months. It was originally intended to look at exclusive breastfeeding for up to 6 months, as this is the standard recommendation by the American Academy of Pediatrics (Centers for Disease Control [CDC], 2019). Due to limited sample size and the number of mothers who discontinued breastfeeding from 1 to 3 to 6 months, exclusive breastfeeding was redefined as breastfeeding for 3 months. Future studies can improve on the present study by extending the timeframe of the study and measuring longitudinally over a longer period of time. It would be interesting to see how exclusive breastfeeding for 6, 9, and 12 months would have an effect on emotional availability and maternal confidence across the first year of the infant's life. This would allow researchers to determine if there is a dose-response relationship between longer exclusive breastfeeding and higher emotional availability and maternal confidence.

A second limitation is that this study was fully correlational, and it is impossible to claim causality because there may be other factors at play. Future studies may examine these variables experimentally to better pinpoint the causal influences. Another limitation is that emotional availability was examined in only one context, at bedtime, and not other contexts across the day, which may have been more sensitive to whether or not mothers exclusively breastfeed. A recommendation for future research would be to examine daytime emotional availability along with bedtime emotional availability. It is possible that there is a difference in maternal emotional availability at different times of the day and this may provide meaningful findings.

It is also necessary to recognize the limitation regarding racial distribution of the sample population. The sample for this study was relatively homogenous regarding race, 83.6% white, thus the findings may not be generalizable to mothers in other racial and ethnic groups. Lastly, the present study did not differentiate new mothers from mothers with more than one child. This could potentially have an influence on mothers' confidence in maternal roles. Future studies on maternal confidence and breastfeeding should analyze new mothers separately as they do not have previous parenting experience. There are several different directions to extend on this current study and each would contribute important information to the current research on breastfeeding, emotional availability, and maternal confidence.

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Table 1. Descriptive Statistics of Sample Characteristics

Variables	n (%)	<i>M</i> (SD)
Average Age of Mothers	-	29.43 (5.27)
Average Age of Fathers	-	32.10 (5.87)
Race		
White	138 (83.60)	-
Black	6 (3.60)	-
Asian American	6 (3.60)	-
Latino	9 (5.50)	-
Other	6 (3.60)	-
Marital Status		
Married, living with a partner	135 (80.80)	-
Single, living with a partner	24 (14.40)	-
Single, living without a partner	4 (2.40)	-
Married, living without a partner	3 (1.80)	-
Relationship with a partner, living without a partner	1 (0.60)	-
Mother's Highest Level of Education	-	4.95 (2.06)
Mother's Employment Status, Employed	103 (62.00)	-
Mother's Average Yearly Income	-	\$69,503.59 (\$47,604.71)

Note. *M* = mean, SD = standard deviation, and n = number of participants, followed by the percentage in parenthesis.

Table 2. Pearson Correlations Between Emotional Availability, Lack of Confidence in Caregiving, and Lack of Confidence in Feeding at 1, 3, and 6 Months for Exclusive versus Non-Exclusive Breastfeeding Mothers

Measure	1	2	3	4
<b>1 Month</b>				
1. Emotional Availability	-			
2. Exclusive vs. Non-Exclusive Breastfeeding (1 and 3 months)	.01	-		
3. Lack of Confidence in Caregiving	.03	-.12	-	
4. Lack of Confidence in Feeding	.06	-.22**	.48**	-
<b>3 Months</b>				
1. Emotional Availability	-			
2. Exclusive vs. Non-Exclusive Breastfeeding (1 and 3 months)	.07	-		
3. Lack of Confidence in Caregiving	.08	-.09	-	
4. Lack of Confidence in Feeding	-.04	-.15	.48**	-
<b>6 Months</b>				
1. Emotional Availability	-			
2. Exclusive vs. Non-Exclusive Breastfeeding (1 and 3 months)	.18	-		
3. Lack of Confidence in Caregiving	.05	-.01	-	
4. Lack of Confidence in Feeding	.12	.07	.45**	-

Note. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

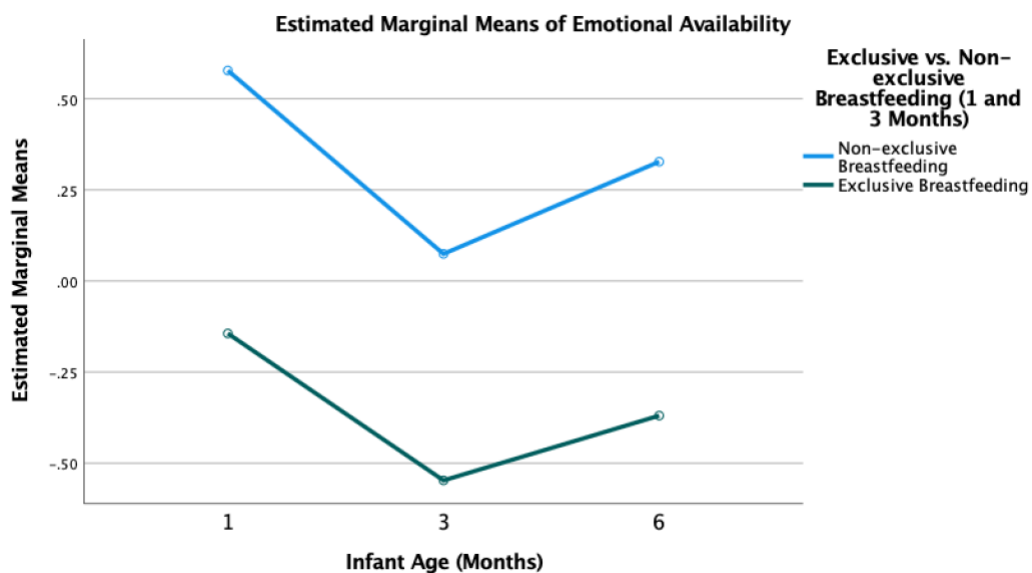


Figure 1. Emotional Availability at 1, 3, and 6 Months for Exclusive versus Non-Exclusive Breastfeeding Mothers

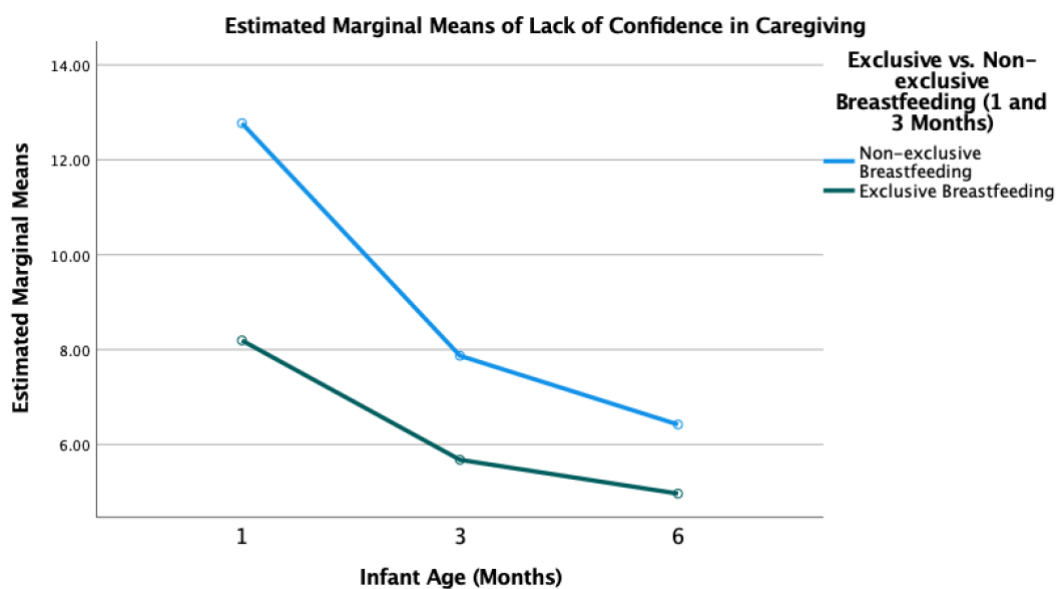


Figure 2. Lack of Confidence in Caregiving at 1, 3, and 6 Months for Exclusive versus Non-Exclusive Breastfeeding Mothers



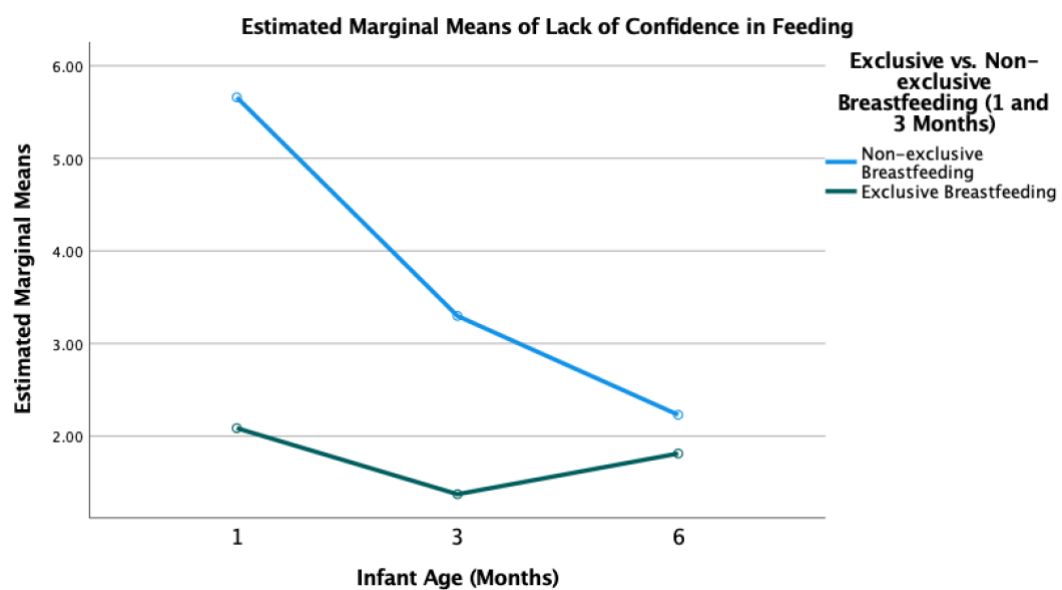


Figure 3. Lack of Confidence in Feeding at 1, 3, and 6 Months for Exclusive versus Non-Exclusive Breastfeeding Mothers

## ACADEMIC VITA - Nicole P. Smith

### Education

Pennsylvania State University, University Park, PA Aug 2017 – May 2021  
Bachelor of Science in Biobehavioral Health, Expected May 2021  
Minor: Human Development and Family Studies

### Awards and Honors

Dean's List (6/7 semesters)  
Schreyer Honors College Scholar  
Penn State Provost Award Scholarship  
Schreyer Family Honors Scholarship  
Summer Success Scholarship

### Healthcare Experience

*Emergency Medical Technician* Jan 2019 – present

*Centre LifeLink EMS, State College, PA*

- Provide emergency medical care and transportation to critically sick or injured patients
- Work 6-12 hours per week during the school year and 20-30 hours biweekly in the summer

*Camp Administrator First Aider*

May – Aug 2019

*Varsity Spirit, Memphis, Tennessee*

- Ensured a safe and secure environment for athletes at cheerleading camp by providing first aid and demonstrating basic athletic trainer skills
- Worked 327 hours total in the summer

*Student Observer*

Nov 2018

*St Luke's University Health Network, Bethlehem, PA*

- Observed physician assistants, physicians, and nurse practitioners in the fields of surgery, pediatrics, OB/GYN, and emergency medicine
- Witnessed patient interactions, surgical techniques, and day-to-day operations in a hospital and office setting

### Research Experience

*The College of Health and Human Development, University Park, PA* Jan 2019 – present

*Study of Infants' Emergent Sleep Trajectories (Project SIESTA)*

*Research Assistant*

- Study parent-infant interactions and co-parenting across the first two years of an infant's life by coding bedtime videos, analyzing data in SPSS, and completing a thesis on emotional availability, maternal confidence, and breastfeeding
- Work 105 hours per semester for 5 semesters

*The College of Health and Human Development, University Park, PA* Aug – Dec 2018

*Disparities Related to Individual Variance in Executive Functioning and Stress (DRIVES Lab)*

*Research Assistant*

- Ran participant visits by administering memory tests, stress tests, and collecting physiological health measurements in a study to determine how interpersonal relationships impact health
- Completed 75 hours in the lab

## **Certifications**

Emergency Medical Technician	Dec 2018
American Heart Association Basic Life Support (CPR and AED)	Sept 2020
Recognizing Child Abuse and Mandated Reporting certification	Jan 2021
Social and Behavioral Human Subjects Research (IRB) certification	Dec 2018

## **Leadership and Involvement**

***Club Cheerleading, Vice President and Student Head Coach*** Aug 2017 – Apr 2020

- Participated as a member of the team from 2017-2019 and assumed the position of Vice President and Student Head Coach for the 2019-2020 season
- Instructed a team of 30 competitive college athletes by teaching tumbling, stunting, and gameday related skills

***THON at Penn State, Participant*** Aug 2017 – present

- Volunteer as a participant and committee member to spread THON's mission and play an active role in ensuring the success of THON's year-long efforts as the world's largest student-run philanthropy

***Centre Volunteers in Medicine, Medical Screener*** Jun 2020 – present

- Volunteer as a COVID-19 medical screener at a healthcare clinic serving individuals without insurance

***Hope in the Hills of Warren, Volunteer*** Jun 2013 – Jun 2018

- Volunteered through Habitat for Humanity to improve the living conditions for older adults, low-income, and disabled individuals in my community

***Lion Scouts Tour Guide, Member*** Oct 2017 – Dec 2018

- Provide campus tours to prospective students and their families in groups of 10-30 people