The Relationship between Stress, Social Support, and Confidence in Paternal Role Perceived by Korean Fathers of High Risk Infants

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A B S T R A C T

Purpose: This study aimed to define the level of perceived stress, social support, and paternal role confidence in Korean fathers with high risk infants and investigate how they perceived stress and social support influence their confidence in paternal role.
Design and methods: A descriptive study was conducted. The participants were 160 fathers of high risk infants admitted for 72 h or longer in the neonatal intensive care unit (NICU). Using a self-reported questionnaire, high risk infants' fathers' general characteristics, stress, social support, and confidence in paternal role were measured.
Results: Fathers' low stress from the sights and sounds of the unit, more family members and fathers' awareness of the infants' prognosis were found to have a significant influence on paternal role confidence for high risk infants, explaining 18.7% variance in the effect.
Conclusions: To assist fathers in developing paternal role confidence in their parenting, nurses should comprehend the degree of stress experienced by fathers whose infants were hospitalized in an NICU and offer supportive nursing to them to help them cope with their stress.
Practice implications: When preparing a nursing care plan for high risk infants and their fathers, if nurses help fathers to participate in infants' care and offer proper information to them to understand the environment of the NICU, actions taken for their infants, and infants' prognosis, the fathers' confidence in their paternal role is expected to improve.

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Introduction

With recent increases in maternal age at birth in Korea and the use of advanced technologies providing assisted reproductive technology to overcome infertility worldwide, the numbers of multiple births and preterm and/or low-birth weight infants have been increasing along with their survival rates owing to advancements in medical technologies (Lim, 2011; Sunderam et al., 2014). The number of births in South Korea decreased by 5.5% from 425,786 in 2010 to 402,516 in 2014, whereas the percentage of preterm and low-birth weight infants, increased from 3.8% to 4.7% (Research Institute for Health Insurance Policies, 2016). High risk infants are defined as the infants having higher-than-average mortality and morbidity rates due to certain conditions or environments during delivery or difficulties in adaptation to extrauterine life regardless of gestational age or weight at birth (Hockenberry & Wilson, 2015).

The birth of high risk infants acts as an unpredicted stressor for parents and families who expected to have healthy babies (Dutta, Mahajan, Agarwal, Nehra, & Narang, 2016; Han & Chae, 2016). High risk infants,

including preterm infants, are separated from their family and admitted to the neonatal intensive care units (NICU) upon birth. Having babies admitted to NICU induces increased stress in parents. Moreover, in addition to the crises surrounding the new birth of high risk infants and immediate admission into NICU, factors such as anxiety regarding the survival of the baby, separation, decreased interaction with the baby, changes in parenting role, lack of emotional support, and financial burden further intensify the stress experienced by parents (Cekin & Turan, 2018; Lee, 2005).

High level of distress of mothers, the main caregivers of infants, may interfere with early positive interaction and decrease their ability of taking care of the high risk infants, and negatively influence the development of confidence in one's parenting (Choi, 1998; Dunlop, Logue, & Thorne, 2016; Hwang, Kim, Yoo, & Shin, 2013; Ionio et al., 2017). Family-centered care, which involves individualized care focused on infant and family and reciprocal collaboration of families and health care professionals, has become a central part of neonatal intensive care and is proposed as a model of care worldwide. Although it can have positive impact on both high risk infants and families (Abdeyazdan, Shahkolahi, Mehrabi, & Hajiheidari, 2014; Galarza-Winton, Dicky, O'Leary, Lee, & O'Brien, 2013), the implementation of family-centered care for high risk infants in NICU requires substantial educational efforts and changes in the practice of care in addition to physical changes in the NICU

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(Bastani, Abadi, & Haghani, 2015; Mirlashari, Valizadeh, Navab, Craig, & Ghorbani, 2018). Due to the lack of educational programs for professionals regarding the value of family-centered care, different understanding among care providers, and gaps between the ideal and actual implementation, the level of implementation of supportive care for families varied across the settings and cultures (Mirlashari et al., 2018). In Korea, high risk infants are often separated from their parents and receive highly sophisticated medical treatment and care, which often interferes with their early interaction with mothers. The unfamiliar NICU environment such as the presence of various medical devices, sights and sounds of the unit, serious condition of the baby, appearance and behaviors of other infants, and lack of information can lead parents to experience substantial stress and decrease their parental confidence (Busse, Stromgren, Thorngate, & Thomas, 2013; Lee & Cho, 2008).

Admission of infants to NICU after birth poses challenges to mothers as well as fathers (Doering, Dracup, & Moser, 1999; Ionio, Colombo, Mascheroni, Confaloniere, & Castoldi, 2016). One study involving both mothers and fathers showed that there were no differences in negative affective states (Ionio et al., 2016). Modern industrialization has caused functional and structural changes to family lives. In particular, whereas the importance of mothers was emphasized in parent-children relationships in the past (Choi and Lee, 2018; Lee, 2011; Lee & Cho, 2008), the roles of both parents have become important recently with the nuclearization of families and increased female employment. These factors have led to a change in the recognition of parenting as being a common interest of both parents rather than the sole responsibility of the mother (Sung & Joo, 2007). Most previous studies conducted on roles of parents in raising high risk infants have focused on mothers; studies on parenting by fathers, who also play important roles in parenting, are substantially lacking. Further, although previous studies on fathers of high risk infants have mostly investigated their stress (Han & Chae, 2016; Sung, Ahn, & Chang, 2004), a limited number of studies has focused on the fathers' confidence in the paternal role.

The birth of children marks the beginning of paternal role and continued affection for and interest in newborns and participation in parenting helps fathers to perform their paternal roles well (Kim, 1998; Noergaard, Ammentorp, Garne, Fenger-Gron, & Jofoed, 2018). In case of high risk infants, fathers should simultaneously act as the caregiver and decision-maker regarding health problems of high risk infants and mothers, the link between mothers and newborns who cannot have early contact with each other, and supporters of the mothers. In this process, fathers of high risk infants experience socioemotional difficulties and require support from the surrounding people, as do the mothers (Hollywood & Hollywood, 2011).

As one of main factors affecting parenting confidence, social support from family and health care professions in the hospital unit may be a protective factor relieving parenting stress and subsequently improving confidence in parenting (Eriksson & Pehrsson, 2002; Shin & Chung, 1998). Social support refers to support provided with interest and affection and fathers or mothers who receive high levels of support from their spouses have been found to perform their parenting roles better than those who do not (Delight, Goodall, & Jones, 1991; Dickie, 1987). Increased emphasis with fathers' roles in parenting, strategies to improve confidence in the paternal role are required in order to help fathers with high risk infants and subsequently mothers to care for their infants well (Sung & Joo, 2007). Health care professionals including nurses caring for infants in the NICU can play important roles as supporters of parents who have to adapt to a new stressful environment where their high risk infants receive intensive treatment and care.

Thus, the study aimed to assess the level of perceived stress, social support, and paternal role confidence in Korean fathers of high risk infants and investigate how stress and social support perceived by high risk infants' fathers influence their confidence in paternal role. The findings from this study could be utilized as evidence in developing nursing intervention programs to improve confidence in paternal role among high risk infants' fathers.

Methods

Study design

This was a descriptive study that aimed to assess the level of perceived stress, social support, and paternal role confidence of fathers of high risk infants and investigate the factors affecting fathers' perceived confidence in their parenting role.

Setting and samples

The participants were fathers of high risk infants who were admitted to NICU for >48 h with any health condition requiring intensive care for the infants. As we assumed that a tentative stay in NICU may not induce significant impact on fathers of infants, we selected fathers of high risk infants who were hospitalized for at least 48 h. The fathers who understood the study aims and consented to participate in the study were recruited. The fathers of twins with both infants admitted to NICU were excluded from this study as the course of care for twins and resulting experiences for parents were expected to differ greatly from fathers with one infant with a high risk condition.

The minimum sample size required for regression analysis was calculated through G-power 3.1.9.2 to be 98 for the effect size (f) of 0.15, significance level (α) of 0.05, power of testing (1-β) of 0.80, and 6 predictors. Based on this, questionnaires were distributed to a total of 170 fathers considering a possible drop-out rate of 20%, and the data collected from 160 participants used for analysis.

Data collection

Data were collected between March 21 and October 31, 2016 after obtaining approval of the institutional review board of E hospital and with the help of the manager of NICU at E hospital. We selected fathers who had an infant hospitalized at NICU for at least 72 h because we believe that several days were needed for fathers to adjust to the NICU environment compared to those of the newly hospitalized infants. When the fathers visited their infants during visiting hours in the hospital, the researchers explained to the fathers of high risk infants the purpose and details of the study, rules regarding anonymity and confidentiality, and the fact that participants may withdraw from the study at any time without any consequence. Fathers were asked to fill out the questionnaire after they provided written consent and to return it in the enclosed envelope after completion. The data collection was completed during the infant's NICU stay, mostly before the discharge of the infant.

We asked 170 fathers of high risk infants who were hospitalized and obtained written consent for participation. As the questionnaires from 10 fathers were not sufficient for inclusion in data analysis due to omitted responses, we used a total of 160 questionnaires. On an average, 15–20 min were required to complete the questionnaires and they were given 10 dollars as a token of appreciation for study participation.

Measurement tools

General characteristics

Thirteen questions assessing the general characteristics of fathers of high risk infants were used to collect information about their age, marital status, occupation, educational background, religion, family monthly income, family type, number of family members, whether the pregnancy was planned, the most supportive person, information about infants' prognosis, and reliability of medical staff. Nine questions were used to collect information about the general characteristics of high risk infants, including the length of stay in NICU, sex, birth weight, birth order, medical diagnosis, plans for surgeries, past surgeries, artificial respirator use, neonatal incubator use, and feeding method. The items of general characteristics of fathers and their infants were completed by the fathers.

Stress perceived by high risk infants' fathers

To measure the level of stress perceived by fathers of high risk infants, the subscales of the Parental Stressor Scale: Infant Hospitalization (PSS) modified by Miles and Brunssen (2003), which was adapted from the Parental Stressor Scale: Neonatal Intensive Care Unit developed by Miles, Funk, and Carlson (1993), was used. We used the Korean version of PSS developed by Han and Chae (2016), which was translated and used for the fathers of high risk infants hospitalized in the NICU.

The Korean version of PSS consists of a total of 26 questions with 5 questions assessing the sights and sounds of the NICU, 14 assessing the appearance and behavior of the infant, and 7 about the relationship with the infant and parental role. The questions are rated on a 5-point Likert scale, with a score of 1 corresponding to "Never" and 5 corresponding to "Always"; higher scores indicate higher levels of stress. However, when questions did not apply to newborns, the questions were scored as 0 corresponding to "Not applicable." Cronbach's alpha was 0.94 in the study of Han and Chae (2016) and.88 and in this study.

Social support

In order to measure social stress recognized by fathers of high risk infants, we used the social support tool, which was used by Lee (2011) for measuring perceived social support of mothers with premature infants from families and health care professions. It comprised 15 items including two domains of perceived social support from health care professionals and family members. The questions were rated on a five-point Likert scale with a score of 1 corresponding to "Strongly disagree" and 5 corresponding to "Strongly agree," and higher scores indicated that fathers of high risk infants perceived higher levels of social support from medical staff and family. Cronbach's alpha for support from health care professionals and family members were 0.90 and 0.86, respectively, in this study.

Confidence in paternal role

For measuring the confidence in paternal role of high risk infants' fathers, we used the tool developed by Sung and Joo (2007). It was used to assess fathers' parental role, interpretation of infant behavior, and anxiety or doubt about ability to satisfy the infants' needs. It consists of a total of 14 questions, which are scored on a four-point Likert scale ranging with score of 1 corresponding to "Never" and 4 corresponding to "Always." Higher scores indicate higher confidence in paternal role of high risk infants' fathers. Cronbach's alpha in Sung and Joo's (2007) study was 0.82, and it was 0.83 in this study.

Data analysis

The collected data were analyzed using SPSS WIN 22.0; the general characteristics were assessed in terms of frequencies, percentages, means, and standard deviation whereas stress, social support, and level of confidence in paternal role were analyzed using means and standard deviations. The participants' confidence in paternal role according to their general characteristics was analyzed using *t*-test and ANOVA and Scheffe's test was used for post-hoc analysis. Pearson's correlation was used to analyze the correlation between stress, social support, and confidence in paternal role and multiple linear regression analysis was conducted to investigate the factors that influence their confidence in paternal role.

Results

General characteristics of the fathers of high risk infants

There were 160 participants and their mean age was 34.9 ± 4.47 years; 121 (76.5%) were between 31 and 40 years of age. Regarding the family's total monthly income, 68 (42.5%) reported it to be between 273 and 454 US dollars. Most were from nuclear families (146; 91.2%).

Regarding the birth order of the high risk infants, 96 (60.0%) reported that these infants were their first child.

The participants responded that the most supportive person during their children's stay in the NICU was their spouse (54; 33.7%), nurse (47; 29.4%), and doctor (46; 28.7%). To the question "How much are you aware of your baby's prognosis?", 53 (33.1%) responded that they knew a little bit and 43 (26.9%) that they have an average understanding; the mean score was 3.64 ± 1.12. Regarding the reliability of the medical staff, 68 participants (42.5%) responded that the staff were very reliable and the mean score was 3.92 ± 0.78 (Table 1).

The high risk infants of the fathers stayed in the NICU for 5.46 ± 5.91 days on average and 81 (50.6%) were girls whereas 79 were boys (49.4%). The mean birth weight was 2.87 ± 0.65 kg and 116 (72.5%) infants weighed >2.5 kg at birth. The main diagnoses of high risk infants were preterm birth, jaundice, respiratory distress syndrome, sepsis, meconium aspiration syndrome, acute gastro-enterocolitis, and transient tachycardia of the newborn (Table 1).

Stress, social support, and confidence in paternal role perceived by fathers of high risk infants

The score for level of stress perceived by high risk infants' fathers was 3.17 ± 0.69 out of 5. Among the subdomains of stress, the score was the highest (3.61 ± 0.91) for relationship with infant and parental role, followed by appearance and behavior of infant (3.20 ± 0.88), and the sights and sounds of the unit (2.46 ± 1.02) (Table 2).

The mean score for social support recognized by high risk infants' fathers was 4.25 ± 0.45 out of 5 and that for support from medical staff was 4.11 ± 0.60, which was lower than that for support from family at 4.33 ± 0.51 (Table 2). The mean score for the confidence in paternal role was 2.77 ± 0.43 out of 4 (Table 2).

Level of confidence in paternal role of high risk infants' fathers according to their general characteristics

Regarding the confidence in paternal role of high risk infants' fathers (Table 3), the scores were significantly different according to the number of family members, fathers' level of information about infants' prognosis, and the level of fathers' perceived faith in medical staff. Specifically, the mean scores of fathers' confidence in their paternal role were significantly higher in the following instances: when the fathers had four or more family members than when they had three or fewer (t = −2.95, p = .004); when the fathers were unsure, knew a little bit, or knew more about the prognosis of their babies than when they did not know at all (F = 3.48, p = .009); when the fathers found medical staff to be more reliable (F = 3.39, p = .020); and when the high risk infants were the second or subsequent child compared to when they were the first child (t = 2.84, p = .005).

Correlation between stress, social support and confidence in paternal role of high risk infants' fathers

The correlation between stress, social support, and confidence in paternal role perceived by high risk infants' fathers and their awareness of babies' prognosis and perceived reliability of medical staff was analyzed. Although confidence in paternal role of high risk infants' fathers was found to have no correlation with total stress and social support, it was found to have a negative correlation with the sights and sounds of the unit (r = −0.233, p = .003) and a positive correlation with the awareness of the baby's prognosis (r = 0.277, p = .004) (Table 4).

Factors affecting the confidence in paternal role of high risk infants' fathers

In order to investigate the factors affecting the father's confidence in their role, a multiple linear regression analysis was performed. As the relevant independent variables that define the confidence in paternal

Table 1
General characteristics of the participants (N = 160).

Characteristics	Category	N (%)	M ± SD	Min-Max
Father's age (years)	≦30	21 (13.1)	34.9 ± 4.77	23–50
	31–40	121 (75.6)		
	41–50	18 (11.3)		
Family monthly income ($)	Less than 272$	57 (35.6)		
(1$ = 1100won)	273–454$	68 (42.5)		
	More than 455$	35 (21.9)		
Family type	Nuclear family	146 (91.2)		
	Extended family	14 (8.8)		
Number of family members	≤ 3	91 (56.9)		
	≥ 4	69 (43.1)		
Who is the most supportive person to fathers?	Nurse	47 (29.4)		
	Doctor	46 (28.7)		
	Spouse	54 (33.7)		
	Parents	8 (5.0)		
	Other parents under similar context	2 (1.3)		
	Other	3 (1.9)		
Father's information about infants' prognosis	Did not know at all	9 (5.6)	3.64 ± 1.12	
	Rarely knew	14 (8.8)		
	Unsure	43 (26.9)		
	Knew a little bit	53 (33.1)		
	Knew well	41 (25.6)		
Father's perceived reliability on medical staffs	Not reliable	2 (1.3)	3.92 ± 0.78	
	Slightly reliable	49 (30.6)		
	Moderately reliable	68 (42.5)		
	Highly reliable	41 (25.6)		
Current hospital days in NICU of high risk infants	3–7	140 (87.5)	5.46 ± 5.91	3–50
	8–14	12 (7.5)		
	15–29	6 (3.7)		
	≥30	2 (1.3)		
Gender of high risk infants	Male	79 (49.4)		
	Female	81 (50.6)		
Birth order of infants	First	96 (60.0)		
	Second or later	64 (40.0)		
Infant's birth weight (kg)	≤1.5	4 (2.5)	2.87 ± 0.65	0.64–4.54
	1.51–2.0	16 (10.0)		
	2.01–2.5	24 (15.0)		
	≥2.51	116 (72.5)		
Medical diagnosis of infants	Preterm birth	39 (24.4)		
	Meconium Aspiration Syndrome	13 (8.1)		
	Respiratory Distress Syndrome	27 (16.9)		
	Acute Gastro Enterocolitis	11 (6.9)		
	Jaundice	31 (19.4)		
	Sepsis	18 (11.3)		
	Transient Tachycardia of the Newborn	7 (4.4)		
	Others (arrhythmia 2, convulsion 2, intra-uterine growth retardation 2, cyanosis 2, urinary infection 2, neonatal asphyxia 1, meningitis 1, pneumonia 1)	14 (8.8)		

role, we included the demographic variables which showed significant mean difference in confidence in paternal role, which were number of family members, birth order, father's information about infants' prognosis, and father's perceived reliability on medical staff. Also, the independent variables that showed significant correlation with the fathers' confidence in their role were included: three subscales of stress including the sight and sounds of unit, appearance and behavior of infant, and relationship with infant and parental role as well as two subscales of social support of the health care professionals and of the family were included. We entered all the variables into the regression model to find the relative influence of the included variables.

When the hypothesis of the regression analysis was tested, the Durbin-Watson value was 2.09 indicating no auto-correlation. Tolerance was below 1.0 at 0.63–0.95 and variance inflation factor was below 10 at 1.05–1.59; therefore, there was no issue of multicollinearity. Cook's distance for analysis of influence was below 1.0 for all and analysis of residuals revealed normality and homoscedasticity of the error term and linearity of the model.

Regarding factors influencing confidence in paternal role of high risk infants, the stress on the sights and sounds of the unit ($\beta = -0.203$, $p = .010$), number of family members ($\beta = 0.260$, $p = .001$), and fathers'

information on their infants' prognosis ($\beta = 0.205$, $p = .009$) were found to have a significant influence on paternal confidence for their high risk infants and these variables had a total explanatory power of 18.7% (Table 5).

Discussion

Birth of an infant with a high risk health condition and hospitalization in the NICU of the infant can be a traumatic event and can lead to negative feelings in both parents. Given the previous studies on the confidence level as a parent of an infant in NICU that mostly involved mothers, the identification of the perceived stress and social support of a father with a high risk newborn as well as the influence of the variables on the father's parental confidence can provide insights for planning and implementing family-centered care in the NICU (Browne & Talmi, 2005).

In our study, the fathers of high risk infants were found to experience moderate or high levels of stress. The subscales reporting high means in stress level were the relationship with the infant and parental role. The total level of paternal stress in our study was relatively lower than those found by Sung et al. (2004), Oh (2009), and Han and Chae

(2016) who studied Korean fathers of high risk infants. However, our results on the level of fathers' stress upon the NICU hospitalization of their newborn infants were consistent with those found by Miles, Funk, and Kasper (1992) and Franck, Cox, Allen, and Winter (2005), who reported high levels of paternal stress. Often higher birth weight and gestational age were associated with less parental stress in studies of newborns with a high risk condition, mainly premature birth (Ionio et al., 2016). Although the mean birth weight of high risk infants was relatively higher than those in another study (Noergaard et al., 2018), fathers' stress level was rather high in our samples.

Among the subscales of paternal stress, "the relationship with the infant and parental role" was ranked as the main stressor, followed by infant's fragile appearance and behaviors and unfamiliar sights and sounds in the NICU environment. This was different from the results of a previous study with Turkish parents with premature babies that showed that the parental role alteration was the least stressful (Cekin & Turan, 2018). Given the previous results reporting the high levels of psychological distress of parents of infants in the NICU as well as their stress about the sense of failure in the parental role (Cekin & Turan, 2018; Hwang et al., 2013; Lee & Cho, 2008), health care professionals in the NICU are in position to provide the emotional and educational support needed to relieve the fathers' high level of stress (Abdeyazdan et al., 2014).

In our study, the level of social support recognized by fathers of high risk infants was high as evidenced by the high mean score. In particular, the highest subscale scores were support from health care professionals and from the family. Due to feelings of postpartum physical discomfort of mothers and their emotional difficulties such as guilt, mothers may have difficulties in visiting their babies, which may have led them to perceive less support from medical staff than fathers (Dunlop et al., 2016). Rather, fathers of sick newborns felt supported by the nurses in NICU when they received information and direct health care for their baby (Han & Chae, 2016). Most participants in our study responded that their spouses and medical staff, including nurses and physicians, were the most supportive persons. This indicates that health care professionals in NICU can play important roles as the primary caregivers who spend the most time with babies. It also corresponds to the findings of Eriksson and Pehrsson (2002) that found nurses offered the most help for parents' emotional adaptation to their children's admission to the NICU. In this regard, nurses can play important roles in decreasing fathers' stress and promoting their confidence in paternal role as supporters during and after admission, and provide correct information about the high risk infants to their fathers.

The level of confidence in paternal role of fathers of high risk infants admitted to the NICU was above the median value. Although studies investigated the confidence in paternal role of fathers of high risk infants are limited, the results are similar to the findings of Hwang (2003) who analyzed confidence in paternal role in fathers of premature infants and also of Lee and Cho (2008) who investigated confidence in maternal role in mothers of preterm infants. The confidence in paternal role was found to be significantly higher when the number of family members was more than three and the birth order of a sick infant was the second child or higher. These results are similar to the finding of Lee and Cho (2008) that confidence in maternal role differed significantly depending on the birth order. In a prospective longitudinal cohort study (Dolatian et al., 2014), the large family size in terms of the number of children in addition to family income and mothers' educational level had a significant overall positive effect on perceived social support, perceived stress, and pregnancy outcomes in pregnant women. Based upon our findings, parents' confidence in their parenting may be strengthened when parents have a large family support system and may result in reduced parenting stress and increased social support in their parenting. Our results also showed that fathers having more information on the prognosis of their infants' condition and their sense of trust in health care professionals were factors significantly affecting high level of mean in paternal role confidence; hence, findings suggest that nursing

professionals need to pay attention to the allocation of expanded resources in addition to provide detailed information on infant status.

In the regression analysis, the significant factors affecting improved paternal role confidence were the lower stress from the sights and sounds of the NICU, a large number of family members, and father's well-informed status on their infant's prognosis. Stress from NICU environments perceived by the fathers of high risk infants can pressurize the fathers. Increased use of complex technology to relieve health concerns of high risk newborns may be regarded as a threat to the quality of the nurse-patient relationship as well as the parent-infant bonding. Moreover, when they lack understanding of the diseases and conditions affecting their children, they may feel anxious and insecure regarding the uncertain prognosis, which could lead to difficulties in performing their roles as fathers (Ionio et al., 2016, 2017). Therefore, nurses need to understand the potential of parental anxiety and fear experienced by fathers of high risk infants and respond to their needs.

Our results that the fathers were more confident when they were more aware of their baby's conditions and prognosis which suggests that sufficient explanation of the NICU environment as well as the behaviors and treatment for the baby might be helpful to improve fathers' paternal role confidence. Given that supports from health care professions can be considered to influence the fathers' confidence in their paternal role, providing accurate information regarding the treatment and related use of medical devices as well as the infant's behavioral states and prognosis need to be included in the care plan for the families of high risk infants.

Fathers' involvement in caring for high risk infants has been a mode of family-centered care in a neonatal intensive care arena (Feeley, Sherrard, Waitzer, & Boisvert, 2013). Based on the aforementioned findings of this study, if nurses understand the stress experienced by the fathers of high risk infants admitted to the NICU and provide necessary information and emotional support for the fathers, it will be possible to decrease their stress and improve their confidence in paternal role. The educational program that was developed to provide developmentally appropriate care strategies based on the understanding of therapeutic impact of the parent-infant relationship on infant outcome as well as the support for parental competency and overall family functioning might be a model for use in future clinical application (Galarza-Winton et al., 2013). Also, the nurse education program emphasizing of an involvement of both parents in caring for infants in NICU was helpful to improve the quality of parent-infant interaction and subsequent long-term effect on infant healthy development and optimal family functioning. Given that the majority of previous family support interventions combining emotional support and detailed information was applied to mothers of infants, a customized approach for fathers of fragile infants need to be planned. Considering that the provision of father's tactile stimulation for their sick infants in NICU was shown to be effective for increasing fathers' attachment to their infants and improving infants' physiological responses in a study (Kim, Kim, & Cho, 2017), the targeted intervention for fathers to improve their confidence and attachment with their babies might be useful.

Our study has several limitations. First, as this study was performed with fathers of high risk infants admitted to the NICU with a convenient sampling from two sites of hospitals, caution needs to be exercised in generalizing the findings of this study to all fathers of high risk infants across cultural contexts. Additionally, as the researchers and NICU nurses explained and distributed questionnaires to the fathers of infants having at least 72 h of hospital stay and mostly the data collection was completed before the discharge of the infant, there could be a possible variation in paternal responses due to the timing to complete the questionnaire across the entire duration of NICU hospitalization. The replication of the study to support the results with stratified systematic sampling may be required, including multiple sites from various cultural backgrounds.

Table 2

Level of confidence in paternal role, social support, and stress perceived by high risk infants' fathers (N = 160).

Variables	M ± SD	Min	Max
Stress[a](26 items)	3.17 ± 0.69	0.96	4.77
The sights and sounds of unit	2.46 ± 1.02	0.00	5.00
Appearance and behavior of infant	3.20 ± 0.88	0.00	5.00
Relationship with the infant and parental role	3.61 ± 0.91	0.86	5.00
Social support[a](15 items)	4.25 ± 0.45	2.93	5.00
Support from Health care professional	4.11 ± 0.60	2.50	5.00
Family support	4.33 ± 0.51	2.89	5.00
Fathers confidence in paternal role[b](14 items)	2.77 ± 0.43	1.79	3.64

[a] 5-point scale.
[b] 4-point scale.

Second, although we included the stress and social support as independent variables affecting paternal confidence based on the conceptual framework with rigorous literature review, the variables known to affect paternal confidence, such as mother's sensitivity to guide spouse's paternal role, may be included in the further study to increase the explanatory power on paternal confidence.

Conclusion

In this study, we investigate how the levels of stress and social support experienced by fathers of high risk infants influence their confidence in paternal role. The results revealed that high risk infants' fathers' confidence in paternal role was high if stress related to the

Table 4

Relationship between included variables and father's confidence in paternal role (N = 160).

Variables	Fathers' confidence in paternal role
	r (p)
Fathers' confidence in paternal role	1
Stress_the sights and sounds of unit*	−0.233 (**.003**)*
Stress_ appearance and behavior of infant	−0.066 (.404)
Stress_relationship with infant and parental role	0.018 (.821)
Stress (total)	−0.106 (.184)
Social support_ health care professional support	−0.014 (.864)
Social support_ family support	0.146 (.065)
Social support (total)	0.092 (.246)
Father's information about infant's prognosis*	0.277 (**.004**)*
Father's perceived reliability on medical staff	0.078 (.326)

Bold: general characteristics showed significant difference in confidence in paternal role.
* Significance level: $p < .05$.

environment of an NICU was low, the number of family members including infants was large, or awareness about infants' prognosis was high.

Pediatric nurses providing care based on a family centered care framework need to providing care to fathers of high risk infants. In order to assist fathers to raise high risk infants along with mothers, strategies to improve their confidence in paternal role are required. Specifically, nurses can assist fathers in participating in infants' care and offer information needed to fathers to understand the environment of the NICU, action taken for their infants, and their infants' prognosis,

Table 3

Confidence in paternal role according to general characteristics of participants (N = 160).

Characteristics	Category	M ± SD	t or F (p) Scheffé
Father's age (years)	≤30	2.74 ± 0.47	0.77
	31–40	2.78 ± 0.42	(.926)
	41–50	2.75 ± 0.50	
Family monthly income ($)	Less than 272$	2.73 ± 0.47	0.47
(1$ = 1100won)	273–454$	2.81 ± 0.41	(.625)
	More than 455$	2.75 ± 0.42	
Family type	Nuclear family	2.76 ± 0.44	−1.12
	Extended family	2.89 ± 0.37	(.263)
Number of family members*	3	2.68 ± 0.45	**−2.95**
	4 or more	2.88 ± 0.39	**(.004)**
Who is the most supportive person to fathers?	Nurse	2.72 ± 0.42	0.96
	Doctor	2.74 ± 0.45	(.444)
	Spouse	2.83 ± 0.45	
	Parents	2.71 ± 0.28	
	Other parents	2.46 ± 0.25	
	Other	3.10 ± 0.48	
Father's information about infants' prognosis*	Did not know at all[a]	2.30 ± 0.20	3.48
	Rarely knew[b]	2.64 ± 0.36	(.009)
	Unsure[c]	2.79 ± 0.40	a < c,d,e
	Knew a little bit[d]	2.82 ± 0.46	
	Knew well[e]	2.83 ± 0.45	
Father's perceived reliability on medical staffs *,†	Not reliable	3.32 ± 0.25	**3.39**
	Slightly reliable	2.64 ± 0.49	**(.020)**
	Moderately reliable	2.84 ± 0.38	
	Highly reliable	2.77 ± 0.42	
Current hospital days in NICU of high risk infants	3–7	2.75 ± 0.43	0.81
	8–14	2.89 ± 0.28	(.490)
	15–29	2.95 ± 0.66	
	≥30	2.64 ± 0.51	
Gender of infants	Male	2.82 ± 0.41	1.63
	Female	2.71 ± 0.46	(.106)
Birth order of high risk infants*	First	2.69 ± 0.45	**−2.84**
	Second or subsequent	2.89 ± 0.39	**(.005)**
Infants' birth weight (kg)	≤1.5	2.77 ± 0.58	0.75
	1.51–2.0	2.92 ± 0.39	(.523)
	2.01–2.5	2.78 ± 0.44	
	≥2.51	2.74 ± 0.44	

Bold: general characteristics showed significant difference in confidence in paternal role.
* Significance level: p < .05.
† No significant difference in post hoc (Scheffé)test.

Table 5
Multiple regression analysis of factors affecting high risk infants' fathers' confidence in paternal role (N = 160).

Variables	B	SE	β	t	p
Stress_the sights and sounds of unit[*]	−0.089	0.034	−0.203	−2.608	**.010**[*]
Stress_appearance and behavior of infant	0.010	0.043	0.021	0.238	.812
Stress_relationship with infant and parental role	0.000	0.041	0.001	0.007	.994
Social support_health care professional support	−0.105	0.067	−0.145	−1.566	.119
Social support_family support	0.087	0.071	0.101	1.223	.223
Number of family members[*]	0.227	0.066	0.260	3.445	**.001**[*]
Birth order	−0.038	0.044	−0.68	−0.859	.392
Father's information about infants' prognosis[*]	0.079	0.030	0.205	2.660	**.009**[*]
Father's perceived reliability on medical staff	0.050	0.051	0.090	0.995	.321
$R^2 = 0.187$, Adj. $R^2 = 0.138$, F = 3.827, df1 = 9, df2 = 150, $p < .001$					

Bold: general characteristics showed significant difference in confidence in paternal role.
[*] Significance level: $p < .05$.

high risk infants' fathers' confidence in paternal role is expected to improve.

Practice implications

High risk infants, including preterm infants, are separated from their family and admitted to the NICU upon birth. Having their babies admitted to the NICU is an unexpected event for parents, which causes them to experience stress and require social support.

In our study, high risk infants' fathers showed higher confidence in the paternal role, as the stress related to the environment in the NICU reduces, the number of family members including infants increases, and the level of awareness about infants' prognosis increases. Nurses should understand the level of stress of fathers of high risk infants who are hospitalized in the NICU and supporting nursing should be carried out so that fathers can deal with stresses. Paternal confidence in their role in the families of high risk infants will be promoted if correct information is provided to understand prognosis and treatment of infant. Additionally, nursing plans for high risk infants in the NICU and their fathers should aim to support fathers to participate in infant care. This study's results provide preliminary data for nursing intervention programs to decrease the stress of high risk infants' fathers and promote their confidence in paternal role in nurturing and caring of high risk infants. Moreover, as we explored factors influencing fathers' confidence in paternal role, this study could contribute to the preparation of the theoretical basis for the development of nursing intervention strategies targeting fathers of high risk infants.

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Authorship statement

Jeong Hee Eom

- Substantial contribution to the study conception and design, data acquisition, analysis, and interpretation.
- Drafting or revising the article for intellectual content.
- Agreement to be accountable for all aspects of the work related to the accuracy or integrity of any part of the work.
- Approval of the final version.

YeoJin Im

- Substantial contribution to the study conception and design, data acquisition, analysis, and interpretation.
- Drafting or revising the article for intellectual content.
- Agreement to be accountable for all aspects of the work related to the accuracy or integrity of any part of the work.
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Declaration of competing interest

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