

ORIGINAL RESEARCH

The effects of a breastfeeding self-efficacy intervention on short-term breastfeeding outcomes among primiparous mothers in Wuhan, China

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Abstract

Aims. To evaluate the effects of a breastfeeding intervention on primiparous mothers' breastfeeding self-efficacy, breastfeeding duration and exclusivity at 4 and 8 weeks postpartum.

Background. Few studies have examined the effects of breastfeeding self-efficacy on improved breastfeeding outcomes among primiparous mothers in China.

Design. An experimental pre-test and posttest, two-group design was used in the study.

Methods. A total of 74 participants were recruited to the study from a tertiary hospital in central China, from June–October 2012. An individualized, standardized nursing intervention based on the Self-Efficacy Theory was delivered to enhance mothers' breastfeeding self-efficacy, breastfeeding duration and exclusivity at 4 and 8 weeks postpartum. Participants were randomly assigned to an intervention or referent group. Participants in the intervention group received three individualized, self-efficacy-enhancing sessions. Participants in the referent group received standard care.

Results. Participants in the intervention group showed significantly greater increases in breastfeeding self-efficacy, exclusivity and duration than participants in the control group at 4 and 8 weeks postpartum (except for duration at 4 weeks). High baseline breastfeeding self-efficacy predicted higher breastfeeding self-efficacy later and more exclusive breast-feeding.

Conclusion. The findings in this study suggest that intervention aimed at increasing self-efficacy has a significant impact on maternal breastfeeding self-efficacy and short-term breastfeeding outcomes.

Keywords: breastfeeding duration, breastfeeding exclusivity, breastfeeding self-efficacy, China, primiparous mothers, self-efficacy, self-efficacy intervention, self-efficacy theory, short-term breastfeeding outcomes

Why is this research or review needed?

- Despite the acknowledged value of exclusive breastfeeding, breastfeeding rates are still far from the recommended level in China.
- Few intervention studies have evaluated the effects of breastfeeding self-efficacy on improved breastfeeding outcomes in Chinese mothers.

What are the key findings?

- The study demonstrated that the self-efficacy intervention was an effective approach to increasing breastfeeding self-efficacy, exclusivity and duration for primiparous mothers.
- Women who had higher baseline breastfeeding self-efficacy scores were more likely to breastfeed exclusively at 4 and 8 weeks.

How should the findings be used to influence policy/practice/research/education?

- The findings imply that nurses should provide intervention focused on sources of self-efficacy to support and educate postpartum mothers for breastfeeding.
- Regular postpartum telephone follow-up provided by community health nurses were recommended to help mothers build confidence and breastfeed successfully.

Introduction

The World Health Organization (WHO 2001) recommends that infant feeding should be exclusively breastfeeding for 6 months, and should be breastfed together with sufficient supplements maintained until 2 years or beyond. Breastfeeding has many advantages for both mothers and infants, enhancing the infant immune system, supplying optimal nutrition, improving mother–infant bonding, and decreasing risk of mothers' ovarian and breast cancer (AAP 1997, Gartner *et al.* 2005).

Fewer than half of newborns globally are exclusively breastfed for the first 6 months of life (WHO 2011). In some cities of China, for example, the reported rate of exclusive breastfeeding for 4 months is only 45.3% (Liu *et al.* 2003). Reasons for early termination are diverse; many mothers cease breastfeeding due to perceived difficulties rather than out of choice (Dennis 2002). Studies have focused on factors which affect breastfeeding exclusivity and duration, and have found that mothers who are young, single, low income and less educated are particularly vulnerable and more likely to terminate breastfeeding prematurely (Dennis 2002, Hu *et al.* 2004, Swanson & Power 2005, Ladomenou *et al.* 2007). However, many of these

variables are non-modifiable variables. To deal with low breastfeeding duration and rates, it is essential to recognize factors that support breastfeeding (Dennis & Faux 1999). Breastfeeding confidence or breastfeeding self-efficacy is one possible modifiable variable (Dennis 1999, Duun *et al.* 2006).

Studies have found that interventions based on Bandura's self-efficacy theory were feasible and effective in improving mothers' breastfeeding outcomes. However, few studies have evaluated whether breastfeeding self-efficacy can be enhanced in Chinese mothers and lead to improved breastfeeding outcomes. Therefore, this study examined the effects of a self-efficacy intervention for primiparous mothers on breastfeeding self-efficacy, breastfeeding duration and exclusivity and compared these outcomes with a referent group of women.

Background

Despite the acknowledged value of exclusive breastfeeding and endeavour for promoting this practice, breastfeeding performance is considered poor in many cities of China. In Wuhan, about 67% of mothers give up breastfeeding when the infant is 4–6 months old (Liu *et al.* 2011). Li and Wang (2007) reported that although 95.6% of mothers initiate breastfeeding in Shanghai, only 32.1% of those persevere in breast milk until the infant is 4 months old, and 22.5% of mothers continue to breastfeed exclusively to 6 months.

To improve breastfeeding outcomes and efficacy, health professionals need to determine antecedents that are modifiable in interventions (Dennis & Faux 1999). Studies examining breastfeeding self-efficacy have revealed that self-efficacy is an important variable related to breastfeeding initiation, duration and exclusivity. Women with higher breastfeeding self-efficacy scores were significantly more likely to breastfeed and to persevere in human milk only 1 week to 4 months after delivery (Blyth *et al.* 2002).

A pilot randomized controlled trial suggested that an individualized nursing intervention based on Bandura's self-efficacy theory was feasible (McQueen *et al.* 2011). The study also indicated that one-on-one intervention ensured that the intervention conducted to participants was individualized and based on participants' needs. In another study, a nine-page interactive self-efficacy intervention workbook was created to increase breastfeeding self-efficacy and short-term breastfeeding outcomes (Nichols *et al.* 2009). However, few studies have evaluated whether breastfeeding self-efficacy can be enhanced in Chinese mothers and lead to improved breastfeeding outcomes.

Conceptual framework

The conceptual framework for the study was based upon Bandura’s (1977) self-efficacy theory and on Dennis’s (1999) breastfeeding framework, which includes the demographic characteristics of participants, their breastfeeding self-efficacy, short-term breastfeeding outcomes, and interventions based on self-efficacy (Figure 1).

Bandura (1977) defines self-efficacy as an individual’s evaluation of his or her ability to achieve a given task. Individuals who believe that they are able to attain desired outcomes are more likely to initiate behaviours, adhere to the behaviours and achieve target goals. Bandura (1977) suggests that four sources of information determine the perceived confidence of an individual to master a given behaviour: (a) performance accomplishment; (b) vicarious experience; (c) verbal persuasion; and (d) physiological and affective states.

Dennis’s (1999) breastfeeding framework was developed to explain breastfeeding confidence based on self-efficacy theory. Breastfeeding self-efficacy is defined as a mother’s perceived capability to breastfeed her infant (Dennis 1999). The framework identifies factors that may influence mothers’ self-efficacy and thus, the framework can be used to: (a) depict the relationships among maternal self-efficacy, and behaviour; and (b) address antecedents that may influence maternal self-efficacy.

In the study, sources of information identified as antecedents were considered as strategies for developing the intervention. As the framework proposes, a mother’s breastfeeding self-efficacy was expected to predict breastfeeding performance including initiation, duration and exclusivity (Dennis 1999).

The study

Aim

The aim of the study was to evaluate the effects of a breastfeeding intervention on primiparous mothers’ breastfeeding self-efficacy, breastfeeding duration and exclusivity at 4 and 8 weeks postpartum and compare these outcomes with a referent group of primiparous women.

Research questions

Research questions of this study were: (1) what is the effect of the self-efficacy intervention on breastfeeding self-efficacy at 4 and 8 weeks postpartum? (2) what is the effect of the self-efficacy intervention on breastfeeding duration at 4 and 8 weeks postpartum? (3) what is the effect of the self-efficacy intervention on breastfeeding exclusivity at 4 and 8 weeks postpartum?

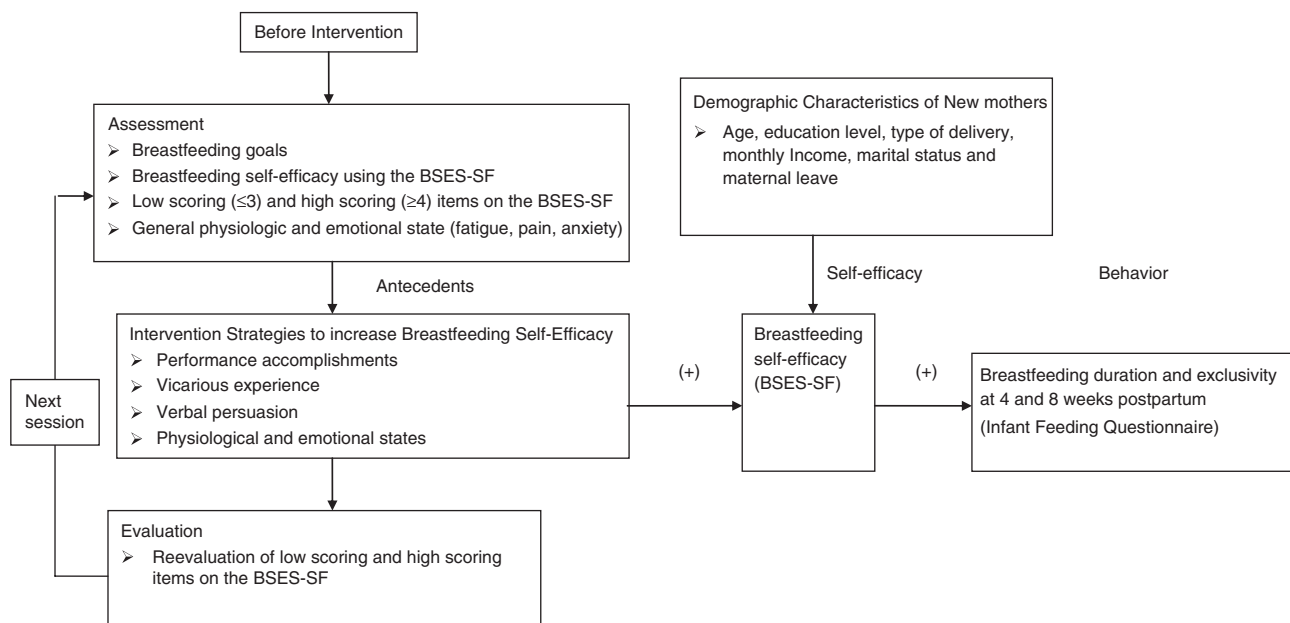


Figure 1 Relationships among self-efficacy intervention, breastfeeding self-efficacy and breastfeeding behaviour (Bandura’s 1977, Dennis 1999).

Design

An experimental pre-test–posttest design with two groups was used to examine the effects of a self-efficacy intervention on breastfeeding self-efficacy, breastfeeding duration and breastfeeding exclusivity at 4 and 8 weeks postpartum for primiparous mothers.

Participants

A quasi-random, point-of-reference sample of participants were recruited from the maternity department of a tertiary hospital in a major city of central China, Wuhan. Inclusion criteria were that participants be 18 years of age or older, be able to read and understand Mandarin, be a new mother who had given birth to a single, healthy term infant, and intend to breastfeed. Mothers were excluded from the study if they had any condition that would interfere with breastfeeding, such as a serious illness, mental illness, or an infant requiring special care that could not be discharged with the mother.

Breastfeeding self-efficacy was used as the outcome variable to compute the sample size for the study using a repeated measures ANOVA *F*-test (two-tailed procedure; Gamma parameter estimated from previous research). A sample size of 74 was determined to provide statistical power $\geq 80\%$, assuming a type I error rate of 0.05, an effect size of 0.29, and 20% attrition rate (G*Power version 3.1.3; Faul *et al.*, 2009). Participants were recruited and randomized into the intervention ($n = 37$) and referent ($n = 37$) group (Figure 2).

Data collection

Data were collected from June to October 2012. Once permission to contact eligible women was obtained, first author contacted potential participants within 24 hours after delivery to provide a detailed explanation and obtain consent. All participating mothers were required to complete a baseline questionnaire, the Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF) (Dennis 2003). On confirmation of eligibility, consent to participate and com-

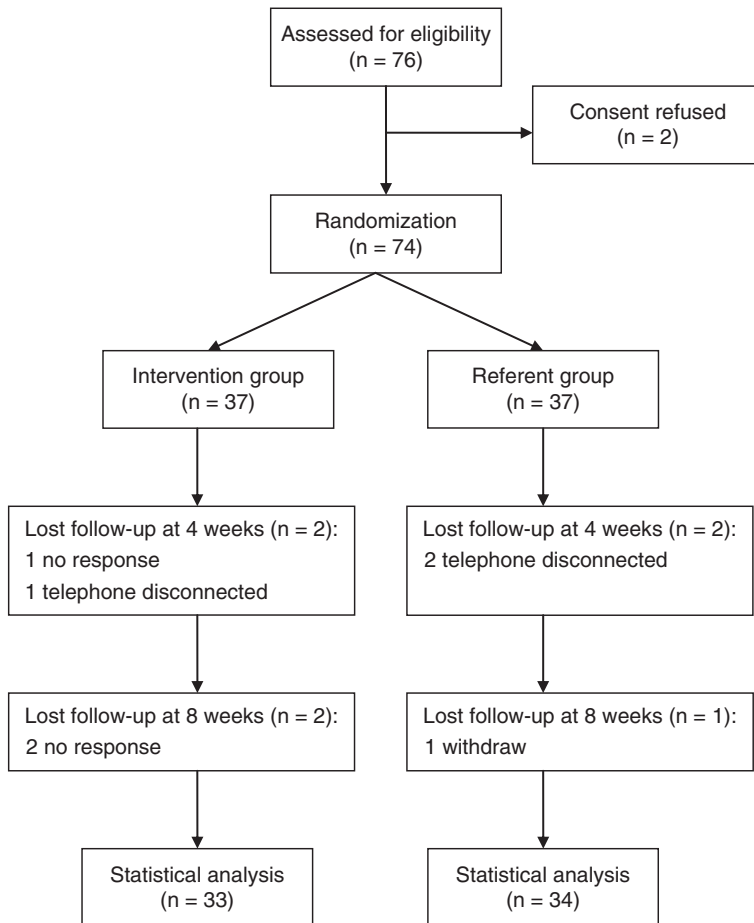


Figure 2 Trial recruitment flow diagram.

pletion of baseline information, mothers were randomly assigned to the intervention or referent group.

Mothers who were assigned to the referent group received standard care that included in-hospital care and follow-up by a community nurse after discharge. Mothers who were in the intervention group received standard care plus the self-efficacy intervention. Data were collected pre-intervention, at 24 hours after delivery (T1) and at 4 weeks (T2), and 8 weeks (T3) postpartum. All mothers were interviewed over the telephone by a researcher at 4 and 8 weeks postpartum.

Intervention

The individualized intervention was provided in three sessions in the postpartum period. The first session occurred within 1-day after delivery. The second session took place 1 day after the first session. Breastfeeding was observed at one of the two intervention sessions to maximize performance accomplishment. The third session of the intervention was delivered over the telephone 1 week after hospital discharge. The one-on-one sessions included assessment, self-efficacy-enhancing strategies, and evaluation. Assessment included a test of the participant's breastfeeding goals, breastfeeding self-efficacy, analysis of low-scoring and high-scoring items on the BSES-SF and general physiological and affective state, including fatigue, pain and anxiety. This assessment was intended to ensure that the intervention was individualized to meet each participant's needs. Fatigue, pain and anxiety were assessed by self-report.

Self-efficacy-enhancing strategies were implemented based on the initial assessment. The strategies were developed from the four sources of information noted in self-efficacy theory (Bandura 1977) and in the breastfeeding framework (Dennis 1999): performance accomplishment, vicarious experience, verbal persuasion, and physiological and emotional states.

Breastfeeding counselling, a training course (WHO & UNICEF 1993) was used to guide the efforts to help mothers and their infant breastfeed optimally. Based on the guideline, teaching topics, content and specific self-efficacy-enhancing strategies were developed and implemented to meet mothers' needs. As the intervention was based on initial assessment and was individualized, the content of the efficacy-enhancing strategies was not completely standardized because mothers had different low-scoring and high-scoring items, various breastfeeding goals and differing perceptions of breastfeeding self-efficacy. However, the process of determining individual needs was standardized (Table 1).

At the end of each session, mothers completed an evaluation. They were encouraged to respond as honestly as possible to the questions, without concern for the researcher, to minimize social desirability bias. Low-scoring items were re-evaluated to identify any needed changes. The evaluation also was used to focus the plan for the next session based on mothers' needs. The intervention was delivered by the first author.

Ethical considerations

The study received Research Ethics Committee approval from the university school of nursing and the hospital. The principal investigator obtained informed consent from each participant. Confidentiality of study data was maintained throughout the entire process. Questionnaires were numbered and no name was linked to the participant in the questionnaires. Personal information was destroyed after completion of the study.

Instruments

Data to evaluate the effects of the intervention were collected at baseline, 4 and 8 weeks postpartum.

Baseline demographic data

The baseline questionnaire included socio-demographic, labour and delivery and postpartum variables that could influence breastfeeding outcomes, including age, education, marital status, type of delivery, monthly income, mother's perceptions of breastfeeding support and mother's breastfeeding plan.

Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF) was used to assess breastfeeding self-efficacy at baseline and 4 and 8 weeks postpartum. The BSES-SF (Dennis 2003) is a 14-item, self-report instrument. All items are preceded by the phrase 'I can always' and are anchored with a 5-point Likert scale where 1 = not at all confident and 5 = always confident. As recommended by Bandura (1977), all items are presented positively and scores are summed to produce a range from 14 to 70, with higher scores indicating greater breastfeeding self-efficacy.

Dennis (2003) refined the original BSES to the short-form, and the BSES-SF was psychometrically tested within a Canadian sample of mothers (Dennis 2003). The internal consistency of the tool, using Cronbach's alpha was 0.94. The BSES-SF has been evaluated with mothers in Poland (Wutke & Dennis 2007), Canada (Kingston *et al.* 2007) and the UK (Gregory *et al.* 2008). In general, studies have found the BSES-SF to be a reliable and valid tool to predict

Table 1 Description of intervention modules.

Topic	Sources of self-efficacy theory and intervention strategies
Why breastfeeding is important	Verbal persuasion: <ul style="list-style-type: none"> ● Provide positive feedback whenever appropriate, highlighting personal capabilities. ● Create optimistic beliefs: You have what it takes to succeed.
Help a mother with an early breastfeeding	Performance accomplishment: <ul style="list-style-type: none"> ● Provide positive reinforcement and suggestions about how to improve future breastfeeding performance. ● Set short-term goals that the mother will be able to achieve. ● Provide anticipatory guidance that difficulties may be encountered, especially in the early period. ● Success usually requires tenacious effort and it is how the difficulties are handled that will determine future success. Vicarious experience: <ul style="list-style-type: none"> ● Use visual aids to make unobservable breastfeeding skills apparent to mother. ● Use visual aids to demonstrate breastfeeding techniques such as positioning or proper latch. ● Provide written materials to supplement learning. Verbal persuasion: <ul style="list-style-type: none"> ● Provide positive feedback whenever appropriate, highlighting personal capabilities. ● Correct any inaccurate and low perceptions of performance capability. ● Create optimistic beliefs: You have what it takes to succeed. ● Provide accurate information to increase sense of ability.
Positioning a baby at the breast	Performance accomplishment: <ul style="list-style-type: none"> ● Provide positive reinforcement and suggestions about how to improve future breastfeeding performance. ● Give attention to successful or improved aspects of breastfeeding performance. ● Identify and reinforce past and present successes or accomplishments. Vicarious experience: <ul style="list-style-type: none"> ● Use visual aids to demonstrate breastfeeding techniques such as positioning or proper latch. ● Provide written materials to supplement learning.
Expressing breast milk	Performance accomplishment: <ul style="list-style-type: none"> ● Provide positive reinforcement and suggestions about how to express breast milk. ● Success usually requires tenacious effort and it is how the difficulties are handled that will determine future success. ● Identify and reinforce past and present successes or accomplishments. Vicarious experience: <ul style="list-style-type: none"> ● Provide written materials to supplement learning. Verbal persuasion: <ul style="list-style-type: none"> ● Create optimistic beliefs: You have what it takes to succeed. ● Provide support when handling pressure and failure. Physiological and emotional states: <ul style="list-style-type: none"> ● Correct any misinterpretations of body states.
Not enough milk	Physiological and emotional states: <ul style="list-style-type: none"> ● Correct any misinterpretations of body states. ● Provide anticipatory guidance that the tendency to experience anxiety, pain, and fatigue should be explicitly acknowledged and normalized. Verbal persuasion: <ul style="list-style-type: none"> ● Correct any inaccurate and low perceptions of performance capability. ● Create optimistic beliefs: You have what it takes to succeed. ● Provide support when handling pressure and failure. ● Provide accurate information to increase sense of ability. ● Encourage mother to envision successful performances and manage self-defeating thoughts on how she might persevere through any breastfeeding difficulties that are apparent to the mother.

Table 1 (Continued).

Topic	Sources of self-efficacy theory and intervention strategies
Breast conditions	Physiological and emotional states: <ul style="list-style-type: none"> • Correct any misinterpretations of body states. • Provide anticipatory guidance that the tendency to experience anxiety, pain, and fatigue should be explicitly acknowledged and normalized. Verbal persuasion: <ul style="list-style-type: none"> • Correct any inaccurate and low perceptions of performance capability. • Create optimistic beliefs: You have what it takes to succeed. • Provide support when handling pressure and failure. • Encourage mother to envision successful performances and manage self-defeating thoughts on how she might persevere through any breastfeeding difficulties that are apparent to the mother.

mothers at risk for early discontinuation of breastfeeding (Dennis 2003, Kingston *et al.* 2007, Wutke & Dennis 2007, Gregory *et al.* 2008). The Chinese version of the BSES was translated and tested among Chinese mothers and Cronbach's alpha coefficient was 0.93 (Dai & Dennis 2003). In this study, Cronbach's alpha coefficient for the BSES-SF was 0.88.

Breastfeeding duration and exclusivity

Based on Labbok and Krasovec's classification (Labbok & Krasovec 1990), the Infant Feeding Questionnaire was used to assess breastfeeding duration and exclusivity at 4 and 8 weeks postpartum. The questionnaire is composed of two questions that ask about the method of infant feeding (breastfeeding or bottlefeeding) and level of breastfeeding. If a mother indicates that she is breastfeeding, breastfeeding is classified as: (a) exclusive breastfeeding (breast milk only); (b) almost exclusive breastfeeding (breast milk and other fluids, but not formula); (c) high breastfeeding (<one bottle/day); (d) partial breastfeeding (at least one bottle of formula/day); or (e) token breastfeeding (breast given to comfort baby, but not nutrition). Many studies have used this type of classification for assessing breastfeeding duration and exclusivity (Dennis *et al.* 2002, Gregory *et al.* 2008, Nichols *et al.* 2009, McQueen *et al.* 2011). In this study, breastfeeding was defined as any breast milk: either by breast or expressed breast milk by bottle or tube. If a mother was no longer practicing any breastfeeding, the date of discontinuation was recorded, and she was classified as bottlefeeding (formula).

Data analysis

Baseline demographic data were summarized by descriptive statistics. Independent t-tests and chi-square were used to compare equivalence on demographic data between groups.

Differences in the outcome variable (BSES-SF scores) over time and between the two groups were examined using repeated measures ANOVA. Logistic regression analysis was used to assess the effects of the group assignment on breastfeeding exclusivity. A Mann-Whitney *U*-test was performed to compare breastfeeding duration days between groups. Sensitivity of conclusions from missing data due to dropout was assessed using multiple imputation methods and all conclusions were consistent. A two-sided *P*-value <0.05 was considered statistically significant.

Results

Baseline demographic characteristics of participants

A total of 74 participants were recruited and randomized: 33 in the intervention group and 34 in the referent group completed follow-up (Figure 2). The ages of mothers ranged from 21–35 years, with a mean age of 28.07 years. All participants were married, and 44.8% ($n = 30$) had a college degree. The majority (83.5%, $n = 56$) were employed and 49.3% ($n = 33$) had a maternity leave for 4 months or less. Only 43.3% ($n = 29$) of the mothers gave birth vaginally. Most mothers (62.7%, $n = 42$) reported at baseline that they planned to breastfeed exclusively and 73.1% planned to breastfeed more than 4 months; 77.6% ($n = 52$) have access to a mother who had given birth before (Table 2).

There were no significant differences in demographic characteristics between the intervention and referent groups (maternity age: $t = 0.90$, $P = 0.37$; education level: $\chi^2 = 0.012$, $P = 0.91$; maternal leave: $\chi^2 = 1.61$, $P = 0.45$; family income: $\chi^2 = 1.13$, $P = 0.77$; type of delivery: $\chi^2 = 0.45$, $P = 0.80$; planned breastfeeding duration: $\chi^2 = 1.64$, $P = 0.65$; planned feeding type: $\chi^2 = 0.44$, $P = 0.80$; access to an experienced mother: $\chi^2 = 0.66$, $P = 0.42$).

Table 2 Baseline characteristics of the study sample.

Variable	Groups		
	Intervention group (<i>n</i> = 33)	Referent group (<i>n</i> = 34)	Total (<i>N</i> = 67)
Age			
Mean (SD)	28.39 (2.76)	27.76 (2.98)	28.07 (2.87)
Education level			
Below undergraduate degree	18 (54.5)	19 (55.9)	37 (55.2)
Undergraduate or above	15 (45.5)	15 (44.1)	30 (44.8)
Maternal leave			
≤4 months	14 (42.4)	19 (55.9)	33 (49.3)
>4 months	12 (36.4)	11 (32.4)	22 (34.3)
Out of work	7 (21.2)	4 (11.8)	11 (16.4)
Family income per capita (RMB/month)			
<1000	1 (3.0)	3 (8.8)	4 (6.0)
1000–2999	9 (27.3)	8 (23.5)	17 (25.4)
3000–4999	12 (36.4)	13 (38.2)	25 (37.3)
≥5000	11 (33.3)	10 (29.4)	21 (31.3)
Type of delivery			
Vaginal birth	15 (45.5)	14 (41.2)	29 (43.3)
Selective caesarean section	14 (42.4)	17 (50.0)	31 (46.3)
Caesarean section with labour	4 (12.1)	3 (8.8)	7 (10.4)
Planned breastfeeding duration (<i>P</i> ; months)			
<i>P</i> ≥ 6	18 (54.5)	18 (52.9)	36 (53.7)
4 ≤ <i>P</i> < 6	8 (24.2)	5 (14.7)	13 (19.4)
2 ≤ <i>P</i> < 4	3 (9.1)	4 (11.8)	7 (10.4)
I don't know	4 (12.1)	7 (20.6)	11 (16.4)
Planned feeding type			
Exclusively breastfeeding	22 (66.7)	20 (58.8)	42 (62.7)
Almost exclusive breastfeeding	7 (21.2)	9 (26.5)	16 (23.9)
High breastfeeding	4 (12.1)	5 (14.7)	9 (13.4)
Access to a experienced mother			
Yes	27 (81.8)	25 (73.5)	52 (77.6)
No	6 (18.2)	9 (26.5)	15 (22.4)

Numbers presented are frequency (percentage) except for mean (SD) for age.

Table 3 Repeated measures ANOVA to test breastfeeding self-efficacy between groups at different times.

	Pre-intervention Mean (SD)	4 weeks Postpartum Mean (SD)	8 weeks Postpartum Mean (SD)	<i>F</i>	<i>P</i>
Intervention	48.21 (7.40)	58.88 (5.26)	59.85 (5.04)	8.84	0.004
Referent	47.91 (7.80)	52.29 (6.60)	53.00 (7.52)		

Effect of the breastfeeding self-efficacy intervention on breastfeeding self-efficacy

When pre-intervention breastfeeding self-efficacy was used as a covariate, there were significant differences between the groups at different times. Mothers in the intervention group had significantly higher mean BSES-SF scores at 4 weeks ($F = 56.67$, $P < 0.001$, $R^2 = 0.74$) and 8 weeks ($F = 53.79$, $P < 0.001$, $R^2 = 0.74$) than the referent group.

Results of ANOVA used to examine differences within and between groups are shown in Table 3. Mauchly's test of sphericity showed that BSES-SF was proportional to an identity matrix (Mauchly's $W = 0.92$, $P = 0.069$). Tests of within-participant effects indicated that there were significant differences in mean BSES-SF scores in the groups ($F = 165.49$, $P < 0.001$). Also, there was a significant difference in mean BSES-SF scores between the groups ($F = 8.84$, $P = 0.004$).

Effect of the breastfeeding self-efficacy intervention on breastfeeding exclusivity

Logistic regression analysis was performed to determine whether the intervention influenced breastfeeding exclusivity (Tables 4 and 5). The breastfeeding method was revalued (exclusively breastfeeding = 1, mix breastfeeding or formula feeding = 0). All baseline variables were entered into the regression as covariates. The Wald χ^2 statistic was used to compute which variables remained in the final model. The result of logistic regression analysis showed that only baseline BSES-SF scores and intervention group remained in the final model at both 4 and 8 weeks. Group assignment was significant (4 weeks: OR = 9.20, $P = 0.013$; 8 weeks: OR = 5.63, $P = 0.026$) in predicting the breastfeeding exclusivity. In addition, women who had higher baseline breastfeeding self-efficacy scores were more likely (4 weeks: OR = 1.73, $P < 0.001$; 8 weeks: OR = 1.61, $P < 0.001$) to breastfeed exclusively at 4 and 8 weeks.

Effect of the breastfeeding self-efficacy intervention on breastfeeding duration

A Chi-square test was used to examine the differences on breastfeeding duration at both follow-up periods. A difference was found at 8 weeks postpartum between intervention and referent groups (87.9% breastfeed in the intervention group vs. 67.6% in the referent group; $\chi^2 = 3.95$, $P = 0.047$). However, there was no significant difference at 4 weeks between groups (90.9% in the intervention group vs. 76.5% in the referent group; $\chi^2 = 2.54$, $P = 0.111$).

A Mann-Whitney U -test was used to examine if there were differences in breastfeeding duration days by group. A differ-

ence was found between intervention (mean = 51.33, SD 13.03, mean rank = 37.6) and referent group (mean = 43.06, SD 19.70, mean rank = 30.5; $Z = -2.03$, $P = 0.042$).

Discussion

This study examined the effects of a breastfeeding self-efficacy intervention on breastfeeding self-efficacy, and breastfeeding duration and exclusivity and compared these outcomes with a referent group of women. The results indicated that the intervention had a significant impact on breastfeeding self-efficacy, breastfeeding duration and exclusivity among primiparous mothers.

Mothers in the intervention group had significantly higher mean BSES-SF scores at both 4 and 8 weeks than the referent group. In addition, breastfeeding duration of participants in the intervention group was longer than that in the referent groups. Similarly, women in the intervention group were breastfeeding more exclusively than women in the referent group at both follow-up periods. These results indicated that an intervention based on self-efficacy theory may promote breastfeeding outcomes in the short-term, including breastfeeding self-efficacy, and breastfeeding duration and exclusivity. These findings are consistent with previous studies evaluating the impact of an intervention based on self-efficacy theory (Nichols *et al.* 2009, McQueen *et al.* 2011).

Breastfeeding self-efficacy

On average, the BSES-SF score at baseline was 48.06, which is similar to the mean score of 46.4 tested by McQueen *et al.* (2011), but slightly lower than Dennis's original finding in 2003 (mean 55.8) and Wutke and Dennis' finding in Polish women in 2007 (mean 55.5). This variance in BSES-SF scores may be due to the different sample criteria. In this study, only primiparous mothers were

Table 4 Logistic regression analysis of predictors of breastfeeding at 4 weeks postpartum.

Variable	B	SE	Wald χ^2	d.f.	P	OR
Intervention group	2.22	0.90	6.15	1	0.013	9.20
Baseline BSES-SF scores	0.60	0.16	13.45	1	<0.001	1.83
Constant	-24.73	6.37	15.07	1	<0.001	<0.01

Table 5 Logistic regression analysis of predictors of breastfeeding at 8 weeks postpartum.

Variable	B	SE	Wald χ^2	d.f.	P	OR
Intervention group	1.73	0.77	4.99	1	0.026	5.63
Baseline BSES-SF scores	0.48	0.13	12.85	1	<0.001	1.61
Constant	-25.21	6.95	13.16	1	<0.001	<0.01

recruited, but the other studies recruited both primiparous and multiparous mothers. It has been shown that primiparous mothers have significantly lower breastfeeding self-efficacy scores than multiparous women (Dai & Dennis 2003, Dennis 2003, Wutke & Dennis 2007). Another reason for the difference may be different measurement points. In those studies, BSES-SF scores were obtained during the postpartum hospitalization, but scores were obtained 24 hours after delivery in this study. Mothers may gain support from nurses and family while staying at hospital. Also, they may have some successful breastfeeding experience during their stay so that they perceive more self-efficacy than those who just gave birth to a new baby (Dennis 1999).

Breastfeeding exclusivity

The mothers in the intervention group did more exclusive breastfeeding than the referent group at both 4 and 8 weeks postpartum. However, the exclusive breastfeeding rates in this study were low. In both groups, less than 60% of mothers breastfed exclusively at both 4 and 8 weeks postpartum.

One study reported that 60.38% of Chinese women in Sichuan province were exclusively breastfeeding at 4 weeks, and 56.88% of those continued to breastfeed exclusively at 8 weeks postpartum (Wang *et al.* 2010). Similarly, a survey conducted in America found that the exclusive breastfeeding rate was nearly 60% at 8 weeks (Shealy *et al.* 2008). The findings in this study showed a failure to current exclusive breastfeeding recommendations for 6 months of life (WHO 2001). Moreover, many participants did not meet their planned breastfeeding goal.

Many factors associated with breastfeeding duration may also be related to exclusive breastfeeding, including demographic variables, milk supply and psychosocial factors (Dennis *et al.* 2002, Hu *et al.* 2004, Semenic *et al.* 2008, Liu *et al.* 2011). In this study, perception of insufficient milk supply was a common cause for formula supplementation, especially in the referent group. According to Duun *et al.* (2006), many women changed to partial breastfeeding instead of exclusive breastfeeding because they perceived not enough milk to satisfy their infants. As fewer mothers in the intervention group indicated perceptions of not enough milk, the intervention in this study may have contributed to the increased breastfeeding exclusivity.

Breastfeeding duration

At 4 weeks postpartum, the breastfeeding rate in the intervention group (90.9%) was similar or higher than other

reports in China, whereas the rate of breastfeeding in the referent group (76.5%) was lower than in other reported studies. For instance, Zhang *et al.* (2008) conducted a cross-sectional study in nine cities of China and found that the breastfeeding rate was 85.1% from 4–12 weeks. Similarly, studies in the Jiangnan district of Wuhan found that the rate of breastfeeding from 0–16 weeks was 80.9% (Liu *et al.* 2011).

There was no significant difference between the groups in the breastfeeding duration at 4 weeks. The high rate of breastfeeding can be explained by the fact that at 4 weeks postpartum, most women in China were still in the postpartum period called 'doing the month' (sitting for a month). Most of them received support from family and therefore may have had no significant decline in breastfeeding behaviour during the first 4 weeks postpartum. Although breastfeeding duration had no significant difference between the groups at 4 weeks, the breastfeeding duration rates of the referent group were 4.4–14.4% less than the intervention group and mothers in other studies (Zhang *et al.* 2008, Liu *et al.* 2011).

At 8 weeks postpartum, the difference in breastfeeding rate between the groups was significant. Approximately 20.3% more women in the intervention group (87.9%) than in the referent group (67.6%) continued to breastfeed. Some women in the intervention group had discontinued breastfeeding mainly due to time-issue; infant's latching difficulty; or fatigue. One woman mentioned perceived insufficient milk supply. Women in the referent group had stopped breastfeeding because of perceptions of insufficient milk supply; infant's latching difficulty; sadness and fatigue.

Most women discontinue breastfeeding in the first 8 weeks postpartum due to difficulties encountered rather than out of choice (Dennis 2002). This was confirmed in this study. Approximately 80% of the women in the referent group stated that they wanted to breastfeed for 8 weeks or longer, although in fact, less than 70% were breastfeeding at 8 weeks.

Perceptions of insufficient milk production are one of the most common reasons why women prematurely discontinue breastfeeding (Blyth *et al.* 2002, Chatman *et al.* 2004, Liu *et al.* 2011). Furthermore, perceptions of insufficient milk production have been associated with low breastfeeding confidence (Duun *et al.* 2006). This suggests that the intervention in this study had an impact on decreasing the number of women with perceptions of insufficient milk supply.

Many participants doubted whether their babies were getting enough milk in the first few days after delivery. The

first author had a discussion with the mothers to provide them with information regarding milk production, cues to infant satiety and the negative effects of formula on milk production. Likewise, the intervention in this study provided participants with information on ways to enhance their breastfeeding self-efficacy in other areas associated with early termination, including latching difficulties and sore nipples (Dennis *et al.* 2002). The intervention undertaken in the study also is in line with the breastfeeding framework by Dennis (1999).

Limitations

There are some limitations of the present study. First, the participants represented a fairly small convenience sample of primiparous mothers with healthy, mature infants from a single hospital in Wuhan. Although our study had sufficient *a priori* power to detect significant differences (if present) within an acceptable margin of error, the potential misclassification of a few values could have changed our results. Accordingly, our findings must be interpreted cautiously in a clinical setting. Nonetheless, our study was conducted in a rigorous fashion with validated instruments and accepted data collection methods, thus minimizing any potential bias. Additionally, our results may have future utility in the context of a larger pooled meta-analysis.

The majority of primiparous mothers in the study had a caesarean section performed (57%), which may be slightly higher than the average caesarean section rate in China. However, according to a report by WHO (2010), almost 50% of women are opting for caesarean section in China. The caesarean section rate also was higher in urban areas than in rural areas in China (Feng *et al.* 2011). Thus, our results, particularly in the context of non-significant values, may have limited generalizability. Additionally, follow-up needs to be extended to evaluate the maintenance of breastfeeding. Last but not least, in this study, demographic data, exclusivity and duration were all collected through self-report or telephone interview; social desirability may have bias on the study findings.

Implications for nursing

Currently, nurses in China lack knowledge and skills in promoting breastfeeding behaviour for postpartum women, although the government is trying to find effective methods to support mothers to breastfeed successfully and achieve the goals established by WHO. This study indicates that nurses should use self-efficacy breastfeeding intervention to educate and encourage mothers to breastfeed. In addition,

as most women discontinued breastfeeding prior to the time currently recommended by WHO (2001), nurses should pay attention to increasing mothers' breastfeeding self-efficacy while providing care to postpartum mothers. Also, regular postpartum follow-up visits by community nurses are recommended to help solve mothers' problems in breastfeeding and to facilitate and maintain the success of mothers' breastfeeding behaviour.

Future research is recommended to explore the effects of the intervention in other populations, for example, single, young, low-income or ethnic minority mothers. In addition, researchers can use an experimental design with a larger sample size. Furthermore, future study that focuses on the impact of self-efficacy intervention should evaluate the breastfeeding outcomes through long-term follow-up.

Conclusion

The present study demonstrated that the self-efficacy intervention was an effective approach to increasing breastfeeding self-efficacy, exclusivity and duration for primiparous mothers. The study showed a meaningful way to improve breastfeeding support and clinical health education. It is very encouraging to see in this study that breastfeeding self-efficacy is modifiable. Nurses should provide self-efficacy intervention to educate postpartum mothers for breastfeeding. Future studies should replicate this intervention and evaluate breastfeeding outcomes over longer periods.

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Conflict of interest

No conflict of interest has been declared by the authors.

Author contributions

All authors have agreed on the final version and meet at least one of the following criteria [recommended by the ICMJE (http://www.icmje.org/ethical_1author.html)]:

- substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content.

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