Research Paper Effectiveness of Educational Intervention Based on the Extended Theory of Planned Behavior on Exclusive Breastfeeding

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ABSTRACT

Background: Breastfeeding is one of the most effective ways to ensure a child's health. This study investigated the effect of an extended theory of planned behavior (TPB) on exclusive breastfeeding (EBF).

Methods: In this randomized educational trial, 132 pregnant women were divided into two intervention groups and one control group using a multi-stage random clustering method. The first intervention group received interventions based on the TPB. In the extended theory group, interventions to promote breastfeeding self-efficacy and social support for breastfeeding were also provided. In order to collect information, the constructs of the planned behavior questionnaire, Dennis's breastfeeding self-efficacy questionnaire and boateng's breastfeeding social support questionnaire were used, all of which have confirmed validity and reliability. Data were analyzed using the paired t-test, analysis of covariance, one-way analysis of variance, and chi-square and Bonferroni tests.

Results: All the constructs of the TPB in both groups improved after the intervention (P<0.05). The results also showed that although the breastfeeding self-efficacy score was improved in the extended group (0.009), the three groups did not show significant differences in this regard (P=0.241). Although the social support score improved in the extended group, this difference was not statistically significant (P=0.145). The analysis of variance revealed that the scores for intention and behavior had significant differences among the three groups (P=0.0001). However, the post hoc Bonferroni test showed no significant difference between the two intervention groups (P>0.05).

Article info:

Received: 21 Oct 2023 Accepted: 27 Jan 2024 Publish: 01 Nov 2024 **Conclusion:** This study showed that the constructs of both the TPB and the extended TPB could effectively promote EBF behavior. It appears that combining the use of planned behavior theory constructs with social support structures and breastfeeding self-efficacy can be effective in promoting breastfeeding behavior.

Keywords: Breast feeding, Theory of planned behavior, Social support, Self-efficacy

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Introduction

he World Health Organization (WHO) defines exclusive breastfeeding (EBF) as breastfeeding an infant exclusively, without the introduction of other foods or even water, except for medication, oral rehydration solutions, vitamins and supplements [1]. In addition to providing

the most appropriate physical growth for the baby and meeting the emotional needs of the infant and mother, breast milk plays a vital role in preventing gastrointestinal and respiratory infections [2]. It also provides maternal health and well-being by affecting gestational age and reducing the risk of breast and ovarian cancer [3]. However, even in developed countries, the rate of EBF has been reported to be low [4]. At the 65^{th} meeting of the WHO, it was decided to increase the rate of EBF to 50% by 2025. This figure differs significantly in developing countries, ranging from 13% to 77% in Iran [5]. A study in Riyadh showed that despite the start of breastfeeding, only 20.9% continue to be exclusively breastfed [6]. The results of the latest studies conducted in a review study on EBF showed that despite the emphasis of Iran Ministry of Health and Medical Education and the concern of health policymakers to increase this index, only about half of women adhere to EBF [7]. Therefore, it is necessary to determine effective interventions to promote this behavior for the health of mothers and babies.

Early cessation of breastfeeding causes physical, psychological, and socio-economic damage to the child and society [8]. Subjective norms among lactating and postpartum women, including the views of significant individuals, such as peers and social networks and important family members, such as spouses, parents, or siblings, are important factors in breastfeeding [9].

One of the theories that influence behavior change in response to social norms is the theory of planned behavior (TPB), which was developed in 1991 by Ajzen and Fishbein [10]. The TPB includes the following constructs: Behavioral intention, attitude toward behavior, subjective norms and perceived behavioral control (PBC) [10]. The TPB is a behavioral theory in social psychology that analyzes the factors affecting behavioral goals and explains the behavior. It points out that the main predictor of behavior is a change in behavior intention that depends on individuals' attitudes, subjective norms, and PBC [11]. This theory, which has been applied to many health behaviors, explains, on average, about 40% of the relationship between intention and health behaviors [12]. One of the criticisms of the TPB is the lack of attention to social factors affecting behavior. Numerous studies have emphasized the role of social support, especially the spouse's involvement, in initiating and continuing EBF [13, 14]. Breast-feeding is a behavior that requires the knowledge, skills, support, and confidence of the mother [15]. Social factors, including the support of social groups, significantly affect breastfeeding mothers [16].

On the other hand, some researchers believe that selfefficacy predicts the behavior's occurrence better than the PBC for some behaviors, such as successful breastfeeding. Breastfeeding self-efficacy is a social cognitive theory that was developed by Dennis. Breastfeeding self-efficacy reflects how a mother perceives her ability to breastfeed rather than her true ability to succeed in breastfeeding. Mothers with high self-efficacy often can overcome the exhausting barriers of mothers with low self-efficacy [17]. Breastfeeding self-efficacy can predict breastfeeding outcomes at one and two months postpartum in mothers with term infants, and this is a modifiable factor that can affect breastfeeding success [18].

Considering the criticisms of the TPB and the results of studies on factors affecting EBF behavior, especially the prominent role of social support and breastfeeding selfefficacy, interventions based on a model that incorporates these constructs seem necessary. Few studies have been conducted to examine the intention and behavior of breastfeeding by combining the constructs of the TPB with breastfeeding self-efficacy and social breastfeeding support. Yazdanpanah et al. showed that the use of the extended TPB, along with social support structures and breastfeeding self-efficacy, can predict the intention and behavior of EBF [19].

In this study, the answers to three hypotheses were evaluated: 1) Can an educational intervention based on the TPB improve the intention and behavior of EBF? 2) Can an intervention that combines social support for breastfeeding and breastfeeding self-efficacy with interventions based on the constructs of the TPB improve the intention and behavior of EBF? 3) Is the effect of the intervention based on the extended TPB on the intention and behavior of EBF greater than the effect of the intervention based on the constructs of the TPB?

Methods

Design

This study was a randomized controlled educational trial, in which 132 primiparous pregnant women who



Figure 1. Flow diagram of the study

were referred to comprehensive public health service centers in Kerman between December 2019 and January 2020 were included.

One hundred thirty-six people were evaluated according to the study's inclusion criteria, and four people were excluded from the study. Finally, the results of the second stage were analyzed in the intervention group based on the extended theory, which included 41 participants; the intervention based on the TPB, which included 40 participants and the control group, which included 39 participants (Figure 1).

Participants

The sample size calculation formula (Equation 1) applied in interventional studies (comparing the averages of two groups before and after the intervention) was used to determine the sample size.

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$$\dot{n} = (1 - \rho^2) \left[4((Z_{1 - \frac{\alpha}{2}} + Z_{1 - \beta})^2 \sigma^2 / d^2) + Z_{1 - \frac{\alpha}{2}}^2 / 4 \right]$$

Due to the presence of three groups in the study, the correction formula $n=\sqrt{kn}$ was used, where k is equal to the number of groups minus one and ρ is the correlation coefficient between the measurements before and after the intervention, which was considered equal to 0.76 based on similar studies. Also, considering a confidence level of 95% and the statistical power of 90%, and according to similar studies [20], the minimum difference in the average attitude score o between the two groups is 1.68, with a variance of 2.2, Consequently, the required sample size for each of the three groups was calculated to be 44 participants.

Randomization

The sampling method was multi-stage random sampling. After coordinating with officials from Kerman health centers, the first two areas in the city, categorized by economic, social, and cultural status, were excluded. Then, out of the remaining eight comprehensive health service centers, three centers were selected by lottery using a multi-stage random sampling method. In the second stage, a health center was selected from each center by lottery. Then, one center was randomly assigned to the first intervention group, one center to the second intervention group and one center to the control group through a drawing. In each center, samples were randomly entered into the study based on the electronic records of pregnant women and according to the inclusion and exclusion criteria.

Inclusion criteria

Primiparous women with singleton pregnancies were enrolled in the study.

Exclusion criteria

Pregnant women who did not fully participate in the sessions, as well as women who experienced an abortion or did not cooperate in completing the questionnaire after the intervention, were excluded from the study.

Educational intervention

In order to investigate the effectiveness of TPB by combining the two constructs of self-efficacy and breastfeeding social support, two intervention groups were considered.

In both intervention groups, educational sessions were conducted to improve the TPB constructs. Interventions were planned in order to create a positive attitude, improve PBC, and modify subjective norms for EBF. The educational program consisted of three online sessions, each one hour long and scheduled one week apart. In the extended intervention group, one 45 minute training session was also provided to improve social support, and one 45-minute training session was also provided to improve breastfeeding self-efficacy based on the strategies recommended by Bandura [21]. The training intervention was presented in the 32nd week of pregnancy. The questionnaire was completed before the intervention and again in the second month after delivery. The control group received routine training at health centers. The educational intervention lasted for five weeks, employing various methods such as presentations, discussions, exchanges of ideas, and sharing of successful experiences (Table 1).

Data collection tool

The tool used in the research was a standard questionnaire consisting of five sections that included demographic characteristics, including age, level of education, occupation, and income. The knowledge assessment questionnaire, adopted from Faridvand et al.'s study [22], consisted of 14 questions, where a score of 2 was assigned for a correct answer, a score of 0 was assigned for a wrong answer, and a score of 1 was assigned for those who did not know the answer. The validity of this tool has been confirmed through content validation and its reliability through test re-test [22]. Reliability was determined by calculating the internal correlation coefficient (ICC). Twenty people who were randomly selected from the studied samples were asked to complete the questionnaire again one week later and the correlation coefficient between the scores obtained from the two tests was calculated. The reliability of the instrument was confirmed with an ICC=0.71, which was significant at the P<0.05 level (95% confidence interval [CI]).

The part related to the constructs of the TPB included attitude, measured through 11 questions; subjective norms, measured through seven questions; PBC, measured through four questions and behavioral intention, measured through three questions. These constructs were adopted from the Alami et al.' study [23]. The questions were measured using a five-point Likert scale, where a score of five was assigned for complete agreement, and a score of one was assigned for complete disagreement. The materials related to the model constructs demonstrated acceptable content validity (ranging from 0.66 to 0.99) (with <0.5 considered poor, between 0.5 and 0.75 considered average, between 0.75 and 0.9 considered good and >0.9 considered excellent). Additionally, Cronbach's a and intra-class correlation coefficients were 0.79 and 0.81, respectively (with <0.5 considered unacceptable, between 0.5 and 0.6 considered poor, between 0.6 and 0.7 considered questionable, between 0.7 and 0.8 considered acceptable, between 0.8 and 0.9 considered good and >0.9 considered excellent).

The Dennis lactation behavior self-efficacy questionnaire (adopted from the Araban et al.'s study) [24] consisted of 13 questions. The answers were provided on a five-point likert scale. In examining the differential validity, the questionnaire demonstrated a significant correlation with the scales of general self-efficacy and perceived stress. The Cronbach's α for the questionnaire was evaluated at 0.91 [24]. In the present study, the Cronbach's α coefficient was recalculated to be 0.85. This questionnaire includes 13 questions, each scored from zero to four, with a maximum score of 52. No specific cut-off point has been established for the tool.

The social support questionnaire adopted from Boateng et al.'s study [25] consisted of 16 questions. The answers to the questions were categorized into three options: 1) Receive no help at all or much less than you would like, 2) Less than what you would like and 3) As much as you would like. The validity of this questionnaire was examined qualitatively, as well as through

Session	Intervention Group	Objectives of the Meeting	Summary of Activities
1 st	Extended TPB and TPB	Promoting the awareness of preg- nant mothers regarding exclusive breastfeeding	Benefits of breast milk for the baby and mother, the most important time for successful breastfeeding, strength- ening the emotional relationship between mother and baby, the role of breastfeeding in controlling postpartum hemorrhage and the lack of influence of breast size on the success of breastfeeding
2 nd	Extended TPB and TPB	Promoting the attitude of preg- nant mothers toward exclusive breastfeeding	Emphasis on strengthening the emotional relation- ship between mother and child after breastfeeding and prevention of infections and cancers in women, as well as comfort, naturalness and cost-effectiveness of breastfeed- ing
3 rd	Extended TPB and TPB	Promoting subjective norms and perceived behavioral control in the field of exclusive breastfeed- ing	People's beliefs about breastfeeding, how to deal with common breastfeeding problems, how to breastfeed properly, and expressing tips about breastfeeding working mothers
4 th	Extended TPB group	Enhancing the self-efficacy of pregnant mothers regarding exclusive breastfeeding	Breastfeeding behavior training in three parts: How to sit properly, how to hold the baby properly, how to breast- feed the baby correctly, and ways to deal with common problems and stress during breastfeeding
5 th	Extended TPB group	Increasing social support for pregnant mothers in the context of exclusive breastfeeding	Emphasis on the approval of the spouse, reassuring and listening to her, expressing concern about her physical and mental condition and praising her for her efforts, answering the mother's questions, giving advice on breastfeeding and self-care issues, assisting with house- hold tasks and child care, and delivering health messages through health center staff

Table 1. Educational content of sessions received by TPB and extended TPB groups

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expert opinions and the determination of the content validity ratio (CVR) and content validity index (CVI). In the reliability analysis, Cronbach's α coefficient for the scale was calculated to be 0.84 (with <0.5 considered unacceptable, between 0.5 and 0.6 considered poor, between 0.6 and 0.7 considered questionable, between 0.7 and 0.8 considered acceptable, between 0.8 and 0.9 considered good and >0.9 considered excellent).

Questionnaires related to the constructs of the TPB, social support and breastfeeding self-efficacy were completed by all three groups in the last month of pregnancy and again three months after the intervention, when the child was two months old. Two months after delivery, EBF behavior was also investigated and compared among all three groups.

The tool for examining the performance of EBF also included five questions scored from zero to three, which were adapted from the breastfeeding checklist of the ministry of health [24]. The questionnaire was completed before the intervention and again in the second month after delivery Statistical analysis

Finally, the data were entered into SPSS software, version 22 (IBM, Armonk, NY, USA). The significance level for the tests was set at P<0.05. Means and frequencies were calculated for all demographic variables. Analysis of covariance, one-way analysis of variance, paired t-test, chi-square tests and Bonferroni tests were used to analyze the data.

Results

Demographic characteristics of the participants

Regarding age, 77.2% of the samples were in the age group of 15-30 years. The majority (87.12%) of the samples were housewives and had a university education (44.6%). Most spouses were self-employed (58.3%) and had diplomas (49.2%). Also, 90.9% of households had a monthly income of fewer than one million Tomans. The results based on the chi-square test conducted before the educational intervention on 132 participants, showed that no significant difference in any of the demographic characteristics among the three groups (P<0.05) (Table 2).

A paired t-test was used to compare the changes in the scores of the TPB constructs, as well as the scores of

Veriables			Tost Doculto			
Vdfid	ibles	Extended TPB	ТРВ	Control	lest Results	
A 70 (v)	15-30	36(81.8)	29(65.9)	37(84.1)	P=0.086 χ ² =0.06	
Age (y)	31-43	8(18.3)	15(34.1)	7(15.9)		
Occuration	Housewife	6(13.6)	9(20.5)	2(4.5)	P=0.082	
Occupation	Employed	38(86.4)	35(79.5)	42(95.5)	χ²=1.6	
	Employee	10(22.7)	10(22.7)	18(40.9)		
	Labor	8(18.2)	1(2.3)	1(2.3)		
Spouse's job	Unemployed	1(2.3)	2(4.5)	2(4.5)	P=0.071 χ²=0.65	
	Self-employed	24(54.5)	31(70.5)	22(50)		
	Farmer	1(2.3)	0	1(2.3)		
	Primary school	5(11.4)	3(6.8)	5(11.4)		
Education	Middle school	2(4.5)	4(9.1)	4(9.1)	P=0.879	
Education	Diploma	16(36.4)	16(36.4)	18(40.9)	χ²=0.45	
	Academic	21(47.7)	21(47.7)	17(38.6)		
	Primary school	3(6.8)	4(9.1)	3(6.8)		
Spouse's educa-	Middle school	1(2.3)	6(13.6)	4(9.1)	P=0.461	
tion	Diploma	26(59.1)	20(45.5)	19(43.2)	χ ² =0.01	
	Academic	14(31.8)	14(31.8)	18(40.9)		
Income (million	<50	43(97.7)	39(88.6)	38(86.4)	P=0.146	
Rials per month)	>50	1(2.3)	5(11.4)	6(13.6)	χ²=3.41	

Table 2. Frequency of the participants' demographic characteristics in the three groups

TPB: Theory of planned behavior; χ^2 : Chi-squared test.

social support and breastfeeding self-efficacy and the intention to exclusively breastfeed before and after the intervention in the three groups (Table 3). The scores of TPB constructs in both groups increased compared to before the study, while no such difference was observed in the control group. Based on the paired t-test, the mean score of breastfeeding self-efficacy construct significantly increased before the intervention and three months after the intervention in the extended TPB group. However, regarding the social support construct, no significant increase was observed in the extended theory group, even with the intervention.

The analysis of covariance was used to compare the three groups in terms of the constructs of the TPB, as well as the constructs of self-efficacy and social support related to breastfeeding. In order to eliminate possible confounding factors, the group was considered as a covariance (Table 4). The F statistic for the TPB constructs in the post-test, with P<0.05, indicates that there is a significant difference between the groups in their scores. However, the F statistic for self-efficacy and social support in the post-test, with P>0.05, was not significant and showed no significant difference between the groups in the groups in the changes in these constructs.

According to the analysis of variance, the scores of the intention and the behavior of EBF showed a significant difference among the three groups (P=0.0001). However, the post hoc Bonferroni test showed that the scores of intention and behavior in both intervention groups were

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Table 3. Comparison of mean scores of TPB and extended theory constructs in the study groups before and after the educational intervention

Variables	Group	Before the Intervention	Three Months After the Intervention	Р	
	Control	22.19±3.04	22.71±2.86	0.298	
Knowledge	Intervention 1	21.34±3.31	24.52±3.17	<0.001	
Knowledge	Intervention 2	22.93±3.14	24.97±2.24	<0.001	
	Ρ	0.066	0.001	-	
	Control	44.88±4.62	43.94±7.59	0.346	
	Intervention 1	43.72±4.83	47.90±5.48	<0.001	
Attitude	Intervention 2	45.27±3.92	49.62±4.39	<0.001	
	Р	0.246	<0.001	-	
	Control	31.32±3.71	30.58±4.99	0.449	
Subjective	Intervention 1	30.02±3.49	32.57±2.55	0.001	
norms	Intervention 2	31.25±3.37	33.25±2.41	<0.001	
	Р	0.157	0.003	-	
	Control	16.11±2.44	15.73±3.71	0.634	
Perceived behav-	Intervention 1	15.45±2.56	17.61±2.61	0.001	
ioral control	Intervention 2	17.18±2.14	18.52±1.91	0.001	
	Р	0.004	<0.001	-	
	Control	12.83±1.6	12.39±3.41	0.333	
Intention	Intervention 1	12.52±1.88	14.16±1.57	0.001	
intention	Intervention 2	13.39±1.91	14.59±0.91	0.001	
	Р	0.079	<0.001	-	
	Control	50.66±7.41	50.70±13.88	0.991	
Breastfeeding	Intervention 1	46.9±6.89	51.71±10.23	0.009	
self-efficacy	Intervention 2	53.39±8.89	54.92±9.45	0.27	
	Ρ	<0.001	0.241	-	
	Control	36.6±5.6	32.92±9.17	0.038	
Social support	Intervention 1	34.70±5.77	36.59±7.37	0.145	
	Intervention 2	36.44±6.32	35.42±8.01	0.469	
	Р	0.254	0.13	-	

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Variables		df	Mean Squares	F	Sig.	Effect Size	Р
	Pre-test	1	18.165	2.335	0.129		
Knowledge	Group	2	49.969	6.423	0.002	0.101	0.897
	Error	114	7.78				
	Pre-test	1	121.245	3.503	0.064		
Attitude	Group	2	302.962	8.754	0.0001	0.133	0.967
	Error	114	34.607				
	Pre-test	1	61.453	5.279	0.023		
Subjective norms	Group	2	72.278	6.209	0.003	1	0.886
	Error	112	11.64				
	Pre-test	1	4.606	0.573	0.451		
Perceived behav- ioral control	Group	2	76.568	9.523	0.0001	0.143	0.978
	Error	114	8.04				
	Pre-test	1	3.882	0.787	0.377		
Intention	Group	2	50.572	10.249	0.0001	0.154	0.985
	Error	113	4.934				
	Pre-test	1	406.395	2.671	0.105		
Self-efficacy	Group	2	258.709	1.7	0.187	0.03	0.351
	Error	111	152.161				
	Pre-test	1	26.803	0.394	0.531		
Social support	Group	2	134.284	1.975	0.143	0.033	0.401
	Error	114	67.979				

Table 4. Results of univariate analysis of covariance to investigate the differences in the level of knowledge and other constructs of the two theories in primiparous pregnant women

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significantly higher than in the control group; however, was not significant (P>0.05).

Discussion

The present study was a randomized controlled educational trial to investigate the effect of combining social support and self-efficacy constructs with TPB on promoting the intention and behavior of EBF in primiparous pregnant women in Kerman. Considering that the mothers participating in this study were primiparous, the majority were under 30 years old (77.2%), which is similar to the findings of Arshad et al. and Jamehei et al. [20, 26]. Although most mothers had a university education, they were not employed. The majority of the studied population reported their income level as below average, while in some similar studies, the majority reported an average income [27].

The majority of women had a high level of awareness, which is consistent with the results of Mansour Ghanaei et al. [28]. However, there are contradictory results in this regard. For example, Haghighi and Varzandeh in Shiraz [29] showed that 69.2% of mothers, despite most having a bachelor's degree, had low knowledge in this area. Ihudiebube-Splendor et al. [30] found that most women learn about breastfeeding from midwifery visits during pregnancy. Therefore, one reason for the difference between the results of Haghighi and Varzandeh and the present study could be the difference in the level of education during pregnancy in the two populations. In analyzing the questions in the knowledge section of the questionnaire, the greatest weakness was the knowledge about the benefits of breastfeeding for the mother. In Mansour Ghanaei et al.'s study [28], the most incorrect answer was related to the relationship between proper maternal nutrition and the quality of breast milk.

The results showed that the mean attitude score three months after the intervention was significantly increased in the intervention groups, which is consistent with the findings of Arshad et al. [20]. Also, the results of the present study are consistent with those of Zhang et al. who showed that the attitude toward EBF improved after the intervention [31]. Attitude toward behavior refers to the desirability of that behavior from an individual's perspective [10]. The stronger the attitude toward performing a positive behavior, the more likely it is that the intention to perform that behavior will be formed [32]. Walingo and Mutuli [33] and Jalambadani et al. [34] also showed that attitude significantly affects the intention of breastfeeding behavior. This contrasts with the results of Bajoulvand et al. [35], who showed that PBC can explain 60% of the intention to exclusively breastfeed.

Regarding the construct of subjective norms, it can be said that, as in the study by Arshad et al. [20] and the study by Rahmanian et al. [36], the educational intervention increased subjective norms in the intervention groups of pregnant women. In contrast, in the study by Jalambadani et al. [34], the construct of subjective norms did not change after the educational intervention; one reason could be cultural and social differences in different regions. Some studies have shown that the recommendations given by friends, healthcare teams, grandmothers, and even the spouses of pregnant women play a significant role as subjective norms influencing the behavior of EBF [37]. Considering the influence of these people and the compliance of pregnant mothers, especially primiparous women who lack experience in EBF, these individuals should be considered as secondary target groups in the intervention programs.

In the present study, the perceived behavioral control score improved in both intervention groups. The interventions were designed to enhance self-efficacy, fostering a sense of empowerment to overcome barriers to breastfeeding and the belief that EBF is manageable and not difficult. For this purpose, group discussions and the expression of successful experiences and examples from similar people were used to promote this construct. In this regard, our results are consistent with those of Arshad et al. [20] and Jalambadani et al. [34]. Therefore, due to issues, such as maternal and infant diseases, as well as misconception that EBF is impossible and challenging, interventions in this area appear to be necessary.

Breastfeeding self-efficacy score improved in the extended group. This finding is supported by previous studies worldwide [38]. According to this finding, it can be concluded that the educational intervention program based on the extended model for the behavior of EBF increased the level of breastfeeding self-efficacy in the extended intervention group. In a review study [9] on factors affecting EBF, Lau et al. found self-efficacy as an important predictor for the duration of breastfeeding. However, Temple Newhook et al. [39] and Senghore et al. [40] considered attitude the most important predictor for intention. This difference can be related to the differences in the social structural elements that shape mothers' lives. Budiati et al. showed that one of the factors influencing the attitude toward breastfeeding is the culture and level of social support provided by the mother [41].

Regarding social support, it can be said that the educational intervention based on the extended model for the EBF behavior did not increase the levels of social support in the intervention groups. It appears that education provided only before childbirth was insufficient. It would be more effective to conduct interventions in two stages: During pregnancy and postpartum. Although training on social support for EBF during pregnancy can prepare the people around the pregnant mother to offer support during the postpartum period, it seems that the continuation of this training and support after delivery, especially in the face of real and unforeseen challenges, can strengthen this support. Additionally, it is possible that the circumstances of virtual education and the restrictions imposed by COVID-19 played a role in this lack of effect. In contrast to the findings of the present study, Wilson et al. demonstrated that breastfeeding social support improved through the formation of a social support group [42]. It seems that the strength and scope of these support networks are influential factors in the difference in results.

Regarding the construct of intention, it can be said that educational intervention increased the levels of intentional behavior in both intervention groups. Although the difference in the mean score of behavior intention in the extended intervention group was greater than in the TPB group, this difference was not significant between the two intervention groups. In this study, the highest mean score of behavior was seen in the extended intervention group. However, according to the Bonferroni test, this difference was not significant between the extended TPB and TPB groups.

It can be concluded that the constructs of both theories independently contribute to increasing the intention and behavior of breastfeeding. In the context of comparing the effect of the intervention on the TPB and extended theory, along with the constructs of breastfeeding selfefficacy and breastfeeding social support on EBF, no completely similar studies were found in the literature. Some studies show that the constructs added to the model have been effective in promoting EBF behavior. Ismail et al. in a prospective cohort study, showed that postpartum social support for breast-feeding problems could increase the explained variance of behavior by 6% [43]. Lau et al. found breastfeeding self-efficacy to be an important predictor for breastfeeding duration [9].

In justifying the lack of a significant difference between in behavior between the two intervention groups, it can be pointed out that in this study, the levels of breastfeeding social support and self-efficacy did not change significantly compared to the TPB group, which could be due to the limitations in the implementation of the study. Among the limitations of this study was the delivery of courses in a virtual format and during the COVID-19 pandemic, which may have affected the quality of the interventions. Therefore, further research is suggested to address the limitations of the current study to develop a comprehensive model to encourage EBF behavior and improve the health of mothers and babies.

Conclusion

The present study showed improvement in EBF behavior in both interventional groups compared to the control group. Although the behavior score was higher in the extended group, this difference was insignificant. It can be concluded that the extended theory, combined with the constructs of breastfeeding self-efficacy and social support, can effectively promote EBF behavior. Therefore, it is suggested to implement interventions based on the developed theory, with an emphasis on social support and breastfeeding self-efficacy for primiparous pregnant mothers.

Limitations

In the present study, the implementation of training was conducted solely online, which has several disadvantages, including a lack of visual communication (such as eye contact and non-verbal cues), hindering the establishment of effective communication with learners. Also, the sample size was relatively small, and it would be beneficial to include a larger sample in future studies. Participants were selected only from pregnant women who visited health centers in Kerman City, excluding those who sought care at private clinics, which may limit the generalizability of the results to the entire population of pregnant women.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of Rafsanjan University of Medical Sciences (Code: IR.RUMS.REC.1399.102) and ethically in accordance with the World Medical Association Declaration of Helsinki. Mothers provided their written informed consent to participate.

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Authors' contributions

Conceptualization and supervision: Mahdi Abdolkarimi and Farahnaz Yazdanpanah; Methodology: Hassan Ahmadinia; Data collection: Farahnaz Yazdanpanah; Funding acquisition and writing the original draft: Farahnaz Yazdanpanah, Mostafa Nasirzadeh, Mahdi Abdolkarimi and Hassan Ahmadinia; Review and editing: Mostafa Nasirzadeh; Mahdi Abdolkarimi and Farahnaz Yazdanpanah; Resources: Farahnaz Yazdanpanah.

Conflict of interest

The authors declared no conflict of interest.

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