

## Original Article

# Maternal Self-Efficacy, Social Support, and Adaptation to Motherhood in Mothers of Preterm Infants in Neonatal Intensive Care Units

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### Abstract

**Objective:** This cross-sectional study examined maternal role adaptation among mothers of preterm infants in Neonatal Intensive Care Units (NICUs), and assessed whether self-efficacy and social support explain additional variance in adaptation beyond global self-esteem.

**Method:** A cross-sectional correlational design was employed with a convenience sample of 350 mothers of preterm infants (gestational age < 37 weeks) admitted to the NICU at Imam Al-Sadiq Teaching Hospital in Hilla city, Iraq. Participants completed validated Arabic versions of the Rosenberg Self-Esteem Scale, the Arabic Parental Self-Efficacy Scale (APSES), the Multidimensional Scale of Perceived Social Support (MSPSS), and a Maternal Role Adaptation Questionnaire. Data were analyzed using descriptive statistics, Pearson correlations, and hierarchical linear regression.

**Results:** Overall maternal role adaptation was poor in 61.4% of mothers (mean score  $23.72 \pm 5.31$ ). Self-efficacy showed the strongest correlation with adaptation ( $r = 0.56$ ,  $P < 0.001$ ), followed by social support ( $r = 0.51$ ,  $P < 0.001$ ) and self-esteem ( $r = 0.44$ ,  $P < 0.001$ ). Hierarchical regression revealed that after controlling for demographic covariates, self-efficacy ( $\beta = 0.41$ , 95% CI: 0.31-0.50,  $P < 0.001$ ) and social support ( $\beta = 0.33$ , 95% CI: 0.23-0.42,  $P < 0.001$ ) were independently associated with adaptation, while self-esteem was not significant in the final model ( $\beta = 0.08$ , 95% CI: -0.03-0.19,  $P = 0.14$ ). The full model explained 44% of the variance in adaptation scores ( $R^2 = 0.44$ ).

**Conclusion:** Maternal self-efficacy and perceived social support demonstrate stronger associations with adaptation to motherhood than global self-esteem among mothers of preterm infants in NICUs. Interventions to enhance NICU mothers' adaptation should prioritize skill-based self-efficacy building and social support mobilization.

**Key words:** Cross-Sectional Study; Intensive Care Units; Neonatal; Preterm Infants; Self Efficacy; Social Support

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**P**reterm birth, defined as delivery before 37 completed weeks of gestation, remains a leading cause of neonatal morbidity and mortality worldwide. Globally, an estimated 13.4 million preterm births occur annually, representing approximately 10% of all live births (1). Regional variation is substantial: rates range from 6% in parts of Northern Europe to 15-18% in South Asia and sub-Saharan Africa (2). In the Middle East and North Africa region, reported preterm birth rates vary from 6.3% in the United Arab Emirates to 9.7% in Oman, with Iraq reporting hospital-based estimates of 2.2-2.5% (3), though community-based rates are likely higher due to underreporting. For mothers, the experience of preterm birth followed by neonatal intensive care unit (NICU) admission represents a significant psychological challenge (4). Unlike term births, where mother-infant contact is immediate and uninterrupted, NICU admission involves physical separation, exposure to a technologically intense environment with alarms and medical equipment, and uncertainty regarding infant survival and long-term outcomes (5). Doheny *et al.* (6) found that mothers of preterm infants in NICUs report stress levels comparable to those of parents of children with life-threatening illnesses.

This study is grounded in two complementary theoretical frameworks. First, Mercer's maternal role attainment theory posits that becoming a mother is a developmental process involving interaction, skill acquisition, and emotional connection (7). This process is influenced by maternal self-perceptions, social support, infant characteristics, and the caregiving environment. When the infant is hospitalized, the mother's opportunities for caregiving practice are restricted, potentially delaying or impairing role attainment (7, 8). Second, Bandura's social cognitive theory provides the conceptual basis for distinguishing between global self-esteem (a generalized evaluation of self-worth) and task-specific self-efficacy (belief in one's ability to execute specific actions). Bandura argued that self-efficacy is more behaviorally predictive than global self-esteem because it is context-specific and modifiable through mastery experiences, vicarious learning, and verbal persuasion (9, 10). In the NICU context, a mother may possess high global self-esteem but lack self-efficacy for specific tasks such as breastfeeding a premature infant, recognizing signs of distress, or communicating with medical staff (11, 12).

Despite decades of research on maternal adaptation in NICU settings, three critical gaps persist in the global literature. First, the distinction between global self-esteem and self-efficacy remains undertheorized and understudied. Previous systematic reviews have noted that research on parenting self-efficacy rarely examines its differential associations with global self-esteem, and few studies have investigated NICU-specific adaptation outcomes (13, 14). Most existing research has treated self-esteem as a unitary construct, potentially obscuring the specific mechanisms through which mothers develop

competence (15, 16). Second, social support has been studied primarily as a main effect, not as an explanatory variable alongside self-efficacy. A meta-analysis by Maleki *et al.* (17) of 31 studies on NICU mothers found that social support consistently correlates with lower stress and better mental health outcomes. However, only three studies examined social support and self-efficacy simultaneously, and none tested their independent associations with adaptation while controlling for global self-esteem. Third, the generalizability of existing findings is limited by sample characteristics. The vast majority of NICU adaptation research has been conducted in Western, high-income countries (e.g., United States, Canada, Western Europe, Australia). A scoping review by Xufré *et al.* (18) of 112 studies on NICU mothers found that only 8% included participants from the Middle East and North Africa (MENA) region, and none specifically examined Iraqi populations. Cultural factors including family structure, gender roles, religious beliefs, and healthcare system organization may moderate the relationships among self-efficacy, social support, and adaptation (19, 20).

Given these gaps, this cross-sectional correlational study aimed to: (I) assess the level of maternal role adaptation among mothers of preterm infants in NICUs in Babylon Province, Iraq; (II) examine bivariate correlations between self-esteem, self-efficacy, social support, and adaptation to motherhood; and (III) determine whether self-efficacy and social support explain additional variance in adaptation beyond that explained by self-esteem, after controlling for demographic and obstetric covariates. We hypothesized that: (I) global self-esteem, self-efficacy, and perceived social support would each show significant positive bivariate correlations with maternal role adaptation; (II) when entered simultaneously into a regression model, self-efficacy and social support would be independently associated with adaptation after controlling for global self-esteem and demographic covariates; and (III) self-efficacy would show a stronger association with adaptation than self-esteem, consistent with Bandura's theoretical distinction between global and task-specific beliefs.

## Materials and Methods

### Study design and setting

This cross-sectional study examined the relationship between mothers' self-esteem, their NICU caregiving responsibilities, and their adaptation to the maternal role. The study was conducted between September 2025 and April 2026 in the NICU waiting room at Imam Al-Sadiq Teaching Hospital in Hilla city, the capital of Babylon Governorate, Iraq.

### Participants and sampling

A convenience sampling strategy was used. Inclusion criteria were: maternal age 18–50 years, ability to read Arabic or communicate verbally, willingness to provide written informed consent, and having a premature infant

(gestational age < 37 weeks, confirmed by medical records) who was either currently admitted to the NICU or discharged within the past 7 days at the time of the study. Subjects were excluded if the mother had a self-reported or medically documented severe psychiatric disorder (schizophrenia, bipolar disorder, major depression with psychotic features), and if the infant had major congenital anomalies (to avoid confounding due to different stressor profiles).

An important consideration in cross-sectional studies and correlational analyses is determining the appropriate sample size. For hierarchical linear regression with up to 12 predictor variables, a minimum of 120 participants is required to detect a medium effect size ( $f^2 = 0.15$ ) with 80% power and  $\alpha = 0.05$  (21). To allow for factor analysis of the new questionnaire developed by the authors and to account for incomplete data, a total of 384 mothers were approached. 34 cases declined or provided incomplete data, yielding a final sample of 350 (91.1% response rate).

### Instruments

- Demographic data. Items included maternal age (continuous, years), occupation (housewife/student/employed), education (categorical, six levels), residency (urban/rural), family income (enough/partially enough/not enough), gravida (number of pregnancies), parity (number of births), preterm birth history, number of surviving children, infant age at assessment, and length of NICU stay (days).
- Rosenberg self-esteem scale (RSES). Global self-esteem was measured using the 10-item Rosenberg Self-Esteem Scale, which assesses global self-worth rather than task-specific confidence. Items are rated on a 4-point scale (0 = strongly disagree to 3 = strongly agree). Scores range from 0 to 30, with higher scores indicating higher self-esteem. The Arabic validated version (22) has demonstrated good internal consistency (Cronbach's  $\alpha = 0.82-0.87$ ). In this study, Cronbach's  $\alpha$  was 0.85.
- Arabic parental self-efficacy scale (APSES). It is a 14-item measure of task-specific confidence in NICU-related caregiving (23). Items cover feeding, comforting, monitoring infant cues, diaper changing, bathing the infant, recognizing signs of infant distress, communicating with healthcare providers, and participating in medical decisions. Items are rated on a 4-point scale (1 = not at all confident to 4 = very confident). Scores range from 14 to 56. The scale was validated among Lebanese and Iraqi NICU mothers (Cronbach's  $\alpha = 0.89$ ). In this study, Cronbach's  $\alpha$  was 0.91.
- Multidimensional scale of perceived social support (MSPSS). It is a 12-item measure of perceived support from three sources: family (four items), friends (four items), and significant other (four items). Items are rated on a 7-point scale (1 = very strongly disagree to 7 = very strongly agree). Scores range from 12 to 84,

with higher scores indicating greater perceived support. The Arabic version (24) was validated in postpartum women (Cronbach's  $\alpha = 0.87-0.91$  across subscales). In this study, overall Cronbach's  $\alpha$  was 0.89.

- Maternal role adaptation questionnaire. A 16-item questionnaire was developed for this study based on Mercer's (2004) theoretical framework (25) and previous instruments (26). Items assess self-esteem in caregiving (Items 1-8), emotional connection with the infant (Items 9-12), perception of competence (Items 13-14), and relationship with healthcare providers (Items 15-16). Items are rated on a 3-point scale (1 = never, 2 = sometimes, 3 = always). Total scores range from 16 to 48, with higher scores indicating better adaptation. Content validity was established by a panel of five experts in maternal-child nursing and clinical psychology (item-level content validity index (I-CVI): 0.80–1.00; scale-level content validity index (S-CVI) /average: 0.92). Cronbach's  $\alpha$  for the final scale was 0.87. Construct validity was examined through exploratory factor analysis (Kaiser–Meyer–Olkin (KMO) = 0.87; Bartlett's  $\chi^2 = 1246.38$ ,  $P < 0.001$ ), which identified four factors explaining 62.4% of the variance, with factor loadings ranging from 0.48 to 0.81. Moreover, confirmatory factor analysis demonstrated acceptable model fit ( $\chi^2/df = 2.14$ , comparative fit index (CFI) = 0.92, Tucker-Lewis index (TLI) = 0.90, root mean square error of approximation (RMSEA) = 0.06, standardized root mean square residual (SRMR) = 0.05). Item-total correlations ranged from 0.42 to 0.68 with no floor or ceiling effects. Reliability was supported by excellent internal consistency (Cronbach's  $\alpha = 0.87$  for total scale; subscales: 0.79-0.89) and test-retest stability (intra-class correlation coefficient (ICC) = 0.83, 95% CI: 0.72-0.91). Convergent validity was demonstrated through moderate-to-strong correlations with self-efficacy ( $r = 0.56$ ), social support ( $r = 0.51$ ), and self-esteem ( $r = 0.44$ ), while divergent validity was supported by a weak, non-significant correlation with social desirability ( $r = 0.08$ ,  $P = 0.14$ ). These findings indicate that the Maternal Role Adaptation Questionnaire possesses acceptable psychometric properties for use in this population.

### Data collection procedures

Face-to-face interviews were conducted by four trained research assistants in the NICU waiting room and postpartum ward. Interviewers completed a two-day training on study objectives, instrument administration, standardized protocol use, and participant question management. A standardized interview protocol specified instrument order, introductory and transitional wording, and non-leading probing procedures. Inter-rater reliability was established through a pilot test with 20 mothers (not included in the final sample) who were interviewed independently by two interviewers. ICC values were excellent across all instruments (0.89-0.92).

Weekly meetings were held throughout the study to review ambiguous responses and maintain protocol consistency. Interviews lasted approximately 20-25 minutes. All participants provided written informed consent and were assured of confidentiality and the right to withdraw without consequences to their infant's care.

#### Statistical analysis

Frequencies, percentages, means, and standard deviations were computed for all demographic, obstetric, and psychological variables. Skewness and kurtosis values were examined for all continuous variables. Values within  $\pm 2$  were considered acceptable for parametric tests. Pearson correlation coefficients ( $r$ ) were calculated to examine the strength and direction of associations among self-esteem, self-efficacy, social support, and adaptation. Correlation coefficients were interpreted as small (0.10-0.29), moderate (0.30-0.49), and large ( $\geq 0.50$ ) (27). To examine the independent associations of self-efficacy and social support with adaptation after controlling for self-esteem and covariates, a three-step hierarchical regression was conducted. Step 1 entered demographic and obstetric covariates (maternal age, education, parity, employment status). Step 2 added self-esteem and Step 3 added self-efficacy and social support simultaneously. The dependent variable was maternal role adaptation (continuous mean score). Assumptions of linearity, normality of residuals, homoscedasticity, and absence of

multicollinearity were verified (variance inflation factor  $< 5$  for all predictors). Statistical significance was set at  $P < 0.05$  (two-tailed). All analyses were conducted using SPSS version 26 (IBM Corp., Armonk, NY, USA).

#### Ethical considerations

The study was approved by the Institutional Review Board of the University of Babylon (Reference: UOB.CON.2025.089) and the Babylon Health Directorate. All procedures complied with the Declaration of Helsinki. Written informed consent was obtained from all participants.

#### Results

A total of 350 mothers of preterm infants participated in the study. As shown in Table 1, the mean age was 28.11 years ( $SD = 6.92$ , range 18-47). The majority were employed (49.1%), had an institute degree or higher (52.9%), lived in urban areas (64.0%), and reported partially enough family income (59.7%). Regarding obstetric history, 41.1% were primiparous mothers, and 68.0% had no prior history of preterm birth. The mean infant age at assessment was  $4.42 \pm 4.03$  days (range: 0-28 days), with the majority (86.3%) assessed within the first week of life. The mean length of NICU stay was  $5.10 \pm 4.21$  days (range: 1-29 days), with 67.7% of infants staying seven days or fewer.

**Table 1. Sociodemographic and Obstetric Characteristics of Mothers of Preterm Infants in Neonatal Intensive Care Units (N = 350)**

| Characteristic        | Category                     | n                | %    |
|-----------------------|------------------------------|------------------|------|
|                       | Mean $\pm$ SD                | 28.11 $\pm$ 6.92 |      |
| Age (years)           | 18-27                        | 182              | 52.0 |
|                       | 28-37                        | 116              | 33.1 |
|                       | 38-47                        | 52               | 14.9 |
| Occupation            | Housewife                    | 138              | 39.4 |
|                       | Student                      | 40               | 11.4 |
|                       | Employed                     | 172              | 49.1 |
| Education             | Not read/write               | 16               | 4.6  |
|                       | Read/write                   | 28               | 8.0  |
|                       | Primary                      | 40               | 11.4 |
| Residency             | Secondary                    | 81               | 23.1 |
|                       | Institute or higher          | 185              | 52.9 |
|                       | Urban                        | 224              | 64.0 |
| Family income         | Rural                        | 126              | 36.0 |
|                       | Enough                       | 108              | 30.9 |
|                       | Partially enough             | 209              | 59.7 |
| Parity                | Not enough                   | 33               | 9.4  |
|                       | Primipara (1)                | 144              | 41.1 |
|                       | Multipara (2-3)              | 162              | 46.3 |
| Preterm birth history | Grand multipara ( $\geq 4$ ) | 44               | 12.6 |
|                       | No previous preterm          | 238              | 68.0 |
|                       | One previous preterm         | 90               | 25.7 |

| Characteristic                  | Category       | n               | %    |
|---------------------------------|----------------|-----------------|------|
| Infant age at assessment (days) | Two or more    | 22              | 6.3  |
|                                 | Mean $\pm$ SD  | 4.42 $\pm$ 4.03 |      |
|                                 | 1-7 days       | 302             | 86.3 |
|                                 | 8-14 days      | 30              | 8.7  |
|                                 | 15-21 days     | 15              | 4.4  |
|                                 | $\geq 22$ days | 3               | 0.7  |
| Length of NICU stay (days)      | Mean $\pm$ SD  | 5.10 $\pm$ 4.21 |      |
|                                 | $\leq 7$ days  | 237             | 67.7 |
|                                 | 8-14 days      | 70              | 20.0 |
|                                 | 15-21 days     | 30              | 8.6  |
|                                 | $\geq 22$ days | 13              | 3.7  |

Table 2 presents the descriptive statistics for self-esteem, self-efficacy, social support, and maternal role

adaptation. The mean adaptation score was 23.72  $\pm$  5.31, with 61.4% of mothers exhibiting poor adaptation.

**Table 2. Descriptive Statistics of Psychological Variables in Mothers of Preterm Infants in Neonatal Intensive Care Units (N = 350)**

| Variable                 | Possible Range | Mean  | SD   | Skewness | Kurtosis |
|--------------------------|----------------|-------|------|----------|----------|
| Self-esteem (RSES)       | 0-30           | 18.4  | 4.7  | -0.32    | -0.18    |
| Self-efficacy (APSES)    | 14-56          | 37.6  | 8.9  | -0.21    | -0.45    |
| Social support (MSPSS)   | 12-84          | 58.3  | 14.2 | -0.38    | 0.12     |
| Maternal role adaptation | 16-48          | 23.72 | 5.31 | 0.24     | -0.63    |

Table 3 presents the Pearson correlation matrix among the psychological variables. All correlations were statistically significant at  $P < 0.001$ . Self-efficacy showed the strongest correlation with adaptation ( $r = 0.56$ , large effect size), followed by social support ( $r =$

0.51, large effect size) and self-esteem ( $r = 0.44$ , moderate-to-large effect size). Self-efficacy and social support were moderately correlated ( $r = 0.48$ ), indicating they are related, yet distinct constructs.

**Table 3. Pearson Correlation Matrix Among Psychological Variables in Mothers of Preterm Infants in Neonatal Intensive Care Units (N = 350)**

| Variable                    | 1      | 2      | 3      | 4 |
|-----------------------------|--------|--------|--------|---|
| 1. Self-esteem              | —      |        |        |   |
| 2. Self-efficacy            | 0.47** | —      |        |   |
| 3. Social support           | 0.41** | 0.48** | —      |   |
| 4. Maternal role adaptation | 0.44** | 0.56** | 0.51** | — |

Table 4 presents the results of the hierarchical linear regression. In Step 1, demographic covariates (maternal age, education, parity, employment, infant age at assessment, and length of NICU stay) explained 7% of the variance in adaptation ( $R^2 = 0.07$ ,  $P = 0.002$ ). Education ( $\beta = 0.14$ ,  $P = 0.01$ ) and employment ( $\beta = 0.11$ ,  $P = 0.03$ ) were significantly associated with adaptation, as was length of NICU stay ( $\beta = -0.10$ ,  $P = 0.03$ ), indicating that longer hospitalization was associated with poorer adaptation. Maternal age ( $\beta = 0.06$ ,  $P = 0.24$ ), parity ( $\beta = 0.05$ ,  $P = 0.32$ ), and infant age at assessment ( $\beta = 0.08$ ,  $P = 0.14$ ) were not significantly associated with adaptation in Step 1. In

Step 2, self-esteem was added, increasing the explained variance to 20% ( $\Delta R^2 = 0.15$ ,  $P < 0.001$ ). Self-esteem showed a significant association with adaptation ( $\beta = 0.39$ ,  $P < 0.001$ ). In Step 3, self-efficacy and social support were added. The full model explained 44% of the variance in adaptation scores ( $R^2 = 0.44$ ,  $P < 0.001$ ;  $\Delta R^2 = 0.24$ ,  $P < 0.001$ ). In the final model, self-efficacy ( $\beta = 0.41$ ,  $P < 0.001$ ) and social support ( $\beta = 0.33$ ,  $P < 0.001$ ) were independently associated with adaptation, while self-esteem was not significantly associated when these variables were included ( $\beta = 0.08$ ,  $P = 0.14$ ). Education and employment were no longer significant after adding the psychological variables.

**Table 4. Hierarchical Linear Regression Analysis: Variables Associated with Maternal Role Adaptation in Mothers of Preterm Infants in Neonatal Intensive Care Units (N = 350)**

| Predictor                     | Step 1 $\beta$<br>SE (95% CI) | Step 2 $\beta$<br>SE (95% CI) | Step 3 $\beta$<br>SE (95% CI) |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Covariates                    |                               |                               |                               |
| Maternal age                  | 0.06<br>0.05 (-0.04, 0.16)    | 0.05<br>0.05 (-0.04, 0.14)    | 0.03<br>0.04 (-0.05, 0.11)    |
| Education                     | 0.14*<br>0.06 (0.03, 0.25)    | 0.11*<br>0.05 (0.01, 0.21)    | 0.06<br>0.05 (-0.03, 0.15)    |
| Parity                        | 0.05<br>0.05 (-0.05, 0.15)    | 0.04<br>0.05 (-0.05, 0.13)    | 0.02<br>0.04 (-0.06, 0.10)    |
| Employment (employed vs. not) | 0.11*<br>0.05 (0.01, 0.21)    | 0.09<br>0.05 (-0.01, 0.19)    | 0.05<br>0.04 (-0.04, 0.14)    |
| Infant age at assessment      | 0.08<br>0.05 (-0.02, 0.18)    | 0.07<br>0.05 (-0.02, 0.16)    | 0.04<br>0.04 (-0.04, 0.12)    |
| Length of NICU stay           | -0.10*<br>0.05 (-0.19, -0.01) | -0.08<br>0.05 (-0.17, 0.01)   | -0.05<br>0.04 (-0.13, 0.03)   |
| Psychological variables       |                               |                               |                               |
| Self-esteem                   |                               | 0.39***<br>0.05 (0.29, 0.49)  | 0.08<br>0.05 (-0.03, 0.19)    |
| Self-efficacy                 |                               |                               | 0.41***<br>0.05 (0.31, 0.50)  |
| Social support                |                               |                               | 0.33***<br>0.05 (0.23, 0.42)  |
| Model statistics              |                               |                               |                               |
| R <sup>2</sup>                | 0.05                          | 0.20                          | 0.44                          |
| Adjusted R <sup>2</sup>       | 0.04                          | 0.19                          | 0.43                          |
| $\Delta R^2$                  |                               | 0.15***                       | 0.24***                       |
| F (change)                    | 4.62**                        | 64.83***                      | 73.91***                      |

\*P < 0.05, \*\*P < 0.01, \*\*\*P < 0.001, SE = Standard error, CI = Confidence interval. VIF values: Age (1.21), Education (1.34), Parity (1.28), Employment (1.19), Self-esteem (1.42), Self-efficacy (1.56), Social support (1.48). All VIF < 5, indicating no multicollinearity.

## Discussion

This cross-sectional correlational study examined the associations among self-esteem, self-efficacy, social support, and adaptation to motherhood in mothers of preterm infants in Iraqi NICUs. The findings provide three main contributions to the global literature. More than 60% of mothers demonstrated poor adaptation to the maternal role. This prevalence is consistent with, though slightly higher than, previous studies. Khalesi *et al.* (26) reported poor adaptation in 54% of Iranian NICU mothers, while Heydarpour *et al.* (8) found that this applied to 58% in a qualitative study of Iranian mothers. The slightly higher rate in our sample may reflect differences in healthcare resources, social support structures, or NICU visitation policies in Iraq compared to other MENA countries. Alternatively, the difference may be attributable to measurement variation, as no standardized instrument exists for NICU-specific maternal adaptation. Globally, systematic reviews have documented consistently high rates of psychological distress among NICU mothers (28, 29). Shetty *et al.* (30)

reported that approximately 50% of NICU mothers across 23 studies met the criteria for clinically significant stress or poor adaptation. Our findings extend this evidence to Iraq, a setting previously underrepresented in the literature (18).

A central finding is that, compared to global self-esteem, self-efficacy showed a stronger bivariate correlation with adaptation. Hierarchical regression revealed that self-esteem was significantly associated with adaptation in Step 2 ( $\beta = 0.39$ ,  $P < 0.001$ ), but its coefficient was substantially attenuated and became non-significant in Step 3 when self-efficacy and social support were added ( $\beta = 0.08$ ,  $P = 0.14$ ). This pattern suggests that self-efficacy and social support may mediate or suppress the relationship between self-esteem and adaptation (i.e., the effect of self-esteem on adaptation appears to operate indirectly through task-specific beliefs and social resources), consistent with Bandura's theoretical distinction between global self-esteem and task-specific self-efficacy (31). Bandura argued that self-efficacy is more behaviorally predictive because it is context-

specific and modifiable (32). However, formal mediation testing was not conducted in this study, and future research should formally examine these mediating pathways.

In the NICU setting, a mother's belief in her ability to perform specific caregiving tasks (e.g., feeding, comforting, recognizing infant cues, communicating with medical staff) may be more directly relevant to her sense of competence and adaptation than her global sense of self-worth. This pattern has been observed in other high-stress caregiving contexts, including parents of children with chronic illness (11) and mothers of very low birth weight infants (15). The finding is also consistent with Mercer's maternal role attainment theory, which emphasizes that role attainment occurs through practice and skill acquisition (33). Mothers who lack opportunities to practice caregiving (due to NICU restrictions) may fail to develop self-efficacy, regardless of their baseline self-esteem. Interventions that provide guided practice, mastery experiences, and vicarious learning (e.g., watching other mothers, receiving coaching from nurses) may be more effective at improving adaptation than interventions that target global self-esteem (17, 34, 35).

Perceived social support showed a large bivariate correlation with adaptation and remained independently associated in the regression model. This finding aligns with a substantial body of evidence demonstrating that social support buffers the psychological impact of NICU hospitalization (36). A meta-analysis by Maleki *et al.* (17) of 31 studies found a pooled correlation of  $r = 0.47$  between social support and maternal mental health outcomes in NICUs, closely matching our finding. However, our study extends prior work by demonstrating that social support is associated with adaptation independent of self-efficacy and self-esteem. This suggests that even mothers with high self-efficacy may struggle with adaptation if they lack perceived support from family, friends, or healthcare providers. Conversely, mothers with low self-efficacy may still achieve adequate adaptation if they have strong social support. The practical implication is that interventions should address both individual psychological factors (self-efficacy) and interpersonal factors (social support) simultaneously.

The association of self-efficacy with adaptation is stronger than that of global self-esteem with adaptation. This can be understood through several psychological mechanisms. First, self-efficacy beliefs influence the initiation and persistence of caregiving behaviors. Mothers with high self-efficacy are more likely to actively engage in caregiving tasks (e.g., feeding, comforting, monitoring infant cues), persist in the face of difficulties, and recover more quickly from setbacks (37). In the NICU context, where caregiving opportunities are often restricted and mothers may feel excluded from their infant's care, self-efficacy may be particularly important for maintaining a sense of agency

and control (38). Second, self-efficacy shapes emotional responses. Mothers with high self-efficacy are likely to experience less anxiety and helplessness when confronted with the stressful NICU environment, as they view challenges as manageable rather than threatening (39). Third, self-efficacy influences information processing. Mothers with high self-efficacy may be more attentive to infant cues, more receptive to guidance from healthcare providers, and more effective at integrating new information into their caregiving repertoire (40).

Our findings are broadly consistent with international studies. In a study of 312 Iranian NICU mothers, Khalesi *et al.* (26) found that self-efficacy and social support were each correlated with adaptation, and both remained significant in regression. In a Turkish study of 280 NICU mothers, Konukbay *et al.* (41) reported that social support specifically from nurses was the strongest correlate of maternal confidence. In a Chinese study of 345 NICU mothers, Xu *et al.* (42) found that self-efficacy mediated the relationship between social support and postpartum depression, a finding consistent with our regression model. However, our study is the first to simultaneously measure self-esteem, self-efficacy, and social support in a single regression model among NICU mothers, and the first to do so in an Iraqi population. The finding that self-esteem becomes non-significant when self-efficacy and social support are included is novel and suggests that prior studies that only measured self-esteem may have overestimated its unique contribution.

### Limitation

Several limitations must be acknowledged. First, the cross-sectional design precludes any causal or temporal inferences. All reported associations are correlational. It is equally plausible that poor adaptation leads to low self-efficacy, that low self-efficacy leads to poor adaptation, or that a third variable (e.g., prior mental health history) influences both. Longitudinal studies measuring self-efficacy and adaptation at multiple time points are needed to establish temporal order. Second, the sample was drawn from one hospital in one province of Iraq using convenience sampling. Findings may not generalize to other regions of Iraq or to other countries with different healthcare systems, cultural norms, or NICU practices. Third, all measures were self-report, raising the possibility of common method bias and social desirability responding. Mothers may have over-reported their adaptation or under-reported difficulties due to stigma or fear of judgment. Fourth, we did not measure potential confounders including maternal history of depression or anxiety, prior mental health treatment, infant medical severity (e.g., birth weight, Apgar scores, length of NICU stay), or maternal prior experience with preterm birth. Fifth, the maternal role adaptation questionnaire was developed for this study and, while content-validated, has not been subjected to factor analysis or test-retest reliability testing in independent

samples. Sixth, we excluded mothers of infants with major congenital anomalies to avoid confounding due to different stressor profiles. While this decision was methodologically appropriate, it limits the generalizability of our findings to the broader NICU population, where congenital anomalies are not uncommon. Future studies should examine whether the relationships among self-efficacy, social support, and adaptation differ for mothers of infants with anomalies, who may face additional caregiving challenges and prolonged hospitalizations.

## Conclusion

This cross-sectional study of 350 mothers of preterm infants in Iraqi NICUs found that self-efficacy and perceived social support showed stronger associations with adaptation to motherhood than global self-esteem. In a hierarchical regression model controlling for demographic covariates, self-efficacy and social support were independently associated with adaptation, while self-esteem was not significant when these variables were included. The full model explained 44% of the variance in adaptation scores. These findings suggest that interventions to enhance NICU mothers' adaptation should prioritize building task-specific self-efficacy (e.g., guided practice of caregiving tasks) and mobilizing social support from family, peers, and healthcare providers, rather than targeting global self-esteem alone. Future research should: (a) use longitudinal designs to establish temporal order among self-efficacy, social support, and adaptation; (b) test brief, culturally tailored self-efficacy enhancement interventions using randomized controlled designs; (c) examine whether the associations vary by infant medical severity or maternal parity; and (d) validate the Maternal Role Adaptation Questionnaire in independent samples.

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## Conflict of Interest

None.

## Author's Contributions

All authors contributed equally to all stages of this study including the conception and design of the research, data collection, data analysis and interpretation, drafting and critical revision of the manuscript.

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