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Tori Shavon Young

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THE EFFECT OF DEPRESSION, ANXIETY, AND LENGTH OF  
STAY IN NEONATAL INTENSIVE CARE UPON  
MATERNAL-INFANT BONDING

by

TORI S. YOUNG

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The University of Texas at Arlington in Partial Fulfillment  
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April 21, 2022

## ABSTRACT

# THE EFFECT OF DEPRESSION, ANXIETY, AND LENGTH OF STAY IN NEONATAL INTENSIVE CARE UPON MATERNAL-INFANT BONDING

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The University of Texas at Arlington, 2022

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Bonding is important to establish an early relationship but a challenge to mothers with infants in NICU. The aim of this study was to determine if a longer length of time an infant requires NICU admission is associated with impaired maternal-infant bonding. A secondary goal explored associations and effects of maternal depression and anxiety upon bonding via the Postpartum Bonding Questionnaire (PBQ), Edinburg Postnatal Depression Scale (EPDS), and a subscale of the EPDS for anxiety. A descriptive design was used to explore mental health and bonding among 45 NICU mothers who were at least 18 years old and could speak, read, and write in English. Study results revealed that neither NICU length of stay, anxiety, nor depression significantly predicted impaired bonding. However, bonding scores significantly correlated with anxiety and depression variables; thus, despite

a small sample size, mental health assessments are important in the postpartum care of mothers with NICU infants.

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## CHAPTER 1

### INTRODUCTION

#### 1.1 Statement of Purpose and Research Questions

Mothers of infants admitted into the Neonatal Intensive Care Unit (NICU) often miss the opportunity to form an early bond with their newborn because of medical issues and essential separation for care. Successful maternal-infant bonding has benefits for both mother and infant such as increased maternal self-efficacy in the role of mother, decreased stress levels, and better mental health (Klawetter et al., 2019). Further, maternal engagement through skin-to-skin contact, such as cuddling and breastfeeding, has shown facilitated progression toward a stronger connection between mother and infant and developmental milestones for the infant including optimal brain development, plus improved weight, and a shorter hospital stay for the infant (Klawetter et al., 2019).

Unfortunately, the development of the maternal-infant connection is often interrupted with admission into a NICU due to maternal emotional reactions to the birth outcome and NICU environment (Klawetter et al., 2019). The birth of an infant requiring a NICU admission is a traumatic event for a mother and often generates an overwhelming amount of stress and stress-related depression (Jubinville et al., 2012). These ensuing emotional stressors along with maternal anxiety, fear, and detachment, negatively contribute to the disconnect between a mother and infant in a NICU (Jubinville et al., 2012).

Given the recognized challenges to successful maternal bonding with an infant in NICU, and the known consequences of impaired bonding between a mother and infant,

additional investigation is suggested. Further, research exploring an association specifically between the infant's length of stay (LOS) in the NICU and maternal-infant bonding is unknown. Thus, this study's main goal was to determine if impaired bonding is associated with a longer length of time an infant requires NICU admission. A secondary goal was to explore the association and effects of LOS in NICU and maternal depression and anxiety on maternal-infant bonding. Therefore, the research questions are as follows:

- 1) Does impaired maternal-infant bonding associate with an extended LOS in NICU?
- 2) What are the associations between LOS in NICU, depression, anxiety and maternal-infant bonding?
- 3) What effects do LOS in NICU, depression, and anxiety have upon maternal-infant bonding?

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Factors Affecting Maternal-Infant Bonding

Maternal-infant bonding is defined as the “unidirectional positive emotions a mother has toward her infant and is seen as a significant motivator of parenting behaviors.” (Kasamatsu, 2019, p. 161). The second and third trimesters of pregnancy and the immediate period after birth are the most crucial moments of bonding between a mother and infant (Dunham & Marin, 2020). Bonding after birth is imperative to foster a later successful attachment between mother and infant. Among a sample of 125 Spanish mothers of NICU infants, bonding alterations were noted by Lasheras et al. (2020) to be about 2%; however, the rate increases greatly to as high as 38.75% among mothers receiving psychiatric services (Brockington et al., 2006).

Mothers and infants separated due to an admission into NICU are vulnerable to increased risk for impaired bonding due to not only separation and the infant’s medical condition, but the NICU environment as well. The nature of the infant’s illness and the subsequent separation and specialized care required in a NICU can impede maternal-infant bonding, especially when essential care is long-term and the NICU admission is lengthy (Dunham & Marin, 2020). The NICU environment is unpredictable and unfamiliar (Lasheras et al., 2020). Klawetter (2019) reported that mothers also often report difficulties in bonding with their infants in NICU because of physical barriers characteristic of most NICU environments including how small and crowded the unit may be with monitors,

wires, and tubes surrounding the newborn. Numerous reasons may require an admission into the NICU, and LOS may vary between a short observation of a few hours to months of special care. An infant's LOS in a NICU is dictated by the severity of the medical condition; yet little research exists that explores the LOS and its impact on maternal-infant bonding.

Mothers of infants in NICU often worry that they will be unable to connect with their infant (Redshaw & Martin, 2013). Skin-to-skin contact is recommended immediately after birth because it is associated with the biological processes that occur during this time. Initially, mothers produce an increased amount of oxytocin after birth which aids in establishing a maternal-infant bond (Widstrom et al., 2018). Oxytocin is beneficial because it decreases the level of stress the infant experiences following birth, improves the infant's temperature regulation ability, and reduces crying (Widstrom et al., 2018). Further, infants release catecholamines immediately following birth which helps the infant recognize their mother by strengthening their memory and learning their surroundings (Widstrom et al., 2018). Lastly, the mothers' breast temperature increases after initiating skin-to-skin with the infant. The increased temperature of the breast warms the infant's foot which is associated with stress reduction for the infant (Widstrom et al., 2018). Additional non-biological processes immediately following the birth experience are also associated with adjustment and realization of role changes, as parents get to know their infant (Brazelton & Nugent, 2011).

Considering the known benefits of early skin-to-skin, mothers faced with a lengthy NICU admission, often of an indefinite time, can become increasingly stressed, anxious, and depressed, which causes additional difficulty in establishing an early maternal-infant

bond. Increased levels of stress, emotional instability, and resulting poor mental health are commonly recognized characteristics of mothers with infants in NICU (Klawetter et al., 2019). Researchers exploring the psychological impact of a NICU admission found that mothers reporting increased anxiety, depression, and stress adapting to their new role often reported interrupted bonding (Bonacquisti et al., 2020).

During a lengthy NICU admission, mothers long for a sense of connection and belonging with the infant and when these needs are met mothers have expressed greater confidence in caring for and showing intimacy with their infants (Obeidat et al., 2009). Conversely, when these needs are not met, unsuccessful maternal-infant bonding occurs. The mother distances herself, abandons, and shows hostility towards her infant (Kasamatsu, 2019). These behaviors after birth are commonly associated with postpartum depression wherein mothers of NICU infants experiencing postpartum depression often do not recognize their infant's needs or show poor judgment, and therefore, render ineffective parenting behaviors to their child.

Mothers reporting postpartum anxiety also have found it difficult to bond and nurture their infants (Dubber et al., 2015). Depressed and anxious mothers of NICU infants become insecure causing maternal doubt regarding their ability to be a parent, thus, resulting in mothers reporting lower bonding scores compared to mothers not experiencing symptoms (Kerstis et al., 2016). Mothers increasingly report unanticipated role changes as their biggest stressor during an NICU admission (Bonacquisti et al., 2020). Further, as the infant's LOS in the NICU increases, mothers begin to lose perception of how they anticipated their new role to be (Klawetter et al., 2019). In summary, the combination of increased or an unknown future LOS in the NICU, sadness due to unanticipated role

outcomes, and stressful adjustment to forced separation from the infant negatively affects maternal-infant bonding. Additional research in this area can allow health care providers to identify high risk mothers early and implement plans to promote maternal-infant bonding before an infant's discharge home.

## CHAPTER 3

### METHODOLOGY

#### 3.1 Study Design

This Institutional Review Board (IRB) approved study used a descriptive design to explore the associations between, and prediction of, maternal emotions (depression and anxiety) and LOS of infants admitted into a NICU upon maternal-infant bonding.

#### 3.2 Setting

Data analyzed for this study were collected in a large three-tiered NICU at the local, county hospital which delivers about 5000 infants per year.

#### 3.3 Study Sample

The current study sample consisted of 45 mothers with infants currently in NICU. Due to the setting, the sample is primarily Hispanic. Inclusion criteria for study participants were 18 years of age or older and able to speak, read, and write in English. See Table 1 for sample characteristics.

#### 3.4 Measurements

The current study explored associations between LOS in the NICU, maternal mental health, specifically depression and anxiety, and maternal-infant bonding and tested the effects of LOS, depression, and anxiety scores as predictors of maternal-infant bonding. Maternal-infant bonding was measured by the 25-item Postpartum Bonding Questionnaire (PBQ) (Brockington et al., 2001). The PBQ uses a 6-point Likert



scale to rate the mothers' feelings about their infant on a scale of 0-5 in which higher scores indicate impaired bonding. Four subscales labeled impaired bonding, rejection and anger, anxiety about care, and incipient abuse provides a total score ranging from 0-125 with a minimum cutoff value of 26 to indicate any type of bonding disorder and 40 or above for severe disorder (Brockington et al., 2001; Farre-Sender et al., 2018). Use of the PBQ by Garcia-Esteve et al. (2015) established Cronbach's alpha coefficients in the total sample at 0.90 and a range between 0.56 to 0.85 for the four primary factors. Reliability for the PBQ in the current study was 0.45.

Depression and anxiety have been recognized to impact the developing bond between a mother and infant and were examined via the Edinburgh Postpartum Depression Inventory (EPDS) (Cox et al., 1987) and the three-item EPDS (EPDS-A subscale). The EPDS is a 10-question survey used to illuminate depressive symptoms during the first seven days following birth (Cox et al., 1987). Items have been identified to assess anxiety, sadness, sleep, and thoughts of self-harm (Lasheras et al., 2020). Scores range from 0-30 with higher scores on the EPDS indicative of a mother experiencing depressive symptoms (Cox et al., 1987). Reliability from Cox's 1987 work was reported at 0.88, reliability of the EPDS for the current study was 0.75. Well-used around the world as a gold standard of measurement, a systematic review of studies using the EPDS in postpartum women revealed cut off points of 9/10 for minor depression and 12/13 for major depression (Cox et al., 1987).

More recently, three items of the EPDS (#3,4,5) have been used to assess anxiety (Swaim et al, 2010). Use of the 3-item EPDS-A has been described as a reliable screen for anxiety by other researchers (Loyal et al., 2020; Riaz & Riaz, 2020). Scores for the three

items combined range from 0-9, with a score of 4 or greater considered to show perinatal anxiety (Swaim et al., 2010).

The LOS was assessed as days in NICU by mothers' self-reports via a researcher-developed demographics tool. For this study, extended LOS was defined as 14 or more days based on the reported average length of stay in a NICU for infants of all gestational ages to be 13.2 days (March of Dimes, 2011).

### 3.5 Procedures

Potential participants for the study were recruited directly from the NICU by either the primary investigator or student research assistants. A brief explanation of the study was provided at the infant's bedside, and if there was interest, mothers and researchers retreated to a quiet room in the NICU for additional study details and written consent to participate. Most questionnaires were completed by the mother shortly after the consent and not taken home; therefore, researchers were available to the mothers if any questions or emotional issues arose regarding study materials. Social workers for the unit were available if needed; however, none were called for assistance due to study participation. Questionnaires were returned to the researchers upon completion and written materials related to depression were provided to all mothers.

### 3.6 Data Analysis

Descriptive statistics defined the sample. Pearson's Correlation Coefficient was used to determine associations between variables. Linear regression evaluated the effects of LOS in NICU and maternal depression and anxiety on maternal-infant bonding. The LOS in NICU variable was skewed ( $>1$ ) and therefore, these results are cautionary.

## CHAPTER 4

### RESULTS

#### 4.1 Study Findings

Of the 45 mothers who agreed to participate in the study, participants ranged from 18 to 44 years old. A majority (52.6%) of the mothers were Hispanic, single, and had received a high school diploma. Nearly 95% of mothers had a previous child, but only 8.09% of mothers had a previous child who required admission into NICU. Study results revealed 25% of the sample had depressive symptoms; however, the EPDS mean score was sub clinical at 5.23 (SD=4.33). Additionally, 35.9% of the mothers experienced perinatal anxiety, with a mean score of 2.33 (SD=1.97). According to the extended LOS definition of >14 days, 35.9% of mothers had an infant with extended LOS; however, with notable outliers, the average LOS was 15.94 days (SD=20.33). Lastly, the PBQ found that 0% of the mothers experienced impaired bonding revealing a mean score of 5.02. (SD=4.66). See Table 1 for sampling characteristics.

Study results showed PBQ scores not to be significantly associated with extended NICU admissions,  $r=.018$ ,  $p=.921$ . However, PBQ scores did significantly correlate with maternal anxiety,  $r=.460$ ,  $p=.006$ , and depression,  $r=.394$ ,  $p=.021$ . See Table 2 for correlations. Linear regression showed no significant effects of LOS, depression, or anxiety on maternal-infant bonding.

Variables	(n=39)	%
Age		
18yrs-30yrs	28	71.8
31yrs-44yrs	11	28.2
Race		
(White)	3	7.9
(Black)	12	31.6
(Hispanic)	20	52.6
(other)	3	7.9
Marital Status		
Single	21	53.8
Married	18	46.2
Education Completion		
6 <sup>th</sup> – 12 <sup>th</sup> grade	29	78.4
1-3 years of college	8	21.6
Planned Pregnancy		
No	16	42.1
Yes	22	57.9
Number of kids		
1-4	37	94.9
>5	2	5.09
Previous child in NICU		
No	34	91.9
Yes	3	8.09
Depression		
0-8; No Depression	30	75
9-11; Minor Depression	6	15
>12; Major Depression	4	10
Anxiety		
None; 1-3	25	64.1
Some Anxiety; 4-7	14	35.9
Length of Stay (LOS)		
<14 days	23	62.2
>14 days	14	37.8
Total Bonding Score		
<26; no bonding disorder	35	100
>26; bonding disorder	0	0

Table 4.1: Sample Characteristics

		Days in NICU	Depression	Bonding Score	Anxiety
Days in NICU	Person	1	.067	.018	.021
	Correlation		.691	.921	.902
	Significance				
	n	37	37	32	37
Depression	Person	.067	1	.394*	.770**
	Correlation			.021	<.001
	Significance	.691		.021	<.001
	n	37	40	34	40
Bonding Score	Person	.018	.394*	1	.460**
	Correlation				.006
	Significance	.921	.021		.006
	n	32	34	35	34
Anxiety	Person	.021	.770**	.460**	1
	Correlation				
	Significance	.902	<.001	.006	
	n	37	40	34	40

Table 4.2: Correlations between Main Study Variables

## CHAPTER 5

### DISCUSSION

#### 5.1 Research Discussion

This study explored the connections between LOS in NICU, maternal mental health, and bonding and examined the effects of depression, anxiety, and LOS in NICU on maternal-infant bonding. No significant association was found between LOS and bonding. Despite finding that the mean LOS was extended beyond 14 days, no mother reported impaired bonding by PBQ scores. It may be suggested that mothers became better adjusted over time to the NICU environment and NICU staff members had adequate time to encourage and allow mothers to participate in the decision making and care for their infant. Additionally, findings may be a result of NICU staff members preparing mothers for the NICU environment which decreased the stress mothers may have experienced beforehand. Associations were found, however, between bonding and maternal depression and anxiety which suggests the need for healthcare providers to continue to monitor maternal mental health and intervene as needed to promote good mental health and hence maternal-infant bonding.

While few studies exist focused on maternal-infant bonding among NICU populations, Lasheras et al. (2020) compared mothers with infants in NICU (n=125) and mothers without infants in NICU (n=276) using the EPDS and PBQ. This research group found that LOS in the NICU was significantly related to EPDS scores, but no association between depression and bonding at six weeks postpartum was found. In fact, no differences

were found between the two groups of mothers for either depression or bonding scores. Methodological study differences including an EPDS cutoff of >11 indicating major depression only and a six-week administration of study tools did exist for the Lasheras and group's study. Yet, like the current study, mean EPDS and PBQ scores revealed an overall sample without depression or impaired bonding. Healthcare providers were also credited by Lasheras et al. (2020) as important to overcoming challenges facing these NICU mothers that may have decreased maternal stress and depression.

Similar work in this area conducted by Faisal-Cury et al. (2020) revealed associations between maternal-infant bonding (via the PBQ) and maternal depression in high-risk mothers (N=346) within one year after birth. While the current study also revealed these associations, Faisal-Cury et al. (2020) showed slightly higher percentages of depression than the current study and found only moderate to severe forms of depression were associated with bonding impairment in 10% of the population ( $r=1.91$ ,  $p=0.17$ ). However, differences in this study from the current study included a larger sample size, administration of measures in the extended postpartum, and use of a different measure to assess depression. The current study population was primarily Hispanic which also may contribute to the deviation in results when compared to previously conducted studies.

## CHAPTER 6

### CONCLUSION

#### 6.1 Research Conclusion

Depression and anxiety are associated with maternal-infant bonding, but along with LOS in NICU, did not predict impaired bonding. These findings, however, suggest the critical importance for healthcare providers to assess and monitor the mental health of mothers with infants in NICU. With a short hospital stay for mothers, a planned follow-up by phone or home visit by a nurse or social worker needs to be arranged prior to hospital discharge of the mother. LOS had no association with impaired bonding, and no mother scored on the PBQ to indicate impaired bonding. Mothers with longer periods of time in the NICU may have benefited greatly from helpful healthcare providers encouraging interactions and bonding between mothers and infants. Observations of maternal-infant bonding with encouragement from healthcare providers to develop quality interactions and scheduled involvements in care for mothers and infants while in NICU can help promote bonding while mother and infant are separated. Additional research should continue to help identify predictors of bonding among mothers with NICU infants.

#### 6.2 Limitations

This study's findings cannot be generalized to the entire population of NICU mothers. The small sample of mothers were mainly from one racial demographic. Additionally, this study failed to standardize a data collection time frame for each mother. Therefore, timing for administration of tools varied for each participant which reflects the



mothers' current perception of the NICU experience and bonding between her infant differently and at that one time period. Moreover, it is unknown whether participants experienced depression and anxiety prior to their infants' NICU admission. Finally, the poor reliability of the PBQ in this study should be considered when analyzing study results, as future studies may have difficulty recreating results. Most importantly, the role of the healthcare workers in NICU must be considered as they worked closely with these NICU mothers for an extended time to allow mothers to learn to bond with their infant through interaction and participation in care. These actions by NICU staff may contribute to the unanimous reduction of impaired bonding for study participants.

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## BIOGRAPHICAL INFORMATION

Tori Young began her college journey at UT Arlington in 2018, after moving to Texas from Louisiana. After realizing her passion for healthcare and improving the lives of those around her, she worked diligently to earn a spot in UT Arlington's nursing program. Upon acceptance into the nursing program, Tori used her membership in UT Arlington's Honors College to guide interactions with professors so that she could further study topics she is passionate about. Tori has a passion for women's health and was able to conduct and analyze research alongside Dr. Cheryl Anderson, who has conducted numerous studies within women's health. Tori's future plans are to work as a Registered Nurse in the Intensive Care Unit after graduating with an Honors Bachelor of Science in Nursing May 2022.