

# ORIGINAL ARTICLE

## The Effect of Applying Problem-solving Skills on Stress Coping Styles and Emotional Self-efficacy in Mothers of Preterm Neonates: A Randomized Clinical Trial

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### ABSTRACT

**Background:** Dysfunctional stress-coping styles may accelerate negative emotional self-efficacy in the mothers of preterm neonates. This study was conducted to determine the effect of applying problem-solving skills on stress-coping styles and emotional self-efficacy in mothers of preterm neonates.

**Methods:** This randomized clinical trial was conducted from January 2020 to February 2021 in 4 neonatal intensive care units (NICU) of Mashhad, Iran. 60 mothers were selected using convenience sampling method and randomly assigned to control and intervention groups. The intervention group was divided into groups of 3-5 people to attend 6 sessions of at least 60 minutes held 3 times a week for two weeks and received training on problem-solving skills. The control group received routine care. Data were collected using demographic characteristic forms, problem-solving inventory, ways of Coping Questionnaire, and the emotional self-efficacy scale. The tools were initially filled out by both groups and re-completed at the end of the second week after the intervention and four weeks later. Data were analyzed using SPSS version 21 and the significance level of less than 0.05. Independent and paired t-test, Mann-Whitney, Chi-square, Fisher's exact test, repeated measures, and Bonferroni post hoc test were used.

**Results:** Analysis of variance with repeated measures showed that in the intervention group, there was an increase in the scores of problem-focused style (before:  $37.9 \pm 6.3$ ; immediately:  $46.2 \pm 5.3$ ; one month later:  $47.5 \pm 5.6$ ) ( $P < 0.001$ ), a decrease in scores of emotion-focused style (before:  $44.0 \pm 6.9$ ; immediately:  $38.6 \pm 6.2$ ; one month later:  $38.0 \pm 4.4$ ) ( $P < 0.001$ ), and an increase in mothers' emotional self-efficacy (before:  $113.0 \pm 14.9$ ; immediately:  $130.3 \pm 10.6$ ; one month later:  $134.5 \pm 8.3$ ) ( $P < 0.001$ ).

**Conclusion:** Problem-solving skills are recommended to be used in NICU to empower mothers to adopt appropriate strategies for dealing with the situational stress of having a preterm neonate and to increase emotional self-efficacy.

**Trial Registration Number:** IRCT20191211045696N1.

**Keywords:** Coping skills, Preterm neonates, Problem solving, Mother, Self efficacy

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## INTRODUCTION

The birth of a neonate is an exciting and enjoyable event for parents. However, the unexpected birth of preterm neonates is equally stressful and can cause a crisis for mothers (1). According to a systematic review and meta-analysis, 10% of all deliveries end in preterm births in Iran (2). Every year, about 15 million preterm neonates are born in the world (2), and prematurity is the most important cause of mortality and morbidity in neonates (3). After birth, these neonates are admitted to neonatal intensive care units (NICU) to receive advanced care services (4). Separating the neonates from their mothers immediately after birth is the most difficult aspect of neonates' hospitalization for mothers (5). A neonate needs parental contact for optimal physiological and emotional development, and parents need meaningful relationships with their neonates to establish and assume the identity of a mother or a father (6). On the other hand, the detrimental effect of preterm birth impairs the mother's ability to think and concentrate, which in turn adds to the stress of having a high-risk neonate. High levels of stress also alter the mother's interactions with the neonate and even disrupt her relationship with the health care providers (7).

Traumatic events cause common negative reactions (8). Research shows that 77% of mothers show clear signs of psychological trauma even up to one month, and 49% show these symptoms for up to one year after the birth of a preterm neonate (9). The results of a study showed that the severity of maternal post-traumatic stress 6 months after birth negatively correlated with the quality of mother-neonate interaction at 12 months of age (10). Also, uncontrolled maternal stress in the NICU can affect mothers' attachment to their neonates (11).

In NICU, parents often experience negative emotions, and concerns about the survival of their neonate or the long-term negative consequences of prematurity may make the mother feel helpless, guilty, and terrified (12). In addition, mothers' dysfunctional coping

mechanisms with sources of situational stress will exacerbate stress, maladaptation, and negative emotions (13).

Problem solving and coping skills play a decisive role in reducing stress and feeling satisfied with the decision-making process in dealing with situational problems (14). In problem-solving training, it is probable that under the influence of this training, people's expectations of their self-efficacy and personal adequacy will improve (15). In the meantime, coping styles are a set of cognitive and behavioral efforts are used to comprehend, interpret, and correct a stressful situation (16). The occurrence of stressful events in people's lives, such as preterm birth combined with poor problem-solving skills leads to the use of ineffective coping styles. On the other hand, emotional self-efficacy is an important predictor of a person's specific performance in the field of emotional performance. In addition, this variable plays an important role in the effective response to stress and anxiety (17). To the best of our knowledge, no study has been conducted on emotional self-efficacy in mothers of preterm neonates. Also, in Iran, few studies have been conducted on stress-coping styles in mothers of preterm neonates. In this regard, a cross-sectional study only described stress-coping styles in mothers of preterm neonates (18). Another study also investigated the effect of maternal empowerment in neonate care on maternal stress coping styles (19). They found no significant difference between mothers in the intervention and control groups in their use of coping styles. Therefore, given the importance of maternal self-efficacy in controlling negative emotions in coping with the birth of a preterm neonate and the mother's correct coping with the stress caused by preterm birth and considering the limited number of interventional studies in this regard, this study aimed to determine the effect of problem-solving skills on stress-coping styles and emotional self-efficacy of mothers with preterm neonates.

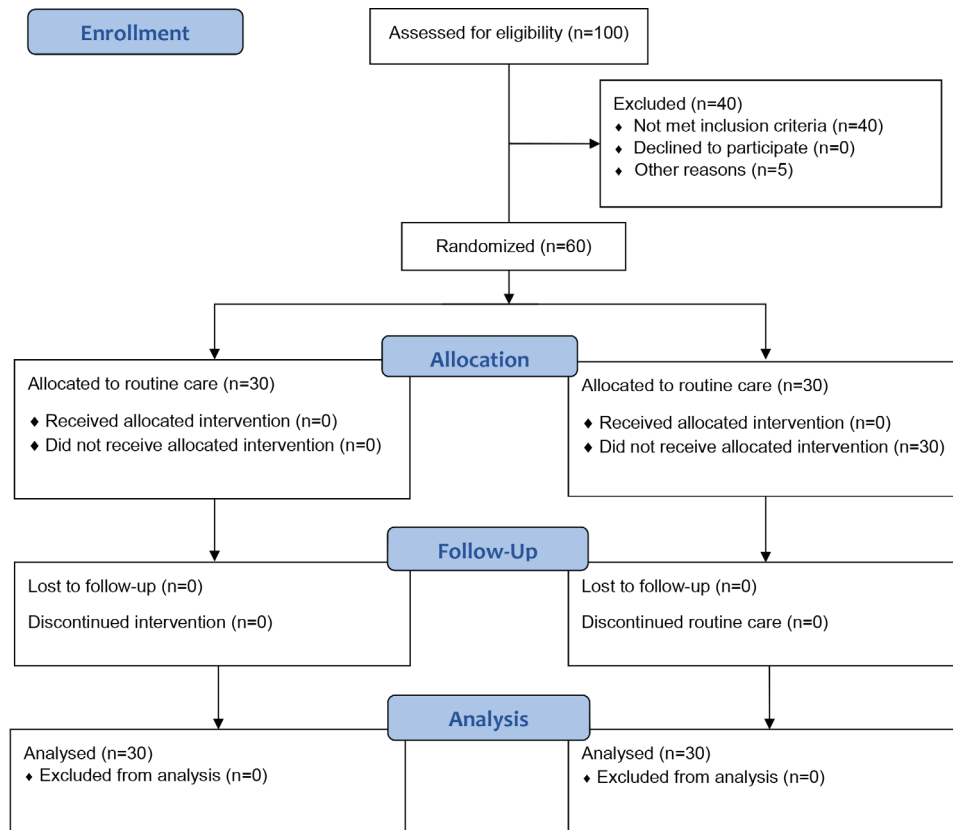
## METHODS

This study is a randomized clinical trial conducted on 60 mothers from January 2020 to February 2021. The research site was the NICU of the university hospitals of Mashhad (Imam Reza Hospital, Ghaem Hospital, Om-Al-Banin Hospital, and Hasheminejad Hospital).

The sample size was calculated separately in two occasions for each dependent variable, and finally the largest number was considered as the minimum sample size. For this purpose, the sample size for stress coping styles, using the formula of “Sample size for comparing two independent samples”, was calculated to be 26 in each group, following the results of the study of Karbandi et al. (2018) who determined the minimum sample size by comparing the mean ( $M_1:22.5$ ,  $M_2:19.8$ ) and standard deviation ( $S_1:9.0$ ,  $S_2:7.0$ ) of dependent variables (19). Regarding the variable of emotional self-efficacy, due to the lack of a similar study, we conducted a pilot study. Based on the results of a pilot study on 10 mothers, using the formula of “Sample size for comparing two independent samples”, the sample size for emotional self-efficacy was calculated to be 25 for each group ( $S_1: 10.2$ ,  $S_2: 13.1$ ,  $d: 9.3$ ). Then, the higher number (26 in each group) was considered for sample size, and 20% was added due to the possibility of attrition. In calculating the minimum sample size, 95% confidence level and 80% test power were considered in this study. Finally, 30 participants were considered for each group. They were selected using convenience sampling method according to the inclusion criteria at least 48 hours after the birth of the baby. Inclusion criteria were the age of neonate under 32 weeks, no maternal history of known chronic physical or mental illness, at least primary education, maternal age of 18 years or older, no history of preterm birth in previous deliveries, and no major congenital defects in the neonate. Exclusion criteria were the mother’s unwillingness to continue the study, discharge of the neonate before the end of the intervention, absence of the mother

for more than one session in the intervention sessions, and neonate death. In this study, randomization was done for hospitals. In this regard, by drawing lots, initially two hospitals were considered for the intervention group and two other hospitals for the control group; thus, 15 mothers were assigned to each group of hospitals (15 mothers from 2 hospitals for the intervention group and 15 mothers from 2 hospitals for the control group). After discharge of this number of participants, this time hospitals already considered for the control group were used for the intervention groups and vice versa, and mothers were assigned to each group of hospitals like the previous procedure. Finally, 30 mothers were assigned to the intervention group and 30 to the control group.

After obtaining approval from the Ethics Committee of Mashhad University of Medical Sciences and being registered in the Iranian Registry of Clinical Trials, we sent an official letter of introduction to the researcher to enter the research site. The researcher (first author) passed the problem-solving skills training course and received the necessary certificate. Then, by presenting a letter of introduction to the officials of the university hospitals and obtaining their consent, the mothers of preterm neonates who met the inclusion criteria were selected. After stating the objectives of the study, the researcher obtained written informed consent from the mothers and assigned them to two groups of control and intervention (Figure 1). Then, the demographic information form for each research unit was completed individually based on the data in the medical record. Afterward, before the intervention, the instruments related to problem-solving, stress coping styles, and emotional self-efficacy were completed in both groups. The researcher answered the participants’ questions and cleared up any ambiguities while the participants were filling out the questionnaire. The control group received the routine care process in the ward and completed the tools again at the end of the second week and four weeks later.



**Figure 1:** CONSORT flowchart of the study

The intervention group was divided into groups of 3-5 subjects to attend 6 sessions of at least 60 minutes held 3 times a week for two weeks and received training on problem-solving skills based on the method of D’Zurilla and Goldfried (1971) (15). The participants in this group completed the tools immediately after the end of the intervention, at the end of the second week, and four weeks later. Meetings were held in the mothers’ room at the NICU. In both groups, most of the mothers completed the third round of questionnaires (at four weeks after the end of intervention) in the hospital and the rest of the mothers received the questionnaires before discharge and sent them to the researcher via Telegram or WhatsApp at the due date. Also, to be aware of the changes in problem-solving skills in the mothers under study, the Heppner-Peterson problem-solving inventory was completed by both groups before and immediately after the intervention. Given that D’Zurilla and Goldfried (1971) identified the stages of (a) general orientation or “set,” (b) problem definition and formulation, (c) generation

of alternatives, (d) decision making, and (e) verification (15), the content of the problem-solving sessions for the intervention group was formulated in Table 1. In this study, blinding was performed for the statistical analyst.

The instruments used in this study included a demographic information form, Heppner-Peterson problem-solving inventory, Folkman and Lazarus’ Ways of Coping Questionnaire, and the emotional self-efficacy scale.

The demographic information form was a researcher-made tool, including date of admission, date of delivery, mother’s details (age, insurance coverage, mother’s level of education, mother’s employment, type of delivery, number of deliveries), and baby’s characteristics (sex, weight, gestational age, and Apgar score). Face and qualitative content validities of this form were approved by 7 experts (3 faculty members of nursing school, 2 neonatal nurses, 1 psychiatric nurse, and 1 neonatologist) in this study.

The Heppner-Peterson problem-solving inventory was designed in 1988 to assess people’s perception of their problem-solving ability.

**Table 1:** The content of the problem-solving training sessions for the intervention group

Session	Content
First	General Orientation: A. Introducing and expressing the principles of group work and the purpose of the intervention, the total number of sessions, and the number and length of each session per week; asking mothers about their expectations of the group program and the changes they would like to see in their current situation; and asking about their problems in their current situation (the birth of a premature infant) B. Situation recognition - accepting the problem as a potential and changeable natural phenomenon; believing in the effectiveness of the problem-solving framework in dealing with the problem; expecting high self-efficacy in order to execute the model steps; and getting used to stopping, thinking and then trying to solve a problem.
Second	Reviewing the previous session, defining and formulating the problem (what is the problem?) - Gathering all available information, separating the facts from hypotheses that need research, analyzing the problem, and identifying the real goals.
Third	Generating alternative solutions, determining a range of possible solutions to select the most effective one through brainstorming without any judgment or inhibition, not evaluating it as good or bad, and choosing the most effective answer possible from among the answers.
Fourth	Decision making, anticipating the possible consequences of each solution, and paying attention to the benefits of the consequences of each solution.
Fifth	Implementation of the selected solution. Based on priority and proportionality to the mother's value system, at this stage, mothers were encouraged to evaluate their proposed solutions to problems and to implement the problem-solving method step by step.
Sixth	Reviewing and observing the results of the implementation of each solution and evaluating them.

There were 32 items scored using a 6-point Likert scale (1: strongly agree to 6: strongly disagree). This tool has 15 negative statements that are scored inversely. The problem-solving skill scores range from a minimum of 32 to a maximum of 192 and a lower score indicates a higher problem-solving ability. The instrument has a high internal consistency (0.90). Based on the test-retest method, the reliability of the instrument was reported to be in a range of 0.83 to 0.89. Factor analysis revealed 3 distinct constructs: Problem-Solving Confidence, Approach–Avoidance Style, and Personal Control (20). To test its validity in Iran, Feizi Konjini et al. gave the instrument to 13 experts, obtaining a content validity ratio of 1 for all items of this questionnaire and a content validity index between 0.7 and 1. The internal consistency of the instrument was also reported to be good using Cronbach's alpha coefficient ( $\alpha=0.80$ ) (21). In this study, qualitative content validity and content validity ratio of 1 for all items of this tool was confirmed based the opinion of 7 experts. Also, internal consistency of the instrument was good (using Cronbach's alpha coefficient;  $\alpha=0.84$ ). It is noteworthy

that the reason for measuring the variable of problem-solving skills in mothers was that the researcher checked how much problem-solving sessions could lead to the improvement of this skill and ability in mothers.

The Ways of Coping Questionnaire is a 66-item test developed by Folkman and Lazarus in 1980 and revised in 1985 (22). This questionnaire assesses the wide range of thoughts and actions that people have when faced with external or internal stressful situations. This questionnaire evaluates two coping styles (i.e., problem-focused style and emotion-focused style). The 16 questions of this questionnaire are distractors, and the other 50 questions assess the individual's coping style based on a 4-point Likert scale (0=does not apply and/or not used; 3=used a great deal). Problem-focused style scores (with 23 items) are between 0-69 and emotion-focused style scores (with 27 items) are between 0-81. In problem-focused style, a higher score indicates better coping styles; also, in emotion-focused style, a lower score indicates better coping styles. Folkman and Lazarus reported the reliability of this questionnaire as 0.79 using Cronbach's alpha method (22).

Clark et al. (1995) found adequate convergent ( $AVE > 0.5$ ) and discriminant ( $r = 0$ ) validity for the scale (23). In Iran, the validity of this tool has been reported acceptable by Samsi Khani et al. (2007). The CVR was reported 0.76. The reliability, using Cronbach's alpha method, in the Iranian sample is reported to be 0.93 (24). In this study, qualitative content validity and content validity ratio of 1 for all items of this tool were confirmed based the opinion of 7 experts. Also, the internal consistency of the instrument was good (using Cronbach's alpha coefficient;  $\alpha = 0.88$ ).

The Emotional Self-Efficacy Scale is a 32-item test developed by Kirk, Schutte, and Hine (2008). The questions are scored using a five-point Likert scale (1: strongly disagree to 5: strongly agree). The Emotional Self-Efficacy Scale score ranges from a minimum of 32 to a maximum of 160. A higher score indicates better emotional self-efficacy. The internal consistency of the test questions was reported to be 0.96 based on Cronbach's alpha coefficient. The test-retest reliability coefficient of the scale was calculated to be 0.85. The validity of the scale has also been reported to be sufficient by measuring its correlation with related constructs (17). This questionnaire was translated into Persian in Iran by Khodayarifard et al. (2012). The convergent validity of the scale in terms of the correlation coefficient of this instrument with the Emotional Intelligence Scale was 0.76. The test-retest reliability of the scale was 0.81, and its internal consistency according to Cronbach's alpha was 0.79 (25). In this study, the qualitative content validity of this tool and content validity ratio of 1 for all items of this tool were confirmed based the opinion of 7 experts. Also, the internal consistency of the instrument was good (using Cronbach's alpha coefficient;  $\alpha = 0.82$ ).

After data collection, statistical analysis was performed using SPSS version 21. In this study, mother's coping styles were the primary and mothers' emotional self-efficacy was the secondary outcome variables. To decide on the use of an appropriate test to

compare demographic variables in the two groups, first, the normality of the distribution of quantitative variables was examined by Kolmogorov-Smirnov and Shapiro-Wilk tests, and a significance level of 5% was considered. The independent t-test was used to compare the two groups in terms of quantitative normal variables, Mann-Whitney test was used for quantitative variables with non-normal distribution, and Chi-square and Fisher's exact tests were used for nominal variables. For within-group tests and comparison of the three stages of before, immediately after the end of the intervention, at the end of the second week, and four weeks later, analysis of variance with repeated measures was used for normal variables. Bonferroni post hoc tests were used for pairwise comparisons between the stages. Independent and paired t-tests were used for comparison of the mean of variables between and within groups, respectively.

This study obtained approval from the Ethics Committee of Mashhad University of Medical Sciences (Reference Code: IR.MUMS.NURSE.REC.1398.068). Written informed consent was obtained from all mothers who participated in this study. Also, data were analyzed confidentially and anonymously. The mothers were also assured that they can withdraw from the study at any time they wished without affecting the treatment process of their baby. Also, at the end of the study, the content of the problem-solving training program was provided to the control group.

## RESULTS

The results of the demographic variables of the studied mothers and neonates are shown in Table 2. The mean age of mothers in the intervention and control groups was  $30.70 \pm 6.90$  and  $30.3 \pm 6$  years, respectively. The mean of gestational age (weeks) of neonates in the intervention and control groups was  $28.6 \pm 1.80$  and  $28.7 \pm 1.50$  weeks, respectively. The results of statistical tests showed that the two groups were homogeneous in terms of demographic variables.

**Table 2:** Demographic variables of the mothers and neonates in the intervention and control groups

Variable	Group		P value
	Intervention (N=30) Mean±SD	Control (N=30) Mean±SD	
Mother's age (years)	30.70±6.90	30.30±6.00	0.84*
Neonate's weight (gr)	1186.00±333.20	1231.00±245.50	0.55*
Gestational age (weeks)	28.60±1.80	28.70±1.50	0.87*
Apgar			
First minute	5.80±2.30	6.10±1.90	0.53*
Fifth minute	7.70±1.60	7.80±1.50	0.88*
Mother's education level	N (%)	N (%)	
Primary	10 (33.30)	15 (50)	0.18**
Diploma	14 (46.70)	8 (26.70)	
College	6 (20)	7 (23.30)	
Mother's employment			
Housewives	29 (96.70)	26 (86.70)	0.35***
Employed	1 (3.30)	4 (13.30)	
Mother's insurance			
Has	28 (93.3)	27 (90.0)	1.00***
Doesn't have	2 (6.7)	3 (10.0)	
Type of delivery			
Vaginal	12 (40)	14 (46.70)	0.60**
Cesarean	18 (60)	16 (53.30)	
Parity			
1	12 (40)	16 (53.30)	0.44**
2	13 (43.30)	9 (30)	
3	4 (13.30)	3 (10)	
4	1 (3.30)	2 (6.70)	
Neonate's sex			
Girl	14 (46.70)	14 (46.70)	1.00**
Boy	16 (53.30)	16 (53.30)	

\*Independent t-test; \*\* Chi-square; \*\*\*Fisher's exact test

The results showed that the mean score of mothers' problem-oriented coping style in the two groups was not statistically significant before the intervention (P=0.78). Also, compared with the control group, in the intervention group, the problem-oriented coping style immediately after the intervention (P<0.001) and one month after it (P<0.001) had a higher increase in comparison with before the intervention. According to within-group comparison, repeated measures test in the intervention group showed a significant difference between intervals (P<0.001). Bonferroni post hoc test showed a significant difference between the scores obtained immediately after the intervention (P<0.001) and one month after it (P<0.001) and those recorded before the intervention, but this test did not show a significant difference

between the scores of immediately after the intervention and one month after it (P=0.66). In the control group, the repeated measures test did not show a significant difference between the intervals (P=0.79) (Table 3).

The results also showed that the mean score of mothers' emotion-oriented coping style in the two groups was not statistically significant before the intervention (P=0.057). The emotion-oriented coping style of mothers in the intervention group was significantly lower compared with the control group, immediately after the intervention (P=0.01) and one month after it (P<0.001). In the within-group comparison, the test of repeated measures showed a significant difference between the intervals in the intervention group (P<0.001). Bonferroni post hoc test showed a significant difference between

**Table 3:** Mean and standard deviation of mothers' problem-oriented coping style before, immediately after, and one month after the intervention in the intervention and control groups

Problem-oriented coping style	Group		P value*
	Control (N=30)	Intervention (N=30)	
	Mean±SD	Mean±SD	
Before intervention	38.50±10.30	37.90±6.30	0.78
Immediately after intervention	39.00±6.50	46.20±5.30	<0.001
One month after intervention	39.30±7.70	47.50±5.60	<0.001
Differences between immediately after the intervention and before the intervention	0.50±6.70	8.20±5.20	<0.001
Differences between one month after the intervention and before the intervention	0.80±9.30	9.60±7.40	<0.001
Differences between one month after intervention and immediately after the intervention	0.30±5.90	1.40±6.00	0.88
P value**	0.79	<0.001	

\*Independent t-test; \*\*Repeated measurement

**Table 4:** Mean and standard deviation of mothers' emotion-oriented coping style before, immediately after, and one month after the intervention in the intervention and control groups

Emotion-oriented coping style	Group		P value
	Control (N=30)	Intervention (N=30)	
	Mean±SD	Mean±SD	
Before intervention	39.40±10.80	44.00±6.90	0.057*
Immediately after intervention	43.70±8.60	38.60±6.20	0.01**
One month after intervention	44.90±6.90	38.00±4.40	<0.001**
Differences between immediately after the intervention and before the intervention	4.30±8.00	-5.40±5.30	<0.001*
Differences between one month after the intervention and before the intervention	5.50±10.50	-6.00±7.10	<0.001*
Differences between one month after intervention and immediately after the intervention	1.20±7.0	-0.50±5.00	0.27*
P value***	0.005	<0.001	

\*Independent t-test; \*\*Univariate Analysis of Variance; \*\*\*Repeated measurement

the scores obtained immediately after the intervention ( $P<0.001$ ) and one month after it ( $P<0.001$ ) and those recorded before the intervention. Still, the test did not show a significant difference between the scores one month after the intervention and those of immediately after it ( $P=1.00$ ). In the control group, the repeated measures test showed a significant difference between the intervals ( $P=0.005$ ). Bonferroni post hoc test showed a significant difference between the scores obtained immediately after the intervention ( $P=0.02$ ) and one month after it ( $P=0.02$ ) and those recorded before the intervention. Still,

the test did not show a significant difference between one month after the intervention and immediately after ( $P=1.00$ ) (Table 4).

The present study showed that the difference between the mean scores of mothers' emotional self-efficacy in the two groups before the intervention was not statistically significant ( $P=0.83$ ). Compared with before the intervention, emotional self-efficacy immediately after the intervention ( $P=0.007$ ) and one month after it ( $P<0.001$ ) increased significantly in the intervention group, and this increase was greater than that in the control group. The increase in emotional



self-efficacy one month after the intervention was greater than that immediately after it in the intervention group, but it decreased in the control group. Regarding within-group comparison, repeated measures test showed significant differences between the scores obtained at different intervals in the intervention group ( $P < 0.001$ ). In this group, the Bonferroni post hoc test showed a significant difference between the scores obtained immediately after the intervention ( $P < 0.001$ ) and one month after it ( $P < 0.001$ ) and those recorded before the intervention; however, no significant difference was shown between the scores obtained one month after the intervention and immediately after it ( $P = 0.12$ ). In the control group, the repeated measures test showed a significant difference between the scores obtained at different intervals ( $P = 0.03$ ). Bonferroni post hoc test showed a significant difference between the scores obtained immediately after the intervention and those recorded before the intervention ( $P = 0.03$ ), but no significant difference was seen between the scores obtained one month after the intervention and before the intervention ( $P = 0.80$ ), and between those obtained one month after the intervention and immediately after it ( $P = 0.33$ ) (Table 5).

Also, the results of the present study showed that the comparison of the mean total scores of problem-solving skills in mothers before the intervention between the two groups was not statistically significant ( $P = 0.617$ ). The mean total score of problem-solving skills immediately after the intervention compared to before it decreased in the intervention group, but it increased in the control group. Independent t-test showed that this difference was significant ( $P < 0.001$ , CI: 23.49-33.37). As to within- group comparison, paired t-test showed a significant difference between the scores at different intervals in the intervention group ( $P < 0.001$ ) and in the control group ( $P = 0.025$ ) (Table 6).

## DISCUSSION

The results of the present study showed that the mean score of problem-oriented coping style of the studied mothers in the intervention group increased immediately after the intervention and one month after it, while the mean score of emotion-oriented coping style of the studied mothers in the intervention group decreased immediately after the intervention and one month after it. Along with this line of research, a study showed that problem solving training based on D’Zurilla and Goldfried’s model led

**Table 5:** Mean and standard deviation of mothers’ emotional self-efficacy before, immediately after, and one month after the intervention in the intervention and control groups

Emotional self-efficacy	Group		P value*
	Control (N=30)	Intervention (N=30)	
	Mean±SD	Mean±SD	
Before intervention	113.70±8.10	113.00±14.90	0.83
Immediately after intervention	121.50±13.80	130.30±10.60	0.007
One month after intervention	117.20±13.20	134.50±8.30	<0.001
Differences between immediately after the intervention and before the intervention	7.80±15.60	17.30±12.70	0.01
Differences between one month after the intervention and before the intervention	3.60±17.20	21.50±12.60	<0.001
Differences between one month after intervention and immediately after the intervention	-4.30±14.10	4.20±10.70	0.01
P value**	0.03	<0.001	

\*Independent t-test; \*\*Repeated measurement

**Table 6:** Mean and standard deviation of mothers' problem-solving skill before and immediately after the intervention in the intervention and control groups

Problem solving skill	Group		P value*
	Control (N=30)	Intervention (N=30)	
	Mean±SD	Mean±SD	
Before intervention	103.80±16.50	105.60±9.90	0.617
Immediately after intervention	109.70±18.20	81.40±9.80	<0.001
Differences between immediately after the intervention and before the intervention	5.80±13.50	-24.20±11.30	<0.001
P value **	0.025	<0.001	

\*Independent t-test; \*\*Paired T Test

to a significant increase in problem-oriented coping strategies and a significant decrease in emotion-oriented strategies in women with type 2 diabetes in the intervention group (26). Another study showed that teaching students problem solving skills caused a change in their coping strategies, and the difference between the intervention and control groups in terms of using problem-oriented coping styles was statistically significant (27). A study was conducted on the effect of problem-solving training on the dimensions of stress coping strategies and student responsibility. The results showed that the intervention group tended to use more problem-oriented strategies after training (28). Another study aimed to determine the effects of teaching problem-solving skills in mothers with children who had recently developed autism spectrum disorder. The results of their study showed an increase in problem-solving skills in the mothers of the intervention group immediately after the intervention and three months after it. Also, the distress of the mothers in the intervention group was significantly reduced (29).

The results of the above studies are consistent with those of the present study. Given the emphasis of problem-solving training on problem identification and methods of solving it, this training can affect problem-coping styles. People who use problem-oriented and adaptive coping styles use behaviors to reconstruct the problem cognitively and use coping techniques based on correct recognition of the problem (15). According to the results in our study, given the content of the intervention

sessions, increasing mothers' use of problem-oriented coping styles in this study was not far from expectation.

Contrary to the results of the present study, a study that aimed to determine the effect of maternal empowerment in neonate care on stress-coping styles in mothers with preterm neonates found no significant difference between mothers in the intervention and control groups in their use of problem-oriented and emotion-oriented coping styles (19). One of the reasons for the inconsistency of the results of their study with our findings could be attributed to the fact that in the aforementioned study, only one source of maternal stress which is the ability to care for preterm neonates was addressed, while stress coping styles are a psychological variable. Thus, the intervention needs to be psychological in nature and should focus, in an organized and planned fashion, on how the mother thinks about, recognizes, and analyzes a problematic situation so that her cognitive and behavioral skills as well as her coping abilities are promoted against this situation. These considerations were considered while designing the intervention in the present study, which included the use of problem-solving skills. Also, the results of another study showed that the effect of problem-solving training on adoption of some coping strategies such as emotional control and physical control by students was not statistically significant (27). This result is not consistent with those of the present study either, which could be due to the differences in

the research population (students) and nature of the problematic situation in the two studies, and the small sample size in their study (10 participants in each group).

The results of the present study showed that the emotional self-efficacy of the mothers in the intervention group was higher than that in the control group immediately after the intervention and one month after it. A study investigated the effectiveness of cognitive-behavioral therapy (CBT) and acceptance and commitment therapy (ACT) on the emotional self-efficacy of female-headed households. The results of this study showed that there was a significant difference among the control, ACT, and CBT groups in terms of emotional self-efficacy. Based on the results of these two interventions, ACT and CBT caused a significant increase in emotional self-efficacy of female-headed households compared to the control group (30). Other researchers also studied the improvement of emotional intelligence and emotional self-efficacy through a training intervention for university students. The results of this study showed that there was a possibility of promoting emotional self-efficacy and some aspects of emotional intelligence ability in this way (31). People who can manage negative emotions and are not affected by these emotions have high emotional self-efficacy (17). In the present study, the mothers in the intervention group achieved higher levels of emotional self-efficacy compared with those in the control group, thanks to using stress coping styles based on problem recognition and negative emotion management while dealing with situational stress of preterm birth.

Teaching problem-solving skills based on a valid and established model proposed by D'Zurilla and Goldfried and using valid tools to measure dependent variables are the strengths of this study. It is noteworthy that the precise control of some variables was beyond the researcher's ability, which were considered as the limitations of the research. This limitation includes the personality

characteristics of the mothers participating in the research.

## **CONCLUSION**

Problem-solving skills are effective in using coping styles (i.e., increasing the use of problem-oriented styles and reducing the use of emotion-oriented styles) and promoting the emotional self-efficacy of mothers of preterm neonates. Therefore, teaching and applying problem-solving skills, as an intervention with a cognitive-behavioral approach to empower mothers to use appropriate strategies for dealing with the situational stress of preterm birth and to promote mothers' emotional self-efficacy, can provide a special opportunity to provide safe care for mothers with preterm neonates in the NICU. It is suggested that the effect of applying problem-solving skills on other psychological variables of these mothers should be studied in the future.

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## **Authors' Contribution**

MB, MR, SV, and TS were responsible for the conceptualization and design of this study. The data analysis and interpretation were carried out by MB & MR. MB & MR drafted the initial manuscript. All authors critically reviewed, revised the manuscript, and approved the final version for publication. All authors take responsibility for the integrity of the data and the accuracy of the data analysis. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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