



# You Can't Take Your Baby Home Yet: A Longitudinal Study of Psychological Symptoms in Mothers of Infants Hospitalized in the NICU

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## Abstract

Evidence suggests that mothers of infants hospitalized in the Neonatal Intensive Care Unit (NICU) experience elevated rates of psychological symptoms. However, previous studies of this population have been mainly cross-sectional and have focused on very preterm infants. Although moderate- to late-preterm infants generally thrive, the possible psychological toll on their mothers has not yet been sufficiently examined. In the current study, we used a longitudinal design to investigate whether mothers of moderate- to late-preterm infants experience elevated rates of psychological symptoms during the infant's hospitalization in the NICU and 6 months later. Results indicated that these mothers did show elevated depression, anxiety, and PTSD symptoms, and that symptom levels were similar in mothers of moderate- versus late-preterm infants. Mothers of moderate- to late-preterm infants hospitalized in the NICU appeared to experience these symptoms steadily over a 6-month period after giving birth. These findings suggest a need for greater support for these mothers while in the NICU.

**Keywords** NICU · Mothers · Depression · Anxiety · PTSD

## Introduction

For most mothers, the birth of a child is a deeply profound experience (Barclay, Everitt, Rogan, Schmied, & Wyllie, 1997; Nyström & Axelsson, 2002). For mothers of premature infants, however, this experience is often colored by the extremely difficult consequences of having their newborn child placed in the Neonatal Intensive Care Unit (NICU; Beck, 2003; Holditch-Davis, Bartlett, Blickman, & Miles, 2003; Nyström & Axelsson, 2002; Wigert, Johansson, Berg, & Hellström, 2006). From 1981 to 2015, there was a 19.9% increase in the number of premature births per year in the United States, resulting in large increases in NICU admissions (Goldenberg, Culhane, Iams, & Romero, 2008; Martin, Hamilton, Osterman, Curtin, & Mathews, 2015). Mothers of NICU infants are not permitted to take their babies home

as planned, and may even be unable to hold or care for their infant, instead observing as an “outsider” as the child is cared for by nurses and attached to monitors and machines (Nyström & Axelsson, 2002). The lessened ability to care for and comfort their baby may lead to a sense of powerlessness and lack of control (Nyström & Axelsson, 2002).

Clinical levels of psychological disorders such as depression, anxiety, and posttraumatic stress disorder (PTSD) have been shown to be present at higher rates in mothers of newborns compared to women who have not recently given birth (Beck, Gable, Sakala, & Declercq, 2011; Gavin et al., 2005; Wenzel, Haugen, Jackson, & Brendle, 2005). When an infant is born prematurely or experiences medical complications, preliminary evidence suggests that the experience of birth and new motherhood is often further characterized by confusion, helplessness, and distress (Beck, 2003; Holditch-Davis et al., 2003; Wigert et al., 2006). Mothers of infants hospitalized in the NICU generally experience higher rates of postpartum depression compared with mothers of healthy infants (Beck, 2003; Davis, Edwards, Mohay, & Wollin, 2003; Lefkowitz, Baxt, & Evans, 2010). One study found that 39% of mothers with infants hospitalized in the NICU met criteria for depression (compared with 10–15% of mothers of healthy babies), with an additional 16.9% meeting

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criteria for sub-syndromal depression, and 32.2% reporting suicidal thoughts in the prior 2 weeks (Lefkowitz et al., 2010). While there is little research focused on postpartum anxiety and PTSD symptoms, especially in the context of the NICU (Matthey, Barnett, Howie, & Kavanagh, 2003), some studies have also shown increased rates of postpartum anxiety and PTSD symptoms in these mothers (Carter, Mulder, Bartram, & Darlow, 2005; Lefkowitz et al., 2010; Shaw et al., 2006). However, it is important to note that the majority of these studies included a very wide gestational age range, focused on infants that were extremely or very preterm (< 32 weeks gestation), or had severe complications or medical illnesses.

Despite these advancements in knowledge more generally about psychological symptoms in NICU mothers, little is still known about mothers of moderate- to late-preterm infants specifically (born between 32<sup>0/7</sup> weeks and 36<sup>6/7</sup> weeks gestation). Because the infants from this group *typically* survive with few or no lasting health problems and are similar in size and weight to term infants (Brandon et al., 2011; Stark, 2004), medical professionals often treat them as low-risk, and healthcare professionals may assume that their mothers will experience minimal emotional distress (Brandon et al., 2011; Engle, 2006; Fuchs & Gyamfi, 2008; Melamed et al., 2009). Though these mothers may be less concerned about their infant's survival, they may still worry about a variety of complications, such as hypoglycemia, feeding problems, and infectious disease (Engle, Tomashek, Wallman, & The Committee on Fetus and Newborn, 2007; Shapiro-Mendoza & Lackritz, 2012). Mothers of moderate- to late-preterm infants may suffer a great deal with these unknowns, but given assumptions by doctors and nurses that they are not distressed (Brandon et al., 2011; Engle et al., 2007), they may do so in silence.

Thus far, research investigating psychological symptoms in mothers of NICU infants has been limited for two primary reasons. First, as previously stated, most studies of NICU mothers have included mothers of only *very preterm infants* (born between 28<sup>0/7</sup> weeks and 31<sup>6/7</sup> weeks gestation) or have been *over-inclusive*, investigating maternal reactions regardless of the infant's gestational age. Surprisingly, there has been little research focusing exclusively on moderate- to late-preterm infants and their mothers, despite this gestational age range accounting for such a high percentage of preterm births in the US (approximately 83% of preterm births in the United States; Martin et al., 2015).

Further, there may be important differences in psychological symptoms for mothers of moderate-preterm (born between 32<sup>0/7</sup> and 33<sup>6/7</sup> weeks gestation) versus late-preterm infants (born between 34<sup>0/7</sup> and 36<sup>6/7</sup> weeks). There is a great deal of variability in the conditions of moderate- to late-preterm infants, with some experiencing highly complicated medical problems and treatment courses (Engle, 2006;

Martin et al., 2006; Melamed et al., 2009). The infant mortality rate for moderate-preterm infants (16.2 per 1000 live births) is more than double the rate for late-preterm infants (7.1 per 1000 live births; Shapiro-Mendoza & Lackritz, 2012). Additionally, for infants born before 38 weeks, morbidity rates appear to approximately double for each week earlier, with 51.7% morbidity at 34 weeks compared to 5.9% morbidity at 37 weeks (Shapiro-Mendoza & Lackritz, 2012; Shapiro-Mendoza et al., 2008), indicating that each passing week of gestation in the moderate- to late-preterm range brings significant health benefits. Still, it is important to note that even late-preterm infants are significantly more likely than term infants to be diagnosed after birth with complications such as temperature regulation problems, hypoglycemia, respiratory distress, apnea, jaundice, and feeding difficulties, and are more likely to be readmitted to the hospital due to illness (Engle et al., 2007; Wang, Dorer, Fleming, & Catlin, 2004). To our knowledge, no research has compared rates of psychological symptoms in mothers of moderate-preterm versus late-preterm infants.

Second, while the majority of findings indeed suggest that mothers of NICU infants generally experience higher rates of postpartum depression (Beck, 2003; Carter et al., 2005; Davis et al., 2003), anxiety, and PTSD (Carter et al., 2005; Doering, Moser, & Dracup, 2000; Shaw et al., 2006) than mothers of healthy infants, these studies have focused only on a single time point (e.g., while the baby is still hospitalized), or on a very brief period of time, such as within one month of birth (e.g., Lefkowitz et al., 2010). This has not allowed for the examination of how symptoms may evolve over time, or after the infant has gone home.

There exist significant risks of maternal psychopathology, including difficult mother-infant bonding, increased infant medical illness, and lower maternal quality of life (Beck et al., 2011; Gavin et al., 2005). Research has found that maternal depression during infancy/childhood is linked with higher levels of internalizing problems (e.g., social withdrawal, anxiety), externalizing problems (e.g., bullying, acting out in school), and general childhood psychopathology (Goodman et al., 2011). Earlier studies have shown that children of depressed parents are between two and five times as likely to exhibit behavioral difficulties as compared with children of non-depressed parents (Cummings & Davies, 1994). Given these risks, it is critical to gain a better understanding of the mental health concerns of mothers of moderate- to late-preterm infants—both during NICU hospitalization and, importantly, over time.

## The Current Study

We designed this study to address the deficit in the literature about psychological symptoms in mothers of moderate- to late-preterm NICU infants. Specifically, we used a

longitudinal design in order to explore whether mothers of moderate- to late-preterm infants had elevated rates of psychological symptoms *over time*. In addition, we explored whether rates of psychological symptoms differed for mothers of moderate- versus late-preterm infants from immediately after birth to 6 months later. While the current investigation did not include a control group of mothers of term infants, we were able to compare rates of psychological symptoms in moderate- to late-preterm infants to well-established rates of psychopathology for mothers of term infants reported previously in the literature.

## Method

### Participants

The study was approved by the IRB of Columbia University Medical Center. We attempted to recruit all mothers of moderate- to late-preterm infants from the Neonatal Intensive Care Unit of Morgan Stanley Children's Hospital, Columbia University Medical Center within 6 months of admission. Mothers were excluded if their babies were born earlier than 32<sup>0/7</sup> weeks gestation, or later than 36<sup>6/7</sup> weeks, or if they had been in the NICU for longer than 6 months. In total, 91 mothers were included in the current study.

### Procedure

A baseline assessment took place as soon as possible after the infant was admitted to the NICU, while the infant was still hospitalized. The average length of time between birth and baseline assessment was 34.8 days ( $SD = 27.3$  days). Follow-up took place approximately 6 months after the initial assessment ( $M$  days = 195.1,  $SD = 34.7$ ), after the mother and infant had returned home. The research nurse of the Division of Neonatology identified all mothers of moderate- to late-preterm infants; the attending neonatologist then requested verbal agreement from mothers to be contacted by our research team. If the mother agreed, she was asked to complete the consent form and questionnaire packet while in the NICU or sent these materials by mail. Six months later, a member of our research team reached out to the mother by telephone to inform her that we were mailing a 6-month follow-up packet.

### Measures

#### Depression Symptoms

The Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) is a standardized 11-item scale that has shown adequate test-retest reliability and internal

consistency across a wide range of subsamples (Roberts, Rhoades, & Vernon, 1990) ( $\alpha$  for the current sample = .83). The clinical cutoff score for the 11-item CES-D is 8 (Kohout, Berkman, Evans, & Cornoni-Huntley, 1993). This measure demonstrates high validity (Radloff, 1977).

#### Anxiety Symptoms

The Generalized Anxiety Disorder-7 Item (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006) is a standardized and widely used measure assessing the presence of symptoms of Generalized Anxiety Disorder ( $\alpha$  for the current sample = .92). A score of 5 represents mild anxiety, 10 moderate anxiety, and 15 severe anxiety on the GAD-7 (Löwe et al., 2008), with a score of 10 or above generally accepted as a clinical cutoff (Spitzer et al., 2006). This measure shows high construct validity (Löwe et al., 2008).

#### Posttraumatic Stress Disorder (PTSD) Symptoms

The PTSD Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993) is a 17-item standardized, validated, self-report measure asking respondents to report level of distress associated with each reported PTSD symptom over the past month ( $\alpha$  for the current sample = .93). It has shown high diagnostic accuracy (Forbes, Creamer, & Biddle, 2001). The recommended cutoff score for civilians on the PCL is 38 (National Center for PTSD, 2016).

## Results

The current study included a total of 91 mothers (40.7% Caucasian, 38.9% Hispanic 17.4% African American, 10.5% Asian, 2.3% American Indian/Alaskan Native, 29.1% other). Mean age was 32.45 years ( $SD = 6.78$ ). Mean years of education was 14.29 years ( $SD = 4.30$ ). In the current study, 71.4% of mothers reported being married, with 2.2% separated, 11.0% single, and 15.4% living with a partner. For 37.4% of mothers, the hospitalized infant was their first child, and mean total number of children was 2.27 ( $SD = 1.55$ ), with 13.2% of mothers reporting having had a prior infant hospitalized in the NICU. Gestational age range of the current sample was 32<sup>0/7</sup>–36<sup>6/7</sup> weeks, with a mean of 33.53 weeks ( $SD = 1.33$ ). Of the mothers included in our study, 9.9% reported having been diagnosed with a mental illness in the past.

Of the original 91 mothers, 76 participated in the 6-month follow-up assessment, representing an 83.5% retention rate. Mothers who declined or were unreachable for follow-up did not differ from mothers who participated for any demographic variables or variables included in the study.

### Rates of Psychological Symptoms in Mothers

Compared with known symptom rates for mothers of healthy/term infants, we found elevations in depression, anxiety, and PTSD symptoms in mothers of moderate- to late-preterm infants *during the time of the infant's hospitalization and 6 months post-birth*. Figure 1 depicts baseline and 6-month symptom rates compared to established rates of psychological symptoms in mothers of healthy/term infants reported previously in the literature.

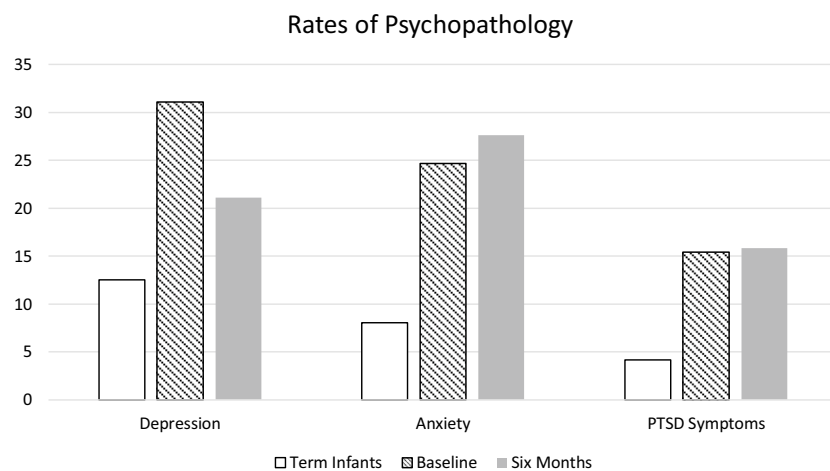
Depression scores above the clinical cutoff were found in 31.1% of NICU mothers at baseline and 21.1% of NICU mothers 6 months later, compared with approximately 6.5–12.9% of mothers of healthy infants experiencing postpartum depression reported in the literature (Gavin et al., 2005; Woody, Ferrari, Siskind, Whiteford, & Harris, 2017). For anxiety, 24.7% of mothers had clinically relevant anxiety scores during hospitalization and 27.6% 6 months later—comparatively higher rates than the approximately 7.4–8.7% of mothers of healthy infants who experience clinically significant levels of postpartum anxiety (Matthey et al., 2003).

For PTSD symptoms, 15.4% of mothers in the current study had clinically significant levels at baseline and 15.8% at 6-month follow-up, compared with 2.3–6% of mothers of healthy infants evidencing clinically significant PTSD symptoms (Ross, McLean, & Psych, 2006; Söderquist, Wijma, & Wijma, 2006).

Overall, 33.7% of mothers at baseline and 38.2% of mothers at follow-up exhibited clinically significant psychopathological symptoms. PTSD, anxiety, and depression symptoms were strongly positively correlated at both time points. At baseline, all three psychological disorders were approximately equally correlated with one another, with PTSD and anxiety slightly less strongly correlated. At 6 months, depression and PTSD were the least strongly correlated, and depression and anxiety most strongly correlated (Table 1). Correlations were weaker at 6 months than they were at baseline.

We ran a series of repeated measures time (baseline versus 6 months) × gestational age range (moderate-preterm vs. late-preterm) ANOVAS to determine whether symptom levels for depression, anxiety, and PTSD significantly

**Fig. 1** Comparing rates of psychopathology in mothers of moderate-preterm and late-preterm infants at baseline and 6 months to known rates for mothers of term infants. *Term infants* known rates in mothers of term infants as reported in the literature, *Baseline* measured soon after birth, during NICU hospitalization; *Six months* measured 6 months later, after mothers and infants returned home



*Note:* Term Infants = Known rates in mothers of term infants as reported in the literature; Baseline = Measured soon after birth, during NICU hospitalization; Six months = Measured six months later, after mothers and infants returned home

**Table 1** Correlation Matrix for baseline and 6-month symptoms

	1	2	3	4	5	6
1. Baseline depression						
2. Baseline anxiety	.78***					
3. Baseline PTSD	.77***	.70***				
4. 6 Month depression	.47***	.40***	.34**			
5. 6 Month anxiety	.36***	.35**	.27*	.77***		
6. 6 Month PTSD	.37**	.33**	.41***	.60***	.69***	
Mean	4.89	6.06	26.99	4.00	5.62	27.13
Standard deviation	4.13	5.90	11.87	4.07	5.25	10.63

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

differed between time points and for mothers of infants in each gestational age range. See Table 2 for means and standard deviations.

Results showed no significant main effects or time  $\times$  gestational age range interactions. Depression scores for mothers at baseline did not differ significantly from scores at 6 months,  $F(1, 74) = 3.46, p > .05$ , and depression scores were not significantly different for mothers of moderate-preterm versus late-preterm infants,  $F(1, 74) = .09, p > .10$ . Anxiety scores also did not differ significantly from baseline to 6-month follow-up,  $F(1, 73) = .35, p > .10$ , and were not significantly different for mothers of moderate-preterm versus late-preterm infants,  $F(1, 73) = .29, p > .10$ . Similarly, PTSD scores did not differ significantly from baseline to 6 months,  $F(1, 74) = .00, p > .10$ , and were not significantly different for mothers of moderate-preterm versus late-preterm infants,  $F(1, 74) = .02, p > .10$ .

## Discussion

The idea that mothers of moderate- to late-preterm infants who are hospitalized in the NICU experience minimal emotional distress (Brandon et al., 2011; Engle, 2006; Fuchs & Gyamfi, 2008; Melamed et al., 2009) appears to be unfounded. Focusing on NICU infants of a restricted gestational age allowed us to assess rates of psychological symptoms in a specific subset of mothers, whom might have been expected to have lower symptom levels. Despite being presumably lower-risk than mothers of very preterm infants (Brandon et al., 2011; Engle, 2006; Fuchs & Gyamfi, 2008; Melamed et al., 2009), results of the current study show that mothers of moderate- to late-preterm infants hospitalized in the NICU evidence rates of depression, anxiety, and PTSD symptoms that are markedly higher than known rates for mothers of healthy, term infants, both *during hospitalization* and *6 months later*. Of particular importance, we did not

observe any significant changes in maternal symptomatology over the course of 6 months, indicating that mothers with elevated symptoms continued to have high symptom rates after mother and infant had returned home from the hospital.

While a small number of previous studies have also found that mothers of infants within this gestational age range experience higher levels of distress than mothers of term infants (Brandon et al., 2011; Voegtline & Stifter, 2010; Zanardo et al., 2011), very few studies have examined symptoms *over time*. Of the few studies that did follow these mothers over time, one assessed mothers at birth and only *1 month* later (Brandon et al., 2011), and another examined symptom levels at 2 and 6 months (Voegtline & Stifter, 2010), but not immediately after birth or during NICU hospitalization. The current study was the first to our knowledge to capture symptom levels *during the infant's NICU hospitalization* as well after the mother and infant had returned home in order to provide a more in-depth understanding of how symptoms evolve during this unique time period.

In addition, no prior studies have examined differences in psychological symptoms among mothers of moderate-preterm versus late-preterm infants. Findings of the current study showed *no differences* in depression, anxiety, or PTSD symptom levels when these two groups were compared. Assumptions that mothers of late-preterm infants experience lower levels of depression, anxiety, and PTSD symptoms may prevent mothers of infants in this gestational age range from being offered psychological support or assistance after birth. Our findings concerning elevated depression, anxiety, and PTSD symptoms that did not significantly reduce over a 6-month period suggest that these mothers need support as well.

## Limitations

It is important to note several limitations of the current study. First, we did not include a control group of mothers of healthy/term infants for comparison purposes. However, the utilization of standardized measures allowed us to compare rates of psychological symptoms to known maternal norms. Second, the current study focused on mothers who were able or willing to visit their babies in the hospital. It will be important for future studies to include mothers who for various reasons do not or cannot visit the NICU in order to better understand their experiences. It is possible that mothers who did not visit the NICU had a greater number of external limitations (e.g., lived farther from the hospital, had older children, did not have access to transportation) and/or higher levels of distress, which may have prevented them from coming to visit their infants. Including these mothers may have resulted in higher levels of symptoms than were captured in the current study. A third limitation of this study was

**Table 2** Means and standard deviations for symptom scores at baseline and 6 months

	Moderate-preterm ( <i>n</i> = 46)		Late-preterm ( <i>n</i> = 45)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Baseline				
Depression	4.92	3.77	4.87	4.55
Anxiety	6.00	5.69	6.18	5.87
PTSD symptoms	28.26	11.24	25.82	12.24
6 Months				
Depression	3.71	3.81	4.26	4.36
Anxiety	5.19	5.17	6.13	5.38
PTSD symptoms	26.24	10.14	28.03	11.17



the inclusion of only mothers; future studies might include fathers and other caregivers in order to explore whether symptom levels are elevated.

Finally, some infants in the moderate- to late-preterm range have significant health complications and require lengthy hospital stays and intensive medical interventions. The current study did not exclude severe diagnoses or very sick infants, and this may have impacted symptom scores. It will be important for future studies to examine how differences in medical severity impact maternal psychological symptoms, as well as examining other potential predictors or markers of psychological symptoms (e.g., demographic variables).

### Conclusions and Recommendations

Despite these limitations, this study noted elevated rates of psychological symptoms in mothers of moderate- to late-preterm infants *over time*. We expect that the current findings will encourage NICU staff to offer emotional and psychological support to mothers of infants in this gestational age range, who may have been overlooked in the past.

Specifically, we suggest giving brief screening measures (such as the measures used in the current study) for depression, anxiety, and PTSD to all mothers of moderate- to late-preterm infants at the time of the infant's admission to the NICU. Mothers with high levels of psychological symptoms should then be referred to hospital social workers or psychologists, and/or invited to join a parent support group if one exists at their facility. If meeting with a hospital social worker or psychologist is not feasible for various reasons (e.g., shortage of hospital staff, distance from home, timing), these mothers should be provided with local referrals to mental health service providers. While we only studied mothers in the current study, it may also be worthwhile to offer screenings and referrals to all parents/caregivers of moderate- to late-preterm infants. We acknowledge that there may be potential barriers to implementing such screenings in the NICU. For example, adding these screenings to nurse workload may not be feasible or acceptable, as nurses are often already over-worked and stressed (Braithwaite, 2008). Decisions about who would administer screenings and how soon screening would occur after NICU admission may vary due to staff availability.

It is important to note that while symptom levels were higher in mothers of moderate- to late-preterm infants than mothers of term infants, the majority of these mothers did not endorse clinical levels of psychological symptoms. Careful screening on admission would help to target interventions to mothers in need without also assuming that all need treatment.

### Compliance with Ethical Standards

**Conflict of interest** The authors Jenny H. Lotterman, John M. Lorenz, and George A. Bonanno declares that they have no conflict of interest.

**Ethical Approval** All procedures were in accordance with the ethical standards of the institutional research committees and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** was obtained from all individual participants included in the study.

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