

Effect of Infant Care Training on Maternal Bonding, Motherhood Self-Efficacy, and Self-Confidence in Mothers of Preterm Newborns

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Accepted: 20 November 2021 / Published online: 27 November 2021 © The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2021

Abstract

Aim This study aims to evaluate the effect of infant care training on maternal bonding, motherhood self-efficacy, and self-confidence in mothers of preterm newborns and examine the relationship between them.

Method The study was conducted experimentally with pre-test and post-test control groups in the Maternity Hospital. The population of the study consisted of late preterm newborns and their mothers (N=81) who met the inclusion criteria of the study. Data was collected with an information form, a maternal bonding scale (MBS), a perceived maternal parenting self-efficacy scale (PMP-SE), and a Pharis self-confidence scale (PSCS). Mothers of the infants in the experimental group were given preterm infant care training as a nursing initiative.

Results In the study, the post-test MBS scores significantly increased in the experimental group, with a significant difference between all the sub-dimensions and the total scores of the PMP-SE post-test of mothers in both groups (p < 0.001). The post-test PSCS scores were significantly higher in the experimental group (p < 0.01). The correlation between MBS and PMP-SE (p < 0.05) mean scores of the mothers was positive, a correlation between PMP-SE and PSCS (p < 0.001) mean scores was positive and a correlation between PSCS and MBS (p < 0.05) mean scores was positive.

Conclusions The existence of a directly proportional relationship between the variables of maternal bonding, motherhood self-efficacy, and self-confidence may mean that motherhood self-efficacy can be increased and motherhood self-confidence can be enhanced by supporting maternal bonding. Further studies starting from the prenatal period are recommended.

Keywords Preterm newborn · Maternal bonding · Motherhood self-efficacy · Self-confidence

Significance

What's already known Maternal bonding and motherhood self-efficacy perceptions are regarded as the main components of a healthy growth and developmental process. Prematurity adversely affects maternal bonding and motherhood self-efficacy.

What's new Infant care education given to mothers of late preterm newborns can positively support maternal bonding, motherhood self-efficacy, and self-confidence.

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Introduction

The preterm birth of a infant might make new mothers feel unprepared in taking care of their infants. The reason why mothers perceive themselves as unprepared is that they are not physically, emotionally, and psychologically ready for preterm births (Çakmak & Karaçam, 2018; Cho et al., 2016).

Since preterm newborns are immature, they need more intensive care and maternal support. Preterm newborns who were not with their mothers for a long time starting from the early neonatal period and had to struggle with lifethreatening diseases in the NICU were under the threat of the disruption of a healthy growth and development process (Çakmak & Karaçam, 2018).

Preterm neonates were physiologically different from term neonates and were highly at risk of developing health problems. The apnea, respiratory disorders, hypothermia, fever, infection, hyperbilirubinemia, feeding, and developmental problems were the most common causes of



hospitalization after discharge. This condition of preterm newborns requires regular counseling for new mothers (Cho et al., 2016; Jain, 2006), and mothers need relevant information to care for their newborn infants (Çınar & Öztürk, 2014).

In studies of mothers of preterm newborns, it has been observed that mothers felt unprepared when they assumed full responsibility after the infants were discharged, because they needed education in the care of their infants, and they preferred not to be involved in the infant care process since they did not feel confident in themselves (Çakmak & Karaçam, 2018; Davis-Strauss et al., 2021). Similarly, the health problems of preterm newborns, such as diaper rash, thrush, and neonatal seborrheic dermatitis, were significantly reduced with adequate maternal education (Karaçam & Sağlık, 2018). Other studies reported that preterm birth and hospitalization of the infant adversely affected maternal bonding and the development of the maternal role (Barnes & Adamson-Macedo, 2007; Davis-Strauss et al., 2021; Fernández Medina et al., 2018).

Maternal bonding and motherhood self-efficacy perceptions are regarded as the main components of a healthy growth and developmental process. Prematurity adversely affects maternal bonding and perceived motherhood self-efficacy (Korja et al., 2012). At the same time, an inadequate level of maternal bonding and perceived motherhood self-efficacy negatively affected infant care (Shrestha et al., 2016).

Previous studies related to this subject generally focused on neonates (Davis-Strauss et al., 2021; Korja et al., 2012), and the studies relating to preterm neonates did not correlate maternal bonding, perceived maternal self-efficacy, and self-confidence. However, this study evaluated the effect of infant care training on maternal bonding, motherhood self-efficacy, and self-confidence in mothers of preterm newborns and examined the relationship between them.

Methods

The study was conducted experimentally with a pre-test and post-test control group at the NICU of a Maternity Hospital in Eastern Anatolia. The population of the study consisted of neonates and their mothers (N=81) who met the inclusion criteria of the study between January 1 and June 30, 2017.

The inclusion criteria for the study were as follows: being a breastfed late preterm newborn that received treatment and care in the NICU, and did not have a high risk (such as infants who were not ventilated, intubated, or had an exchange transfusion) and being a mother who did not need advanced intervention during childbirth, stayed at the hotel for mothers in the unit, gave birth at 34–36 gestational

weeks, and was open to communication and cooperation and did not have a diagnosed psychiatric illness.

A priori power analysis was performed before the study was carried out to determine the sample size (Perugini et al., 2018). The size of the study group was 62, with a significance level of 0.05, a confidence interval of 95%, and a sample representation level of 99%. Although the study group included 81 mothers of preterm newborns, 15 of them whose babies' condition worsened and three others who left the research voluntarily were excluded from the study. The final study size was 63.

Data was collected with an information form (IF), an MBS, a perceived maternal parenting self-efficacy scale (PMP-SE), and a PSCS.

IF This form, which was prepared from existing literature by the researchers, consisted of four questions about the newborn and nine questions about the mother, addressing identity, such as the gender of the newborn, gestational week, mode of delivery, birth weight, diagnosis, as well as the mother's age, educational background, profession, and consanguineous marriage.

MBS This scale was developed by Müller (1994) to measure maternal bonding, and he found that the reliability coefficient of the scale was 0.85 in mothers of newborns. The Turkish version of the MBS was adopted by Kavlak and Şirin (2009) and the alpha reliability coefficient was 0.77 in the mothers of newborns. MBS measured maternal sense and behavior. Since the MBS was a self-administered scale, it could be applied to mothers who knew how to read and write and understood what they read. MBS was a 4-point Likert-type scale that consisted of 26 items. The scale included direct expressions graded between 1 and 4 (1 = never, 2 = sometimes, 3 = often, 4 = always). The scores that were obtained from the scale were between 26 and 104. High scores indicated a high level of maternal bonding (Kavlak & Sirin, 2009). In this study, the internal consistency coefficient of the scale was found to be 0.956.

PMP-SE The validity and reliability of this scale was adopted to Turkish by Kadiroglu (2018), but it was originally developed by Barnes and Adamson-Macedo (2007). The scale evaluated the perceived maternal self-efficacy level of mothers of hospitalized preterm newborns. The reliability coefficient of the scale was 0.98 in mothers of hospitalized preterm newborns. The scale, which consisted of 19 items, was graded between 1 and 4 (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree). Scoring of the scale was calculated by adding the scores obtained. The score obtained from the scale was between 19 and 76. A higher score meant that the level of perceived maternal self-efficacy was also high (Barnes & Adamson-Macedo, 2007).

PSCS This scale was first developed by Pharis (1978). After that, it was studied by Walker in 1986, and the internal consistency coefficient was found to be between 0.71



and 0.91 (Walker et al., 1986). The scale was adapted to Turkish society by Çalışır (2003). The internal consistency coefficient was found to be 0.85 in this adaptation. The scale measured the level of self-confidence of the mothers in caring for their babies. The 5-point Likert type scale consisted of 13 items, graded between 1 and 5 (1 = none, 2 = very little, 3 = moderate, 4 = much, 5 = totally). The scores obtained from the scale were between 13 and 65, and it was applicable to mothers with babies under 1 year of age. A higher score meant that the level of maternal self-confidence was also high. In this study, the internal consistency coefficient was found to be 0.928.

Nursing Initiative

In the study, mothers of infants in the control group received routine care in the NICU. Mothers of the infants in the experimental group were given preterm infant care training as a nursing initiative along with routine care practices in the NICU. The groups were randomly selected, and the study was started with the control group.

After collecting the pre-test data for the control group, the infants and their mothers received routine care. The control group data was obtained between January 1 and March 30, 2017 (n = 33).

After collecting the pre-test data for the experimental group, a infant care training session was held where questions from the mothers were answered, and training manuals were presented. A total of four training sessions, each lasting for 20 min, and three reinforcements were provided once a week until the infants were 1 month old. The experimental group data was obtained between April 1 and June 30, 2017 (n=30).

The topics covered during the preterm newborn care training sessions included body care (mouth, belly, eye, skin, bath, and infant clothing characteristics); nutrition (feeding methods, breast milk, breastfeeding); parent—infant interaction (skin-to-skin contact, eye-to-eye contact); thermoregulation, immunization, and home care of the preterm newborn (sleep, heat and ventilation, sound, light, massage, positioning). Themes such as emotions frequently experienced by newborn mothers, perceptions of the newborn, maternal bonding, motherhood self-efficacy, and self-confidence were also discussed.

The interactive training, using oral presentations, question and answer discussions, feedback, and visual aids, was given in the hospital and at the homes of infants who had been discharged. The training manual was given to mothers in the control group after the post-test data was collected.

Evaluation of Data

IBM SPSS Statistics for *Windows* (Version 20.0; Armonk, New York) statistical package software was used to evaluate the research data. The level of statistical significance was accepted as p < 0.05. The descriptive characteristics of the data were number, percentage, arithmetic mean, standard deviation, and minimum—maximum values. Statistical analyses were conducted using Pearson chi-square, Mann—Whitney U test, Wilcoxon t-test, and Pearson correlation test.

Ethical Principles of the Research

For the research, approval from the ethics committee of a university (Date: 17.06.2016 No: 2016/06/2) and written permission from the relevant institutions were obtained. The mothers who participated in the study were informed about the research, its duration and the procedures that will be applied, and their consent was obtained. Also, voluntarism and confidentiality principles were adhered to.

Results

In the study, 50% of the preterm neonates in the experimental group were females, 43.3% were 36 weeks old, 60% were born vaginally, and 53.3% weighed 2000-2500 g at birth. Also, 60.6% of the preterm neonates in the control group were males, 39.4% were 35 weeks old, 57.6% were delivered by cesarean section, and 48.5% weighed 2000-2500 g at birth. The experimental and control groups were found to be similar in terms of the characteristics of the preterm newborns (p>0.05, Table 1).

The average postnatal age of the mothers in the experimental group was 29.30 ± 6.732 , while the average age of the mothers in the control group was 28.12 ± 6.697 . 50% of the mothers in the experimental group were primary school graduates, 80% had an income equal to their expenditures, 43.3% lived in the city center, 53.3% lived in a nuclear family, 23.3% were experiencing their first pregnancy, 43.3% gave birth to three or more living infants, 86.7% did not have consanguineous marriage, and 90% did not have a chronic disease. 66.7% of the mothers in the control group were primary school graduates, 78.8% had income equal to their expenditures, 48.5% lived in the city center, 66.7% lived in a nuclear family, 27.3% were experiencing their third pregnancy, 39.4% had two living infants, 87.9% did not have consanguineous marriage, and 90.9% did not have a chronic disease. The experimental and control groups were found to be similar in terms of the characteristics of the mothers (p > 0.05, Table 2).

The post-test maternal bonding scores of mothers in the experimental (p < 0.001) and control (p < 0.05) groups



Table 1 Descriptive characteristics of preterm newborns (N=63)

Characteristics	Experimental group		Control group		Total		Test
	n	%	n	%	n	%	p
Gender							
Female	15	50.0	13	39.4	28	44.4	$\chi^2 = 1.714$
Male	15	50.0	20	60.6	35	55.6	p = 0.190
Pregnancy week							
34 week	12	40.0	9	27.3	21	33.3	$\chi^2 = 5.722$ p=0.057
35 week	5	16.7	13	39.4	18	28.6	
36 week	13	43.3	11	33.3	24	38.1	
Type of birth							
Vaginally	18	60.0	14	42.4	32	50.8	$\chi^2 = 3.270$
Cesarean section	12	40.0	19	57.6	31	49.2	p = 0.071
Birth weight							
Under 2000 g	9	30.0	10	30.3	19	30.1	$\chi^2 = 1.120$
2000–2500 g	16	53.3	16	48.5	32	50.8	p = 0.772
Over 2500 g	5	16.7	7	21.2	12	19.0	

 $[\]chi^2$ = Pearson Chi-squared test

increased significantly in intragroup comparisons. In intergroup comparisons, the post-test maternal bonding scores significantly increased in the experimental group (p<0.001, Table 3) while there was no significant difference between pre-test maternal bonding scores of mothers in both groups (p>0.05).

In the intragroup comparisons, the scores of soothing (p < 0.05) and care giving $(p \le 0.01)$, which were the subdimensions of perceived maternal self-efficacy and the total (p < 0.05) post-test scores of the mothers in the experimental group, were significant. However, an insignificant difference was found between all the sub-dimensions of perceived maternal self-efficacy and the total pre-test and post-test scores of the mothers in the control group (p > 0.05, Table 4).

In the intergroup comparisons, the difference between the pre-test scores of the mothers in the experimental and control groups concerning soothing, management, and caregiving sub-dimensions and total average scores were statistically insignificant (p>0.05). A significant difference was found between all the sub-dimensions and the total scores of the PMP-SE post-test of mothers in both groups (p<0.01, Table 4).

The intragroup comparisons revealed a significant difference between the pre-test and the post-test PSCS scores of the mothers in both groups (p < 0.01). However, the intergroup comparisons showed no significant difference between the pre-test scores of the mothers in both groups (p > 0.05), and the post-test PSCS scores in the experimental group were significantly higher (p < 0.01, Table 5).

The results further showed that the correlation between the mothers' MBS and PMP-SE (p < 0.05) mean scores were moderately positive, the correlation between PMP-SE and PSCS (p<0.001) mean scores were also moderately positive but the correlation between PSCS and MBS (p<0.05) mean scores was a low positive (Table 6).

Discussion

The development of a strong maternal attachment between a mother and her newborn infant is necessary for the infant to receive quality care (Cho et al., 2016; Güleşen & Yıldız, 2013). This study shows that maternal bonding in both the experimental and control groups' increases significantly in the first evaluation of intragroup comparisons. A previous study reported that maternal attachment is higher in mothers of preterm newborns than in mothers of term newborns (Hasanpour et al., 2017). Another study examining maternal attachment levels in mothers of newborns for 1 year in the postnatal period, reports that maternal attachment level is highest in the first 4 weeks (O'Higgins et al., 2013). Maternal attachment in the early period is the main determinant of a long-term attachment process. The early maternal attachment is also the strongest dynamic for maternal role development (Kim & Tak, 2015). These results may indicate that early period maternal attachment is a natural process.

Although Güleşen and Yıldız (2013) report that the development of a strong maternal bonding is crucial in maintaining a infant's physical, mental, and emotional health, maternal bonding could also be interrupted after the delivery of a preterm infant, and the emotional state of the mother (Evans et al., 2017) as well as the NICU environment could limit the development of maternal bonding (Fernández Medina et al., 2018). Also the nursing initiatives that provide training for mothers of preterm infants in terms of



Table 2 Descriptive characteristics of mothers (N=63)

Characteristics	Experimental	group	Control group		Total		Test
	n	%	n	%	n	%	p
The average age*	29.30 ± 6.732		28.12 ± 6.697	7	28.65 ± 6.682	,	U=388.500 p=0.362
Educational status							
Primary school	15	50.0	22	66.7	37	58.7	$\chi^2 = 1.086$
Middle-high school	15	50.0	11	33.3	26	41.3	p = 0.297
Perception of income status							
Income equivalent to expense	24	80.0	26	78.8	50	79.4	$\chi^2 = 0.098$
Income is less than expenses	6	20.0	7	21.2	13	20.6	p = 0.754
Living location							
City center	13	43.3	16	48.5	29	46.0	$\chi^2 = 0.840$
District	10	33.3	7	21.2	17	27.0	p = 0.657
Village-town	7	23.3	10	30.3	17	27.0	
Type of family							
Nuclear	16	53.3	22	66.7	38	60.3	$\chi^2 = 0.617$
Extended	14	46.7	11	33.3	25	39.7	p = 0.432
Pregnancy status							
First	7	23.3	7	21.2	14	22.2	$\chi^2 = 0.501$
Second	6	20.0	7	21.2	13	20.6	p = 0.973
Third	5	16.7	9	27.3	14	22.2	
Fourth	5	16.7	5	15.2	10	15.9	
Five or more	7	23.3	5	15.2	12	19.0	
Number of live births							
One	10	33.3	8	24.2	18	28.6	$\chi^2 = 0.792$
Two	7	23.3	13	39.4	20	31.7	p = 0.673
Three or more	13	43.3	12	36.4	25	39.7	
Kinship status with spouse							
Yes	4	13.3	4	12.1	8	12.7	$\chi^2 = 0.000$
No	26	86.7	29	87.9	55	87.3	p = 1.000
Status of being a chronic disease							r
Yes	3	10.0	3	9.1	6	9.5	$\chi^2 = 0.000$
No	27	90.0	30	90.9	57	90.5	p = 1.000

 $[\]chi^2$ =Pearson Chi-squared test, U Mann-Whitney U test

Table 3 Comparison of MBS intra-group and inter-group pretest post-test average scores of the mothers (N=63)

MBS	Experimental g	roup	Control group	Test and p	
	$\overline{x} \pm SS$	Min-Max	$\overline{x} \pm SS$	Min-Max	
Pre-test	90.90 ± 10.67	68–104	91.96±7.94	78–104	U=446.000 p=0.953
Post-test	98.90 ± 9.60	63–104	95.33 ± 6.11	78–104	U=184.000 p = 0.000
Test and p	z = 4.292 p = 0.000		z = -2.047 p = 0.041		

Bold values indicate p < 0.05

U Mann-Whitney U test, z Wilcoxon t-test

infant care, encouragement, and the participation of mothers in the infant care process could facilitate maternal bonding (Fernández Medina et al., 2018; Güleşen & Yıldız, 2013).

In the study, the post-test maternal bonding levels of the mothers in the experimental group were significantly higher than those in the control group. All studies, including our



^{*}Presented as Mean ± SD

Table 4 Comparison of PMP-SE intra-group and intergroup pre-test post-test average scores of the mothers (N=63)

PMP-SE	Experimental group		Control g	group	Test and p	
	$\overline{x} \pm SS$	Min– Max	$\overline{x} \pm SS$	Min– Max		
Soothing						
Pre-test	24.70 ± 10.10	9-36		$25.53 \pm 7.939 - 36$	U = 434.500 p = 0.816	
Post-test	29.73 ± 4.18	22-36		$26.46 \pm 4.7617 - 36$	U = 152.500 p = 0.000	
Test and p	z = -2.262 p = 0.024		z = -912 p = 0.362			
Management						
Pre-test	14.96 ± 5.41	6-20		$14.60 \pm 3.715 - 20$	U = 403.500 p = 0.478	
Post-test	16.76 ± 2.38	12-20		$14.36 \pm 2.699 - 20$	U = 162.000 p = 0.000	
Test and p	z = -1.723 p = 0.085		z = -1.906 p = 0.057			
Giving care						
Pre-test	14.33 ± 4.14	7–20		$15.83 \pm 3.01811 - 20$	U = 368.000 p = 0.222	
Post-test	17.53 ± 2.41	14-20		$15.80 \pm 2.569 - 20$	U = 238.000 p = 0.002	
Test and p	z = -3.092 p = 0.002		z =048	8 p = 0.962		
Total						
Pre-test	54.00 ± 18.60	23-76		$55.96 \pm 13.1125 - 76$	U = 441.500 p = 0.900	
Post-test	63.53 ± 8.67	48-76		$56.63 \pm 9.7336 - 76$	U = 201.500 p = 0.000	
Test and p	z = -2.038 p = .042		z = -0.7	730 p = 0.466		

Bold values indicate p < 0.05

U Mann-Whitney U test, z Wilcoxon t-test

Table 5 Comparison of PSCS intra-group and inter-group pretest post-test average scores of the mothers (N=63)

PSCS	Experimental group		Control group	Test and p	
	$\overline{x} \pm SS$	Min– Max	$\overline{x} \pm SS$	Min- Max	
Pre-test	34.96 ± 10.33	14–52	35.06 ± 8.02	22–46	U=440.500 p=0.888
Post-test	45.46 ± 6.55	34–58	39.26 ± 7.77	23-47	U = 257.000 p = 0.004
Test and p	z = -6.738 p = 0.000		z = -6.740 p = 0.000		

Bold values indicate p < 0.05

U Mann-Whitney U test, z Wilcoxon t-test

Table 6 Assessment of the relationship between scales (N=63)

Scales	PMP-SE		PSCS		MBS	
	r	p	r	p	r	p
MBS	0.332	0.010	_	-	_	_
PMP-SE	_	_	0.642	0.000	_	_
PSCS	_	_	_	_	0.247	0.034

Bold values indicate p < 0.05 Pearson correlation was applied

study, show that providing infant care training to the mothers increases maternal bonding, interaction between the mother and the infant, and the positive responses of the infants to their mothers (Çınar & Öztürk, 2014; Kristensen et al., 2017; Fernández Medina et al., 2018; Moudi et al., 2017; Shoghi et al., 2018).

Motherhood self-efficacy is one of the most important factors that affect the adaptation to the maternal role, according to the studies conducted by Ingram et al. (2016) and Liyana Amin et al. (2018). To provide support and educate mothers of preterm newborns on infant care, to eliminate their negative feelings about the motherhood role and to increase their self-efficacy levels is necessary (Moudi et al., 2017). Therefore, nurses should provide much more information, material and support (Liyana Amin et al., 2018). In the study, the post-test perceived



maternal self-efficacy levels of the mothers in the experimental group were found to be significantly higher compared to the mothers in the control group. This finding, like the other studies, shows that infant care training for mothers whose infants have been hospitalized in the NICU improves perceived maternal self-efficacy.

Our study finds that the post-test maternal self-confidence levels are significantly higher for the mothers in the experimental group than those in the control group. Extant studies have shown that maternal self-confidence increases over time, and it can be improved upon in the early postnatal period with requisite education and training programs (Bagherinia et al., 2017; Matthies et al., 2017).

According to this study, the correlation between maternal bonding and perceived motherhood self-efficacy is positive. Similarly, researchers report that mothers with high self-efficacy perceptions have more attentive, competent, sensitive, and positive interactions with their infants (Hsu & Lavelli, 2005; Leerkes & Burney, 2007) and a high maternal self-efficacy perception strengthens maternal bonding (Shrestha et al., 2016).

The study, also reveal that there is a positive correlation between maternal bonding and maternal self-confidence. Suffice it to say that the self-confidence of the mothers increases with maternal bonding and the development of the maternal role.

The findings of this research further indicate that the correlation between perceived maternal self-efficacy and maternal self-confidence is moderately positive. Other studies report a positive correlation between maternal self-efficacy and maternal roles (Fathi et al., 2018) as well as parental self-efficacy and competence (Pennell et al., 2012). In a study that examined the similarities, differences, measurement congruency, and conceptual limits between parental self-efficacy and self-confidence, the parental self-efficacy and self-confidence determine the capability of parental behaviors, and both capabilities should be used as objective criteria by someone other than the parents in evaluating the quality of parenthood (Vance & Brandon, 2017). Our finding of a direct relationship between perceived maternal self-efficacy and maternal self-confidence indicates that maternal self-confidence can be improved with an increase in maternal self-efficacy.

Limitations

Due to the nature of the study, only the postnatal period was evaluated. Although the results of the study are representative of mothers of late preterm infants, they cannot be generalized to mothers receiving treatment and care in different NICUs.

Conclusions

Infant care education given to mothers of late preterm newborns can positively support maternal bonding, motherhood self-efficacy, and self-confidence. In addition, the existence of a directly proportional relationship between the variables of maternal bonding, motherhood self-efficacy, and selfconfidence may mean that motherhood self-efficacy can be increased and motherhood self-confidence can be enhanced by supporting maternal bonding. Further studies starting from the prenatal period are recommended. The mothers of preterm newborns should be given relevant education and support in line with maternal attachment, self-efficacy, and self-confidence. For future studies, the effects of perinatal depression on maternal behavior should be evaluated, and studies should be designed to investigate the effects of training and reinforcement starting from the prenatal period.

Acknowledgements We wish to thank the nursing staff from the study hospital and all the mothers who kindly agreed to participate in this study. This study was accepted as a doctoral thesis in 2019 and presented as an oral presentation at the 2nd International Congress on Pediatric Nursing between 27–30 November 2019 in İzmir.

Declarations

Conflict of interest The authors declare no conflicts of interest with respect to the research, authorship and/or publication of this article.

Ethical Approval In the study, Atatürk University Nursing Faculty Ethics Committee approval (Date: 17.06.2016 No: 2016/06/2), and written permission from the institution to which the study will be carried out. Adhered to the Helsinki Declaration.

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