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Can a theory-based intervention lead primiparous women to decide to have a normal vaginal delivery? A randomized controlled trial

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Abstract:

INTRODUCTION: Although cesarean section (CS) plays an important role in reducing the complications and mortality of childbirth, the increase in unnecessary CSs is an indicator of the improper functioning of the health system. This study aimed to measure the effect of an educational intervention based on the theory of planned behavior (TPB) on the intention and type of delivery of primiparous pregnant women.

MATERIALS AND METHODS: This was conducted as a randomized controlled trial in Isfahan city, Iran. In total, 112 primiparous pregnant women participating in childbirth preparation classes were divided into two intervention and control groups by nonrandom sampling method. The intervention group received an educational intervention that included a combination of childbirth preparation classes based on TPB during the 16th to 38th weeks of pregnancy. The data were completed in the form of an online survey using a validated self-report questionnaire and analyzed in SPSS software version 24. The significance level of the tests was considered as $P < 0.05$.

RESULTS: The average score of attitude, subjective norms, and perceived behavioral control in the intervention group significantly increased after intervention ($P < 0.05$). Physicians, spouses, and parents were the most important sources of social norms for selecting the type of delivery for pregnant women in both groups before and after the intervention. There was a significant difference between the intention of women in the intervention group, before and after the intervention ($P = 0.031$), but no significant difference was observed between the two groups regarding the type of delivery ($P = 0.556$).

CONCLUSION: Reconstructing childbirth preparation classes based on TPB improved the intention and other predictive structures of TPB in the intervention group, but the final behavior of the two groups regarding the type of delivery was the same. It seems that the stressful conditions of delivery, along with the final opinion of the physicians, are effective in choosing the final type of delivery.

Keywords:

Cesarean section, normal vaginal delivery, randomized controlled trial, theory of planned behavior

Introduction

The mechanism of childbirth is a spontaneous process without the need for intervention,[1] except in cases where the life of the mother or the child is in danger. In these cases, performing cesarean section (CS) helps to save the mother's or neonate's life.[1] Naturally, 10–15% of pregnancies will end by CS for medical reasons.[1-3] Although CS has played an important role in the last century in reducing the mortality and complications caused by childbirth in mother and fetus, its high rate is associated with negative consequences in the mother's and child's health.[3,4] The

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increase in the demand for CS is one of the worrying phenomena in modern obstetrics[4] because there is no evidence of an increase in obstetric emergencies.[5] According to experts, this issue is considered one of the major problems of the health system,[2] and the increase in CS rates, especially unnecessary CSs, indicates the inappropriate performance of the health system of each country.[2] On the other hand, cesarean deliveries increase the probability of secondary infertility by prolonging the next pregnancy, and performing repeated CSs decreases the fertility rate. In other words, CS is a type of complementary behavior in the family planning program and reduces the total fertility rate.[2]

Currently, CS is the most common surgery in the United States.[6] In Iran, the CS rate is higher than the range recommended by the World Health Organization (WHO).[7] This rate is extremely high, especially in big cities, and has continued to rise and has affected even rural communities. In Iran, the goal set by the Ministry of Health was to reduce the rate of CS to 47% in 2020 and to 43% in 2021. WHO goal in the field of cesarean delivery is to bring this rate to its scientific standard (i.e., 10–15% of obstetric emergencies) because according to the statistics obtained from Iran Demographic and Health Survey, about half of all births performed in the country in 2018 were by CS. In Isfahan province, this rate was reported as 55.4%, which is much more than the recommended rate of WHO. The ascending trend of this method of termination of pregnancy continued in 2019 and 2020, so that the overall rate of CS in 2020 in medical centers covered by Isfahan University of Medical Sciences was reported as 57.4%. Also, the rate of CS increased from 50.86% in 2017 to 55.3% in 2020, and this is a serious alarm for mothers' health in this region because the culture of CS in the first birth leads to repeated CSs and finally increased number of births by CS in the country.[2] Such an increasing trend in performing CS requires studies and theory-based interventions that can properly analyze and predict behavior and be used for an appropriate modification.

Theory of planned behavior (TPB) is one of the theories that is a cognitive-social decision-making model and can provide a useful framework for predicting and explaining health behaviors. The important feature of this theory is "behavioral intention," which focuses on the individual's decision to adopt a behavior and is the most important factor determining the behavior. According to this theory, attitudes, subjective norms, and perceived behavioral control affect the intention to perform a behavior.[8] The attitude refers to the opinions of the pregnant woman regarding her method of delivery and the evaluations she has of her chosen method. Subjective norm is the understanding of social norms in the field of CS and normal vaginal delivery (NVD). In addition, it is worth mentioning the people who are effective in the decision of the pregnant woman in choosing the delivery method. Women act based on their perception of what others think, and their intention to accept NVD or CS is potentially influenced by important people who are closely related to them, such as physicians, spouses, friends, etc. Perceived behavioral control also indicates how much a pregnant woman has the ability to control and choose the type of delivery method. Therefore, in terms of TPB, choosing and performing each of the methods of termination of pregnancy (NVD or CS) is the outcome of the person's attitude toward the specific method of delivery, understanding the common norms regarding the type of delivery and the feeling of control regarding the type of delivery.[9]

In the last few years, the healthcare system around the world, especially in Iran, has felt the need to make an effective intervention to reduce the rate of CS and also to reduce the maternal and neonatal mortality rate. Several measures have been taken, including childbirth preparation classes. It has been founded and implemented under the name of Preparation Labor Childbirth (PLC).[10] In Iran, PLC classes include eight special training sessions for pregnant mothers, whose goal is to increase their self-confidence and self-efficacy, reduce the mother's anxiety during the delivery process, and as a result, reduce the need for medical interventions in this process and plan for an easy delivery, which is physiological and pleasant.[11] In this regard, this study was conducted with the aim of designing a combined educational intervention for the preparation of mothers for childbirth based on TPB and measuring the effect of the theory-based intervention on the intention and final decision of primiparous mothers regarding the type of delivery.

Materials and Methods

Study design and setting

This study was conducted as a randomized controlled trial on primiparous pregnant mothers referring to PLC classes in selected comprehensive health centers in Isfahan city from November 2019 to March 2020. Since primiparous women are experiencing their first pregnancy and delivery, they are not influenced by factors such as a previous CS or experiences different from their previous delivery, and the results of educational interventions are more transparent and visible in this group.

Study participants and sampling

Among four centers conducting PLC classes in Isfahan city, two centers were selected as intervention implementation centers and two centers were selected as control centers. Totally, 124 people from these

four centers were selected to participate in the study. The criteria for entering the study included having a desire to participate in the study, being a native of Isfahan, being a primiparous mother, being literate in reading and writing, speaking Persian, not having any contraindications for NVD, not having any physical or mental illness during pregnancy, having a pregnancy age of 16–20 weeks, full attendance in all class sessions, and providing written consent. The exclusion criteria included unwillingness to continue participating in the study for any reason, including the existence of structural problems in the use of virtual messengers, the detection of any factor during the intervention in a pregnant woman that prohibits NVD, premature delivery, occurrence or suffering from some physical illnesses (such as COVID, cardio-pulmonary diseases, renal diseases, and hypertension), or mental illnesses during the intervention, nonregular participation in educational classes, and mother's relocation outside the city.

Intervention designing

Due to the COVID-19 pandemic and the impossibility of holding PLC face-to-face classes at the time of this study, trainings and interventions for both test and control groups were held virtually and on the WhatsApp social network platform. The choice of WhatsApp as a messaging network was due to its user friendliness and the ability of pregnant women to use it.

The design of the educational intervention was based on various constructs of the TPB. In order to improve the attitude, numerous group discussions were used in the field of favorable experiences of similar people in carrying out NVD. By identifying various motivations for NVD in the studied women, continuous strengthening of these motivations was done until the end of the pregnancy. In order to improve the structure of subjective norms, necessary measures were taken for the active presence of people who were effective in the decision-making of pregnant women. Teaching effective skills and techniques, providing appropriate information, and encouraging feedback in group discussions were also used to improve the perceived behavioral control structure. The intervention design for the control group included the implementation of routine training in PLC classes in the WhatsApp environment. For the test group, the educational intervention was carried out in the form of virtual training based on the TPB during PLC classes. The educational interventions carried out for the test group in the WhatsApp virtual social network were as follows:

1. Ten training sessions including eight routine training sessions (PLC) starting from the 16th–20th week of pregnancy and ending at the end of the 36th week of pregnancy. In addition, two training sessions were held close to the time of delivery (at the end of the 38th and 39th weeks of pregnancy) to maximize the durability of the trainings.
2. Sharing a video of an interview with two mothers with a successful NVD experience, two mothers with a difficult CS delivery experience, and a mother with a history of both types of delivery, to familiarize the participants with different experiences regarding the types of childbirth.
3. Providing some educational sessions for the spouses, other family members, or friends of the participating women, so that people who influence the intentions of the mothers can use the sessions.
4. Sharing educational content in the form of podcasts and multimedia, including educational video clips and broadcasts of NVD and CS for the test group.
5. Providing the possibility of questions and answers for the mother and her relatives with a trainer in WhatsApp network.
6. Sharing a video of delivery rooms to familiarize mothers with the delivery setting.
7. Sending images of posters and educational pamphlets regarding the promotion of NVD intermittently.
8. Sending educational messages at regular intervals and sharing childbirth experiences of mothers who have given birth, to encourage participants to perform NVD during the intervention period until the last days of pregnancy and the time of delivery.
9. Sharing the recommendations of well-known gynecologists and midwives in Isfahan regarding the benefits of NVD and disadvantages of CS in the form of short video clips.
10. Introducing Instagram pages and holding double training sessions on the Instagram platform so that mothers and their influential people can use it.

Data collection tool and technique

The data collection tool was a self-administered questionnaire which was completed before and after the intervention in both groups. The questionnaire consists of two parts: the first included personal characteristics including mother's age, nationality, age at marriage, duration of marriage, level of education of the pregnant woman and her husband, occupation of the pregnant woman and her husband, amount of income, number of pregnancies, history of abortion, history of childbirth, age of pregnancy. The second part was related to measuring the constructs of TPB was planned, and the validated questionnaire of Ghaffari *et al*.[12] was used to evaluate them. Cronbach's alpha coefficients for constructs of attitude, subjective norms, and perceived behavioral control in this study were obtained as 0.73, 0.79, and 0.90, respectively.

The construct of attitude toward behavior was indirectly measured through questions assessing behavioral beliefs

and outcome evaluation, including 16 questions (8 behavioral belief questions and 8 outcome evaluation questions), with a five-item Likert scale (completely disagree to completely agree). This construct was calculated using the sum of the scores of behavioral beliefs in the outcome evaluation score. The range of acquired scores was from 8 to 200.

The construct of subjective norms was indirectly measured by measuring normative beliefs and motivation to follow, including 10 questions (5 questions of normative belief and 5 questions of motivation to follow) with a five-item Likert scale. This construct was also calculated by the sum of the scores of behavioral beliefs in the outcome evaluation score. The range of acquired scores was from 5 to 125.

The construct of perceived behavioral control was indirectly measured by measuring control beliefs and perceived ability, including 6 questions (3 questions of control beliefs and 3 questions of perceived ability) with a 5-item Likert scale. This construct was calculated using the total result of the control belief score multiplied by the perceived ability score. The range of acquired scores was from 3 to 75.

The construct of intention was investigated directly with a two-choice question consisting of the preference of pregnant women for the method of delivery (NVD/CS). The behavior construct was measured by tracking the type of delivery over the phone with a two-choice question (NVD/CS).

Ethical consideration

Maintaining the respect of the participants, respecting their rights, and gaining their trust were prioritized. Full explanations about the research and its objectives were given to the participants and, if necessary, to their spouses, and they were fully assured about the confidentiality of the information and the analysis of the data. Based on this, a code was given to each of the questionnaires and a written informed consent was obtained from the participants. Also, the subjects were informed about the right to withdraw from the study at any stage, if they did not want to continue the study. The present study was approved by the Ethics Committee of Shahid Sadougi University of Medical Sciences in Yazd (ethics code: IR.SSU.SPH.REC.1399.138) and was registered and approved by Iran Clinical Trial Registration System (IRCT) with the following code: IRCT20200917048741N1.

Statistical analysis

Out of 124 pregnant women who completed the pretest questionnaire, three people were excluded from the study due to unwillingness to continue in the study, two people were excluded due to premature delivery, and seven people were excluded due to irregular participation in the meetings. Finally, the information of 112 pregnant women in two test and control groups was analyzed before and after the educational intervention.

The data were analyzed in SPSS 22 software. Since the study design was pretest and posttest in two groups, analysis of variance with 2 × 2 repeated measures was used to investigate the effect of time, group, and the combined effect of time and group. Pairwise comparisons were performed using the Bonferroni posthoc test. The basic assumptions of the model including normality of data distribution and homogeneity of error variances between two groups were examined and confirmed by Kolmogorov–Smirnov and Levin tests, respectively. Chi-square and *t*-tests were used to compare TPB constructs (attitude, behavioral intention, subjective norms, and perceived behavioral control) between two groups and paired *t*-test was used to compare the mean scores of TPB constructs before and after the educational intervention. McNemar test was used to compare the behavioral intention to choose the type of delivery before and after the intervention. Chi-square, t-tests and Mann–Whitney U were used to compare demographic and fertility-related characteristics between two groups. The significance level of the tests was considered as $P < 0.05$.

Results

There was no significant difference in the fertility-related characteristics of primiparous pregnant women in the two study groups (age of mothers, age at marriage, duration of marriage, number of pregnancies) ($P > 0.05$) [Table 1].

Table 2 shows the results of the comparison of some variables between two groups. Chi-square test did not show a significant difference in the mother's occupation ($P = 0.269$), spouse's occupation ($P = 0.242$), residence status ($P = 0.069$), mother's educational status ($P = 0.106$), and spouse's educational status ($P = 0.147$) between two groups.

According to the results of the Bonferroni posthoc test related to the interaction effect, the average scores of attitude toward behavior ($P = 0.189$), subjective norms ($P = 0.419$), and perceived behavioral control ($P = 0.358$) in pregnant women of the control group did not show any significant difference after the intervention, but in the pregnant women of the intervention group, the mean scores of attitude toward behavior ($P < 0.001$), subjective norms ($P < 0.001$), and perceived behavioral control ($P < 0.001 > P$) was significantly higher after the intervention [Table 3].

Table 1: Fertility-related characteristics of primiparous pregnant women in the two study groups

Variable	Intervention group			Control group			Statistics	*P*	Variable	Label	Intervention group		Control group		Statistics	*P*
	Number	Mean	S.D	Number	Mean	S.D					Frequency	Percent	Frequency	Percent		
Mother's age	56	28.71	4.46	56	27.68	5.02	-1.153	0.251*	Number of pregnancies	First pregnancy	42	75	40	71.4	0.182	0.670***
Age at marriage	56	23.75	4.27	56	22.39	4.05	-1.726	0.087*		Second pregnancy (without a history of childbirth and only with a history of abortion)	14	25	16	28.6		
Duration of marriage	56	4.96	2.82	56	5.29	4.00	-0.200	0.842**		total	56	100	56	100		

*independent *t*-test **Mann–Whitney test ***Chi-square test

Examining the mean scores of the sources of the subjective norms in both groups before and after the intervention, showed that physician, spouse, parents, and other family members and friends were the influential people in the intention of pregnant mothers in choosing the type of delivery [Table 4].

Among 56 women in the control group, before the intervention, 30 individuals (53.6%) intended to have an NVD, which increased to 37 individuals (66.1%) after the intervention. McNemar test did not show a significant difference in the behavioral intention of women in this group in the type of delivery before and after the intervention ($P = 0.125$). Also, among 56 women in the intervention group 34 people (60.7%) wanted to have an NVD before the intervention, and after the intervention, it reached 43 people (76.8%). McNemar test showed a significant difference between the behavioral intention of women in this group in the intention to choose the type of delivery before and after the intervention ($P = 0.031$), in other words, the desire to perform NVD in this group increased significantly after the intervention [Table 5].

In the control group, among 19 mothers whose final intention (intention after the intervention) was to perform a CS, 16 had a CS, and 3 had an NVD. Of the 37 mothers whose final intention was to have an NVD, 6 had a CS and 31 had an NVD. The result of the McNemar test did not show a significant difference between the final intention and performing the behavior in mothers of the control group ($P = 1.00$). In the intervention group, out of 13 mothers whose final intention was to have a CS, 12 had a CS and 1 had an NVD. Of the 43 mothers whose final intention was to have an NVD, 7 had a CS and 36 had an NVD. The result of the McNemar test did not show a significant difference between the final intention and the performance of the behavior in the mothers of the intervention group ($P = 0.804$) [Table 6]. According to the Chi-square test, there was not a significant difference between the two groups in the final type of delivery (behavior) ($P = 0.556$).

Discussion

The main objective of the present study was to investigate the effect of the educational intervention about the preparation for childbirth based on the TPB on the intention of primiparous pregnant mothers regarding the type of delivery, which is important in public health and midwifery studies.

In this study, the attitude toward NVD in pregnant women in the intervention group was significantly more favorable after intervention, so a basic assumption in TPB based on the effect of attitude on intention was confirmed. It seems that the weak attitude can be affected

Table 2: Demographic characteristics of primiparous pregnant women in the two study groups

Variable	Label	Intervention group		Control group		Statistics	*P*
		Frequency	Percent	Frequency	Percent		
Occupation of the pregnant woman	Housewife	40	71.4	45	80.4	1.220	0.269*
	Employed	16	28.6	11	19.6		
	Total	56	100	56	100		
Husband's occupation	Unemployed	0	0	2	3.6	3.779	0.242*
	Self-employed	34	60.7	29	51.8		
	Worker	5	8.9	10	17.9		
	Employee	17	30.4	15	26.8		
	Total	56	100	56	100		
Family income	<1 million	0	0	9	16.1	–3.712	*P*<0.001**
	1–3 millions	16	28.6	24	42.9		
	3–5 millions	19	33.9	14	25		
	5–7 millions	11	19.6	5	8.9		
	7–10 millions	7	12.5	3	5.4		
	>10 millions	3	5.4	1	1.8		
	Total	56	100	56	100		
Home ownership	Owner	34	60.7	22	39.3	5.351	0.069*
	Tenant	17	30.4	28	50		
	Other	5	8.9	6	10.7		
	Total	56	100	56	100		
Level of education of the pregnant woman	High school diploma and lower	11	19.6	17	30.4	6.121	0.106*
	Associate's degree	4	7.1	7	12.5		
	Bachelor's degree	29	51.8	28	50		
	Master's degree	12	21.4	4	7.1		
	Total	56	100	56	100		
Level of education of husband	High school diploma and lower	15	26.8	25	44.6	5.69	0.147*
	Associate's degree	11	19.6	11	19.6		
	Bachelor's degree	17	30.4	14	25		
	Master's degree	13	23.2	6	10.7		
	Total	56	100	56	100		

**Chi-square test

Table 3: Mean and standard deviation of attitude, subjective norms, and perceived behavioral control of pregnant women in two intervention and control groups before and after the intervention

Variable	Time	Intervention		Control		*P**	Analysis of variance with repeated measures		
		Mean	S.D	Mean	S.D		Group effect	Time effect	Group-by-time interaction effect
Attitude	Before intervention	121.11	14.64	119.14	17.40	0.519	0.190	0.042	<0.001
	After the intervention	123.86	14.60	118.29	14.48	0.045			
	*P**	<0.001		0.189					
Subjective Norm	Before intervention	90.54	13.97	89.30	17.12	0.677	0.191	<0.001	<0.001
	After the intervention	96.54	15.87	90.11	16.23	0.036			
	*P**	<0.001		0.419					
Perceived behavioral control	Before intervention	37.14	9.48	36.21	11.57	0.643	0.197	<0.001	<0.001
	After the intervention	41.00	11.31	36.96	9.70	0.045			
	*P**	<0.001		00356					

*Bonferroni posthoc test

by women's lack of knowledge regarding the choice of delivery method. This issue arises from the fact that most primiparous pregnant women have vague fear and anxiety regarding the pain of NVD, which is unknown to them. This fear and anxiety leads them to choose CS delivery.[13] Therefore, in childbirth preparation classes, education related to the mental health of pregnant women is of particular importance. Therefore, it can be said that the various educational interventions carried out in the current study, including familiarization with the methods of reducing pain and ease of NVD, using the successful experiences of mothers regarding NVD, and having films and animations related to the process of successful NVD, have been able to improve the awareness and knowledge of women in the field of NVD, and can be effective in improving their attitude in this issue. On the other hand, sharing the adverse experiences of mothers regarding the potential complications of

Table 4: Sources of subjective norms of pregnant women in two groups before and after the intervention

Group	Source	Before the intervention				After the intervention			
		Min	Max	Mean	S.D	Min	Max	Mean	S.D
Control Group	Husband	2	25	12.55	8.05	2	25	12.68	7.05
	Parents	1	25	10.64	6.35	1	25	10.32	6.07
	Physician	4	25	14.41	6.22	4	25	14.54	6.03
	Friends	1	16	3.96	2.52	1	12	4.86	2.70
	Family members	1	16	3.96	2.52	1	12	4.86	2.70
	Total			56				56	
Intervention group	Husband	2	25	12.7	6.40	2	25	12.70	6.40
	Parents	1	25	10.04	6.37	1	25	9.52	6.58
	Physician	4	25	15.50	6.64	4	25	15.34	6.60
	Friends	1	20	4.86	4.14	1	20	4.86	4.14
	Family members	1	20	4.86	4.14	1	20	4.86	4.14
	Total			56				56	

Table 5: Frequency of the intention to choose the type of delivery in pregnant women in two groups before and after the intervention

Group	Intention to choose the type of delivery	Before the intervention		After the intervention		*P**
		Frequency	Percent	Frequency	Percent	
Control	CS	26	46.4	19	33.9	0.125
	NVD	30	53.6	37	66.1	
	Total	56	100	56	100	
Intervention	CS	22	39.3	13	23.2	00031
	NVD	34	60.7	43	76.8	
	Total	56	100	56	100	

*McNemar test

Table 6: Type of delivery in the control and intervention groups

Group	Intention to choose the type of delivery		Type of delivery		*P**
			CS	NVD	
Control	CS	19	16	3	1
	NVD	37	6	31	
	Total	56	22	34	
Intervention	CS	13	12	1	0.804
	NVD	43	7	36	
	Total	56	19	37	

*Chi-square

CS, especially mothers who had surgical termination of pregnancy without medical reasons, has also been able to play a complementary role in this field. In this context, the results of studies by Shahraki Sanavi *et al*. (2014),[14] Biglarifar *et al*. (2015),[15] Lei *et al*. (2003),[16] Penna *et al*. (2003),[17] and Sharifirad *et al*. (2010)[1] also confirm this issue. Keshavarz *et al*. (2016)[6] also showed that training based on TPB is an effective method in improving the attitude and decision-making power of pregnant women to choose NVD.

According to the findings of the present study, after the intervention, the subjective norms regarding NVD in pregnant women in the intervention group were significantly more favorable than the control group, so another basic assumption of TPB, i.e., the effect of subjective norms on the intention to perform the behavior, was confirmed in this study as well. It seems that involving important others of pregnant women such as spouse, mother, or friends in the trainings has been able to improve the attitude of these people toward NVD. This finding was consistent with the results of the studies conducted by Sharifirad *et al*. (2010),[1] Sadat Asadi *et al*. (2014),[18] Lashgari *et al*. (2005),[19] and Otogara *et al*. (2016).[20]

The first important person for pregnant women in the current study was the gynecologist and obstetrician, followed by spouse, parents, friends, and other relatives. Similarly, in the study of Sadat Asadi *et al*. (2014),[18] it was also found that the physician, spouse, healthcare worker, and midwife had the greatest influence on the pregnant mother in choosing the type of delivery. Therefore, it can be concluded that pregnant women try to coordinate their decisions regarding the type of delivery completely with the opinion of the gynecologist and the specialized staff of delivery. Paying attention to this finding can be very important in plans for reducing CS deliveries.

Another basic assumption in TPB is that perceived behavioral control is one of the factors affecting the intention to perform the behavior. This hypothesis was also confirmed in the present study, so that the average score of perceived behavioral control in pregnant women of the intervention group was improved after the intervention. This finding is consistent with the studies

of Abdolkarimy *et al*. (2016),[8] Moradi *et al*. (2019),[7] and Shahraki Sanavi *et al*. (2014).[14] According to Shahraki Sanavi *et al*. study (2014),[14] individuals who intend to have a CS have poor to moderate perceived behavioral control. Also, based on the study of Movahed *et al*. (2012),[21] if a person feels that he can bear the pain of childbirth, he can more easily choose NVD. If the pregnant woman has weaker behavioral control, she chooses CS. Therefore, it seems that training based on improving the knowledge and skills of primiparous pregnant women regarding pain reduction strategies and facilitating NVD and providing them with surrogate experiences, such as getting to know the experiences of mothers with successful NVD, can increase perceived behavior control in these pregnant women.

Another finding of this study showed that the intention to have an NVD in the intervention group increased significantly after the intervention. This finding was consistent with the studies of Mehdizadeh *et al*. (2003),[22] Sharifirad *et al*. (2010),[1] Shahraki Sanavi *et al*. (2014),[14] Maleki *et al*. (2017),[23] Sadat Asadi *et al*. (2014),[18] Runmei *et al*. (2012),[24] and Grunebaum *et al*. (2013).[25] The existence of such similar results shows the effect of educational intervention based on TPB in changing the intention of primiparous pregnant women toward NVD. Of course, despite the fact that all the constructs of this theory, especially the behavioral intention of primiparous pregnant women to have an NVD, increased in the intervention group compared to the control group, it was practically observed that there was no significant difference in the type of delivery between two groups. Yousafund *et al*. (2023).[26] showed that education based on the TPB could significantly affect the fear of childbirth and increase the vaginal delivery rate.

The fact that many mothers with the intention of having an NVD end up having a CS can indicate that factors during the delivery process such as the approach of the delivery attendants, especially surgeons, and gynecologists (due to the possibility of surgery) are effective in choosing and carrying out the type of delivery. Considering the first rank of physicians in examining mothers' subjective norms, this issue comes to mind more than before. Since the decision to perform a CS must be based on an obvious, persuasive, and supportable justification,[27] examining the factors related to the decision-making of gynecologists and obstetrics medical team regarding the final choice of the type of delivery can be an important step in planning effective interventions in the field of control and reduction of CSs. In this way, one related study showed that even medical students' preference for childbirth has changed over time, and their tendency to choose CS as the delivery method suggests the possible influence of medical education.[28]

One suggested way to reduce the number of unnecessary CSs is to decrease surgeons' payment for CSs and increase payment for natural childbirth.[29]

Limitation and recommendation

There were some limitations in this study. The lack of control over mediating variables, including personality traits and family environment, was a main limitation of the study, which can have an effect in determining the real role of the intervention. Furthermore, generalizations from this research may be limited due to the cultural and ethnic diversity across different locations in IRAN and different regions of the world. It is important to note that more accurate information can be obtained by studying the larger and more diverse sample size.

Conclusion

Based on the findings of this study, training based on TPB was effective in improving all predicting variables of mothers' behavioral intention to perform NVD and increased the intention of undergoing NVD in mothers, but the clear difference between the intention and the final behavior in this study could be due to this fact that the mothers chose their desired delivery type due to the stressful conditions of delivery along with the final opinion of the physicians. Therefore, it seems that it is necessary to investigate the perceived barriers of obstetricians and gynecologists and the accompanying team regarding NVD, as well as their perceived benefits for CS, because most mothers under stressful conditions of childbirth, despite the previous intention to undergo NVD, finally accept the decision of the gynecologist. Therefore, it will be very necessary to provide the necessary platform for increasing skills, adherence to medical principles, and professional commitment in the health care workers, especially obstetricians and gynecologists who will perform the final CS.

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Conflicts of interest

There are no conflicts of interest.

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