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Effect of neuro-linguistic programming on comfort after cesarean: a randomized controlled trial neuro-linguistic programming comfort level cesarean

Aysel Doğan^{1,4*} , Nursel Alp Dal² and Kerime Derya Beydag³

Abstract

Background Due to the deterioration in comfort experienced after cesarean section, mothers go through troubled hours, have problems with breastfeeding, and cannot even meet their own and their baby's needs. This study was conducted to determine the effect of neuro-linguistic programming on mothers' comfort levels following cesarean section in the postpartum period.

Methods This study was performed from 1 January to 1 September 2023 as a prospective randomized controlled single-blind clinical trial with 100 participants (50 experimental, 50 control). The research data were collected using the Personal Information Form and the Postpartum Comfort Scale. The dependent samples t test and independent samples t test were used in the analysis of research data as well as numbers, percentages, and means. Analysis of covariance (ANCOVA) was used to evaluate the effect of the NLP more accurately by controlling the pre-test scores.

Results There were statistically significant differences between the mean pretest and posttest postpartum comfort scale scores, physical comfort scores, psycho-spiritual comfort scores, and sociocultural comfort scores of mothers in the intervention group. In this regard, mothers in the intervention group had higher mean postpartum comfort scale scores, physical comfort scores, psycho-spiritual comfort scores, and sociocultural comfort scores in the posttest phase than in the pretest phase.

Conclusions This study revealed that neuro-linguistic programming enhanced the postpartum comfort levels of mothers who underwent cesarean delivery. In this context, it is recommended that nurses and midwives enhance participants' comfort through the use of neuro-linguistic programming techniques in care processes.

Trial registration NCT05646537.

Keywords Care, Mothers, Midwives, Nonpharmacological, Nursing, Holistic care, Postpartum perianesthesia process, Surgery, Single-blinded study

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Background

Cesarean delivery is a major surgical operation that carries numerous risks for both the mother and the baby. At the same time, the postpartum period is a challenging phase characterized by rapid renewal for both mother and baby, during which psychosocial changes occur, and both must cope with intense stress while adapting to these changes [1, 2].

In the postpartum period following the Cesarean section (C-section), severe pain, a catheter, weakness, and anesthesia-related problems cause the mother to fail to take care of herself and perform daily life activities, which leads to a decrease in her comfort [3–5].

The concept of comfort in nursing was expressed and theorized by nurse theorist Kolcaba. Kolcaba defines comfort at three levels in the holistic nursing care approach: The first level is Relief, which depends on meeting physical needs. In the second stage, Ease, which includes talking about satisfaction, and in the last stage, transcendence, which refers to overcoming problems, is an indication that comfort requirements are met in nursing care. Kolcaba developed the General Comfort Scale to assess the holistic comfort of the individual. The general comfort scale has been translated into many languages and revised for different patient groups and has been used in many studies to measure the comfort of patients. “Comfort is the anticipated outcome with a complex structure in the physical, psycho-spiritual, social, and environmental context in which individuals receive the assistance that they need, get the peace that they desire, and overcome the problems that they experience” [6–8].

In the literature, it was discerned that the participants had medium-level comfort, mothers who had a C-section had lower comfort levels than those who had a vaginal delivery, and there were many factors affecting comfort [3–5]. However, it was found that the interventions that would likely enhance comfort were limited in number. It was proposed that the nursing and midwifery interventions implemented following the C-section enhanced the mother’s comfort level [4].

A variety of nonpharmacological methods, such as music [9], transcutaneous electrical nerve stimulation [10, 11], cognitive behavioral therapy [12], reiki [13], reflexology [14], and progressive relaxation exercises [15], have been used to enhance mothers’ comfort and solve problems likely to emerge following C-Sects. [9–15]. One of the nonpharmacological methods applied in response to pain is neuro-linguistic programming (NLP) [16, 17].

NLP was defined by Bandler and Grinder in 1975. NLP techniques facilitate the identification and effective utilization of internal cognitive and behavioral resources. The term “Neuro” refers to the processing by the nervous system of the information that the individual obtains

from his/her environment through his/her five senses, while the “Linguistic” component draws attention to the fact that language forms the basis of thought structure and communication. “Programming” refers to the way in which an individual’s thoughts and behaviors can be structured and directed towards desired outcomes, similar to the recording of computer programs [16–20].

Previous studies suggest that NLP techniques can be used as an effective way of coping with various problems and generating solutions. It was asserted that NLP was effective in alleviating pain and enhancing comfort in patients who underwent open-heart surgery [16]. It has been utilized to eliminate various psychiatric disorders (lepidophobia, claustrophobia, social phobia, posttraumatic stress disorder, psychotherapy, anxiety, depression, insomnia, pollen allergy) and has positive effects [12, 17–20].

It is emphasized that through NLP techniques (modeling/sub-modality, anchoring, swish, representational systems, reframing, rapid phobia erasure, and new behavior generation), it is possible to change individuals’ neural encoding of certain situations or emotional perceptions. In this context, NLP techniques allow the individual to analyze and reconstruct the origin of the linguistic structures and discourses used [16–20].

To facilitate adaptation to the postpartum period, midwives and nurses should support mothers and enhance their comfort [4]. Previous studies support the use of nonpharmacological methods to increase the comfort level of new mothers [9–16]. However, although the use of NLP techniques has been widely studied in different fields, its use in nursing care is new [12, 17–20]. The effect of NLP techniques on postpartum comfort level in C-section patients has not been investigated before. In this respect, this study is the first and original. This research aimed to identify the effect of NLP on mothers’ comfort level following C-section in the postpartum period.

H_0 NLP has no effect on mothers’ comfort following C-section in the postpartum period.

H_1 NLP enhances mothers’ comfort following C-section in the postpartum period.

Methods

Research type and participants

The research was performed as a prospective randomized controlled single-blind clinical trial. This study was planned and reported according to the CONSORT guidelines. The research was conducted between 1 January and 1 September 2023 with mothers who had a C-section at the postpartum service of a maternity hospital in a metropolis in western Turkey.

The research population comprised 135 participants who had a C-section at the postpartum service of the above hospital during the data collection period. The study included 100 participants (50 participants in the control group and 50 participants in the intervention group); the details are given in Fig. 1. The statistical power of the study was calculated as 99.9% by using G*Power with an effect size of 3.35 at the 5% significance level [21]. The participants were randomly assigned to study groups, and in this respect, simple random sampling was used as a probability sampling method. They were subjected to simple random sampling and assigned to study groups by using a random number table. This research was registered in the NIH U.S. National Library of Medicine Clinical Trial Registry (ClinicalTrials.gov registration number NCT05646537 and the date of first registration is 01/01/2023). The sample selection process

of the study was conducted according to the CONSORT criteria (Fig. 1). Since the participants in the study did not know which of the experimental and control groups they were included in the researcher knew, the study was planned to be single-blinded. Statistical analysis of the study data was carried out by an independent statistician who was not the author of the study.

Criteria for inclusion in the research sample

Having a c-section for the first time, being within the period after a minimum of 6 h and before a maximum of 24 h following the c-section, agreeing to participate in the study, not using patient-controlled analgesics, not having an additional health problem, except the c-section incision, which will likely lead to pain in the postpartum period, speaking and understanding Turkish, having no disability limiting mobility.

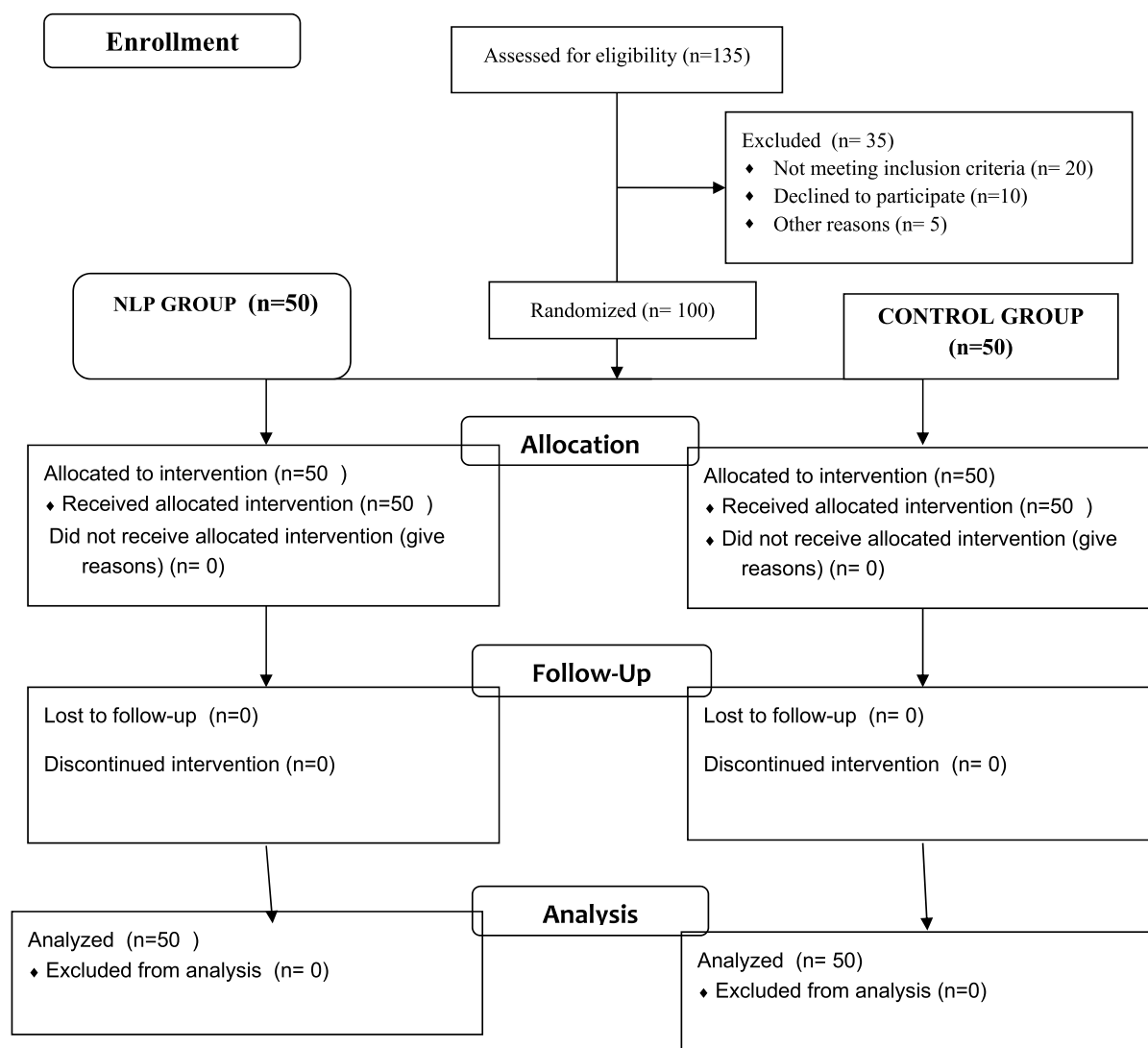


Fig. 1 CONSORT 2010 Flow Diagram

Criteria for exclusion from the research sample

Mothers who wanted to withdraw from the research at any stage after being included in the sample, who could not have verbal communication, who had a hearing or visual problem, or who were previously diagnosed with a psychiatric disease were excluded from the research sample. Before the randomization process, five participants were excluded due to reasons that did not fall under the predefined exclusion criteria but rendered them ineligible for participation. These included personal scheduling issues and withdrawal of consent before any study procedures. As these situations occurred prior to group assignment and no intervention or data collection had taken place, they were categorized under 'other reasons' for exclusion.

Data collection process

Experimental group (NLP applied)

After the participant consented to participate in the study with the informed consent form, her comfort level was measured with the Postpartum Comfort Scale.

A session of NLP (30 min) was applied to the participant. The researcher, who is a certified NLP practitioner, applied NLP techniques to the participants. NLP Practitioner training consists of 21 h of online or face-to-face training, which lasts a total of 7 seven days. In this study, the researcher, who is an NLP practitioner, took a one-week face-to-face course, the last two days of which consisted of practical training.

Change of beliefs, a new behavior generation technique of NLP also referred to as the complex equivalence and causality model, was used. According to this technique, human beings acquire experiences as they perceive the world with their five basic senses, and the thoughts that form in an individual's brain about a situation are coded with these five basic senses. As these codes change, the individual's perception of the situation will also change [22–24].

Application stages of the technique

The patient was informed about the application. The mother was asked to sit or lie down in a comfortable position in her bed. The mother was asked to orient her head from her shoulder to the left and up. In the meantime, the participant was asked to imagine her behavior during the postoperative recovery and baby care process, her nutrition, the place she was in, the way she cared for the baby, and her dialog with the people who helped her. During this process, the patient was given 2–3 min (the aim was to ensure that he focused and structured the process with all the details). The participant was asked to feel the conversations she heard, the colors she saw, the smell, and the ambient temperature.

In the second stage, the mother was asked to direct her head to look up from her right shoulder and to direct the woman with the same characteristics as herself (counting the nursing attempts to increase the postpartum comfort of a participant) as if she were a film director, according to the instructions given. To activate the audiovisual and tactile representation systems, the woman was allowed to express her feelings about color, smell, sound, and ambient temperature.

In the third stage, the participant was asked how he felt to express his feelings. The participants said that they felt much better than in the first scenario. The participants were asked to orient their heads to face down on the left knee and down. The participant was asked to find 3 things he needed to perform the role that she was happy and more comfortable with. The participant was given 2–3 min for this. After the participant found the things he needed, he was allowed to repeat the 2nd stage by adding what the participant found.

Although the duration of each phase varied depending on the participant's level of adaptation, each phase lasted approximately ten minutes on average, with time deviations not exceeding two minutes. Each of the three phases of the implementation had been initiated immediately after the previous one was completed, with no waiting time between stages, and the total duration had not exceeded 30 min.

Before the discharge of the participant from the hospital, her comfort level was evaluated once again using the Postpartum Comfort Scale.

Control group (routine follow-up)

After the participant consented to participate in the study with the informed consent form, her comfort level was measured with the Postpartum Comfort Scale. Without any additional practice, the participants solely followed the routine clinical protocol. Before the discharge of the participant from the hospital, her comfort level was evaluated once again by using the Postpartum Comfort Scale.

Data collection method The research data were collected by using the Personal Information Form and the Postpartum Comfort Scale.

Personal information form This form had questions prepared considering the relevant literature to determine the mothers' demographic characteristics [3, 5, 16, 25].

Postpartum comfort scale (PCS) The General Comfort Questionnaire developed by Kolcaba (1992) was adapted to Turkish society by Kuğuoğlu and Karabacak (2008). This scale was developed based on a taxonomic structure consisting of three levels and four dimensions that constitute the theoretical elements of comfort. The Cronbach's

alpha was found to be 0.88 [6, 8]. Karakaplan and Yıldız (2010) developed the PCS based on the Turkish form of the General Comfort Questionnaire. The PCS, which can be used in the postpartum period following either vaginal delivery or C-section, evaluates postpartum comfort in terms of physical, spiritual, and sociocultural aspects. On the other hand, it does not evaluate environmental comfort. The PCS has 34 items and is designed as a five-point Likert-type scale. In this respect, the participants responded to PCS items by rating them from 1 point to 5 points. For the positively worded items, “I strongly agree” indicates the highest level of comfort, while “I strongly disagree” indicates the lowest level of comfort. Negatively worded items were reverse-coded. The minimum and maximum scores obtained from the PCS are 34 and 170 points, respectively. There is no cutoff point for PCS. As the scores obtained from the PCS increase, the comfort levels also increase. The Cronbach’s alpha coefficient, an internal consistency measure, was found to be 0.78 for the PCS. In the current study, the Cronbach’s alpha coefficient was calculated as 0.82. The first factor contained items that pertained to physical perceptions and measured physical comfort. These items were items 1, 2, 4, 6, 8, 11, 12, 13, 14, 16, 17, 21, 24, and 26. The second factor had items that were composed of spiritual and psychological components and measured psychospiritual comfort. These were items 5, 7, 10, 15, 18, 19, 20, 23, 25, and 31. The third factor included items related to interpersonal, social, and family relations and finance and support systems and measured sociocultural comfort. These were items 3, 9, 22, 27, 28, 29, 30, 32, 33, and 34. The negatively worded items were items 4, 6, 8, 9, 10, 12, 13, 16, 17, 21, 22, 26, 27, 28, 29, 30, 33, and 34, and they were reverse scored from 5

points to 1 point. Positively worded items were items 1, 2, 3, 5, 7, 11, 14, 15, 18, 19, 20, 23, 24, 25, 31, and 32, and they were scored from 1 point to 5 points. Cronbach’s alpha coefficient, which is the internal consistency measure of the sub-dimensions of the scale, was found to be 0.78, 0.70 and 0.62. In the current study Cronbach’s alpha coefficient, which is the internal consistency measure of the sub-dimensions of the scale, was found to be 0.84, 0.80, and 0.76. Exploratory factor analysis supported the scale’s construct validity, revealing a three-factor structure that explained 30.03% of the total variance. The adequacy of the sample was confirmed by a KMO value of 0.64, and Bartlett’s test indicated significant correlations among items ($p < 0.05$) [26]. Previous studies have reported that the scale is a valid and reliable tool for use in determining the comfort level of women undergoing cesarean or vaginal delivery [3–5].

Data evaluation

The data obtained from the research were analyzed by using the Statistical Package for Social Science (SPSS) 26.0. In the evaluation of research data, frequencies (number, percentage) were used for categorical variables, and descriptive statistics (mean, standard deviation) were utilized for numerical variables. The Kolmogorov–Smirnov test was utilized to determine whether the numerical variables were normally distributed, and the numerical variables were normally distributed. Therefore, parametric statistical methods were used in this study (Table 1). The chi-squared test was used to evaluate the associations between two independent categorical variables. Independent samples *t* tests were utilized to identify statistically significant differences between two independent groups. Analysis of covariance (ANCOVA) was used to evaluate the effect of the NLP more accurately by controlling the pre-test scores. With ANCOVA, posttest scores were compared between groups, and pretest scores were included in the model as covariates. The statistically significant differences between the two dependent numerical variables were analyzed by using the dependent samples *t*-test. The significance level was accepted as $p < 0.05$ in all analyses.

Results

The demographic data of the participants are shown in Table 2. According to the independent samples *t* test, there was no statistically significant difference in terms of age, duration of time spent following the C-section, education level, anesthesia type, C-section type, satisfaction with the C-section, or reason for having the C-section between the control and experimental groups ($p > 0.05$).

Table 3 shows the differences between the in-group and intergroup pretest and posttest comfort levels of the experimental and control groups.

Table 1 Normality test (Kolmogorov–Smirnov) results for experimental and control groups

Variable	Group	N	D	p-value
Physical21	Control	50	,072	,200*
	NLP	50	,107	,200*
Physical2	Control	50	,107	,200*
	NLP	50	,119	,071
Physchospiritual 1	Control	50	,117	,076
	NLP	50	,123	,052
Physchospiritual 2	Control	50	,122	,062
	NLP	50	,120	,070
Sociocultural 1	Control	50	,116	,072
	NLP	50	,111	,083
Sociocultural 2	Control	50	,073	,200*
	NLP	50	,104	,200*
Overall PCS (Pretest)	Control	50	,115	,073
	NLP	50	,103	,200*
Overall PCS (Posttest)	Control	50	,125	,059
	NLP	50	,108	,200*

*D=Kolmogorov–Smirnov test statistic. $p > 0.05$ indicates no significant deviation from normality

Table 2 Breakdown of participants' demographic characteristics by group

Variables	Control group (n = 50)		NLP group (n = 50)		t	p
	Mean	SD	Mean	SD		
Age	30.2	5.2	29.98	4.5	0.226	0.82
Duration of time spent following the c-section (hour)	11.76	4	13.04	4	−1.6	0.11
	n	%	n	%	χ^2	p
Education level					0.476	0.79
Primary school	13	26	15	30		
High school	21	42	22	44		
University or higher education	16	32	13	26		
Anesthesia type					0.364	0.55
General anesthesia	26	52	29	58		
Regional anesthesia	24	48	21	42		
C-section type					0.162	0.69
Planned	29	58	27	54		
Emergency	21	42	23	46		
Satisfaction with the C-section					3.26	0.2
Satisfied	29	58	20	40		
Not satisfied	8	16	12	24		
N/A	13	26	18	36		
Factors Contributing to the Decision for C- section					1.98	0.58
Prolonged labor	14	28	13	26		
Twin pregnancy	15	30	10	20		
Premature rupture of membrane*	8	16	12	24		
Abnormal positioning	13	26	15	30		

χ^2 : Chi-square Value, * The decision to perform a C-section was primarily based on clinical assessments of fetal well-being, rather than solely on the diagnosis of premature rupture of membranes. The following diagnosis is documented in the patient's medical history

Table 3 Intergroup and intragroup comparisons of pretest and posttest mean PCS and PCS subscale scores of the control and NLP groups

PCS and PCS subscales	Control group		NLP group		t ^a	p
	Mean	SD	Mean	SD		
Physical comfort (pretest)	46.64	4.73	46.80	4.77	−0.168	0.867
Physical comfort (posttest)	45.38	4.65	51.22	4.39	−6.460	<0.001*
t ^b ;p	6.820; <0.001*		17.853; <0.001*			
Physchospiritual comfort (pretest)	29.08	3.73	33.96	4.99	−5.542	<0.001*
Physchospiritual comfort (posttest)	29.06	3.78	37.90	5.09	−9.860	<0.001*
t ^b ;p	0.129; 0.898		17.051; <0.001*			
Sociocultural comfort (pretest)	27.88	4.42	29.42	5.97	−1.467	0.146
Sociocultural comfort (posttest)	28.48	4.41	40.54	10.13	−7.719	<0.001*
t ^b ;p	−3.656; 0.001*		9.347; <0.001*			
Overall PCS (pretest)	103.56	4.94	109.98	7.64	−4.991	<0.001*
Overall PCS (posttest)	103.08	5.16	129.66	9.97	−16.743	<0.001*
t ^b ;p	1.276; 0.208		17.207; <0.001*			

t^a: Independent samples t test (intergroup comparisons of mean pretest and posttest scores)

t^b: Dependent samples t test (intragroup comparisons of mean pretest and posttest scores) *: $p < 0.05$

There was no significant difference in comfort between the groups in the pretest means ($p > 0.05$). A significant difference was found between the posttest means in favor of the experimental group ($p < 0.05$).

The adjusted averages of the second measurement (post-test) scores according to the first measurement (pretest) scores are presented. According to the results of Analysis of Covariance (ANCOVA), in the physical

comfort sub-dimension, the adjusted mean score of the control group was 45.45, while the adjusted mean score of the experimental group was 51.15. In the psychological comfort sub-dimension, the adjusted mean score of the control group was 31.42, while the adjusted mean score of the experimental group was 35.54. In the social comfort sub-dimension, the mean score for the control group was 29.21 and 39.81 for the experimental group. In total

Table 4 Analysis of posttest differences between groups adjusted for pretest scores

PCS and PCS sub-scales	Control group		NLP group		F	p
	Mean	SE	Mean	SE		
Physical2	45,45	0,21	51,15	0,21	820,823	< 0,001*
Psychospiritual2	31,42	0,21	35,54	0,21	166,325	< 0,001*
Sociocultural2	29,21	0,86	39,81	0,86	75,479	< 0,001*
Overall PCS (posttest)	110,75	1,06	102,80	1,06	17,659	< 0,001*

F: Analysis of Covariance (ANCOVA), SE: Standard Error, * $p < 0,05$

test scores, the adjusted mean of the control group was 110.75, while the mean of the experimental group was 102.80.

As a result of ANCOVA, it was determined that there were significant differences between the groups in physical, psychological, social, and total test scores, controlling for pre-intervention measurements ($p < 0.05$). These results show that the intervention had a significant and positive effect on all sub-dimensions of postpartum comfort. The adjusted second measurement scores of the individuals in the experimental group were found to be statistically significantly higher compared to the control group. (Table 4)

Discussion

In this randomized controlled study, which investigated the effect of NLP techniques on the comfort level of mothers who gave birth by cesarean section, the NLP group had significantly greater mean scores on the PCS and its subscales than did the control group.

The findings of this study demonstrated a statistically significant effect of the NLP on postpartum comfort levels, as evidenced by both independent samples t-tests and analysis of covariance (ANCOVA). While the t-test results indicated significant differences in post-intervention scores between the NLP and control groups, ANCOVA further confirmed these differences after adjusting for baseline (pretest) scores. This consistency across analytical methods strengthens the internal validity of the findings and suggests that the observed improvements in comfort levels can be attributed to the intervention rather than to pre-existing group differences.

Specifically, ANCOVA revealed that, even when initial scores were controlled for, the experimental group had significantly higher adjusted mean scores in physical, psychological, social, and overall comfort measures compared to the control group. This reinforces the efficacy of the NLP and aligns with previous literature emphasizing the importance of targeted postnatal care practices [3, 4, 13, 25]. The convergence of results from both statistical approaches supports the robustness of the observed outcomes. In a similar vein to the findings of the current study, the study conducted by Doğan and Sarıtaş (2021) applied the NLP technique to enhance postoperative

comfort in patients who underwent open-heart surgery and revealed that patients' comfort levels increased along with NLP [16].

A review of the relevant literature revealed that numerous nonpharmacological methods were used for enhancing the participants' comfort and eliminating problems likely to emerge following C-sections. The effectiveness of these methods in improving comfort is well documented [11–14, 27]. However, no study has utilized the NLP technique. In a randomized controlled trial, breastfeeding success and breastfeeding self-efficacy levels of mothers who has C-section were evaluated; it was reported that the group in which NLP (Neuro-Linguistic Programming) techniques were applied showed more positive results compared to the control and progressive relaxation groups [28]. In another quasi-experimental study, the effect of NLP sub-modality technique on perceived inadequate milk production, anxiety and fear of breastfeeding in mothers who had both vaginal and cesarean deliveries was investigated and it was reported that the technique had a great effect in reducing the perceived inadequate milk production [29]. These results are consistent with the findings of the present study.

As an alternative method, C-section is employed for women who cannot have a vaginal delivery, and its prevalence has gradually increased despite policies to promote vaginal delivery [30]. On the other hand, regardless of whether the surgery is large-scale or small-scale, each surgical operation has certain advantages and disadvantages for the individual. The perianesthesia process has diverse effects on the physical, psychological, and social health of the woman who gives birth to a child. During the perioperative period, care should focus on enhancing patient comfort and ensuring patient physical recovery [16, 27, 31].

In the present study, in interviews in which NLP techniques were utilized, efforts were made to develop positive attitudes and set targets for the enhancement of comfort in the postpartum period. For this purpose, the new NLP behavior generation technique was used in the current study. According to the assumptions of NLP, human beings have the resources that they need. In target-setting efforts through NLP, the focus was placed on resources to be utilized to reach the desired situation, departing from the current situation [15–18, 28, 29].

Along with NLP techniques, patients gained the ability and power to cope with negative emotions and felt powerful enough to reach their targets; ultimately, their perceived comfort levels increased [22–24].

Tables 2 and 3 shows that the mean score increased mostly on the psychospiritual comfort subscale. According to NLP assumptions, the mind and body are parts of a system, and the unconscious mind balances consciousness [16, 22, 24]. NLP techniques provide communication with persuasive concepts [22, 29]. In this study, in which the NLP sub modality technique was applied, during the application, the participants reached a state in their imagination where they did not have pain, accepted the baby, and could take responsibility for the baby's care. They subconsciously prepared for a situation where they would receive the social support they needed. Given that every behavior had its own construct, it was emphasized that if the change was achieved in mental programs, the change could also be attained in emotions, thoughts, and attitudes related to the postpartum period [28, 29]. NLP techniques motivate individuals to exhibit relevant behaviors and make them believe that they will achieve a goal [16, 29]. This change may have been associated with the increase in postpartum comfort scores in the intervention group that received the NLP technique.

The effect of NLP techniques on a patient's postpartum comfort may have been connected with the establishment of harmony with calibration and a safe communication setting, relaxation through breathing exercises, target-setting and decision-making efforts to enhance postpartum comfort, and the emphasis placed constantly on the assumptions "Human beings have all resources that they need." and "Each behavior has a positive intention in its construct". According to Bandler and Grinder, the body and mind are magnificent systems that work together [16, 22, 23].

In the current study, the presentation of recommendations about practices for preparing participants both mentally and physically and the application of these practices may have affected postpartum comfort. The use of NLP techniques may have increased patients' conviction that they would be able to cope effectively with the challenges likely to be encountered by them. The long-term effects of NLP (6 months to one year) should be studied in future research. A third group should be assigned to the research group, and the effects of NLP should be compared with those of other nonpharmacological methods.

Limitations and strengths

The research results are based on participant mothers' self-reports. The findings can be generalized solely to participants who underwent a C-section at the hospital where the research was conducted. The real effect of

NLP techniques can be investigated with other methods and NLP techniques that affect the comfort of patients after cesarean section and different studies with a control group. One of the limitations of this study concerns the practical implementation of NLP techniques in clinical settings. Although NLP is generally considered an easy-to-learn and easy-to-apply technique that can be taught through online or in-person training, its application in routine postpartum care may be limited by the need for specific training. Currently, nurses are required to pay for such training programs, which may pose a barrier to widespread adoption. This factor should be taken into account when considering the feasibility and scalability of integrating NLP into standard postpartum care practices. It is considered that the current study will contribute to the relevant literature because, in the relevant literature, there are currently no studies evaluating the effect of NLP on comfort in the postpartum period.

Conclusion

This study revealed that NLP enhanced postpartum comfort in patients who underwent C-section surgery. Psychotherapy methods such as NLP that are effective in a single session can also be preferred and easily applied to patients by nurses and midwives. After learning these techniques, patients can apply them to themselves. In this respect, we believe that the use of NLP techniques in similar research is important for nurses and midwives who aim to enhance patient comfort. Future research should investigate the wider applicability of this technique by examining in more detail the long-term effects of NLP and the processes of its integration into clinical practice.

Abbreviations

NLP	Neuro-Linguistic Programming
PCS	Postpartum Comfort Scale
C-section	Cesarean section
CONSORT	Consolidated Standards of Reporting Trials
ANCOVA	Analysis of covariance

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12884-025-08043-8>.

Supplementary Material 1

Supplementary Material 2

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None.

Data availability

Date of registration, December 2022, Date of initial participant enrollment, Clinical trial identification number: NCT05646537, URL of the registration site: <https://register.clinicaltrials.gov/prs/app/action/SelectProtocol?%20sid=S000CNPZ&selectaction=Edit&uid=U000523E&ts=3&cx=-bz7prh>, The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

To perform the study and collect research data, ethical approval was obtained from the Scientific Research and Publications Ethics Committee of İstanbul Okan University (Date: 5 May 2021, No: 137). After institutional approval was received from the hospital where the research would be conducted, the participants in the sample were informed about the research. Next, they were asked to consent to participate in the study verbally and in written format. Social distancing measures and other necessary protective measures required by the ongoing COVID-19 pandemic were taken during the data collection. The ethical principles of the Declaration of Helsinki were followed at every stage of this study [32].

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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