



The Effects of an Infant Calming Intervention on Mothers' Parenting Self-Efficacy and Satisfaction During the Postpartum Period

A Randomized Controlled Trial

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ABSTRACT

The aim of this study was to evaluate the effects of a behavioral infant calming technique to support mothers' parenting self-efficacy and parenting satisfaction. The methods of this randomized controlled trial are based on the CONSORT guidelines. Data were collected during March 1 to May 20, 2019, from 3 postpartum units in 1 university-

level hospital in Finland. A total of 250 mothers agreed to participate, of which 120 were randomly allocated to the intervention group and 130 to the control group. All mothers completed a baseline questionnaire before randomization. Mothers in the intervention group were taught the 5 S's infant calming technique. The control group received standard care. Follow-up data were collected 6 to 8 weeks postpartum. The primary outcome measure was the change in parenting self-efficacy and parenting satisfaction scores over the follow-up period. The intervention group showed significantly larger improvements in parenting self-efficacy scores. There were no statistically significant differences in median improvements in parenting satisfaction. The 5 S's infant calming technique is feasible. These study findings may assist midwifery and neonatal nursing staff to support mothers and families during the postpartum period, whether the infants are fussy or not.

Key Words: calming technique, excessive crying, infant, parenting satisfaction, parenting self-efficacy

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ClinicalTrials.gov identifier: NCT04296656

This work was supported by the Foundation for Research in Tampere, the Mannerheim League for Child Welfare in Finland, and the Federation of Finnish Midwives. The authors thank the mothers who participated in this study.

Supplemental digital content is available for this article. Direct URL citation appears in the printed text and is provided in the HTML and PDF versions of this article on the journal's Web site (www.jpnnjournal.com).

Disclosure: The authors have disclosed that they have no significant relationships with, or financial interest in, any commercial companies pertaining to this article.

Each author has indicated that he or she has met the journal's requirements for Authorship.

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Submitted for publication: April 1, 2020; accepted for publication: June 3, 2020.

Mothers of infants who are difficult to calm have high levels of stress related to the parenting role. The constant negative feedback from the infant diminishes the mother's feelings of parenting competence.¹ A variety of approaches to calm excessively crying infants have been tested. Parent education, counseling, behavioral calming techniques, dietary modifications, and manipulative treatments have been researched for decades.^{2–5} According to research, counseling the caretakers on the benign nature of excessive crying of infants is considered one of the

best interventions⁵ and is much used. However, waiting it out is a risky line of action. There is evidence that the consequences of having an excessively crying infant in the family are detrimental.⁶ Excessive crying is a predecessor for the caretaker to smother or shake the infant.⁷ The cost and strain of child maltreatment, compared with other health problems, are significant. Taking the excessively crying infant to specialized medical care has increased, which is also costly and time- and resource-consuming.³ For all these reasons, early prevention is critical.⁸ The aim of this study was to evaluate the effects of a behavioral infant calming intervention to support mothers' parenting self-efficacy (PSE) and parenting satisfaction (PS). The hypothesis was that mothers in the intervention group would have higher scores than mothers in the control group in PSE and PS during the early postpartum period.

BACKGROUND

Parenting sense of competence consists of PSE, PS, and interest.⁹ Bandura¹⁰ first described how self-efficacy, which is an individual's sense of being able to manage a task effectively and successfully, will influence how much effort one will put into a given task, such as infant care. Mothers with a high sense of PSE will work hard until the task is completed. Mothers with low sense of PSE will often give up, doubting the ability to complete the task successfully. The stronger the perceived PSE, the more effort the mother will put into the task. Furthermore, it determines how long the mother will persist in the face of difficulties. PSE is also linked to mothers' overall well-being.¹¹ According to Bandura's theory, maternal PSE is an ongoing process that evolves as the mother succeeds at difficult tasks in infant care. On the basis of Bandura's work, it is suggested that perceived PSE have 4 contributors: experience of past successes and failures; experiences of others close to the individual; verbal persuasion; and physiological and affective state.^{10, 12, 13}

PSE is closely related to PS. PS reflects enjoyment or pleasure in the parenting role. Satisfaction in the role as a parent depends on many child and parent factors and can also be complex, as it is intertwined with child behavior, parenting style, and well-being.¹⁴ PS indicates an affective dimension of parenting. It mirrors the degree to which the parent feels negative emotions such as frustration, anxiety, or poor motivation toward parenting.¹⁵

Excessive crying prevails from 10% to 30% in infants up to 12 weeks of age. Previous research has associated excessive crying in infancy with adaptive and behavioral problems in childhood, as well as breastfeeding cessation and both maternal and pater-

nal depression.^{6, 16, 17} Infants with excessive crying in the first months of life have a 3-fold risk of regulatory problems, such as difficulties in eating and sleeping, in late infancy.¹⁸

Mothers of crying infants may benefit from behavioral infant calming skills, which can positively influence maternal psychological well-being and satisfaction in motherhood.¹¹ A consistent set of advices, boosts mothers' coping and improves the ability to care for the crying infant.¹⁹ Targeted educational interventions on how to act when the infant cries excessively are also crucial in preventing violent abuse, such as shaken baby syndrome.^{20, 21} These interventions increase parents' knowledge about the characteristics of early infant crying and the impacts of shaking the infant, as well as introduce coping strategies for the parents. Parent education interventions enhance PSE that can also be maintained over time.^{22, 23} Infant calming skills may help strengthen poor adjustment into parenthood²² and boost parental confidence.²⁴ An early postpartum intervention, which includes individualized education about infant characteristics and how to interact, helps the mother-infant bonding during the neonatal period,²⁵ even if the infant is not fussy or crying excessively.

Educating parents in the use of behavioral interventions may also present risks. There can be danger of raising unrealistic expectations in parents.⁷ Techniques that are supposedly effective in every situation can become frustrating if the parent fails in the efforts of calming the infant. This might result in more anger and increase the risk for abuse despite the intention for the exact opposite. Therefore, the role of the nurses and midwives is to recognize what is normal infant crying and prevent overmedicalization of excessive crying by using and guiding only evidence-based interventions.²⁶

The infant calming intervention used in this study is The Happiest Baby (THB) method, which was developed by a pediatrician in the United States. This method is based on the theory that infants have an innate "calming reflex" that can soothe infant fussing, even excessive crying, and prolong sleep. This "reflex" is triggered by 5 activities that mimic the sensory environment of the womb.²⁷ The 5 techniques are called the 5 S's and they are swaddling, side position, sound (white noise), swinging, and sucking. Parental soothing using the 5 S's can have a direct calming effect on infants. The 5 S's can easily be taught to parents, even within a short guidance session.²⁸

The main, and most researched, features of 5 S's are swaddling and white noise. Side position, swinging, and sucking have not been studied as separate calming interventions recently. Swaddling is an ancient, traditional method to calm crying or fussy infants by wrapping

them snugly in a thin blanket with the infant's head outside. Most research has found swaddling effective and beneficial.²⁹ Swaddling has been found not only to calm the infant but also to increase sleep quantity and quality.²⁹ Preterm infants have shown enhanced neuromuscular progress, less distress, and better capability to regulate themselves when they were swaddled during weighing.²⁹ In addition, swaddling can soothe pain in infants.^{29–31} There is minimal risk for swaddling to be harmful when cautious measures are taken. These measures include preventing overheating, always laying the swaddled infant into the supine sleeping position, and ceasing swaddling when the infant starts to roll over.³² White noise can enhance infants' sleep.³³ In addition, this sound is an effective method to manage pain, shorten crying time, and enhance vital signs in infants.³⁴ A growing number of reports show the calming benefit of combining all 5 techniques of the 5 S's in THB and using them together to calm a fussy infant.^{28, 35–37}

There is a need for research to be targeted toward the impact of excessive crying on families and the in-

terventions that can provide help.^{22, 38} Research regarding behavioral interventions for excessive infant crying has suffered from poor methodological quality, making findings questionable. Therefore, more primary research of a higher quality is needed.²⁵ Results of this study may help develop evidence-based midwife and nursing care to support mothers in the postpartum period, whether the infants are fussy or not.

METHODS

Trial design and participant flow

This was a randomized controlled follow-up parallel trial that compared PSE and PS in an intervention group and a control group. The trial method was based on the guidelines by the Consolidated Standard of Reporting Trials, CONSORT 2010 (see Supplemental Digital Content, available at: <http://links.lww.com/JHTR/A366>), and registered in the ClinicalTrials.gov Identifier: NCT04296656. Participant flow through the phases of the trial can be seen in Figure 1.³⁹

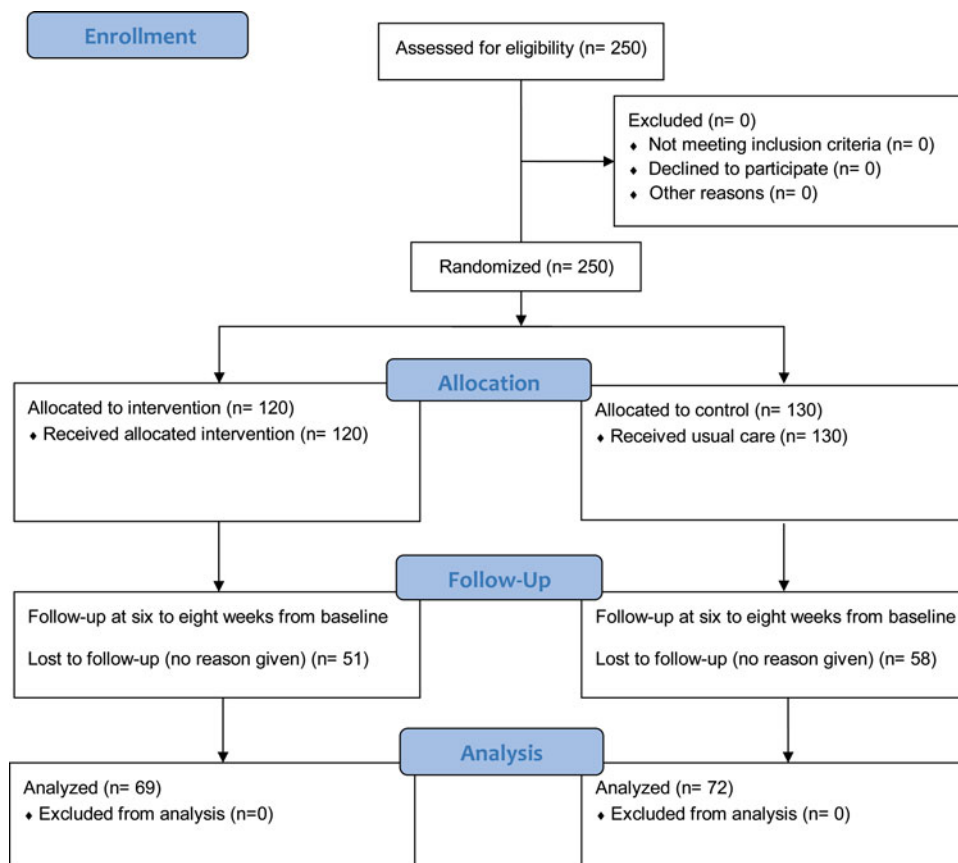


Figure 1. The CONSORT diagram for participant flow through the phases of the randomized controlled trial. This figure is available in color online (www.jpnnjournal.com).

Participants, sample size, and randomization

The data were collected during March 1 to May 20, 2019, from 3 postpartum units in 1 university-level hospital in Finland, with approximately 5000 childbirths annually. A total of 924 mothers were treated in these units during the data collection time. Healthy mother-infant dyads are cared for in these postpartum units, with an average hospital stay of 1 to 3 days. The mothers were recruited by the midwives working in these units. All mothers who stayed in these units during the data collection time and fulfilled the inclusion criteria were given the opportunity to participate. A convenience sample of 250 primiparous or multiparous mothers of healthy infants rooming-in agreed to take part in this study. The sample size calculation was based on a power analysis. Mothers with infants who were treated in another unit during data collection, mothers with multiple infants, or mother with inability to understand Finnish were excluded.

The research groups were recruited randomly. Mothers in one of the postpartum units during the days when the intervention (5 S's) was taught were randomly allocated to the group during the data collection period. The intervention was executed every second week, 3 days a week on Mondays, Wednesdays, and Fridays. The intervention was executed until 120 mothers had participated in them. Control group mothers ($n = 130$) were recruited in a similar fashion as the intervention group but on alternate weeks.

All mothers were asked to complete a structured baseline questionnaire in the postpartum unit; mothers in the intervention group returned the questionnaires before they received the intervention guidance. The mothers were instructed to complete the questionnaire independently. The questionnaire included a total of 75 items and took an average of 20 minutes to complete.

Follow-up questionnaires were sent 6 weeks postpartum to all mothers who filled out the questionnaire after childbirth ($n = 250$). Questionnaires, including those that were filled immediately after childbirth and 6 to 8 weeks postpartum, were returned by 141 mothers (56.4%). The follow-up questionnaire had 79 items.

The sample size calculation was based on previous study,⁴⁰ from which the standard deviation (0.81) for change in PS was calculated. The focus was to compare differences in changes of PSE and PS between 2 groups. A 2-sample *t* test was used in calculations. The clinically significant change in PS was approximated as 0.5. Using factor analysis ($\alpha = .05$, power = 0.80) and assuming equal group sizes, it was calculated that 42 observations were needed in both groups for comparisons.

Intervention

Mothers in the intervention group were taught the infant calming technique 5 S's, which is a part of THB method. This method is based on the theory that infants are born with a "calming reflex" that can soothe infant fussing, excessive crying, and prolong sleep. This reflex is triggered by 5 activities that imitate the womb sensations.²⁷ The 5 S's include swaddling, side position, sound (white noise), swinging, and sucking.

The intervention consisted of a 20-minute face-to-face guidance session with the researcher, executed individually in the mothers' hospital rooms. First, mothers were reminded, when at home and the infant cries, to try feeding, holding, and changing the diaper, not to bypass the infant's basic needs.⁴¹ If none of these were effective, they were suggested to try the 5 S's infant calming technique. Second, the technique was explained to the mothers and then demonstrated with the infants. Third, the mothers practiced the technique to enhance learning. The mothers' partners could take part in the guidance, as it was beneficial in remembering the technique. Each mother was given a leaflet to take home that explained the 5 steps in short. Safety issues, such as safest sleep position (supine), allowing hips to flex and how to avoid overheating when swaddled, were addressed. The same researcher executed each guidance session to maintain standardization.

The mothers in both the control and intervention groups received standard care and support provided by the midwives in the postpartum units. This mainly included breastfeeding and infant care guidance and support in recovering from childbirth and transitioning into parenthood.

Outcomes

Baseline data were collected before randomization in the hospital. Follow-up data were collected 6 to 8 weeks postpartum at home. The instruments to assess the study outcomes were the PSE scale⁴²⁻⁴⁴ and the Evaluation subscale of the PS instrument "What Being the Parent of a New Baby is Like" (WPBL-R).⁴⁵ The primary outcome measure was the change in PSE and PS scores over the follow-up period of 6 to 8 weeks postpartum.

The PSE is based on Bandura's¹³ theory, is domain-specific, and it includes 27 items measuring different infant care skills. These skills are cognitive skills (11 items) such as "I know how to calm a crying baby," affective skills (7 items) such as "I know what my baby enjoys," and behavioral skills (9 items) such as "I'm able to put my baby to sleep." The instrument has a 6-point Likert scale, ranging from 1 ("strongly disagree") to 6 ("strongly agree"). For total scores of PSE and its subcategories, all scores were summed and thereafter divided

by the number of items. In this instrument, higher scores demonstrate better results. In this study, the Cronbach α reached an acceptable level of 0.96 for PSE at baseline, first days postpartum, and 0.95 6 to 8 weeks postpartum. Previous research^{42–44} reported α values of 0.87 or higher.

The WBPL-R to measure PS has 3 distinct subscales: Evaluation (11 items), Centrality (8 items), and Life Change (6 items). The Evaluation subscale contains 11 items where the mothers responded on a 9-point scale with verbal end anchors, such as 1 = not at all (satisfied) to 9 = completely (satisfied). Higher scores indicate more PS. In this study, the Cronbach α yielded 0.86 for the Evaluation subscale at baseline, first days postpartum, and 0.88 6 to 8 weeks postpartum. Similarly, previous research reported α values of 0.87 or higher in the postpartum period.^{40,45} The Evaluation subscale contains items such as “How well do you know your baby?” “How satisfied are you in being a parent of a new baby?” and “How satisfied are you with baby care tasks?” In addition, several mother and infant attributes were considered as independent variables.

Statistical methods

Data were analyzed with SPSS statistical software for Windows, release 25 (SPSS, Chicago, Illinois). Descriptive statistics contained frequencies, percentages, means, and medians. Total scores for the PSE instrument and WBPL-R Evaluation subscale (PS) were counted by summing the points for all items and dividing the acquired sum with the number of items. Higher scores marked better results. Comparisons between groups were made of mother characteristics, PSE and PS. Because of skewed distributions, nonparametric tests were used. Mann-Whitney *U* tests were used for 2 group comparisons, and Kruskal-Wallis tests were used for 3 or more group comparisons.

Analysis of the differences in PSE and PS scores amid the intervention and control groups was conducted using the Mann-Whitney *U* test. Distinctions between the intervention and control groups were further assessed using linear regression, where the change in PSE or PS scores was one at a time as a dependent variable and the group (intervention or control) was used as independent variable together with the number of children, type of birth, and breastfeeding success. However, when cognitive skills were modeled, group and number of children were the only 2 independent variables.

Ethical considerations

The Regional Ethics Committee of the research hospital (reference no. R18188H) approved this research and

therefore it is consistent with the revised Helsinki Declaration of 1975 (updated October 2013). After gaining permission from the hospital administration, the data were collected during March 1 to May 20, 2019. All data are protected in accordance to the EU's General Data Protection Regulation 2016/679 (GDPR). The mothers received written and verbal information and signed consent forms. Mothers were informed about the right to withdraw from the study at any time with no consequences. The questionnaires were thereafter pseudonymized and coded for statistical purposes. Permission for the instruments was obtained from the copyright owners.

RESULTS

Demographic characteristics

A total of 250 mothers participated in this study, of which 120 were randomly allocated to the intervention and 130 to the control group. The mean age of all mothers ($N = 250$) at baseline, immediately after childbirth, was 30.5 years ($SD = 4.78$; range, 19–44 years). Most mothers were married or cohabiting ($n = 238$; 95.6%). The education of almost half of the mothers was secondary, upper secondary, or vocational (48.8%). Just over half of the mothers (51.2%) had a higher university degree. Before staying at home for maternity leave, 64.4% ($n = 161$) of mothers were employed full-time and 35.6% ($n = 89$) were either part-time employed or unemployed. Almost half of the mothers had a first child ($n = 122$; 48.8%), 77 (30.8%) mothers had a second child, and 51 (20.4%) mothers had a third child or more, ranging from 1 to 11. All infants were born between gestational weeks 36 and 42. Most births were normal vaginal births (78.8%), 28 (11.2%) were vacuum extraction births, and 10% were cesarean deliveries. Infants' mean age was 2 days at the time of the baseline data collection, ranging from 0 to 7 days. Regarding perception of the infant, 199 mothers perceived the infant as calm and easy (79.6%) and 49 mothers (19.6%) perceived the infant as fussy in 1 or more qualities.

At 6 to 8 weeks postpartum, 141 mothers returned the follow-up questionnaire. Mother and infant characteristics of the intervention ($n = 69$) and control groups ($n = 72$) are summarized in Table 1. There were no significant differences (all $p > .05$) in the demographic characteristics between the groups.

Effects of the intervention on PSE and PS

PSE showed significant dissimilarities in median changes amid the groups. The intervention group showed significantly larger improvements in scores than

Table 1. Mother and infant characteristics of the intervention ($n = 69$) and control groups ($n = 72$), $N = 141$

| Characteristic | Intervention group ($N = 69$), n (%) | Control group ($N = 72$), n (%) | P |
|----------------------------------|---|--|------|
| Age, y | | | .797 |
| <25 | 6 (8.7) | 5 (6.9) | |
| 25-30 | 23 (33.3) | 25 (34.7) | |
| 31-35 | 25 (36.2) | 22 (30.6) | |
| >35 | 15 (21.7) | 20 (27.8) | |
| Marital status | | | .966 |
| Married/cohabitating | 67 (97.1) | 70 (97.2) | |
| Single, divorced, or separated | 2 (2.9) | 2 (2.8) | |
| Education | | | .434 |
| Secondary/upper secondary school | 9 (13.0) | 11 (15.3) | |
| Vocational school | 20 (29.0) | 13 (18.1) | |
| University of Applied Sciences | 21 (30.4) | 22 (30.6) | |
| University degree | 19 (27.5) | 26 (36.1) | |
| Employment | | | .594 |
| Employed | 48 (69.6) | 53 (73.6) | |
| Part-time employed/unemployed | 21 (30.4) | 19 (26.4) | |
| Number of children | | | .689 |
| 1 | 37 (53.6) | 37 (51.4) | |
| 2 | 16 (23.2) | 21 (29.2) | |
| ≥ 3 | 16 (23.2) | 14 (19.4) | |
| Gestational weeks of this infant | | | .941 |
| 36-39 | 17 (24.6) | 21 (29.2) | |
| 40 | 22 (31.9) | 22 (30.6) | |
| 41 | 17 (24.6) | 17 (23.6) | |
| 42 | 13 (18.8) | 12 (16.7) | |
| Birth | | | .627 |
| Vaginal | 52 (75.4) | 59 (81.9) | |
| Assisted vaginal | 10 (14.5) | 8 (11.1) | |
| Cesarean section | 7 (10.1) | 5 (6.9) | |
| Gender of infant | | | .427 |
| Male | 28 (40.6) | 34 (47.2) | |
| Female | 41 (59.4) | 38 (52.8) | |
| Partner present at birth | | | .585 |
| Yes | 68 (98.6) | 70 (97.2) | |
| No | 1 (1.4) | 2 (2.8) | |
| Breastfeeding success | | | .289 |
| Poor | 23 (33.3) | 21 (30.0) | |
| Good | 34 (49.3) | 29 (41.4) | |
| Very good | 12 (17.4) | 20 (28.6) | |
| Mother's perception of infant | | | .701 |
| Fussy | 16 (23.5) | 15 (20.8) | |
| Nonfussy | 52 (76.5) | 57 (79.2) | |

the control group ($P = .005$). The positive change was statistically significant across all 3 categories of PSE (cognitive, affective, and behavioral skills) in the intervention group. There were no statistically significant differences in median improvements in PS between groups. Table 2 provides the median and change scores.

Based on the model constructed, there were 3 interpretive variables statistically significantly associated with the enhancement in overall PSE. The number of children, type of birth, and breastfeeding success were the only factors that were statistically significantly asso-

ciated with PSE apart from the Cognitive subscale skills in type of birth ($P = .061$) and breastfeeding success ($P = .171$). No other variables explained the improvement in PSE. Table 3 presents statistical analyses assessing the association of the 3 variables mentioned earlier with change in mothers' PSE.

In multivariable linear regressions, the change in mothers' PSE was used as dependent variable with the intervention/control group as independent variable together with 3 individually significant variables: number of children, type of birth, and breastfeeding success.

Table 2. Median score in measuring point at baseline (A) and 6 to 8 weeks postpartum (B) for PSE (range, 1-6) and PS Evaluation subscale (range, 1-9)^a

| | Intervention group (N = 69) | | | Control group (N = 72) | | | P |
|--------------------------|-----------------------------|-----------|--------|------------------------|-----------|--------|------|
| | A, median | B, median | Change | A, median | B, median | Change | |
| PSE | 4.87 | 5.37 | 0.41 | 5.07 | 5.31 | 0.22 | .005 |
| Cognitive skills | 5.00 | 5.55 | 0.27 | 5.32 | 5.36 | 0.09 | .009 |
| Affective skills | 4.29 | 5.00 | 0.71 | 4.57 | 5.00 | 0.43 | .013 |
| Behavioral skills | 5.00 | 5.55 | 0.37 | 5.24 | 5.44 | 0.22 | .003 |
| PS (Evaluation subscale) | 7.95 | 8.18 | 0.18 | 8.18 | 8.18 | 0.09 | .244 |

Abbreviations: PS, parenting satisfaction; PSE, parenting self-efficacy.

^aStatistical analyses assessing the change of PSE and PS in the intervention and control groups. The Mann-Whitney *U* test was used for comparisons. An α level ($P \leq .05$) was used to identify statistically significant comparisons.

Similar analyses were made separately for cognitive, affective, and behavioral skills. The regression models indicated that the difference between the intervention and control groups remained similar for PSE, affective skills, and behavioral skills. However, the cognitive skills model residuals were not considered as normally distributed and therefore this modeling remained inconclusive.

Mothers' experiences of the 5 S's infant calming technique

After baseline measurement, 120 mothers were allocated to the intervention group and they were given a guidance session where the 5 S's infant calming tech-

nique was taught. At follow-up, 6 to 8 weeks postpartum, mothers reported experiences on the 5 S's technique and its usefulness to calm the crying infant. Of all the mothers in the intervention group ($n = 69$), 17.4% ($n = 12$) had not used the technique at all; they also reported that the infant was not crying excessively. However, 42% of the mothers ($n = 29$) used it daily or weekly. Almost half of the mothers found it somewhat useful ($n = 29$), one-third of the mothers (32.8%; $n = 19$) found it useful, and 17.2% ($n = 10$) found it somewhat useful, somewhat useless. Moreover, the intervention guidance in the hospital was perceived beneficial (69.6%; $n = 48$) and timely by most mothers (92.8%; $n = 64$), although the infant was only 1 to 3 days old at the time of the intervention guidance. According to the

Table 3. Associations of statistically significant characteristics with change in mothers' PSE

| Characteristic | Self-efficacy, median | Cognitive skills, median | Affective skills, median | Behavioral skills, median |
|---|-----------------------|--------------------------|--------------------------|---------------------------|
| Number of children | | | | |
| 1 | 0.44 | 0.27 | 0.71 | 0.44 |
| 2 | 0.19 | 0.09 | 0.29 | 0.22 |
| ≥ 3 | 0.09 | 0.00 | 0.29 | 0.11 |
| Statistical comparison across number of children | $P < .001$ | $P = .003$ | $P < .001$ | $P < .001$ |
| Type of birth | | | | |
| Vaginal | 0.26 | 0.18 | 0.43 | 0.22 |
| Assisted vaginal | 0.54 | 0.23 | 1.00 | 0.67 |
| Cesarean section | 0.55 | 0.41 | 0.64 | 0.44 |
| Statistical comparison across type of birth | $P = .003$ | $P = .061$ | $P = .003$ | $P = .001$ |
| Breastfeeding success | | | | |
| Poor | 0.52 | 0.27 | 0.86 | 0.44 |
| Good | 0.31 | 0.18 | 0.43 | 0.33 |
| Very good | 0.11 | 0.05 | 0.26 | 0.06 |
| Statistical comparison across breastfeeding success | $P = .003$ | $P = .171$ | $P = .004$ | $P = .001$ |

Abbreviation: PSE, parenting self-efficacy.

^aMann-Whitney *U* tests were used for 2 group comparisons; Kruskal-Wallis tests were used for groups with 2 or more groups. A conservative α level ($P \leq .05$) was used to identify statistically significant comparisons.

mothers, the infants calmed down completely (43.9%; $n = 25$) or somewhat (54.4%; $n = 31$) when using the 5 S's. In addition, 34 mothers (59.6%) reported that fathers used the calming techniques at home. All the mothers who used the 5 S's recommended it to other families ($n = 57$).

Attrition

This study lost 109 mothers to follow up; 51 mothers in the intervention group and 58 in the control group. Most demographic characteristics between mothers who participated in follow-up and those who were lost to follow-up did not have significant differences ($P \geq .05$). Yet, follow-up respondents had higher education levels ($P = .001$) and were more often full-time employed before maternity leave, whereas mothers who did not respond were more often part-time employed or unemployed ($P = .007$). However, at follow-up, groups remained similar. Reasons for attrition are unknown.

DISCUSSION

The effect of the 5 S's infant calming intervention on mothers' PSE and PS has not been researched before. The results of this study supported the hypothesis that mothers receiving the 5 S's intervention would score higher in PSE and PS during the postpartum period. The findings discovered statistically significant differences in the change of PSE scores between the intervention and control groups 6 to 8 weeks postpartum. There were 3 explanatory variables significantly associated with enhancement in overall PSE, namely, the number of children, type of birth, and breastfeeding success. No other variables explained the improvement in PSE. However, the intervention had no effect on the mothers' PS. Both the intervention and control groups increased PS scores over time, with no statistically significant differences. Previous research also discovered that PS was high on the postpartum period.⁴⁴ The research found that mother's perception of the infant was the most significant attribute affecting PS. In this study, most mothers perceived their infant as nonfussy (>70% in both groups), which can explain the high and unchanging level of PS.

This study indicated that equipping mothers with effective behavioral infant calming skills does increase PSE. This result, together with the benefits and feasibility of the 5 S's, is supported by previous research.^{28,35-37} It is known that parent education interventions have enhanced PSE.^{22,23} They may also help strengthen adjustment into parenthood²² and boost parental confidence.²⁴ Mothers' experience was associated with higher scores in PSE, which is in line with

Bandura's¹³ original theory where the sense of efficacy comes from the experience of succeeding at parenting tasks: the mother knows from experience that it is possible to be a successful mother to the infant.

In this study, breastfeeding success was also associated with PSE. Previous research discovered the same and more.⁴⁶ Mothers with a stronger sense of PSE are positive toward breastfeeding and may breastfeed for a longer duration. In addition, mothers who have a higher sense of PSE are more inclined to adhere to recommendations regarding infant feeding. While the 5 S's can boost PSE, it may also endorse breastfeeding and help mothers achieve the World Health Organization's recommendation to exclusively breastfeed during the first 6 months postpartum.⁴⁷

Caring for an inconsolable infant can injure the mothers feeling of competence.¹ Negative parenting efficacy experiences are also related to postpartum depression.⁴⁸ There is a great need to streamline the diagnosis and treatment of excessive crying in infants, which has not been successfully performed so far. In the meantime, mothers need concrete help. The focus of this study was to teach the 5 S's infant calming intervention not only to the mothers of excessive crying infants but to every new mother in the hospital. This serves as an early prevention of possible problems and prepares mothers for what may come. High PSE will boost motherhood with a sense of possibility to cope and even thrive as a mother. In the best case, this sense of coping may flow over to equip fathers in the same way.

The Joanna Briggs Institute recommends the use of behavioral interventions for fussy or excessively crying infants.⁴¹ The 5 S's is a behavioral intervention that helps mothers to focus on the needs of the infant, to learn to know his or her unique character, and to respond accordingly. This technique is not a one-size-fits-all solution but can be tailor-made for each infant. A technique such as this one supports early interaction between the caretaker and the infant, even if the infant is not fussy or crying excessively.²⁵ Above all, having this skill may prevent the situation from escalating into violence.

In this study, the mothers were able to maintain the 5 S's skill, although there are many other skills taught during the short hospital stay. Mothers learned the technique in one short face-to-face guidance session 1 to 2 days postpartum and experienced it to be at least somewhat useful during the first 6 to 8 weeks of new life with the infant. Nearly half of the mothers used the technique daily or weekly (42%). Nearly all mothers thought that the timing of the intervention was good (92.8%). Because of the 5 S's, the infant calmed somewhat (54.5%) or completely (43.9%). All the mothers who used the method recommended it to other families ($n = 57$).

Mothers may feel that it is a useful tool and skill to have available for a possible situation where the infant is inconsolable. The method's feasibility was encouraging, and it could be adapted to standard guidance in maternity hospitals and clinics. This method serves as early prevention of harmful consequences of excessive crying.⁶

Although it has been argued that there are risks in raising unrealistic expectations in parents by teaching them methods that allegedly work in every situation,⁷ this study shows that mothers did not experience pressure in expecting the method to always work. They learned it in the hospital, practiced once, and used it successfully at home. In the least, it gave mothers a tool that has no side effects or harm for the infant. In using the 5 S's, mothers simultaneously interact with the infant and learn to know him or her better and may figure out how to respond to even the toughest of challenges, unexplained excessive crying.

In today's world, technology advances may produce solutions in calming infants or even responding to some of the infants' needs. This can be helpful, or in worst case, outsource and consequently diminish important early interaction between the parent and the infant. Although in the most difficult infant crying cases, any kind of help is welcome. This randomized controlled trial proved that the 5 S's technique is teachable, learnable, useful, and effective in calming crying infants, and it can boost mothers' PSE.

These findings are valuable when equipping mothers with evidence-based infant calming interventions after childbirth. Results of this study may help develop midwife and nursing care to support mothers and families in the postpartum period, regardless of the infants are fussy or not. Future studies could focus on the effect of the 5 S's behavioral infant calming method on fathers' PSE and PS. In addition, it might be beneficial to explore how the 5 S's affects mothers' PSE and PS over a longer time period.

Strengths and limitations

Strengths and limitations of this research are identified. The randomized controlled trial design used in this study minimized confounding bias. Randomization and allocation to groups were uncomplicated since the turnover in the postpartum units was rapid. Mothers stayed only 1 to 3 days in the units and mostly in single-family rooms; therefore, the chance of an intervention group member sharing information with a member of the control group was minimal. The questionnaire included control questions to check for any knowledge of the 5 S's in the control group. None of the control group mothers notified familiarity or use of the interven-

tion. The researcher was the only intervention provider to ensure that the guidance was carried out in a similar fashion with each mother. It was ensured that the interventions were executed in a way that would be realistic for any midwife or nurse to complete, considering limited resources and time in today's hospital units. The instruments that were used in this study have been validated and previously used in similar contexts successfully.⁴²⁻⁴⁴

The intervention was carried out in 1 hospital with mothers in 3 different postpartum units, which may affect the generalization to other more diverse populations. Although controlling as many variables as possible, there may be other unknown factors that also contribute toward PSE and PS during the postpartum period that may have influenced the change in scores amid the 2 groups.

CONCLUSION

Excessive crying can pose risks for infants and families. It has been proven that intervening early can prevent these harmful consequences. This study has validated the effect and feasibility of the 5 S's behavioral infant calming intervention. The group that learned the infant calming method showed significant improvements in PSE scores compared with the control group. The positive change was statistically significant across all 3 subcategories of PSE (cognitive, affective, and behavioral skills) in the intervention group. Even so, there were no significant differences in change in PS between groups.

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