

# The Effect of Theory-Based Care on Breastfeeding Self-Efficacy, Anxiety and Breast Milk Release

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## ABSTRACT

**Objective:** The effect of nursing care provided according to Dennis' breastfeeding self-efficacy theory on breastfeeding self-efficacy, anxiety, and breast milk secretion was evaluated.

**Methods:** In this quasi-experimental study, 60 mothers in the first week postpartum were examined. The mothers and their supporters in the Dennis Theory-Based Nursing Care group were trained. Before the training, mothers were given the personal information form and the breastfeeding diary form to be filled out for 15 days. The perception of breastfeeding self-efficacy of mothers was evaluated using the "Postpartum Breastfeeding Self-Efficacy Scale". Their anxiety was determined using the "State Anxiety Scale", and breast milk release was assessed using the "Daily Form for Baby's Adequate Nutrition". The parameters were measured on the first day and 15 days after the training. Routine hospital standard nursing care was provided to the mothers in the control group.

**Results:** The number of formulas given by mothers in the Dennis Theory-Based Nursing Care group to their babies was significantly lower than the number of formulas given by the mothers in the control group ( $Z=-0.90$ ,  $p<.001$ ). While the post-evaluation breastfeeding self-efficacy scores of the mothers in the experimental group were significantly higher ( $Z=6.82$ ,  $p<.001$ ), the post-evaluation anxiety scores were significantly lower than those of the mothers in the control group ( $Z=-6.38$ ,  $p<.001$ ).

**Conclusion:** We found that applying Dennis' Theory-Based Nursing Care increased the breastfeeding self-efficacy level of the mothers and decreased their level of anxiety and the number of formulas that the babies received.

**Keywords:** Dennis theory-based care; self-efficacy; breast milk release; anxiety

## 1. INTRODUCTION

In Türkiye, babies are traditionally breastfed; 71.3% of newborns are breastfed within the first hour after birth (1). However, reasons such as the hospitalization of the infant in the neonatal intensive care unit (NICU) greatly hinder breastfeeding (2). Hospitalization of babies in the NICU may cause intense stress in their families, especially in mothers, which in turn can decrease breastfeeding self-efficacy (BSE) and negatively affect milk production (3, 4). The secretion of human milk, which is important for babies hospitalized in the NICU, is suppressed or decreased (2). Additionally, increasing the quantity of milk secreted or restarting milk secretion is possible in mothers whose milk secretion is suppressed (5). Studies have shown that the factors that increase the secretion of human milk include supporting the mother (2), nipple warning (6), and providing theory-based education (7). Dennis' BSE theory contributes to understanding and strengthening mothers' BSE behaviors.

Following Bandura's definition of self-efficacy theory, Cindy-Lee Dennis created the "Breastfeeding Self-Efficacy Theory" in 1999 by determining the factors and sources that affect the perception of breastfeeding self-efficacy. Dennis stated that mothers are influenced by four sources of information while choosing, applying, and maintaining a behavior (8). Factors affecting mothers' perception of BSE include previous experiences, examples from others, environmental support, and psychological states (8–10). The positive and negative experiences of mothers with breastfeeding influence the effort and the outcome of the current effort to achieve breastfeeding success (8, 11). For the mother to achieve individual success, her self-efficacy must first be increased (12). Peer mothers with successful breastfeeding experiences should be used as positive role models to encourage breastfeeding behaviors among new mothers or mothers who have failed at breastfeeding. This can increase the impact of the modeled behavior (8). For example, a mother breastfeeding her baby for the first time will feel more

comfortable when she sees others breastfeed their babies. This will ensure that the baby is satiated and breastfeeding is successful (13, 14). Some studies have stated that focusing attention on successful aspects of a breastfeeding act and praising the mother's current breastfeeding skills increases their self-efficacy (8). The support provided by a spouse to the mother taking care of the baby increases her perception of breastfeeding self-efficacy (12). The support provided to mothers by lactation consultants, health professionals, peers, family members, and friends is effective in increasing breastfeeding success (9, 14). Dennis emphasized that the success of breastfeeding depends on whether the mother is emotionally comfortable (8).

No study based on Dennis' BSE theory has been conducted with mothers whose babies were hospitalized in the NICU. Therefore, this study was conducted with mothers of babies admitted to the NICU, and the effects of nursing care provided to the mothers on their BSE, anxiety, and milk were evaluated according to Dennis's BSE theory.

### Research Hypotheses

Nursing care was given according to Dennis' BSE theory.

$H_{1a}$ : The number of formulas given by mothers in the Dennis Theory-Based Nursing Care group (Dennis TBNC group) to their babies and that given to the babies by mothers in the control group is different.

$H_{1b}$ : The BSE perceptions of the mothers in the Dennis TBNC group and the control group are different.

$H_{1c}$ : The anxiety levels of the mothers in the Dennis TBNC group and the control group are different.

## 2. METHODS

### 2.1. Research Type

This was a pretest-posttest quasi-experimental study.

### 2.2. Population and Sample

The study was conducted between 2018 and 2020. The participants included mothers of infants hospitalized with weight loss in the NICU of a state hospital in the Central Anatolia region in Türkiye.

**Number of samples:** The number of samples required was calculated based on the criteria of 80% power and 5% margin of error, according to the power analysis. In total, 60 participants, 30 each in the Dennis TBNC group and the control group, were included in the study along with their supporters (Figure 1). According to the power analysis conducted at the end of the research, the effect size was found to be .3679.

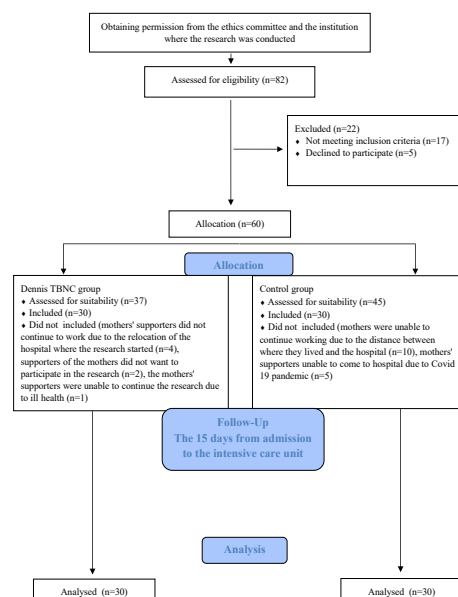


Figure 1. Flow chart

The inclusion criteria for the study were as follows: individuals were at least 18 years old, did not have any disease that might affect milk secretion and breastfeeding, had little or no human milk, were not on drugs that could prevent breastfeeding, had a relative who could support them (preferably their spouse), and whose supporter agreed to participate in the training program. The inclusion criteria for babies were as follows: they were less than seven days old, did not have any problem that might affect sucking, were born at a normal gestational week and weight, had a weight loss of at least 7% compared to their birth weight, and had dark urine output six times a day or less.

### 2.3. Data Collection Tools

The data were collected using a personal information form, breastfeeding diary form, postpartum BSE scale (BSES), and state anxiety scale.

**Personal information form:** The form was prepared based on a literature review performed by the researchers (9, 10, 15). The form consisted of 21 items on maternal sociodemographic, obstetric, and breastfeeding characteristics and infant gender, birth weight, birth week, weight during admission to the intensive care unit, diet, and urinary characteristics.

**Breastfeeding diary form:** The form was developed by the researcher based on previous studies (2, 3, 5, 6) and included questions about the amount of fluid intake of the mother the previous day, the amount of breast stimulation, the practices performed by the supporter to the mother, the evaluation of these practices, and the emotional state of the mother during the day.

**Postpartum BSE scale (BSES):** The BSES was used with the permission of the person who translated it into Turkish

(M. Aluř Tokat, personal communication, July 16, 2017). To evaluate the BSE levels of mothers, BSES was used by Dennis and Faux (1999) (16), whose initial version had 33 items; a shorter version with 14 items was developed in 2003. It is a five-point Likert-type scale (1=“I am not sure at all” and 5=“I am always sure”). As the total score on the scale increases, the self-efficacy of breastfeeding increases. Alpha coefficient reliability value of BSES is .78.

State Anxiety Scale (SAS): The SAS was translated into Turkish by Öner and Le Compte (1983). We used the Turkish version of the scale to evaluate the anxiety levels of mothers participating in the study. Emotions or behaviors expressed in the scale are answered by marking one of the options (1) none, (2) a little, (3) a lot, and (4) completely, according to their level of experience. A high total score obtained on the scale reflects a high level of anxiety (17). Alpha coefficient reliability value of SAS is .87.

## 2.4. Procedure

To prevent interaction between the mothers in the experimental and control groups, the study was first conducted with the mothers in the Dennis TBNC group. After the follow-up period of the mothers in the Dennis TBNC group was over, the study was performed with the mothers in the control group.

The amount of breast milk was evaluated according to the amount of formula the newborns received in addition to breastfeeding and their weight gain.

### 2.4.1. Dennis TBNC group

On the first day of admission to the NICU, a personal information form was filled out and pretests (BSE and SAS) were performed. Then, the mothers and their supporters received 1 h of training based on examples from previous studies and the opinions of five experts in the field. The training program included content prepared based on previous experiences, the psychological state and the support systems of the mother, and examples of other breastfeeding mothers. The training was provided to mothers after assessing their perception of breastfeeding self-efficacy. Additionally, the content of the training included discussion of breastfeeding experiences, fears, perceived positive and negative thoughts, such as the importance of breastfeeding, correction of misinformation and perception about breastfeeding, the way breast stimulation (massage, expressing milk, breastfeeding, etc.) is performed, formulating a breastfeeding and nutrition plan, and the instances where the supporter can help the mother (back massage, support for expressing milk, and comforting the mother). After the training, mothers were given a “breastfeeding diary form” to be filled out for 15 days. Mothers and their supporters were followed up for 15 days. During the follow-up period, the researcher sent a reminder to mothers to make nipple warnings (about expressing milk or giving a massage) via text message on their mobile phones, thrice a day. While their babies were in the NICU, the

mothers were encouraged to communicate with and observe other mothers breastfeeding their babies. On the last day of the study, post-tests (BSE and SAS) were administered to the mothers, the baby’s weight was measured, and the forms filled out by the mothers for 15 days were received.

### 2.4.2. Control group

On the first day of admission to the NICU, a personal information form was filled out and pretests were performed. The mothers were given a “breastfeeding diary form” to fill out for 15 days. Mothers and their supporters were followed up for 15 days. Routine hospital standard nursing care was provided to the participants in the control group. On the last day of the study, post-tests were administered to the mothers, the baby’s weight was measured, and the forms filled out by the mothers for 15 days were received.

## 2.5. Data Analysis

Statistical tests were performed using SPSS (SPSS, 24.0). Frequency tables and descriptive statistics were used to interpret the results. Among parametric tests, the independent samples t-test (t-table value) was performed to determine the differences in the data between two independent groups, and the paired samples t-test (t-table value) was performed to determine the differences in the data between two dependent groups. Among non-parametric methods, the Mann-Whitney U test (Z-table value) was performed to determine the differences in the data between two independent groups, and the Wilcoxon test (Z-table value) was performed to determine the differences between two dependent groups. “Fisher-Exact”, “continuity correction” and “Pearson- $\chi^2$ ” crosstabs were used to assess the relationships between two qualitative variables. Pearson correlation was used to analyze the relationship between two quantitative variables with a normal distribution; in cases where even one quantitative variable was not normally distributed, the Spearman correlation coefficient was used.

## 2.6. Ethical Considerations

The study was approved by the Ethics Committee of the Ankara Pediatrics Hematology Oncology Training and Research Hospital (19 March 2018; approval number 2018–033). Permission was obtained from the head of the NICU where the research was conducted. Written informed consent was obtained from the mothers and their supporters. The mothers and their supporters were informed that the information collected for the research would be kept confidential and only be used for scientific purposes. The study was conducted following the ethical principles outlined by the “World Medical Association’s Declaration of Helsinki”.

## 3. RESULTS

The sociodemographic and obstetrics characteristics of the women and infants in the study are presented in Table 1.

The age of the mother was significantly different between the groups ( $\chi^2= 5.62$ ;  $p=.01$ ). We found that 76.7% of the mothers in the Dennis TBNC group were below 30 years old, and 56.7% of the mothers in the control group were 30 years old or older. The mean length of stay in the intensive care unit for the newborns in the Dennis TBNC group ( $5.66 \pm 0.14$ ) was significantly lower than that in the control group ( $7.10 \pm 0.75$ ) ( $Z=-5.36$ ;  $p<.001$ ). The education level of the mother, number of pregnancies, number of births, delivery method, breastfeeding experience, and supporters were not significantly different between the groups ( $p>.05$ ) (Table 1).

**Table 1.** Distribution of the findings related to some descriptive characteristics of mothers and infants

Characteristics	Dennis TBNC group (n=30)		Control group (n=30)		Statistic
	n	%	n	%	
<b>Age</b>					
<30	23	76.7	13	43.3	$\chi^2=5.62$ $p=.01$
$\geq 30$	7	23.3	17	56.7	
<b>Educational level</b>					
Primary/	8	26.7	6	20.0	$\chi^2=0.41$ $p=.93$
Secondary school	14	46.7	15	50.0	
High school	3	10.0	3	10.0	
Associate degree	5	16.6	6	20.0	
Undergraduate/Postgraduate					
<b>Number of pregnancies</b>	12	40.0	5	16.7	$\chi^2=4.43$ $p=.10$
1	9	30.0	10	33.3	
2	9	30.0	15	50.0	
$\geq 3$					
<b>Number of births</b>					
1	13	43.3	8	26.7	$\chi^2=2.03$ $p=.36$
2	12	40.0	14	46.6	
$\geq 3$	5	16.7	8	26.7	
<b>Delivery method</b>					
Vaginal delivery	18	60.0	21	70.0	$\chi^2=0.29$ $p=.58$
Caesarean section	12	40.0	9	30.0	
<b>Breastfeeding experience</b>					
Yes	18	60.0	22	73.3	$\chi^2=0.67$ $p=.41$
No	12	40.0	8	26.7	
<b>Who supported</b>					
Spouse	15	50.0	16	53.3	$\chi^2=0.09$ $p=.99$
Mother	9	30.0	8	26.7	
Sister	1	3.3	1	3.3	
Mother-in-law	5	16.7	5	16.7	
<b>Hospitalization in NICU</b>	$\bar{X} \pm SD$	Mdn [IQR]	$\bar{X} \pm SD$	Mdn [IQR]	Statistical analysis *
The day number of postpartum	$4.73 \pm 0.94$	5.0 [1.3]	$3.97 \pm 1.04$	4.0 [2.0]	$Z=-2.84$ $p=.01$
Total length of stay in hospital/day	$5.66 \pm 0.14$	5.50 [1.0]	$7.10 \pm 0.75$	7.0 [2.3]	$Z=-5.36$ $p<.001$

TBNC: Theory-Based Nursing Care

\*Wilcoxon test,  $p<.05$ .

The discharge weight and the control weight of the newborns in the Dennis TBNC group were significantly higher than those in the control group ( $p<.05$ ) (Table 2).

**Table 2.** Distribution of weight measurement values of newborns from birth to the control period

Newborn weight	Dennis TBNC group (n=30)		Control group (n=30)		Statistic*
	$\bar{X} \pm SD$	Mdn [IQR]	$\bar{X} \pm SD$	Mdn [IQR]	
Birth weight/gr	$3279.33 \pm 280.40$	3260.0 [427.5]	$3131.33 \pm 232.33$	3025.0 [395.0]	$Z=-1.90$ $p=.05$
Weight of hospitalization in NICU/gr	$2993.83 \pm 238.63$	3020.0 [336.3]	$2866.83 \pm 225.20$	2780.0 [338.8]	$Z=-1.86$ $p=.06$
Discharge weight/gr	$3211.17 \pm 296.24$	3180.0 [497.5]	$3030.00 \pm 220.61$	2942.5 [368.8]	$Z=-2.38$ $p=.01$
Control weight/gr **	$3527.00 \pm 310.33$	3492.5 [487.5]	$3243.33 \pm 227.17$	3155.0 [340.0]	$t=4.04$ $p<.001$

\* "Independent Sample-t" test (t-table value) for comparison of measurement values of two independent groups in data with normal distribution; "Mann-Whitney U" test (Z-table value) statistics were used to compare the measurement values of two independent groups in the data not having normal distribution.

\*\* Control weight is the weight measured on the day (15th day) of the baby at the end of the research period.

Mdn [IQR] : Median [Interquartile Range]

NICU: Neonatal Intensive Care Unit

The mean of the total number of formulas ( $30.20 \pm 7.64$ ) that the newborns in the Dennis TBNC group received from the moment they were admitted to the NICU ( $30.20 \pm 7.64$ ) was significantly lower than that in the control group ( $53.63 \pm 16.29$ ) ( $Z=-0.90$ ;  $p<.001$ ). The difference in the mean of days when the newborns were fully fed only human milk ( $6.00 \pm 1.08$ ) between the Dennis TBNC group and the control group was significant ( $12.03 \pm 1.81$ ) ( $Z=-6.69$ ;  $p<.001$ ) (Table 3).

**Table 3.** Distribution of the mean number of formulas, excluding human milk, which the newborns received daily during the application process

Number of formulas according to days	Dennis TBNC group (n=30)		Control group (n=30)		Statistical analysis
	$\bar{X} \pm SD$	Mdn [IQR]	$\bar{X} \pm SD$	Mdn [IQR]	
1st day 0	$7.50 \pm 1.14$	8.0 [0.0]	$7.70 \pm 1.32$	8.0 [0.0]	$Z=-1.19$ $p=.23$
Formulas taken outside of human milk for 15 days	$30.20 \pm 7.64$	29.0 [8.75]	$53.63 \pm 16.29$	50.00 [15.50]	$Z=-0.90$ $p<.001$
Day of transition to be fed just human milk	$6.00 \pm 1.08$	6.0 [1.0]	$12.03 \pm 1.81$	12.0 [2.3]	$Z=-6.69$ $p<.001$



Before the study, the anxiety levels of the mothers in the Dennis TBNC group were higher than the anxiety levels of the mothers in the control group. The effect size was medium-level ( $d:0.74$ ). The NCI post-test scores of the mothers in the Dennis TBNC group were significantly lower and the effect size was higher compared to those of the mothers in the control group ( $d: -2.81$ ). The pretest (BSES) scores of the mothers in the Dennis TBNC group were significantly higher than those of the mothers in the control group. The effect size was medium-level ( $d:.63$ ). The post-test scores of the mothers in the Dennis TBNC group were significantly higher than those of the mothers in the control group. The effect size was high ( $d:3.65$ ) (Table 4).

**Table 4.** Distribution of the SAS and BSE Perception pre-test and post-test mean scores of the mothers

Score average of the scales	Dennis TBNC group (n = 30)		Control group (n = 30)		Statistical analysis	Effect size (%95 CI*)	
	$\bar{x}\pm SD$	Mdn [IQR]	$\bar{x}\pm SD$	Mdn [IQR]			
SAS	Pre – Test	71.97±4.92	72.0 [7.3]	67.90±5.94	67.0 [8.5]	t=2.88 p=.01	0.74 [0.20-1.28]
	Post-test	22.07±2.38	21.0 [3.0]	31.10±3.86	30.0 [5.3]	Z=-6.38 p<.001	-2.81 [-3.68-1.93]
BSE	Pre – Test	39.27±6.25	37.5 [9.3]	35.70±4.94	35.0 [8.0]	t=2.45 p=.01	0.63 [0.09-1.16]
	Post-test	69.27±1.64	70.0 [0.3]	58.20±3.95	59.0 [5.5]	Z=-6.82 p<.001	3.66 [2.58-4.72]

\*CI: Confidence interval

SAS: State Anxiety Scale

BSE: Breastfeeding Self-Efficacy

#### 4. DISCUSSION

In this study, we investigated the effects of nursing care provided according to Dennis' BSE theory on mothers' BSE, anxiety, and breast milk secretion. In the nursing care provided with information sources based on Dennis's BSE theory, mothers receive not only information but also encouragement and care (9). This approach reduces anxiety in mothers, by focusing on previous breastfeeding situations and increasing support from the environment, which positively affects the psychology of the mother (8, 9). However, factors such as giving the baby food other than human milk, insufficient social support of the mother, anxiety level, and BSE negatively affect the release of human milk.

In our study, the amount and number of formula given to newborns in the Dennis TBNC group was less. In addition, the mean number of days that newborns were fed exclusively with breast milk was shorter than in the control group (Table 3). The milk secretion occurred sooner in the mothers in the Dennis TBNC group than in the mothers in the control group. Based on these results, the  $H_{1a}$  hypothesis was

accepted in our study. In other studies, the investigators found that educating mothers and the participation of their spouses increased the rates of breastfeeding of infants (18–20). Although these studies were conducted using different methods, they supported our findings. These results showed that the support of the mother and the inclusion of the supporter were effective in increasing milk secretion.

The BSE levels and the anxiety levels of mothers are key factors affecting breastfeeding success and human milk secretion. In our study, the pre-test and post-test BSE scores of the mothers in the Dennis TBNC group were significantly higher than those of the mothers in the control group (Table 4). Based on these results, the  $H_{1b}$  hypothesis was accepted in our study. Some studies reported results similar to those of our study; however, in those studies, the level of BSE was examined without relying on Dennis's BSE theory. The investigators found that breastfeeding education given to mothers with the participation of their spouses increased the BSE levels of the mothers (9, 10, 20–24). A study found that the nursing care given to mothers with text messages and phone calls to motivate breastfeeding in the postpartum period positively affected the exclusive breastfeeding status of infants and the BSE levels of the mothers (15). In our study, the post-test SAS scores of the mothers in the Dennis TBNC group were significantly lower than those of the mothers in the control group ( $Z=6.38$ ;  $p=.001$ ) (Table 4). Based on these results, the  $H_{1c}$  hypothesis was accepted in our study. Similar to our findings, O'Biren et al. (25) showed that the supportive and family-centered care provided to the parents of babies hospitalized in the NICU reduced their anxiety levels. Another study showed that mothers with low anxiety in the postpartum period had higher BSE levels and a longer period of breastfeeding (26). Although these studies were conducted with different methods and were not based on Dennis' BSE theory, the techniques used, such as the education given to mothers, environmental support, and family-centered care, reduced the anxiety level of the mothers and increased their perception of self-efficacy, which were similar to our findings.

Social support based on strengthening BSE perceptions of mothers enhances their BSE. The positive support of spouses increases the BSE and breastfeeding success of women. NICU nurses should use a holistic approach while caring for the newborn and the mother. They need to consider the stress and anxiety of the mother. Breastfeeding education based on Dennis' BSE theory, which is given by nurses to mothers and their supporters in the postpartum period, greatly helps in managing the process, as it is a continuous and individualized form of care.

The number of formulas that the mothers in the Dennis TBNC group gave their babies other than human milk was significantly lower than that in the control group. The mean day of onset of milk secretion of the mothers in the Dennis TBNC group was earlier than that in the control group (Table 3). The BSE post-evaluation mean scores of the mothers in the Dennis TBNC group were significantly higher than those of the mothers in the control group. The post-evaluation

anxiety mean scores of the mothers in the Dennis TBNC group were significantly lower than those of the mothers in the control group (Table 4).

### Limitations and Difficulties

This study had five major limitations. First, due to the insufficient sample size, the “Previous Experiences” step, which constitutes the conceptual framework of Dennis’ theory, could not be met by including mothers without breastfeeding experience in the study. Second, before the training, the mean breastfeeding self-efficacy scores of the mothers in the Dennis TBNC group were higher than those of the mothers in the control group. Third, since no intervention was allowed to affect the milk release of the mothers in the control group, the amount of milk of the mothers in the Dennis TBNC group and control group could not be controlled by expressing milk. Fourth, the training provided to mothers and their supporters was conducted in a single session. Fifth, randomization was not performed in this study. Our study had two difficulties. First, the hospital where the study was conducted was moved to a newly constructed site during the study. Second, it was difficult to meet the sample size criterion due to the COVID-19 pandemic, which prolonged the application process.

### 5. CONCLUSIONS

Nursing care based on Dennis’ TBNC decreased the number of formulas other than breast milk fed to babies and the anxiety of the mothers. It also helped increase the BSE levels of the mothers and earlier secretion of breast milk. Our findings showed that when nurses working in the NICU provide care to mothers based on Dennis’ TBNC, they can administer systematic care with a holistic approach.

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#### Author Contribution:

Research idea: RG

Design of the study: RG, AŞE

Acquisition of data for the study: RG, AŞE

Analysis of data for the study: RG, AŞE

Interpretation of data for the study: RG

Drafting the manuscript: RG, AŞE

Revising it critically for important intellectual content: RG, AŞE

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