

# The Effect of Smart Phone Messaging versus Face-to-Face Counseling on the Primiparous Mothers' Breastfeeding Self-efficacy: An Educational Intervention

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## Abstract

**Background:** Increasing breastfeeding rates around the world is one of the most important goals of the World Health Organization. This study was conducted to investigate the impact of smart phone-based education and regular delivery of designed messages on breastfeeding self-efficacy in primiparous mothers.

**Methods:** This study was an educational intervention in which 120 primiparous breastfeeding mothers were randomly allocated into two groups from March 2018 to March 2019. The control group received routine counseling interventions and the intervention group received a smart phone messaging program. We collected the data using demographic questionnaire and Dennis short form breast feeding questionnaire. Self-efficacy levels were compared in the two groups before and after the study procedures. We analyzed the data utilizing Student t-test, chi square, and one way – ANOVA.

**Results:** In this study, 60 mothers were studied in each group, and then the collected data were analyzed. The mean post-test scores in the intervention group ( $60.40 \pm 4.92$ ) and the control group ( $50.10 \pm 7.60$ ) were compared. The results indicated a statistically significant difference between the groups ( $P < 0.001$ ). Working mothers and mothers with a higher level of education had significantly higher self-efficacy score following the intervention ( $P = 0.04$  and  $P = 0.05$ , respectively).

**Conclusion:** Breastfeeding counseling through text, audio, and video messages may increase maternal self-efficacy, particularly in high educated mothers and working ones.

**Keywords:** Breast feeding; Self-efficacy; Smartphone

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## 1. Introduction

Breastfeeding is a vital activity with numerous benefits for mothers and newborns. These benefits include providing rich nutrition for infants' physical and mental growth and reducing respiratory and infectious diseases and mortality, specifically in the first few months of life (1).

Unfortunately, in spite of advice from the World Health Organization and UNICEF, many mothers around the world feed their infants with infant formula milk, because they often think that they cannot produce sufficient milk or because they do not have sufficient knowledge of its benefits (2).

In Iran, the proportion of infants exclusively breastfed at 6 months is moderately acceptable (53.13% in 2010, compared with 13.3% in the United States in 2010 (3)), yet it is still far from the rate recommended

by WHO (4).

Successful breastfeeding is affected by several factors, such as age, level of education, family income, prenatal education, first feeding time, mother's experience, and most importantly, breastfeeding self-efficacy (5).

Among these factors, self-efficacy is a modifying and predictive factor in terms of breastfeeding continuation (6). Bandura says about the effect of self-efficacy in human actions claiming that the human behavior is predicted by their beliefs rather than their abilities (7). In this regard, breastfeeding self-efficacy has been defined as a mother's confidence in her ability to breastfeed her infant. Studies have shown that low levels of self-efficacy have the greatest impact on early breastfeeding, and interventions to increase mother's self-confidence and self-efficacy have a positive effect on breastfeeding continuation (8).

Breastfeeding-associated self-efficacy is influenced by four sources of information: past experiences, observations of other breastfeeding mothers, verbal encouragement, and physical reactions (9). This suggests that the role of healthcare workers could be crucial in supporting primiparous mothers who have no prior breastfeeding experiences (10). Recent research has suggested that smart phone-based interventions, which include regular text and voice messaging in addition to standard methods of education, have had a positive impact on mothers' knowledge (11, 12); accordingly, it could be employed in different educational situations, teaching breast feeding for instance. Moreover, there are studies that illustrate the effects of different educational methods on mothers' self-efficacy (6, 13-16). However, to the best of the author's knowledge, no studies have so far been conducted on the effects of smart phone messaging or smart phone-based education on mothers' breastfeeding self-efficacy. The current study aimed to investigate the impact of routine smart phone-based health education and regular delivery of designed messages on breastfeeding self-efficacy in primiparous mothers referred to health centers in Shiraz, Iran.

## 2. Methods:

### 2.1. Study Design

The present work is an educational intervention. A two-group pre- and post-test design was used to investigate the effect of smart phone messaging on breastfeeding self-efficacy in primiparous pregnant mothers who referred to Enghelab health centers (2 centers) in Shiraz, Iran. The study was conducted from March 2018 to March 2019. The design of the research was approved by the Ethics Committee of Shiraz University of Medical Sciences. (Code of Ethics Committee: IR.SUMS.REC.1395.201).

### 2.2. Selection and Description of the Participants:

According to previous studies (17, 18) and taking into account a type one error of 0.05 and 90% statistical power, at the base of main outcome variable, using *sampsi* command in *Stata* software (version 14.0) and to receive the maximum sample size ( $m_1=119.3$   $sd_1=10.5$   $m_2=108.3$   $sd_2=24.7$ ), the sample size needed was 126 women (63 participants were estimated to be in each group). The number of the subjects in both groups was equal. Using convenient sampling from the mothers who came to the aforementioned centers to received the routine pregnancy care, we selected 163 first time

pregnant women with single healthy fetus. Eventually, 43 mothers were excluded from the study due to illiteracy, not having a smartphone, unwillingness to participate in the study, or not signing an informed consent form; the final sample size was therefore 120. The mothers were allocated to the control ( $n=60$ ) and the intervention ( $n=60$ ) groups using permuted block randomization (block size=4).

The participants included all singleton fetus mothers aged 18-45 years with no history of breastfeeding at 35-40 weeks of gestation (ninth month). They were all literate, familiar with smartphones, and not participating in other similar studies and they agreed to participate in our study. All our participants were fully informed about the nature of the study. They signed the informed consent form after receiving a thorough explanation about the study and ensuring that they understood the objectives.

### 2.3. Technical Information:

#### - Instructional Design:

We designed this educational intervention based on the constructivist theory of education, which believes that learning is a process based on prior knowledge and is constructed based on experience (19).

Perception of this interpretation of learning is different from those of other professionals in this field and one of these interpretations is employing smart phones in learning (20).

In the present study, the intervention group received a smart phone designed messaging program in top of regular counseling. The program included answers to frequently asked questions, proper breastfeeding principles, words of encouragement for breastfeeding mothers which were prepared before the intervention started and designed by an expert and an instructional designer. The program also included regular phone calls to the mothers to monitor their performance 10-15 minutes each, and they received messages in text (30 messages), aural (17 messages), graphical (10 messages), or audio-visual (3 messages) formats (60 messages in sum during 3 weeks=2-4 messages a day), from the first visit in their last month of pregnancy until 2 weeks following delivery. The standard method group received routine interventions, namely face-to-face counseling at health centers, which included two pre-natal and post-natal training sessions, 40-60 minutes each, in the same period.

## - Reliability and Validity of the Questionnaire:

We collected the required data using a questionnaire on demographic characteristics (age, educational level, occupation, family income, lactation duration, and spouse support for breastfeeding) and Dennis Short Form Breastfeeding Self-efficacy Questionnaire BSES-SF. The Short Form Breastfeeding self-efficacy scale consists of 14 questions on a 5-point Likert scale (1: Not confident at all and 5: Always confident). Content validity of the BSES was based on the literature, interviews with breastfeeding mothers, and expert opinions. Cronbach's alpha coefficient for the scale was 0.96 with 73% of all the corrected item-total scale correlations ranging between 0.30 and 0.70 (9). Furthermore, reliability and validity of the Persian version of BSES-SF have been calculated in a recent study (21). In this study, the model for construct validity was fitted ( $\chi^2/df=4.42$ ; CFI=0.96; NFI=0.95; IFI=0.96; RMSEA=0.095 and SRMR=0.054). The Cronbach's  $\alpha$  for the BSES-SF was 0.910.

## 2.4. Statistics

The minimum and maximum scores on BSES-SF questionnaire are 14 and 70, respectively, and the scores

above 50 reflect the likelihood of breastfeeding. Our data were analyzed with SPSS (version 21) for Windows. Following the assessment of the normal distribution of main variable in both groups, we estimated the effect of intervention in the two groups (comparison and intervention) before and after the intervention. A p-value of less than 0.05 was designated as statistically significant.

## 3. Results

## 3.1. Attrition and Completion

All the participants completed the study questionnaires. The comparison of their numbers during the study revealed that they remained in their groups until the end of the study.

The mean age of the mothers in the intervention group was  $27.37 \pm 2.54$  years and in the control group, it was  $28.93 \pm 2.36$  years. Table 1 represents other baseline characteristics of the intervention and control groups.

## 3.2. Evaluation of Breast Feeding Self-efficacy

Comparing the mean scores of the mothers in the

**Table 1:** Baseline characteristics of the study participants

Variables	Control group No.(60)	Intervention group No.(60)	P value
Age, (Mean and SD)	28.43(2.36)	27.67(2.54)	0.09*
Education, (Frequency, %)			0.65**
Elementary	10 (16.7%)	9 (15%)	
High school	25 (41.6%)	21 (35%)	
University degree	25 (41.7%)	30 (50%)	
Occupation (Frequency, %)			0.69**
Housewife	53 (88.3%)	49 (81.7%)	
Employee	6 (10.0%)	9 (15%)	
Others	1(1.6%)	2 (3.3%)	
Family Income (Frequency, %)			0.58**
Low	14 (23.3%)	14 (23.3%)	
Intermediate	43 (71.6%)	45 (75%)	
High	3 (5%)	1(1.6%)	
Mother's Lactation Duration (Frequency, %)			0.92**
<6 month	1 (1.6%)	2 (3.3%)	
6-12 month	4 (6.6%)	4 (6.7%)	
>12 month	38 (63.3%)	39 (65%)	
Don't Know	17 (28.3%)	15 (25%)	
Spouse support for breastfeeding (Frequency, %)			0.59**
Very high	31 (51.6%)	33 (55%)	
High	27 (45.2%)	22 (36.6%)	
Intermediate	1 (1.6%)	3 (5.1%)	
Low	1(1.6%)	2 (3.36%)	

\*Two independent sample t-test; \*\*Chi- square test

control and intervention groups did not indicate a significant difference concerning the pre-test scores (P=0.37). Meanwhile, comparing the mean of the post-test scores in the intervention group (60.40±4.92) and the control group (50.10±7.60) showed a statistically significant difference (P<0.001) (Table 2).

To compare the post-intervention self-efficacy score and probable related factors, such as education, occupation, family income, mother's lactation duration, and husband's interest in breast feeding, in the intervention group, we calculated the mean (SD) of the post-intervention self- efficacy score in multiple layers of each probable related factors, using one- way ANOVA test; Table 3 depicts the obtained results.

According to the results, there seems to be a

significant relationship between maternal education level and mothers' job and the level of breastfeeding self-efficacy (P=0.05 and P=0.04, respectively). The other factors did not reveal any correlations with self-efficacy in breast feeding.

#### 4. Discussion

The benefits of breastfeeding have been assessed by different studies. They have implied that there are numerous factors which affect the continuity of breast feeding, among which breastfeeding self-efficacy could be mentioned. This factor is affected by education itself. New technologies have created the opportunity for different kinds of education which are deeper and more interesting at the same time. Smart phones have brought this opportunity in people's hand. The aim of

**Table 2:** Comparison of the mean self-efficacy scores in the control and intervention groups before and after the intervention

Study groups	Self-efficacy, before the intervention score Mean(SD)	Number	Standard Error of Mean	P value	Self-efficacy after the intervention score Mean(SD)	Number	Standard Error of Mean	Within group comparison(P-value)	P value
Control group	52.72(8.55)	60	1.19	0.37	50.10(7.60)	60	0.99	0.07	<0.001
Intervention group	54.23(8.96)	60	1.15		60.40(4.92)	60	0.63	<0.001	

**Table 3:** Comparison of the post-intervention self-efficacy score in the intervention group according to the probable related factors

Factors	Intervention group Post-intervention Self-efficacy score, M(SD)	*P value
Education (No.60)		0.05
Elementary (9)	56.4 (10.9)	
High school (21)	59.8 (4.3)	
University degree(30)	61.9 (4.6)	
Occupation		0.04
Housewife (49)	59.9 (6.2)	
Employee (9)	64.3 (3.7)	
Others (2)	54.5 (3.5)	
Family Income		0.79
Low (14)	61.21 (5.05)	
Intermediate (45)	60.17 (6.4)	
High (1)	58.0 (00)	
Mother's Lactation Duration		0.97
<6 months (2)	59.5 (3.5)	
6- 12 months (4)	61.25 (2.5)	
>12 months (39)	60.51 (6.7)	
Don't Know (15)	59.93 (5.3)	
Spouse support for breastfeeding		0.35
Very high	60.24 (5.7)	
High	60.77 (6.8)	
Intermediate	55.66 (4.04)	
Low	65.5 (0.07)	

\*One way- ANOVA test

this educational intervention study was to investigate the effect of educational smart phone messaging in combination with face-to-face counseling on primiparous mothers' breastfeeding self-efficacy.

The results demonstrated that the designed messaging program yielded higher self-efficacy scores in breastfeeding among the primiparous mothers who received this intervention as compared to the ones who had solely received standard breastfeeding training.

Our findings also revealed a significant difference between the mean of self-efficacy scores of the two groups under study. These findings suggested that using informative, encouraging, and supportive messages via smartphones could be a useful way to improve self-efficacy in primiparous mothers.

The results of this educational intervention are in line with those of other studies dealing with the effect of educational interventions on self-efficacy (15, 22-24). It demonstrates the effectiveness of self-efficacy training on encouraging mothers to breastfeed, which could improve the duration and quality of breastfeeding.

These training programs can be delivered in a variety of ways, ranging from face-to-face counseling to new teaching methods, such as technology-based training programs, including smart phone messaging in this study. This intervention is almost cost-free and can easily be incorporated into routine training programs. The results herein are not in line with those of some previous studies; they have reported that smart phone applications did not increase breastfeeding rate (25). There are several factors which could affect the results. One of them is the differences in study designs. Other factors are study populations, the time of assessment of variables, and actual use of applications or smart phone messages.

Other factors that could potentially affect the results of our study were educational level, career status, income level, duration of breastfeeding, and spouse support for breastfeeding. Some studies have examined the influence of a number of these variables, including family income, job, and spouse support, as the predictors of breastfeeding (26-29). The outcome of our study revealed that these variables, except for educational level and career status, had no significant effects on maternal self-efficacy.

Educational level changes lifestyle and quality of life management. It directly or indirectly affects and

improves all the aspects of the mother's life, including breastfeeding. It also makes the mother more likely to work.

Nevertheless, in certain studies, no correlations have been observed between educational level and self-efficacy (30). The probable cause of this dissimilarity is that in their study, Chan and colleagues chose one public hospital in Hong Kong; therefore, the participants probably belonged to one socio-economic class.

Our study is of some methodological strengths. The tool utilized for calculating self-efficacy in the study had appropriate validity and reliability. Additionally, random assignment of the participants to the study groups caused homogeneous distribution of the possible confounding factors. All the participants stayed until the end of the study and attrition bias did not occur.

The most important limitation of this study is the use of convenient sampling, which may obscure the generalization of the results to other populations.

For future research, the authors recommend using larger sample sizes, sampling from more diverse geographical areas, and analyzing the influential factors over a longer period of time.

## 5. Conclusions

The results of the present study shed light on the fact that breastfeeding counseling by text, audio, and video messages may increase maternal self-efficacy and breastfeeding duration, particularly in well-educated mothers and working ones. The study provided valuable information for future studies with further participant diversity.

**Conflicts of interest:** The authors declared no conflict of interest.

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