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# Predictors of parental stress from admission to discharge in the neonatal special care unit

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**Abstract**

**Background:** Exacerbated parental stress during a stay in the neonatal intensive care unit can negatively impact the development of the hospitalized infant, strain the dyadic relationship and put parents at risk for poor mental health. It is therefore important to identify risk factors of stress throughout the duration of a hospitalization. This longitudinal study aimed to investigate sources of stress for mothers and fathers who had a baby in the neonatal special care unit.

**Methods:** Parents of 57 singletons and 11 twins (68 infants) admitted to a neonatal special care unit (46% for prematurity) were recruited. Sixty-four mothers and 20 fathers were assessed at admission, and 60 mothers and 16 fathers at discharge. Participants reported their satisfaction with hospital information and completed the Perceived Stress Scale, the Brief Illness Perception Questionnaire and the Dyadic Adjustment Scale.

**Results:** Parents demonstrated similar stress trajectories, with stress on average declining over time. Higher maternal stress at admission was associated with a belief that the baby's illness would have a longer timeline, lower perceptions of treatment efficacy and lower satisfaction with the information received from medical staff. Younger age and lower levels of education predicted higher maternal stress at discharge. Fathers had higher stress at discharge when they were older, had a baby born at younger gestation and felt they had less control. At admission, information satisfaction was positively associated with parental beliefs about treatment efficacy and understanding the infant's condition. At discharge, information satisfaction was negatively associated with beliefs about illness severity and the likely time frame of the illness.

**Conclusion:** The findings highlight that parents' perceptions of their baby's illness and treatment at admission and discharge have a significant association with stress. Clinical staff can use these factors to identify parents who are at risk of exhibiting a greater level of stress over the hospitalization period.

**KEYWORDS**

health beliefs, infancy, neonatal intensive care, NICU, parent stress, prematurity

## 1 | INTRODUCTION

Admissions to a neonatal intensive care unit (NICU) are inherently stressful experiences as premature infants are at a high risk for mortality and morbidity. Aside from prematurity, infants may require hospitalization due to genetic abnormalities or congenital malformations. Infants may also be admitted or transferred to the special care baby unit (SCBU), which provides care for those requiring high-dependency care (e.g., for low blood sugar or infants born after 32-week gestation). High stress levels during this time can negatively influence the infant's psychological and physical development by disrupting the normal transition to parenthood, impacting later parenting behaviours and leading to depression and anxiety in parents (Gerstein, Njoroge, Paul, Smyser, & Rogers, 2019; Gray, Edwards, & Gibbons, 2018; Ionio & Di Blasio, 2013; Meyer et al., 1995; Pace et al., 2016; Schappin, Wijnroks, Uniken Venema, & Jongmans, 2013). Although spouses are often sources of support, hospitalization can strain parental relationships, leading to lasting negative impacts on family function (Carter, Mulder, Bartram, & Darlow, 2005; Doering, Dracup, & Moser, 1999; Hughes & McCollum, 1994; Manning, 2012).

The common stress trajectory shows that parents experience a period of high stress at admission, and this generally declines thereafter. However, moderate to high stress is evident during transition periods such as from NICU to the SCBU or before discharge (Alkozei, McMahon, & Lahav, 2014; Sweet & Mannix, 2012). As parental stress is variable over time, it is important to explore predictors that exacerbate stress to be able to intervene during the more challenging times.

The way parents appraise stressors depends upon the parents' personal characteristics, past experiences of pregnancy and parenthood and concurrent life events (Ionio, Mascheroni, Colombo, Castoldi, & Lista, 2019; Wereszczak, Miles, & Holditch-Davis, 1997). Parents' perceptions of their baby's condition may also influence stress levels (Brooks, Rowley, Broadbent, & Petrie, 2012; Doering, Dracup, & Moser, 1999). Leventhal, Diefenbach and Leventhal (1992) proposed that illness perceptions are central to understand responses to new health threats and how individuals cope. These are important for parents of a hospitalized infant as their beliefs about the infant's condition may not reflect the actual severity of the illness. Mothers often perceive the condition to be more serious and overestimate how unwell their infant is (Brooks, Rowley, Broadbent, & Petrie, 2012). Negative illness perceptions may therefore help predict parental stress during the NICU hospitalization. Likewise, research shows that providing appropriate, empathetic information reduces stress (Govindaswamy et al., 2019). More research is needed to explore whether providing information that addresses parent's negative illness perceptions can further decrease stress.

Given the prevalence of parental stress and its impact on the psychological and physical development of hospitalized infants (Gerstein, Njoroge, Paul, Smyser, & Rogers, 2019; Ionio & Di Blasio, 2013), more research is needed to understand the risk factors of stress throughout the duration of a stay in the neonatal care unit. The primary objective of this study was to examine the predictors of stress in both parents using a longitudinal approach assessing participants at both admission

### Key Messages

- Parental stress during a neonatal hospitalization can negatively impact the infant's later psychological and physical development.
- Limited research has explored risk factors of parental stress in a special care unit during admission to discharge.
- This study found that stress was higher at discharge in mothers who were younger and had lower levels of educational attainment and in fathers who were older, had an infant born at younger gestation and felt they had less control.
- Being satisfied with medical information was found to be associated with various illness beliefs, including those towards treatment efficacy and the time frame of the illness.
- Clinical staff can use these risk factors to identify parents who might benefit from stress-reduction interventions and need additional support at discharge.

and discharge. The secondary outcomes were to (1) explore whether satisfaction with medical information is associated with parental beliefs about the infant's condition and (2) explore the changes in perceived relationship quality during the hospitalization period.

## 2 | METHOD

### 2.1 | Procedure

Ethical approval was granted by the University of Auckland Human Participants Ethics Committee (reference number 017182) and Auckland District Health Board. Mothers and fathers of singleton and twin infants admitted to the National Women's Health Level II SCBU at Auckland City Hospital, New Zealand, were recruited. National Women's Health is also the largest provider of intensive neonatal care (NICU) in New Zealand, with approximately 1000 admissions annually. Based on the recruitment of previous studies, a power analysis indicated that a sample size of at least 61 participants would provide a moderate level of agreement ( $r = 0.35$ ) between parents' perceived severity of their baby's condition and stress levels based on a power of 0.80 and a  $p$ -value of 0.05 (Brooks, Rowley, Broadbent, & Petrie, 2012; O'Sullivan, Rowley, Ellis, Faasse, & Petrie, 2016).

Parents were recruited using a consecutive sampling method between May and September 2016. Follow-up was completed by October 2016. Two hundred and ninety infants were admitted during this time and were screened for eligibility. Inclusion criteria were parents who are fluent in English and had a baby admitted to Level II SCBU for more than one night. Parents were invited to participate if

their infants had a gestation ranging from 23 to more than 40 weeks, required surgery or had congenital malformations or genetic anomalies. Parents were excluded if their infant was receiving palliative care or parents were experiencing psychological distress. Participants were typically recruited on the second or third day following their baby's admission to SCBU, and the follow-up assessment was completed prior to discharge. Parents of NICU graduates also became eligible to participate once their baby was transferred to SCBU.

Of the 105 parents that were approached to participate in the study, 15 declined, two were excluded due to lack of English language fluency and four were excluded as they were recruited on the day of their baby's discharge. When both parents participated, they were asked to rate their answers according to the same baby. In the case of multiples (i.e., twins), parents were asked to answer based on the baby who was born at a smaller birthweight. The resulting sample was 64 mothers and 20 fathers of 68 infants, as some parents from the same family rated the same infant. Sixty mothers and 16 fathers were assessed at follow-up (90% sample retention).

## 2.2 | Measures

Questionnaires were completed independently by mothers and fathers at admission and discharge. The admissions questionnaire collected each parent's age, sex and ethnic group, number of other children, marital status, typical living arrangements, employment status and level of educational attainment. Clinical data were collected for the infant including gestational age at birth, sex, birth weight, diagnosis or reason for admission to NICU, level of care (NICU or SCBU), length of stay and details of any medical interventions.

### 2.2.1 | Parental stress

Parental stress was assessed at admission and discharge using the Perceived Stress Scale (PSS) (Cohen, Kamarck, & Mermelstein, 1983; Roberti, Harrington, & Storch, 2006). The PSS was used to identify parents' global level of perceived stress in relation to their baby's hospitalization. Anchors fall on a 5-point frequency. Higher scores indicated higher perceived stress levels. The PSS has high internal reliability in parents of preterm infants ( $\alpha = 0.84$ ) (Giallo & Gavidia-Payne, 2006).

### 2.2.2 | Illness beliefs

This study used a modified Brief Illness Perception Questionnaire (B-IPQ) (Broadbent, Petrie, Main, & Weinman, 2006). This 11-item scale asked parents to rate their perceptions of their baby's illness and has been used previously to assess parental perceptions of newborns (Brooks, Rowley, Broadbent, & Petrie, 2012). The B-IPQ has high internal reliability in patient and caregiver populations ( $\alpha = 0.80\text{--}0.90$ ) (Broadbent, Petrie, Main, & Weinman, 2006).

### 2.2.3 | Satisfaction with information

Six items were used to assess how satisfied parents were with the medical information and amount of information they received, how well parents understood the information, whether parents still had unanswered questions about their baby's condition and the extent to which the information made parents feel more positively about their baby's condition (Brooks, Rowley, Broadbent, & Petrie, 2012). Items were scored on a 11-point Likert scale. The psychometric properties were assessed for this scale before scoring the parents' responses, and the scale demonstrated moderate internal reliability ( $\alpha = 0.70$ ).

### 2.2.4 | Parental relationship

The abbreviated 4-item version of the Dyadic Adjustment Scale (DAS-4) was used to assess the parent's satisfaction with their relationship and partner (Sabourin, Valois, & Lussier, 2005). Three questions examined relationship satisfaction on a 6-point scale. The remaining question examined how happy the individual is in their relationship on a 7-point scale from 0 (*extremely unhappy*) to 6 (*perfect*). Higher scores indicated greater relationship satisfaction. The scale has good internal reliability ( $\alpha = 0.84$ ) (Sabourin, Valois, & Lussier, 2005).

Six items were taken from the Social Constraints Scale (Lepore, Silver, Wortman, & Wayment, 1996). The items specifically assessed how comfortable parents felt discussing their infant's condition with their spouse or partner, how often the spouse/partner did not want to hear about the infant's condition, made the participant keep feelings to themselves due to the partner being uncomfortable or upset, changed the subject and acted like they did not understand. Items were scored on a 4-point Likert scale. Higher scores indicated that individuals were less comfortable disclosing information about their baby to their partner. This scale has high internal reliability ( $\alpha = 0.85$ ).

## 2.3 | Statistical analysis

Analyses were performed with IBM SPSS v.22. Data were tested for violations of statistical assumptions, and variables that violated statistical assumptions were analysed using nonparametric tests. Paired-samples *t*-tests were performed to compare changes in parents' stress levels between admission and discharge. Individual *t*-tests were conducted for mothers and fathers at admission and discharge. A multiple linear regression analysis was conducted to examine predictors of parental stress at admission and discharge. Independent variables entered into the model were demographic variables (age and education levels), infant characteristics (birthweight and gestation), baseline information satisfaction and baseline illness perceptions. Individual regression models were conducted for mothers and fathers separately for admission and discharge. A subgroup analysis was conducted for those parents whose stress levels deteriorated over time.

Independent samples *t*-tests were conducted to examine the differences between those whose stress improved and those who

deteriorated. Individual tests were conducted for mothers and fathers. A Pearson's correlation was also conducted to determine whether parental information satisfaction was associated with illness perceptions. A Mann–Whitney *U* test was used to assess gender differences in relationship satisfaction between admission and discharge. Lastly, a Spearman's correlation examined relationships between parental stress, perceived ease of disclosure and relationship satisfaction at admission and discharge.

### 3 | RESULTS

The current study included 84 mothers and fathers ( $M = 33$  years,  $SD = 6.01$  years). The majority of parents were mothers ( $n = 64$ , 76.1%) and identified as New Zealand European ( $n = 33$ , 39.3%). In terms of marital status, 75 (89.3%) parents were married or in a de facto relationship. Most parents had no other children ( $n = 53$ , 63%). Sixty-eight babies were included in the study, of which 57 were singletons and 11 were multiples (i.e., twins). The majority ( $n = 43$ , 63%) received high-dependency care in SCBU only, and the remaining babies ( $n = 25$ , 37%) had received intensive care in Level III NICU prior to transfer to SCBU. The average length of hospitalization for both NICU and SCBU was 28.7 days ( $SD = 27.04$ ). See Tables 1 and 2 for more information on participant characteristics.

#### 3.1 | Parental stress between admission and discharge

The results showed that mothers' stress significantly reduced from admission ( $M = 15.38$ ,  $SD = 6.11$ ) to discharge ( $M = 12.59$ ,  $SD = 6.62$ ,  $t(63) = 3.60$ ,  $p = 0.001$ ,  $d = 0.45$ ). Fathers' stress also significantly reduced from admission ( $M = 14.38$ ,  $SD = 5.34$ ) to discharge ( $M = 11.84$ ,  $SD = 3.36$ ,  $t(19) = 2.31$ ,  $p = 0.03$ ,  $d = 0.57$ ). There were no significant gender differences in stress levels at either time period (both  $p$ -values  $> 0.05$ ).

#### 3.2 | Predictors of parental stress at admission and discharge

Assumptions of normality, linearity, multicollinearity and homoscedasticity were not violated. The first multiple linear regression model explained 42.7% of the total variance of maternal stress at admission (see Table 3). Maternal timeline beliefs were the strongest unique predictors of maternal stress at admission ( $\beta = 0.43$ ,  $p = 0.02$ ), with mothers who believed that their baby's condition was more chronic and would last a long time demonstrating higher stress levels. Mothers' beliefs about treatment efficacy for their baby's condition also predicted maternal stress at admission ( $\beta = -0.40$ ,  $p = 0.01$ ), reflecting that those mothers who believed that the NICU treatment would have little effect in reducing the

negative consequences of the baby's illness had higher levels of stress. Satisfaction with information mothers received also predicted maternal stress at admission ( $\beta = -0.30$ ,  $p = 0.04$ ). This indicates that mothers who were not satisfied with the information they received about their baby's condition were likely to suffer higher levels of stress. No other variables predicted maternal stress at admission.

The second linear regression model examining the predictors of maternal stress at discharge revealed that age was the only significant predictor ( $\beta = -0.46$ ,  $p = 0.01$ ) (see Table 4). This indicates that younger mothers were more likely to be stressed at discharge. Multiple linear regression models at admission and discharge for fathers failed to identify any significant predictors of stress at either time point at  $p < 0.05$ , possibly due to lower statistical power.

Subgroup analyses were also conducted for those mothers and fathers whose stress levels increased from admission to discharge. Thirty-nine per cent of mothers had higher stress levels at discharge than admission. Mothers who reported increased stress at discharge were younger in age ( $t(60) = -2.61$ ,  $p = 0.011$ ,  $d = 0.68$ ) and had less formal education ( $t(60) = -2.51$ ,  $p = 0.015$ ,  $d = 0.65$ ) than those who reported reduced stress at discharge. Thirty per cent of fathers had higher stress levels at discharge than admission. Fathers who reported higher stress levels at discharge were significantly older in age ( $t(17) = 2.97$ ,  $p = 0.01$ ,  $d = 1.47$ ) than those who reported lower stress levels at discharge. Fathers who had higher stress at discharge were also more likely to have a baby born at a younger gestation ( $t(18) = -2.21$ ,  $p = 0.05$ ,  $d = -1.03$ ) and perceived that they had less personal control over the baby's illness ( $t(18) = -2.12$ ,  $p = 0.05$ ,  $d = -1.03$ ).

#### 3.3 | Information satisfaction at admission and discharge

Analyses revealed that parental satisfaction with information received was associated with several different illness perceptions. In particular, at admission, information satisfaction was positively associated with parents' perceptions of treatment control ( $r = 0.23$ ,  $p = 0.04$ ). This indicates that parents who felt well informed by staff upon admission to the NICU were more likely to believe that the future treatments for their baby would be beneficial. Information satisfaction was also positively associated with how well parents believed that they understood their baby's condition at admission ( $r = 0.34$ ,  $p < 0.01$ ). Therefore, information received at admission impacts on perceptions of how well-informed parents felt about the baby's illness.

At discharge, different illness perceptions were associated with information satisfaction. In particular, information satisfaction was inversely associated with parents' perceptions of the timeline of their baby's illness ( $r = -0.25$ ,  $p = 0.02$ ). This demonstrates that parents who were satisfied with the information they received at discharge believed that their baby's condition would last a shorter time. In addition, information satisfaction at discharge was associated with lower perceived illness severity ( $r = -0.29$ ,  $p = 0.01$ ).

**TABLE 1** Summary of parent characteristics

Characteristic	All parents (n = 84)	Mothers (n = 64)	Fathers (n = 20)
Unit, n (%)			
Level III NICU	30 (36.6)	24 (38.1)	6 (31.6)
Level II SCBU	52 (63.4)	39 (61.9)	13 (68.4)
Age (years), M (SD)	32.5 (6.01)	31.9 (5.86)	34.3 (6.58)
Ethnicity			
NZ European	33 (40.2)	25 (40.3)	8 (40)
Māori	9 (11)	8 (12.9)	1 (5)
Pacific Islander	7 (8.5)	5 (8.1)	2 (10)
Indian	17 (20.7)	11 (17.7)	6 (30)
Asian	7 (8.5)	5 (8.1)	2 (10)
Other	9 (10.8)	8 (12.9)	1 (5)
Marital status			
Single	7 (8.3)	7 (10.9)	-
Married/de facto	76 (90.5)	56 (87.5)	20 (100)
Divorced	1 (1.2)	1 (1.6)	-
Employment status			
Employed full time	50 (61)	33 (52.4)	17 (89.5)
Employed part time	8 (9.8)	8 (12.7)	-
Unemployed	17 (20.7)	15 (23.8)	2 (10.5)
Work at home	2 (2.4)	2 (3.2)	-
Student	5 (6.1)	5 (7.9)	-
Typical living arrangements			
Living with partner and children	31 (37.3)	27 (42.9)	4 (20)
Living with partner and no children	43 (51.8)	28 (44.4)	15 (75)
Sole adult with children	1 (1.2)	1 (1.6)	-
Level of formal education			
Primary school	1 (1.2)	1 (1.6)	-
Secondary school (fifth form)	7 (8.6)	6 (9.7)	1 (5.3)
Secondary school (sixth or seventh form)	11 (13.6)	11 (17.7)	-
Technical trade or certificate	8 (9.9)	5 (8.1)	3 (15.8)
Polytechnic diploma	5 (6.2)	1 (1.6)	4 (21.1)
University degree	49 (60.5)	38 (61.3)	11 (57.9)
Number of other children			
One	52 (62.7)	17 (27)	4 (20)
Two	21 (25.3)	5 (7.9)	-
Three or more	5 (6)	5 (7.9)	-

Note: Unless otherwise indicated, all values demonstrate the number of participants (with percentages located in parentheses). Abbreviations: M, mean; SD, standard deviation.

### 3.4 | Parental relationship quality at admission and discharge

The results showed that mothers and fathers perceived their relationship more negatively at discharge ( $M = 18.12$ ,  $SD = 2.66$ ) compared with admission ( $M = 18.75$ ,  $SD = 1.54$ ) and were significantly more unhappy with their relationship with their partner by discharge ( $z = -2.03$ ,  $p = 0.04$ ,  $r = 0.16$ ). Parents who reported lower relationship satisfaction at admission had significantly higher stress levels at

discharge ( $r_s = 0.21$ ,  $p = 0.05$ ). Parents who reported more ease in disclosing thoughts and feelings with their partner at admission reported lower stress levels at discharge ( $r_s = -0.26$ ,  $p = 0.03$ ).

## 4 | DISCUSSION

This study contributes to existing literature by exploring the parental stress trajectory and risk factors of stress throughout the

**TABLE 2** Summary of infant characteristics

Characteristics	All admissions <i>n</i> = 68	Level III NICU <i>n</i> = 25	Level II SCBU <i>n</i> = 43
Sex, <i>n</i> (%)			
Female	33 (48.5)	15 (60)	18 (41.9)
Male	35 (51.5)	10 (40)	25 (58.1)
Gestation (weeks), <i>M</i> ( <i>SD</i> )	33.7 (3.82)	31.24 (4.54)	35.2 (2.41)
Preterm	56 (82.4)	21 (84)	35 (81.4)
Full term	12 (17.6)	4 (16)	8 (18.6)
Birthweight (grams), <i>M</i> ( <i>SD</i> )	2024.41 (823.5)	1513.60 (881.83)	2310.93 (639.44)
Length of stay (days), <i>M</i> ( <i>SD</i> )	28.7 (27.04)	51.2 (32.93)	16.1 (10.21)
Parity			
Singleton	57 (83.8)	20 (80)	37 (86)
Multiple	11 (16.2)	5 (20)	6 (14)
Diagnosis			
Prematurity	31 (45.6)	12 (48)	19 (44.2)
Respiratory distress	9 (13.2)	2 (8)	7 (16.3)
Intrauterine growth restriction	8 (11.8)	4 (16)	4 (9.3)
Hypoglycaemia	4 (5.9)	-	4 (9.3)
Jaundice	3 (4.4)	-	3 (7)
Surgical	2 (2.9)	1 (4)	1 (2.3)
Transient tachypnoea	1 (1.5)	1 (4)	1 (2.3)
Congenital malformation	1 (1.5)	1 (4)	-
Genetic anomaly	1 (1.5)	-	1 (2.3)
Pneumothorax	1 (1.5)	1 (4)	-
Tachycardia	1 (1.5)	-	1 (2.3)
Hypoxic ischaemic encephalopathy	1 (1.5)	1 (4)	-
Blood aspiration	1 (1.5)	1 (4)	-
Renal	1 (1.5)	-	1 (2.3)
Hydrocephaly	1 (1.5)	-	1 (2.3)
Congenital pneumonia	1 (1.5)	1 (4)	-
Necrotizing enterocolitis	1 (1.5)	1 (4)	-

Note: Unless otherwise indicated, all values demonstrate the number of participants (with percentages located in parentheses). Abbreviations: *M*, mean; *SD*, standard deviation.

hospitalization period in a neonatal special care unit (Ionio, Mascheroni, Colombo, Castoldi, & Lista, 2019). To our knowledge, this is the first study to explore how satisfaction with information provided during admission and discharge relates to parental perceptions of their baby's illness. Findings revealed that mothers and fathers have similar stress trajectories between admission and discharge with stress levels generally declining over time. Parents also reported significantly lower relationship quality from admission to discharge, and parents who were less comfortable disclosing their thoughts to their partner experienced greater stress. This contributes to mixed findings as for some parents discussing feelings can help them cope with trauma, but for others, disclosing feelings can bring up negative emotions and make coping more difficult (Bry & Wigert, 2019; Geller, Bonacquisti, & Patterson, 2018). A proportion of parents also had higher levels of stress at discharge, and, as evident in existing research, factors that

characterized higher stress levels differed between mothers and fathers (Ionio, Mascheroni, Colombo, Castoldi, & Lista, 2019; Pichler-Stachl et al., 2019). In our study, mothers who had higher stress at discharge were younger and less educated, and fathers were older, had a baby born at younger gestation and had less perceived control over the baby's condition.

The finding that maternal stress at admission was related to beliefs about the length of time the baby would be ill and perceptions of treatment efficacy supports previous research (Brooks, Rowley, Broadbent, & Petrie, 2012). Maternal stress at admission was also related to how satisfied mothers were with the information they received from medical staff. Findings demonstrate the importance of satisfaction with hospital information at admission and discharge, as this is significantly associated with several illness perceptions. Previous research also suggests that consultations can reduce parents'

**TABLE 3** Summary of multiple linear regression for predicting maternal stress at admission

	<i>B</i>	<i>SE (B)</i>	$\beta$	<i>t</i>	<i>p</i>
Age	-0.25	0.16	-0.23	-1.57	0.11
Birthweight	-5.94	0.00	-0.01	-0.03	0.97
Gestational age	-0.30	0.38	-0.19	-0.79	0.43
Information satisfaction	-0.24	0.12	-0.30	-2.12	0.04*
Consequences	0.33	0.48	0.10	0.70	0.49
Timeline	1.36	0.54	0.43	2.51	0.02*
Personal control	-0.17	0.27	-0.09	-0.63	0.53
Treatment control	0.80	0.55	0.30	1.48	0.15
How sick	-0.63	0.64	-0.23	-0.97	0.34
Concern	0.20	0.32	0.11	0.62	0.54
Illness coherence	-0.32	0.47	-0.14	-0.68	0.50
Improve illness	0.28	0.27	0.14	1.05	0.30
Emotionally affected	0.24	0.33	0.12	0.72	0.47
Treatment efficacy	-0.69	0.26	-0.40	-2.69	0.01*
Seriousness	-0.07	0.46	-0.03	-0.16	0.87

Note:  $R^2 = 0.427$ ,  $p = 0.04$ , \* $P < .05$ .

**TABLE 4** Summary of multiple linear regression for predicting maternal stress at discharge

	<i>B</i>	<i>SE (B)</i>	$\beta$	<i>t</i>	<i>p</i>
Age	-0.46	0.16	-0.44	-2.84	0.01*
Birthweight	-0.00	0.00	0.31	1.28	0.21
Gestational age	-0.54	0.40	-0.34	-1.37	0.18
Information satisfaction	-0.23	0.12	-0.27	-1.91	0.06
Consequences	0.53	0.50	0.16	1.07	0.29
Timeline	0.10	0.56	0.03	0.18	0.86
Personal control	-0.38	0.29	-0.19	-1.32	0.19
Treatment control	0.67	0.57	0.25	1.19	0.24
How sick	-0.24	0.67	0.09	-0.35	0.72
Concern	0.14	0.33	0.07	0.43	0.67
Illness coherence	-0.28	0.49	-0.12	-0.58	0.57
Improve illness	0.09	0.28	0.05	0.32	0.75
Emotionally affected	-0.18	0.35	-0.09	-0.53	0.60
Treatment efficacy	-0.16	0.27	-0.09	-0.59	0.56
Seriousness	0.01	0.44	0.00	0.02	0.99

Note:  $R^2 = 0.40$ ,  $p = 0.07$ , \* $P < .05$ .

concerns and that empathetic communication is particularly beneficial for younger parents who have a child with a severe prognosis (Brett, Staniszweska, Newburn, Jones, & Taylor, 2011; Enke, Oliva, Miedaner, Roth, & Woopen, 2017; Govindaswamy et al., 2019).

Far less research has examined paternal stress, as fathers typically spend less time in NICU. However, when studied, fathers often report feelings of helplessness and confusion following the admission of their baby to the NICU (Arockiasamy, Holsti, & Albersheim, 2008). Our study supports previous literature that fathers have higher stress at

discharge when a baby is born at younger gestation and feel they have less control (Arockiasamy, Holsti, & Albersheim, 2008; Ionio, Mascheroni, Colombo, Castoldi, & Lista, 2019). Research, however, suggests that younger age predicts increased stress at discharge. Our findings demonstrate that a proportion of older fathers may also be at risk of increased stress.

As with previous studies, spousal relationship quality reduced over the period from admission to discharge (Coffman, Vitt, & Deets, 1991; Edwards, Gibbons, & Gray, 2016). Our findings

demonstrate that parents who were less comfortable disclosing their thoughts and feelings at admission and discharge experienced greater distress at discharge. Spousal relationships may therefore only act as a buffer for stress if both parents are willing to discuss traumatic events (Lepore & Revenson, 2007).

The strength of this research is that it assesses parents at two important transition periods and has a high degree of participant retention. To our knowledge, this is the first longitudinal study exploring risk factors of parental stress at both admission and discharge in a neonatal special care unit. This study is limited as participants were recruited from one highly specialized teaching hospital, so results may not be entirely generalizable. It should also be noted that some parent's infants were admitted to the NICU prior to admission to the special care unit. This ensures that the sample accurately represents varying pathways of neonatal care but may impact on generalizability. The study was also limited to a small number of fathers who participated. Larger sample sizes are needed in future research. This would enable more reliable sub-analyses of fathers, and between-group analyses to explore whether parents who spent a significant time at an intensive care unit have unique stress risk factors.

## 5 | IMPLICATIONS

Findings demonstrate a need to educate NICU staff on the significant influence that illness perceptions have on parental stress levels. Furthermore, enquiring about the parents' beliefs about the baby's illness severity and the treatment may identify those parents that need more information about likely medical treatment and outcomes. Those parents may also benefit from an additional consultation to allay concerns and to correct misconceptions. This study has shown that at the two transition points, admission and discharge, different illness perceptions are important. Information that addresses the treatment plan, parental concerns, and negative beliefs about the baby's particular condition is important to discuss at admission to reduce stress. At discharge, information regarding the ongoing illness severity and likely time frame of illness should be discussed (Brooks, Rowley, Broadbent, & Petrie, 2012). Finally, younger, less educated mothers and older fathers with preterm babies may need extra support in order to reduce stress and help with the transition into their new role (Arockiasamy, Holsti, & Albersheim, 2008; Ionio, Mascheroni, Colombo, Castoldi, & Lista, 2019).

## 6 | CONCLUSIONS

This study highlights factors that can assist clinical staff to identify parents who are at risk of exhibiting a greater level of stress. Findings also demonstrate the importance of providing appropriate medical information, as this can impact parental perceptions of their infant's condition. More research, and in particular the development of interventions that reduce parental stress in the NICU, is needed.

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## CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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